

67th BPSC/CDPO सुदर्शन चक्र

बिहार लोक सेवा आयोग की
प्रारम्भिक परीक्षा
सामान्य अध्ययन का सम्पूर्ण सार

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67th BPSC/CDPO 2021 Complete Study Material [English]

HISTORY

Chronology of Important Events in Indian History

ANCIENT INDIA

Year	Event	Importance
2 Million BC to 10,00 BC 2 Million BC to 50,000 BC 50,000 BC to 40,000 BC 40,000 BC to 10,000 BC	Paleolithic Period Lower Paleolithic Middle Paleolithic Upper Paleolithic	Fire was discovered Tools made of limestones were used. They are found in Chotanagpur plateau and Kurnool district
From 10,000 BC	The Mesolithic Age	Hunters and Herders Microlith tools were used
7000 BC	The Neolithic age	Food producers Use of polished tools
Pre-Harappan Phase – 3000 BC	Chalcolithic Age	Use of Copper – first metal
2500 BC	Harappan Phase	Bronze age civilization, development of Urban culture
1500 BC-1000 BC	Early Vedic period	Rig Veda period
1000BC-500BC	Later Vedic period	Growth of 2 nd Urban phase with the establishment of Mahajanapadhas
600 BC – 325 BC	Mahajanapadhas	16 kingdoms with certain republics established
544 BC – 412 BC	Haryanka Dynasty	Bimbisara, Ajatshatru and Udayin
412 BC – 342 BC	Shisunaga Dynasty	Shisunaga and Kalashoka
344BC – 323 BC	Nanda Dynasty	Mahapadmananda
563 BC	Birth of Gautama Buddha	Buddhism established
540 BC	Birth of Mahavira	24 th Tirthankara of Jainism
518 BC	Persian Invasion	Darius

483 BC	1 st Buddhist council	Rajgir
383 BC	2 nd Buddhist Council	Vaishali
326 BC	Macedonian Invasion	Direct contact between Greek and India
250 BC	3 rd Buddhist council	Pataliputra
322 BC – 185 BC 322 BC – 298 BC 298 BC – 273 BC 273 BC – 232 BC 232 BC – 185 BC	Mauryan Period Chandragupta Maurya Bindusara Ashoka Later Mauryans	Political unification of India, Dhamma policy of Ashoka, the growth of art and architecture
185 BC – 73 BC	Sunga Dynasty	Pushyamitra Sunga
73 BC – 28 BC	Kanva dynasty	Vasudeva founded the dynasty
60 BC – 225 AD	Sathavahana dynasty	Capital at Paithan, MH
2 nd BC	Indo-Greeks	Menander(165-145AD)
1 st BC – 4 th AD	The Shakas	Rudradaman (130 AD – 150 AD)
1 st BC – 1 st AD	The Parthians	St Thomas arrived in India during the reign of Gondophernes
1 st AD -4 th AD	The Kushans	Kanishka (78 AD – 101 AD)
72 AD	4 th Buddhist Council	Kashmir
3 rd BC – 3 rd AD	Sangam age	Convene of Sangam Commune, Rule of Cheras, Cholas and Pandyas
319 AD – 540 AD 319 – 334 AD 335 – 380 AD 380 – 414 AD 415 – 455 AD 455 – 467 AD	The Gupta Age Chandragupta I Samudragupta Chandragupta II Kumaragupta Skandagupta	319 AD – Gupta Age The golden age of India Development of numerous art and literature. Nagara style of Temple Building
550 AD – 647 AD	Vardhana Dynasty	Harsha (606-647 AD) Kannauj assembly and Prayag assembly held Huan-Tsang visited Harsha's assembly
543 – 755 AD	Chalukyas of Vatapi	Development of Vesera style
575 - 897 AD	Pallavas of Kanchi	Structural temples in Dravida style started to develop

MEDIEVAL INDIA

Early Medieval Period (650 – 1206 AD)

Year	Event	Importance
750 – 1150 AD	Rule of the Palas	Capital at Munger, Bihar
752 – 973 AD	The Rasthrakutas	Capital at Malkhed
730 – 1036 AD	The Pratiharas	Ruled western India
712 AD	First Muslim Invasion	Mahmud Bin Qasim invaded India
850 – 1279 AD	The Cholas	Capital at Tanjore, epitome moment for Dravidian Architecture
998 – 1030 AD	First Turk invasion	Mahmud of Ghazni
1175 – 1206 AD	Second Turk invasion	Mahmud of Ghori
1178 – 1192 AD	Prithviraj Chauhan	First battle of Tarain in 1191 between Prithviraj and Mahmud of Ghori 1192, Second battle of Tarain

The Sultanate Period (1206 – 1526 AD)

The Slave Dynasty		
Year	Event	Importance
1206 – 1210 AD	Qutbuddin Aibak	Known as Lal Bakhsh, began the construction of Qutb Minar
1211 – 1236 AD	Shamsuddin Iltutmish	Real founder of Delhi sultanate
1236 – 1240 AD	Razia Sultana	First and only Muslim lady whoever ruled India
1240 – 1266 AD	Weak successors	
1266 – 1287 AD	Ghiyasuddin Balban	Established Diwan-i-Arz

The Khalji Dynasty		
Year	Events	Importance
1290 – 1296 AD	Jalaluddin Khalji	Founder of Khalji dynasty
1296 – 1316 AD	Allaudin Khalji	Did many administrative reforms, introduced the Dagh and Chehra system

The Tuglaq dynasty		
Year	Events	Importance
1320 – 1325 AD	Ghiyasuddin Tuglaq	Founder
1325 – 1351 AD	Mohammed-Bin-Tuglaq	Introduction of administrative reforms and certain ambitious projects
1351 – 1388 AD	Firoz Shah Tuglaq	Built great cities
1398 – 1399 AD	Taimur Invasion	Taimur, the descendant of Chengiz Khan, invaded during the reign of Muhammad Shah Tuglaq

The Sayyid dynasty 1414 – 1451 AD

The Lodhi Dynasty (1451 – 1526 AD)		
Year	Events	Importance
1451 – 1488 AD	Bahlol Lodhi	Founder of Lodhi dynasty
1489 – 1517 AD	Sikander Lodhi	Founded the city of Agra
1517 – 1526 AD	Ibrahim Lodhi	Babur defeated Lodhi in the first battle of Panipat

Vijaynagar and Bahmani Kingdoms

Vijaynagar Kingdom		
Year	Events	Importance
1336 – 1485 AD	Sangama Dynasty	Founded by Harihara and Bukka
1485 – 1505 AD	Saluva Dynasty	Saluva Narasimha
1505 – 1570 AD	Tuluva Dynasty	Veer Narashima
1509 – 1529 AD	Krishna Deva Raya	A gifted Scholar, contemporary of Babur
1570 – 1650 AD	Aravidu Dynasty	Founded by Tirumala

Bahmani Kingdom		
Year	Events	Importance
1347 – 1358 AD	Alaudin Hasan Bahman Shah	Founded the Bahmani Kingdom at Gulbarga
1397 – 1422 AD	Tajuddin Firoz Shah	
1422 – 1435 AD	Ahmad Shah Wali	

Mughal Empire

1526 – 1530 AD	Babur	Founder of Mughal empire after the 1 st Battle of Panipat
1530 – 1540 AD 1555 – 1556 AD	Humayun	He was defeated by Sher Shah
1540 – 1555 AD	Sur Empire	Sher Shah defeated Humayun and ruled from 1540-45 AD
1556	2 nd Battle of Panipat	Akbar Vs. Hemu
1556 – 1605 AD	Akbar	Established Din-i-illahi, expanded Mughal empire
1605 – 1627 AD	Jehangir	Captain William Hawkins and Sir Thomas Roe visited the Mughal court
1628 -1658 AD	Shahjahan	The pinnacle of Mughal empire and art and architecture
1658 – 1707 AD	Aurangazeb	Beginning of the decline of the Mughal empire
1707 – 1857 AD	Later Mughals	Decline and disintegration of the Mughal empire with gaining strength of the British

Maratha State and Maratha Confederacy

Maratha state 1674 – 1720 AD

Year	Events	Importance
1674 – 1680 AD	Shivaji	Contemporary of Aurangazeb and the biggest challenge for the Mughals in Deccan
1680 – 1689 AD	Sambhaji	
1689 – 1700 AD	Rajaram	
1700 – 1707 AD	Tarabai	
1707 – 1749 AD	Shahu	The rise of Peshwas
1713 – 1720 AD	Balaji Vishwanath	The first Peshwa

Maratha Confederacy 1720 – 1818 AD

1720 – 1740 AD	Baji Rao I	
1740 – 1761 AD	Balaji Baji Rao	
1761 AD	Third battle of Panipat	Defeat of Marathas by Ahmad Shah Abdali
1761 – 1818 AD	Later successors	

Anglo Maratha Wars

1775 – 1782 AD	1 st Anglo Maratha War	British were defeated
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1803 – 1806 AD	2 nd War	Marathas were defeated and they signed the Subsidiary Alliance
1817 – 1818 AD	3 rd War	Marathas were decisively defeated

MODERN INDIA

Bengal		
Year	Events	Importance
1717 – 1727 AD	Murshid Quli Khan	Capital of Bengal transferred to Murshidabad
1727 – 1739 AD	Shujauddin	
1739 – 1740 AD	Sarfaraaj khan	
1740 – 1756 AD	Alivardi Khan	
1756 – 1757 AD	Sirajuddaulah	Battle of Plassey
1757 – 1760 AD	Mir Jafar	
1760 – 1764 AD	Mir Qasim	Battle of Buxar

Mysore		
Year	Events	Importance
1761 – 1782 AD	Haider Ali	Establishment of Modern Mysore state
1766 – 1769 AD	1 st Anglo – Mysore war	Haider Ali defeated the British
1780 – 1784 AD	2 nd Anglo – Mysore war	Haider Ali was defeated by Sir Eyrecoot
1782 – 1799 AD	Tippu Sultan	Continued the 2 nd war
1790 – 1792 AD	3 rd Anglo – Mysore war	Tipu ceded half of his territory
1799	4 th Anglo – Mysore war	Tipu Sultan died

Punjab		
1792 – 1839 AD	Maharaja Ranjit Singh	Founder of Sikh rule
1845 – 1846 AD	1 st Anglo – Sikh war	Sikhs were defeated
1848 – 1849 AD	2 nd Anglo – Sikh war	Dalhousie annexed Punjab

Advent of Europeans in India

1498	Portuguese East India company	Headquarters at Cochin and Goa
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1600	English East India company	Madras, Calcutta and Bombay
1602	Dutch East India company	Pulicat, Nagapattinam
1616	Danish East India company	Serampore
1664	French East India company	Pondicherry

Carnatic wars

1746-48	1 st Anglo-French war	Treaty of Aix-la-Chapelle
1749-54	2 nd Anglo-French war	Treaty of Pondicherry
1758-63	3 rd Anglo-French war	Treaty of Paris

Freedom Struggle

1857	First war of Indian independence	Revolt due to socio-religious and economic causes
1885	Formation of Indian National Congress	A O Hume
1885 – 1905	Moderate phase	Dominated by Dadabai Naoroji, Surendranath Banerjea
1905 – 1917	Extremists Phase	Dominated by Lal-Bal-Pal and Aurobindo Ghosh
1905	Bengal Partition	Curzon announced the partition
1905 – 1908	Swadeshi movement	Boycott of foreign products
1906	Muslim league formation	
1906	Calcutta Session of INC	Swaraj as the goal
1907	Surat split	Question on extending the movement to the rest of India
1909	Morley – Minto reforms	The separate electorate for Muslims
1915 – 1916	Home rule movement	BG Tilak and Annie Besant
1916	Lucknow Pact	Pact between Congress and League
1916	Lucknow session	Extremists admitted in Congress

Gandhian Era

Early life		
1893 – 1914	Gandhi in South Africa	Foundation of Natal Indian Congress, Sathyagraha and CDM against British excesses
1915 – 1948	Gandhi in India	
1915	Arrived in Bombay. First two years to tour India and not to participate in any political movement	
1917	Champaran Campaign	Against the Indigo cultivators
1918	Ahmedabad	First hunger strike
1918	Kheda	First non-cooperation movement
1919	Rowlatt Sathyagraha	Against the Rowlatt act and Jallianwala massacre
1920-22	Non-cooperation and Khilafat movement	
1924	Belgaum session	Gandhi elected as Congress president
1930 -34	Civil disobedience movement	Dandi March Gandhi – Irwin Pact 2 nd Roundtable conference Resuming the Civil disobedience movement
1940-41	Individual satyagraha	
1942	Quit India movement	Do or die

Important Events during this period

1919	Rowlatt act	Gandhi gave a call for Rowlatt satyagraha
1919	Jallianwala Massacre	
1920-22	Khilafat and Non-cooperation movement	Hindu Muslim unity
1922	Chauri Chaura incident	Gandhi called off NCM
1923	Congress Khilafat Swaraj Party	Enter legislative councils

1927	Simon commission	All white commission to review the 1919 act
1928	Nehru committee report	To determine the principles of the constitution
1929	Jinnah's 14 points	
1929	Lahore session	Purna Swaraj
1930	Civil disobedience movement	Dandi March
1931	Gandhi Irwin Pact	To ask Gandhi to participate in the 2 nd RTC
1931	2 nd RTC held in London	
1932	Communal award	
1932	Poona Pact	
1935	Government of India act	Provisional autonomy
1937	18 months rule of Congress begins	
1939-45	World War II begins	
1939	Congress ministries resign	
1940	August offer	Linlithgow proposed to seek India's cooperation in the World War
1941	Individual Satyagraha	
1942	Cripps mission	
1942	Quit India movement	
1943	Gandhi's 21 days fast	
1944	C R Formula	
1945	Wavell Plan and Shimla Conference	
1945	INA Trails	

1946	RIN Ratings Mutiny	
1946	Cabinet mission plan	
1946	Formation of Interim government	
1946	Formation of the constituent assembly	
1947	Atlee's announcement	
1947	Mountbatten Plan	
1947	Indian independence act, 1947	

INDUS VALLEY CIVILIZATION

John Marshall, the first scholar to use the term “Indus valley civilization”. The civilization flourished between 2500 BC-1750 BC.

Geographical Extent of IVC

1. Extent: The Indus valley civilization extended from Sutkagandor (in Baluchistan) in the West to Alamgirpur (Western UP) in the East; and from Mandu (Jammu) in the North to Daimabad (Ahmednagar, Maharashtra) in the South.

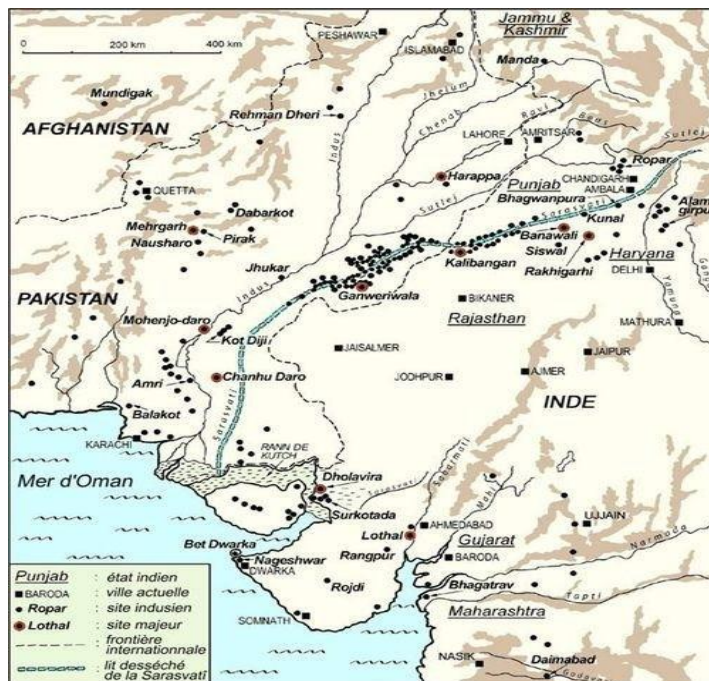


Image source: NCERT

2. Important cities

City	River	Archaeological Importance
Harappa (Pakistan)	Ravi	A row of 6 Granaries, Mother goddess figurines
Mohenjodaro (Pakistan)	Indus	Great Granary, Great bath, Image of Pashupati Mahadeva, Image of Bearded man and Bronze image of a woman dancer
Lothal (Gujarat)	Bhogava	Port city, Double burial, Terracotta horse figurines.
Chanhudaro (Pakistan)	Indus	The city without a citadel
Dholavira (Gujarat)	Indus	City divided into 3 parts.
Kalibangan (Rajasthan)	Ghaggar	Ploughed field
Banawali (Haryana)	Ghaggar	-
Rakhigarhi (Haryana)	-	-
Ropar (Haryana)		
Mitathal (Haryana)	-	-
Bhagatrav (Gujarat)	-	-
Rangpur (Gujarat)	-	-
Sutkagandor (Pakistan)	-	-
Sukotada (Gujarat)	-	-
Kot Diji (Pakistan)		

Town planning and Structure of IVC

- Grid system (Chess-board) of town planning
- Rectangular houses with brick-lined bathrooms and wells together with stairways are found
- Use of Burnt bricks
- Underground drainage system
- Fortified citadel

Agriculture of Indus Valley Civilisation

- Hindon – Cotton – Major trade good – earliest people to produce Cotton.
- Proofs of Rice husk found
- Wheat and Barley were majorly cultivated
- Use of wooden ploughshare. They had no idea about Iron implements.

Domestication of animals

- Ox, Buffalo, Goats, Sheep and Pigs were domesticated
- Asses and camels were used as Beasts of Burden
- Elephants and Rhino were known

- Remains of horse found in Surkotada and evidence of horse in Mohenjo-Daro and Lothal are also found. But the civilization was not horse-centered.

Technology and crafts

- Bronze (Copper + tin) tools widely used
- Stone implements were still in vogue
- Potter's wheel was put to full use
- Bronzsmiths, Goldsmiths, Boat-Making, Brick-laying etc were other occupations commonly found

Trade of Indus Valley Civilisation

- Presence of granaries, weights and measures, seals and uniform script signifies the importance of trade
- The barter system was widely prevalent
- Lothal, Sutkagendor were port cities used for conducting trade
- Trade destinations – Afghanistan, Iran and Central Asia. Contacts with Mesopotamia civilization are also seen

The political organization of IVC

- Cultural homogeneity achieved through a strong central authority
- No temples or religious structures found. Harappa was possibly ruled by Merchants class.
- Weapons are rarely found.

Religious practices of IVC

- Terracotta figure of Mother Goddess.
- Phallu and Yoni worship.
- Pashupati Mahadev seal found with the elephant, tiger, rhino and a bull surrounding him with two deer near his feet.

Tree and animal worship of IVC

- Pipal tree worship was found.
- One-horned Unicorn recognized as Rhino and the humped bull was commonly worshipped.
- Use of Amulets to ward off ghosts and evil spirits.
- The lion was *not* known in Harappan culture.

The Harappan script

- Harappan script Pictographic in nature but not deciphered so far.
- They are recorded on seals and contains only a few words
- Harappan Script is the oldest script in Indian Sub-continent

Weights and Measures

- Use of standardized weights and measures to keep accounts of private property, to indulge in trade and commerce etc.
- Weights are found in multiples of 16.

Harappan Pottery of IVC

- Well-developed Pottery techniques with elaborate designs of trees and circles.
- Redware pottery painted with black designs.

Seals of Indus Valley Civilisation

- Seals were used for the purpose of trade or worship. Images of animals such as Buffalo, bull, tiger etc were found inscribed in the seals

Statue of IVC

- Discovery of Bronze statue of a naked woman and bearded man steatite statue

Terracotta figurines of IVC

- Terracotta – Fire baked earthen clay
- Used as toys or objects of worship
- Massive stone works were not found in Harappa which shows the poorly developed artistic works made of stone

Origin, maturity and end of IVC

- Pre-Harappan Settlements – Lower Sindh, Baluchistan and Kalibangan.
- Mature Harappa – 1900BC – 2550BC.
- Causes for the Decline of Civilization.
- Decreasing fertility due to increasing salinity on the account of the expansion of the nearby desert.
- Sudden subsidence of uplift of land causing floods.
- Earthquakes caused changes in the course of Indus.
- Harappan culture destroyed by invading Aryans.

Post-urban Phase (1900BC – 1200BC)

- Sub-Indus Culture
- Primarily chalcolithic
- Development of Ahar Culture, Malwa Culture and Jorwe Culture at various phases in post-Harappan Civilization.

Early Vedic Period (1500BC-1000BC)

1. Aryans appeared in India around 1500 BC and settled near Eastern Afghanistan, NWFP, Punjab and fringes of western Uttar Pradesh. The whole region is called as the Land of Seven Rivers.
2. The Aryans came into conflict with the indigenous inhabitants Dasyus and the Aryan chief who overpowered them is called as Tarsadasu.
3. Sapta Sindhu mentioned in the Rig Veda. Sindu is the river of *Par Excellence* while The Saraswati or *Naditarana* is the best of rivers in the Rig Veda

Rig Vedic name	Modern Name
Sindu	Indus
Vitasta	Jhelum
Asikani	Chenab
Parushni	Ravi
Vipas	Beas
Sutudri	Sutlej

Later Vedic period (1000 BC - 500 BC)

The history of the later Vedic period is based mainly on the Vedic texts which were compiled *after* the age of Rig Veda.

1. Later Vedic Texts

a. The Veda Samhitas

i. **Sama Veda** – The book of chants with hymns taken from Rig Veda. This Veda is important for Indian Music.

ii. **Yajur Veda** – The book consists of sacrificial rituals and formulae.

iii. **Atharva Veda** – This book consists of charms and spells to ward off evils and diseases

b. **The Brahmanas** – Consists of the explanatory part of the Vedas. Sacrifices and rituals have also been discussed in great detail.

i. **Rig Veda** – Aitreya and Kaushitiki Brahmana

- Consists of 1028 hymns divided into 10 mandalas (books).
- In 11th Mandala, Gayatri mantra is addressed to solar deity Savitri.
- X Mandala addressed to Purusha Sukta

ii. **Yajur Veda** – Shatapatha and Taittiriya

iii. **Sama Veda** – Panchvisha, Chandogya, Shadvish, and Jaiminaya

iv. **Atharva Veda** - Gopatha

c. **The Aranyakas** – Concluding portions of Brahmanas, also called as Forest texts are written mainly for the hermits and students living in forests.

d. **The Upanishads** – Appearing at the end of the Vedic period, they criticized the rituals and laid stress on right belief and Knowledge.

Note- Satyameva Jayate has been taken from Mundaka Upanishad.

2. Vedic literature –

Following the Later Vedic age, a lot of Vedic Literature was developed, inspired by the Samhitas which follow the Smriti – Literature which was written in comparison to Shruti – Word of Mouth tradition. Important texts in Smriti tradition are further subdivided into

a. Vedangas

i. **Shiksha** - Phonetics

ii. **KalpaSutras** – Rituals

- **Sulva Sutras**
- **Grihya Sutras**
- **Dharma Sutras**

iii. **Vyakarna** - Grammar

iv. **Nirukta** - Etymology

v. **Chhandha** - metrics

vi. **Jyotisha** - Astronomy

b. Smriti

i. **Manu Smriti**

ii. **Yajnavalkya Smriti**

iii. **Narada Smriti**

iv. **Parashara Smriti**

v. **Brihaspati Smriti**

vi. **Katyayana Smriti**

c. Mahakavyas

i. **The Ramayana**

ii. **The Mahabharata**

d. The Puranas

i. **18 Maha Puranas** – Dedicated to specific deities such as Brahma, Surya, Agni, Saiva and

Vaishnava. They include Bhagavata Purana, Matsya Purana, Garuda Purana etc

ii. 18 Upa Puranas – Lesser known texts

e. The Upvedas

i. Ayurveda - Medicine

ii. Gandharvaveda - Music

iii. Arthaveda - Vishwakarma

iv. Dhanurveda - Archery

f. Shad-Darshanas or Indian Philosophical Schools

i. Samkhya

ii. Yoga

iii. Nyaya

iv. Vaisheshika

v. Mimansa

vi. Vedanta

Buddhism and Jainism

Causes of Origin

1. The Kshatriya reaction against the domination of the priestly class called Brahmanas. Mahavira and Gautama Buddha, both belonged to the Kshatriya clan.
2. Indiscriminate killing of cattle for Vedic sacrifices and for food had led to the destabilization of the new agricultural economy which was dependent on cattle for ploughing the fields. Both Buddhism and Jainism stood against this killing.
3. The growth of cities with the increase in the circulation of Punch Marked coins and trade and commerce had added to the importance of Vaishyas who looked for a new religion to improve their position. Jainism and Buddhism facilitated their needs
4. The new forms of property created social inequalities and the common people wanted to get back to their primitive form of life
5. Growing complexity and degeneration of Vedic religion.

Difference between Jainism and Buddhism and Vedic Religion

1. They did not attach any importance to the existing Varna system
2. They preached the Gospel of non-violence
3. They accepted Vaishyas, including the Moneylenders who were condemned by Brahmanas
4. They preferred simple, puritan and ascetic living

Buddhism

Gautama Buddha and Buddhism

Gautama Buddha was born in 563 BC in the Republican clan of Shakyas in Lumbini near Kapilavastu. His mother was a princess from Kosalan dynasty.

Four Sights of Buddha's life at the age of 29 had moved him to the path of renunciation. They are

- An old man
- A diseased person
- An ascetic
- A dead person

Important events in the life of Buddha

Events	Places	Symbols
Janma	Lumbini	Lotus and Bull
Mahabhinishkramana	-	Horse
Nirvana	Bodh Gaya	Bodhi Tree
Dharmachakra Pravartana	Saranath	Wheel
Mahaparinirvana	Kusinagar	Stupa

Doctrines of Buddhism

- **Four noble truths**

1. Dukha – life is full of sorrow
2. Samyuda – there are causes for the sorrow
3. Nirodha – they can be stopped
4. Nirodha gamini Pratipada – Path leading towards the cessation of sorrow

- **Ashtangika Marga**

1. Right observation
2. Right determination
3. Right exercise
4. Right action
5. Right speech
6. Right memory
7. Right meditation
8. Right livelihood

- **Madhya Marga** – to avoid the excess of both luxury and austerity

- **Triratna** – Buddha, Dharma and Sangha

Special features of Buddhism and the causes of its spread

1. Buddhism does not recognize the existence of god and soul
2. Women were also admitted to the Sangha. Sangha was open to all, irrespective of caste and sex
3. Pali language was used which helped in the spread of Buddhist doctrines among the common people
4. Ashoka embraced Buddhism and spread it to Central Asia, West Asia and Srilanka
5. Buddhist Councils

First Council: The first council was held in the year 483 B.C at Saptaparni caves near Rajgriha in Bihar under the patron of king Ajatshatru, during the first council two Buddhist works of literature were compiled Vinaya and Sutta Pitaka by Upali

Second Council: The second council was held in the year 383 B.C at Vaishali under the patron of king Kalashoka

Third Council: The third council was held in the year 250 B.C at Patliputra under the patron of King Ashoka the Great, during the third council Abhidhamma Pitaka was added and Buddhist holy book Tripitaka was compiled.

Fourth Council: The fourth council was held in the year 78 A.D at Kundalvan in Kashmir under the patron of king Kanishka, during this council Hinayana and Mahayana were divided.

Importance and influence of Buddhism

Literature

1. Tripitaka
 1. Sutta Pitaka – Buddha's sayings
 2. Vinaya Pitaka – Monastic code
 3. Abhidhamma Pitaka – religious discourses of Buddha
2. Milindapanho – a dialogue between Menander and Saint Nagasena
3. Dipavamsa and Mahavamsa – the great chronicles of Sri Lanka
4. Buddhacharita by Ashvagosa

Sects

1. **Hinayana (Lesser Wheel)** - They believe in the real teachings of Gautam Buddha of attaining Nirvana. They do not believe in idol worship and Pali language was used in the Hinayana text
2. **Mahayana (Greater Wheel)** - They believe that Nirvana is attained by the grace of Gautam Buddha and following Bodhisattvas and not by following his teachings. They believe in idol worship and Sanskrit was used in Mahayana text
3. **Vajrayana** - They believe that Nirvana is attained by the help of magical tricks or black magic.

Bodhisattvas

1. Vajrapani
2. Avalokitesvara or Padmapani
3. Manjushri
4. Maitreya (Future Buddha)
5. Kshitigriha
6. Amitabha/Amitayusha

Buddhist architectures

1. **Places of Worship** – Stupas containing the relics of Buddha or Bodhisattvas. Chaityas are the prayer hall while Viharas are the place of residence of monks
2. **Development of Cave architecture** eg. Barabar caves in Gaya
3. **Development of Idol worship and sculptures**
4. **The growth of universities of par excellence** which attracted students from all over the world

Jainism

- Jainism believes in 24 Tirthankaras with Rishabdev being the first and Mahavira, contemporary of Buddha being the 24th Tirthankara.
- The 23rd Tirthankar Parshwanath (Emblem: Snake) was the son of King Ashvasena of Banaras.
- The 24th and the last Tirthankar was Vardhman Mahavira (Emblem: Lion).
- He was born in Kundagram (Distt Muzaffarpur, Bihar) in 599 BC.
- His father Siddhartha was the head of Jnatrika clan. His mother was Trishla, sister of Lichchavi Prince Chetak of Vaishali.
- Mahavira was contemporary to Bimbisara.
- Married to Yashoda, had a daughter named Priyadarsena, whose husband Jamali became his first disciple.
- At 30, after the death of his parents, he became an ascetic.

- In the 13th year of his asceticism (on the 10th of Vaishakha), outside the town of Jrimbhikgrama, he attained the supreme knowledge (Kaivalya).
- From now on he was called Jaina or Jitendriya and Mahavira, and his followers were named Jains.
- He also got the title of Arihant, i.e., worthy. At the age of 72, he attained death at Pava, near Patna, in 527 BC.

Five vows of Jainism

- Ahmisa – non-violence
- Satya – do not speak a lie
- Asteya – do not steal
- Aparigraha – do not acquire property
- Brahmacharya – celibacy

Three main principles

- Ahimsa
- Anekantavada
- Aparigraha

Triratna of Jainism

- Right faith – Samayak Shradha
- Right Knowledge – Samayak Jnan
- Right Conduct – Samayak karma

Five types of knowledge

- Mati jnana
- Shruta jnana
- Avadhi jnana
- Manahparayaya Jnana
- Keval Jnana

Jain council

- **1st Council** at Patliputra under the Patron of Chandragupta Maurya in 300 BC during which the 12 Angas was compiled
- **2nd Council** at Vallabhi in 512 AD during which the final compilation of 12 Angas and 12 Upangas was done

Sects

- **Shwetambars** – Sthulabhadra – People who put on white robes. Those who stayed back in the North during the times of famine
- **Digambar** – Bhadrabahu – Exodus of monks to Deccan and South during the times of Magadhan famine. They have a naked attire

Jain Literature

Jain literature used Prakrit, which is a common language of people than using Sanskrit. In this way, Jainism reached far and wide through people. The important literary works are

- 12 Angas
- 12 Upangas
- 10 Parikramas
- 6 Chhedsutras
- 4 Mulasutras
- 2 Sutra Granthas
- Part of Sangam literature is also attributed to Jain scholars.

Mahajanapadas, Haryanka Dynasty, Shishunaga Dynasty, Nanda Dynasty

- **Magadha (Patna, Gaya and Nalanda districts)** – The first capital was Rajagriha and the later capital was Pataliputra.
- **Anga and Vanga (Munger and Bhagalpur)** – The capital was Champa. It was a prosperous business centre.
- **Malla (Deoria, Basti, Gorakhpur region)** – The capital was Kushinagar. It was the seat of many other smaller kingdoms. Their main religion was Buddhism.
- **Vatsa (Allahabad and Mirzapur)** – The capital was Kaushambi. The most important ruler of this kingdom was King Udayan.
- **Kashi (Benaras)** – The capital was Varanasi. Though many battles were fought against the Kosala kingdom, eventually Kashi was merged with the Kosala kingdom.
- **Kosala (Ayodhya)** – Though its capital was Shravasti which is identical with Sahet-Mahet but Ayodhya was an important town in Kosala. Kosala also included the tribal Republican territory of Sakyas of Kapilvastu.
- **Vajji (Muzaffarpur and Vaishali)** – Vajji was the seat of a united republic of eight smaller kingdoms of which Lichchavis, Janatriks and Videhas were also members.
- **Kuru (Thaneswar, Meerut and present-day Delhi)** – The capital city was Indraprastha.
- **Panchala (Western Uttar Pradesh)** – Its capital was at Kampila. Earlier a monarch state, it later became an independent republic. Kannauj was an important town in this kingdom.
- **Matsya kingdom (Alwar, Bharatpur and Jaipur)** – Its capital was Viratanagar.
- **Ashmaka (Between Narmada and Godavari)** – Its capital was at Pertaii and Brahamdatta was its most important ruler.
- **Gandhara (Peshawar and Rawalpindi)** – Its capital Taxila was important as a trade and education centre (Ancient Taxila university) during the later Vedic age.
- **Kamboj (Hazara dist of Pakistan, North-east Kashmir)** – Its capital was Rajapur. Hazara was an important trade and commerce centre of this kingdom.
- **Avanti (Malwa)** – Avanti was divided into two parts north and south. The northern part had its capital at Ujjain and the southern part had its capital at Mahismati.
- **Chedi (Bundelkhand)** – Shaktimati was the capital of Chedi. Chedi kingdom was spread between Yamuna and Narmada rivers. One of the families from this kingdom later merged into the Kalinga kingdom from this royal family.
- **Shurasena (Brajmandal)** – Its capital was at Mathura and its most famous ruler was Avantiputra.

Sources of Sixteen Mahajanapadas

- Anguttara Nikaya, Mahavastu (Buddhist Literature)
- Bhagavati Sutta (Jain Literature)

Dynasties

Haryanka Dynasty

(1) Bimbisara (544BC-492BC)

1. Haryanka is the name of a new dynasty founded in Magadha by Bimbisara. He was also called Seniya who was the first Indian to have a regular and standing army
2. Bimbisara was a contemporary of Buddha.
3. Pataliputra and Rajagriha were the capitals of the Magadha kingdom. Magadha falls in the Patna region of Bihar.

(2) Ajatashatru (492BC-460BC)

1. He followed a more aggressive policy. Gained control of Kashi and Vajji. Built the fort of Rajgir.
2. He convened the 1st Buddhist council

(3) Udayin (460BC-440BC)

1. He laid the foundation of Pataliputra and shifted the capital from Rajgir to Pataliputra

Shishunaga Dynasty (412BC-344BC)

- People elected Shishunga over Nagadasaka (last Haryanka ruler) thereby ending the Haryanka dynasty
- Shishunga was succeeded by Kalashoka who convened the 2nd Buddhist council

Nanda Dynasty (344BCC-323BC)

- Mahapadma Nanda was the founder and the first king of the Nanda dynasty.
- He overthrew the Magadha dynasty and established the new Empire. He was known as Sarvakshatrantak and Ugrasena
- Mahapadma was known as Ekraat – the sole monarch
- Initially, the Nanda Dynasty inherited a large kingdom of Magadha and subsequently, the boundaries of the Nanda Dynasty were expanded in all directions by its rulers.
- Dhana Nanda was the last ruler of the Nanda Dynasty. During his rule, Alexander invaded North-West India by 326 BC

Mauryan Empire

Bindusara (298-273 BC)

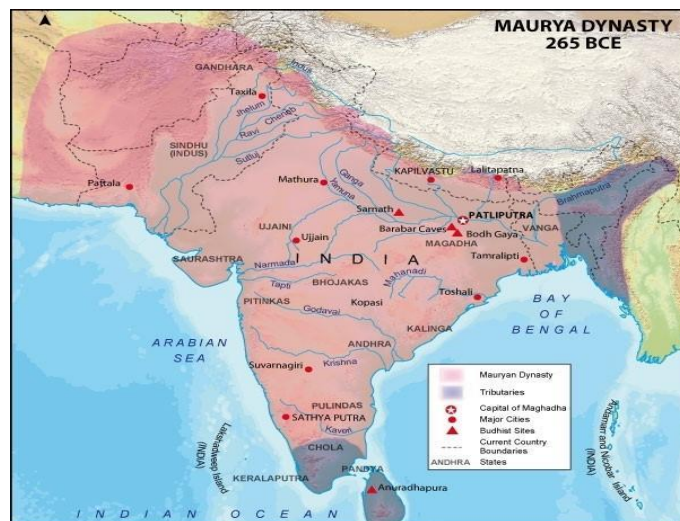
He was known to Greeks as Amitrochates and he patronized the Ajivika sect.

Ashoka

1. Ashoka ascended the throne in 273BC and ruled up to 232 BC. He was known as 'Devanampriya Priyadarsi' the beautiful one who was the beloved of Gods.
2. Ashoka fought the Kalinga war in 261 BC. Kalinga is in modern Orissa.
3. Ashokan inscriptions were deciphered by James Prinsep.
4. After the battle of Kalinga, Ashoka became a Buddhist, being shocked by the horrors of the war, he replaced Bherighosha by *Dhammaghosha*
5. Ashoka was initiated to Buddhism by Upagupta or Nigrodha, a disciple of Buddha
6. For the propagation of Buddhism Ashoka started the institution of Dharmamahamatras.

Ashokan Inscriptions

1. Ashokan inscriptions carried royal orders through which he was able to speak directly to the people. There were rock edicts and pillar edicts which were again divided into major and minor.
2. The 14 Major Rock Edicts of Ashoka tell about the principles of Dharma



3. The Kalinga rock edict explains the principles of administration after Kalinga war. In his Kalinga edict, he mentions "All men are my children"
4. The Major Rock Edict XII of Ashoka deals with the conquest of Kalinga.
5. The term 'Ashoka' was mentioned only in the Maski Minor rock edict.

Foreign Invasions in India

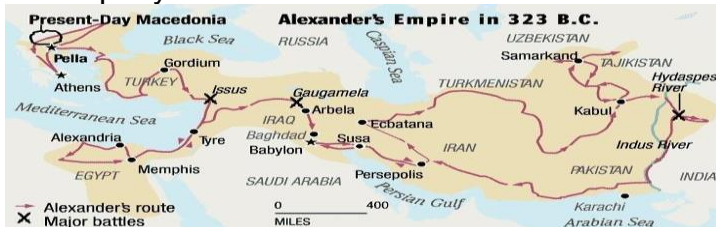
Iranian Invasion – 518 BC

Iranian ruler *Darius* penetrated into NW India in 516 BC and annexed Punjab, West of Indus and Sindh. This was 20th province of Iran and contributed 1/3rd of the total revenue of Iran due to fertile lands. *Xerxes*, the successor of *Darius*, employed a large number of Indians in the war against Greeks.

Alexander's Invasion

He defeated the last king of the line of *Darius*, *Xerxes* in 333 BC and 331 BC. After occupying the realm of the Persian king, Alexander crossed the Hindukush mountains in eastern Afghanistan in 327 BC.

After annexing Iran, Alexander moved into India through Khyber Pass. *Ambhi*, the ruler of Taxila readily submitted. He met *Porus* at *Jhelum* where he defeated him in the Battle of Hydaphes but later restored his kingdom to him. Alexander marched till the *Beas* river but his army refused to accompany him. He remained in India from 326-325 B.C after which he was forced to retreat.



Central Asian contacts and their results

The Indo-Greeks

The series of invasions began in 200 BC by the Bactrian Greeks who were pushed by the Scythian tribes.

- *Menander* (165-145 BC) was the most famous ruler who was converted to Buddhism by *Nagasena*. The questions of *Menander* were compiled as *Milindapanho*.
- Indo-Greeks were the *first* to issue Gold coins in India and they were also the first to issue coins which could be definitely attributed to Kings.
- They introduced the features of *Hellenistic Art* through which *Gandhara style* had developed.

The Shakas (1st BC – 4th AD)

- The Shakas or Scythians replaced Indo-Greeks. There were five branches of Shakas and they controlled a much larger territory.
- Vikrama Samvat started in 57 BC when a king called as *Vikramaditya* in Ujjain defeated the Shakas.
- Rudradaman I (AD 130-150) was a famous king who ruled over western India. He repaired the Sudarshana lake in Kathiawar.

The Parthians

- They originally belonged to Iran and they replaced the Shakas in the NW India.
- During the times of *Gondophernes*, *St. Thomas* is said to have come to India for the propagation of Christianity.

The Kushans

- They were nomadic people of Central Asia who ruled from the Oxus to the Ganges.
- The Kadaphises I and II ruled for 28 years from 50 AD. They were replaced by the Kanishka.
- Peshawar was their first capital and Mathura the second.
- Kanishka started the Shaka era in 78 AD.
- Kanishka patronized Buddhism by holding a Buddhist council in Kashmir where the doctrines of the Mahayana form of Buddhism was finalized.

Impact of the Central Asian Contacts

- Advances in building activities and pottery
- They had a better cavalry
- They identified themselves as an integral part of India
- Satrapy system of Government developed
- They appointed military governors called Strategos
- Mahayana style of Buddhism developed with Gandhara and Mathura schools of Art supporting the Buddhism.

Kushans Empire

Background of Kushans

- Kushans succeeded the Parthian rulers.
- Yue-chi tribe was divided into five clans and they were one among them, also called as Tocharans.
- They were from steppes in north Central Asia and were nomadic.
- First, they occupy Bactria or north Afghanistan. Sakas were displaced there by them.
- Moving southwards gradually, they crossed the Hindu Kush and occupied Gandhara, and replaced Parthians and Greeks in those areas.
- The empire was vastly extending from Oxus and Khorasan in Central Asia to Ganga and Varanasi in Uttar Pradesh.
- Kushanas unified several parts of Central Asia, Iran, Entire Pak, and most part of Northern India bringing under one ruler.

Dynasties of Kushanas

There are 2 dynasties of the Kushan tribe that ruled India.

First:

- Founded by Kadphises, House of chiefs.
- Term: 28 years starting from 50 AD
- Two rulers Kadphises I (Kujul Kadphises) and II (Vema Kadphises), ruled under this dynasty.
- They both issued a large number of Coins. Kadphises I, minted a large number of copper coins in sync with Roman coins. Kadphises II issued gold money and also expanded the kingdom to the far east.

Second:

- Kanishka succeeded the House of Kadphises. Kanishka kings further expanded the kingdom over lower Indus basin and upper India. The authority was much higher over the Gangetic basin.
- The large number and purer gold coins were issued by them, found mainly in the west of Indus.

- Kanishka continued to rule the northwestern part until 230 AD. Several of his successor intermingled completely into India, and also acquired Indian names. Vasudeva was the last ruler of the dynasty.

The Rise and Growth of the Gupta Empire

1. Chandragupta I (319-334 AD)

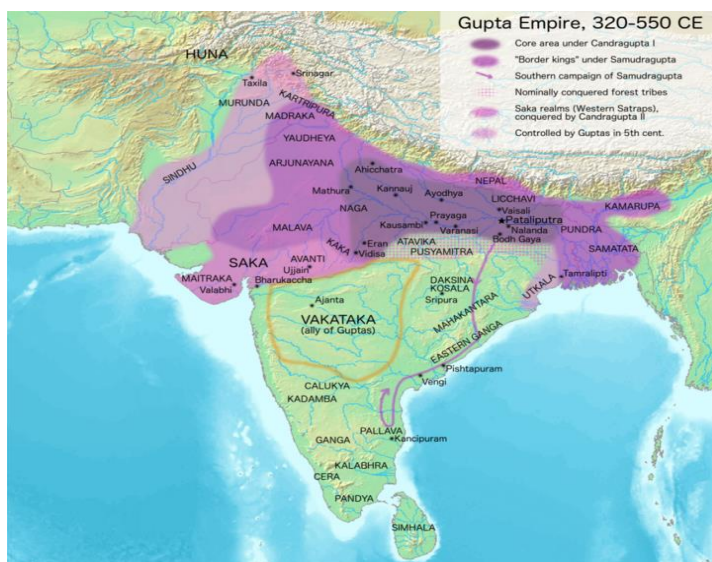
- He was the first great ruler of the Gupta Dynasty. He assumed the title Maharajadhiraja. Married Licchavi princess
- Started the Gupta Era by 319-20 AD
- The original type of Gold coins Dinaras was issued.

2. Samudragupta (335-380 AD)

- He followed a policy of violence and conquest which led to the enlargement of the Gupta empire
- Harisena, his court poet, vividly mentions his military exploits in Allahabad inscriptions
- He reached Kanchi in the south which was ruled by Pallavas
- Meghavarman, the ruler of Srilanka, sent a missionary for permission to build a Buddhist temple at Gaya
- Samudragupta is called as Napoleon of India

3. Chandragupta II (380-412 AD)

- He adopted the title Vikramaditya
- He conquered Malwa and Gujarat which provided him access to the sea which enabled trade and commerce. Ujjain was made as the second capital
- His court was adorned by *the Navaratnas* including Kalidasa and Amarasingha.
- His exploits are glorified in *Iron Pillar* at *Qutub Minar*
- Chinese pilgrim *Fa-Hsien* (399-414AD) visited India during his period.



1. Art

- Gupta period is called the Golden age of ancient India. Art was mostly inspired by Religions.

- **Rock cut caves** – Ajanta, Ellora and Bagh caves

- **Structural temples** – Dashavatar temple of Deogarh, Laxman temple of Sirpur, Vishnu temple and Varah temple of Eran. The growth of Nagara style also enabled the development of temple architecture in India

- **Stupas** – Dhammek stupa of Sarnath, Ratnagiri stupa of Orissa, Mirpur Khas in Sindh developed in

this period.

- **Paintings** – Ajanta paintings and Bagh caves paintings

- **Sculpture** – the Bronze image of Buddha near Sultanganj, Sarnath and Mathura school flourished during this period which supports the growth of Mahayana Buddhism and Idol worship.

- Images of Vishnu, Shiva and some other Hindu gods were also found.

1. Literature

- **Religious**

Ramayana, Mahabharata, Vayu Purana etc were re-written. Dignaga and Buddhagosha were certain Buddhist literature written in this period

- **Secular**

- a. **Mudrarakshasha** by Vishakadatta
- b. **Malavikagnimitra, Vikramorvashiyam, AbhijanaShakuntalam** – Dramas by Kalidasa
- c. **Ritusamhar, Megadoot, Raghuvamsam, Kumarasambhavam** – Poetries by Kalidasa
- d. **Mricchakatika** by Sudraka
- e. **Kamasutra** by Vatsyayana
- f. **Panchatantra** by Vishnu Sharma

- **Scientific**

- a. **Aryabhatiya and Surya Siddhanta** by Aryabhatta
- b. **Romaka Siddhanta**
- c. **Mahabhaskarya and Laghubhaskarya** by Bhaskara
- d. **Pancha Siddhanta, Vrihat Jataka, Vrihat Samhita** by Vrahmihira

The Rajput States

Rajputana

There was an expansion of aggressive and expansionist Turk tribesmen in the North-western India whose main mode of warfare was rapid advance and retreat. The disintegration of Gurjara-Pratiharas in North-Western India led to a time of political uncertainty.

The Ghaznavids

- Mahmud (998-1030) ascended the throne of Ghazni
- Firdausi was a court-poet of Ghazni. His famous work “Shah Namah” was a watershed in Iranian renaissance
- Mahmud was a plunderer and destroyer of temples. In 1025, he raided and plundered the Somnath temple in Gujarat. He undertook 17 raids in India and constantly fought against the Hindushahi rulers
- Seljuk Empire was established with the death of Mahmud

The Rajput States

- The break-up of the Pratiharas empire led to the formation of Rajputana states.
- Few important of these were-
 - (a) Gahadavalas of Kannauj
 - (b) Paramaras of Malva
 - (c) Chauhans of Ajmer
- Few other significant states were Kalachuris near Jabalpur, Chandellas in Bundelkhand, Chalukyas of Gujarat, Tomars of Delhi etc.
- Rajputs patronized Hinduism and Jainism to a certain extent.
- They also upheld the Varna system and the Privileges of Brahmanas

Turkish Conquests

- The Seljuk empire was replaced by Khwarizmi empire in Iran and Ghurid empire in Ghur.
- Muizzudin Muhammed ascended the throne at Ghazni while Chauhan's powers were also constantly rising. With the capture of Delhi, the Chauhans and Ghurids were in the direct contest.
- 1st Battle of Tarain (1191) Muhammed Ghori Vs. Prithviraj Chauhan – Ghurids lost the battle
- 2nd Battle of Tarain(1192) Muhammed Ghori Vs. Prithviraj Chauhan – Prithviraj Chauhan lost the battle. This led to Delhi and Eastern Rajasthan passing under the Turkish rule.
- Muhammad Ghori entrusted the positions under Qutbuddin Aibak, who later found the Slave dynasty and led to the foundations of Delhi Sultanate. Bakthiyar Khalji has entrusted the positions east of Benares.

The Chauhans of Ajmer

- The Chauhans were the feudatories of Gurjara-Pratiharas
- Ajayaraj Chauhan, king of Sakhambari established a city called Ajayameru which was later known as Ajmer
- His successor Vighraharaj captured Dhillika from Tomar Kings
- After the defeat of Prithviraj Chauhan, the dynasty was weakened.
- Qutbuddin Aibak dealt the final blow by defeating the dynasty in 1197 AD.

The Tomars of Delhi

- The Tomars were the feudatories of the Pratiharas.
- They founded the city of Delhi in 736 A.D. During 9th-12th century, the Tomars of Delhi ruled parts of the present-day Delhi and Haryana.
- Mahipala Tomar captured Thaneshwar, Hansi and Nagarkot in 1043 A.D.
- Chauhans captured Delhi in middle of the 12th century and the Tomars became their feudatories.

Mewar

- Mewar is a region of south-central Rajasthan state in western India.
- It includes the present-day districts of Bhilwara, Chittorgarh, Rajsamand, Udaipur, Pirawa Tehsil of Jhalawar District of Rajasthan, Neemuch and Mandsaur of Madhya Pradesh and some parts of Gujarat.
- The region was a part of the Rajput-ruled Mewar Kingdom or the Udaipur Kingdom. In 1568, Akbar captured Chittorgarh, the capital of Mewar.

Maha Rana Sanga (1508 - 1528)

- Rana Sanga of Mewar belonged to the Sisodiya clan who was a contemporary to Ibrahim Lodhi and Babur.
- **The Battle of Khanwa, 1527** took place between Babur and Rana Sanga in which Babur won and established the Mughal's rule firmly in North India.

Maha Rana Pratap (1572 - 1597)

- Rana Pratap of Mewar belonged to the Sisodiya Rajputs as was Rana Sanga.
- He was a contemporary of Akbar.
- When Akbar sent a number of envoys in making Rana Pratap as a vassal and submitting to Akbar, Rana refused and the Battle of Haldighati was fought on 1576 between Raja Man Singh I of Amber and Maha Rana Pratap in which Maha Rana Pratap was defeated by the Mughals.

Marwar

- In 1194, Mahmud of Ghori defeated Jaichand of Kannauj.

- His descendant, Sheoji, established themselves at Mandore city in Marwar.
- The Jodhpur state was founded in the 13th century by the Rathore clan of Rajputs, who claim descent from the Gahadvala kings of Kannauj.
- The Rathore rulers of the Indian princely state of Jodhpur were of an ancient dynasty established in the 8th century.
- However, the dynasty's fortunes were made by *Rao Jodha*, first of the rulers of the Rathore dynasty in Jodhpur in 1459.

The Chandelas of Bundelkhand

- Established them in the 9th century. Harshadeva was the founder of this dynasty.
- Bundelkhand was also known as Jejakabhukti
- Mahoba was the capital of Chandela during the period of Chief Yasovarman
- Kalinjar was their important fort.
- The Chandelas built the most famous Kandariya Mahadeva Temple in 1050 A.D. and a number of beautiful temples at Khajuraho. Vidyadhara is noted for having commissioned the Kandariya Mahadeva Temple.
- Paramal the last Chandela ruler was defeated by Qutb-ud-din Aibak in 1203 A.D.

The Paramaras of Malwa

- They were a part of Agnivanshi Rajput dynasty. Established in 9-10th Century, they were vassals of Rashtrakutas
- They made Dhar as their capital. Bhoja was an important ruler in their period.
- The later Paramara rulers moved their capital to Mandu after Dhar was sacked multiple times by their enemies.
- Mahalakadeva, the last known Paramara king, was defeated and killed by the forces of Alauddin Khalji of Delhi in 1305 CE

The Chalukyas of Gujarat

- The Chalukya dynasty ruled parts of what is now Gujarat and Rajasthan in north-western India, between c. 940 CE and c. 1244 CE. Their capital was located at Anahilavada (modern Patan).
- Mularaja was the founder of the dynasty. During the rule of Bhima, I, Mahmud of Ghazni plundered Somnath temple.
- Mularaja is said to have built Mulavasatika temple for Digambara Jains and the Mulanatha-Jinadeva temple for the Svetambara Jains.
- The Dilwara Temples and the Modhera Sun Temple have constructed during the reign of Bhima I.
- Rani-ki-Vav was commissioned by Queen Udayamati

The Kalachuris of Tripuri

- The Kalachuris of Chedi, ruled parts of central India during 7th to 13th centuries from their capital Tripuri near Jabalpur.
- The kingdom reached its zenith during the reign of *Lakshmikarna*, who assumed the title *Chakravartin* after military campaigns against several neighbouring kingdoms
- The Karan temple at Amarkantak was built by Lakshmikarna (1041 – 1173 CE)

Dynasties of Delhi Sultanate

Dynasty	Period of Rule	Prominent rulers
Mamluk or Slave dynasty	1206 – 1290	Qutubuddin Aibek, Iltutmish, Razia Sultan, Ghiyasuddin Balban
Khilji dynasty	1290 – 1320	Alauddin Khilji
Tughlaq dynasty	1321 – 1413	Muhammad Bin Tughlaq, Firoz Shah Tughlaq
Sayyid dynasty	1414 – 1450	Khizr Khan
Lodhi dynasty	1451 – 1526	Ibrahim Lodhi

Slave Dynasty (1206-1290)

Year	Ruler	Important Facts
1206 - 1210	Qutbuddin Aibak	<ol style="list-style-type: none"> 1) Most trusted slave of Muhammed of Ghori 2) Died in 1210 while playing <i>Chaugan</i> (Polo) 3) He was granted the title <i>Lakh Bakhsh</i> 4) He constructed the <i>Quwat-ul-Islam</i> mosque in Delhi and <i>Adhai din ka jhonpra</i> at Ajmer 5) He also started the construction of <i>Qutb Minar</i> in the honour of Sufi saint <i>Khwaja Qutbuddin Bakhtiyar Kaki</i>
1210 – 1236	Iltutmish	<ol style="list-style-type: none"> 1) The real consolidator of Turkish conquests 2) He saved the Delhi Sultanate from the invasion of the Mongol, <i>Chengiz Khan</i> 3) He introduced the currency system of Tanka and Jittal 4) He organized <i>Iqta System</i> – land grant to soldiers and nobility 5) He set up the <i>Chahalgani</i> system – nobility of 40 members 6) He completed the construction of Qutb Minar

1236 – 1240	Razia Sultana	<ol style="list-style-type: none"> 1) The first and the only Muslim lady who ever ruled India 2) Though a popular ruler, she was disliked by the Chahalgani who wanted to put a puppet ruler at the throne 3) She was defeated and killed by Bandits while in a fight
1240-1266	An era of weak rulers	After the death of Raziya, weak rulers ascended the throne, who were supported by the Nobles. Bahram Shah, Masud shah and Nasiruddin Muhammad were the successors.
1266 – 1287	An era of Balban	<ol style="list-style-type: none"> 1) A strong and centralized government was established 2) He acted as a champion of Turkish Nobility 3) He broke the strength of Chahalgani to restore the powers of the Monarchy 4) He established <i>Diwan-i-arz</i>, military department towards a strong army 5) He adopted a policy of blood and iron to restore the law and order problems 6) He insisted on the ceremony of <i>Sijada and Paibos</i> 7) He took up the title <i>Zil-i-illahi</i>
1218 - 1227	Changez Khan	<ol style="list-style-type: none"> 1) The Mongol leader who prided in being called the <i>Scourge of God</i> 2) They attacked the Khwarizmi empire and sacked the flourishing cities 3) Delhi Sultanate became the only important Islam state of this period 4) Illtutmish, in 1221, refused an asylum request of Jallaudin, who was defeated by Changez Khan. Changez Khan did not cross River Indus, which saved the weak sultanate from loot and plunder.

The Khaljis (1290- 1320)

Year	Rulers	Important Facts
1290 1296	– Jalaluddin Khalji	1) He checked the monopoly of Turkish nobility and followed a policy of tolerance
1296 1316	– Allauddin Khalji	1) He separated religion from politics and proclaimed, 'Kingship knows no kinship' 2) He followed an imperialist and annexation policy. He annexed Gujarat, Ranthambore, Malwa, Mewar etc Administrative reforms 1) By series of 4 Ordinances, Allaudin took steps to avoid the problems caused by the nobles 2) He introduced the <u>Dagh</u> – branding of horse and <u>Chehra</u> – a descriptive roll of soldier's system. 3) By setting up markets, Allauddin fixed the cost of all commodities 4) He constructed the <i>Alai fort</i> and <i>Alai Darwaza</i> – entrance of Qutb Minar 5) He also built the palace of thousand pillars called <i>Hazar Sutun</i> 6) Amir Khusrau was the court poet of Allaudin
1316 1320	– Mubarak Khan	
1320	Khusrau Khan	Ghazi Malik deposed Khusrau Khan in a rebellion.

Tughlaq dynasty (1320-1412)

Emperor	Period
Ghiyasuddin Tughlaq	1320-24
Muhammad Tughlaq	1324-51
Firoz Shah Tughlaq	1351-88
Mohammad Khan	1388
Ghiyassuddin Tughlaq Shah II	1388
Abu Baqr	1389-90
Nasiruddin Muhammad	1390-94
Humayun	1394-95
Nasiruddin Mahmud	1395-1412

Ruler	Period of Rule	Important facts
Ghiyasuddin Tughlaq	1320-1325	1. Khusrau Khan, the last king of the Khilji dynasty was killed by Ghazni Malik, and Ghazni Malik ascended the throne assuming the title Ghiyasuddin Tughlaq. 2. He died in an accident and his son Jauna (Ulugh Khan) succeeded him under the title Mohammad-bin-Tughlaq.

Mohammad-bin Tughlaq	1325-1351	<p>1. Prince Jauna, Son of Ghiyasuddin Tughlaq ascended the throne in 1325</p> <p>2. He tried to introduce many administrative reforms. He had 5 ambitious projects for which he has become particularly debatable.</p> <p>Taxation in the Doab (1326)</p> <p>Transfer of Capital (1327)</p> <p>Introduction of Token Currency (1329)</p> <p>Proposed Khurasan Expedition (1329)</p> <p>Qarachil Expedition (1330)</p> <p>3. His five projects have led to revolts all around his empire. His last days were spent in checking the revolts</p> <p>1335 -- Madurai became independent (Jalaluddin Ahsan Shah)</p> <p>1336 -- Foundation of Vijayanagar (Harihar & Bukka), Warangal became independent (Kanhaiya)</p> <p>1341-47 -- Revolts of Sada Amirs & Foundation of Bahamani in 1347 (Hasan Gangu)</p> <p>He died in Thatta while campaigning in Sindh against Taghi, a Turkish slave.</p>
Firoz Shah Tughlaq	1351-1388	<p>1. He was a cousin of Mohammad-bin-Tughlaq. After his death, the nobles and the theologians of the court selected Firoz Shah as the next Sultan.</p> <p>2. Established of Diwan-i-Khairat (department for poor and needy people) and Diwan-I-Bundagan (department of slaves)</p> <p>4. Making Iqtadari system hereditary.</p> <p>5. Construction of canals for irrigation from the Yamuna to the city of Hissar</p> <p>6. From the Sutlej to the Ghaggar. From the Ghaggar to Firozabad</p> <p>7. From Mandvi and Sirmour Hills to Hansi in Haryana.</p> <p>8. Establishment of four new towns, Firozabad, Fatehabad, Jaunpur and Hissar.</p>

After Firoz Shah Tughlaq	1388-1414	<p>1. The Tughlaq dynasty would not survive much after Firoz Shah's death. The Malwa, Gujarat and Sharqi (Jaunpur) Kingdoms broke away from the Sultanate.</p> <p>2. Timur Invasion: (1398-99) Timur, a Turk, invaded India in 1398 during the reign of Muhammad Shah Tughlaq, the last ruler of the Tughlaq dynasty. His army mercilessly sacked and plundered Delhi.</p> <p>3. Timur returned to Central Asia, leaving a nominee to rule to Punjab which ended the Tughlaq dynasty.</p>
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Sayyid dynasty (1414 – 1450)

Emperor	Period
Khizr Khan	1414-21
Mubarak Shah	1421-33
Muhammad Shah	1421-43
Alauddin Alam Shah	1443-51

Ruler	Period of Rule	Important facts
Khizr Khan	1414-1421	<p>1. Timur's nominee captured Delhi and was proclaimed the new Sultan and the first of the Sayyid Dynasty.</p> <p>2. They ruled over Delhi and surrounding districts.</p>
Mubarak Shah	1421-1434	<p>1. He succeeded Khizr at the throne after his successful expeditions against Mewatis, Katehars and the Gangetic Doab area.</p> <p>2. He was killed by the nobles in his own court.</p>
Muhammad Shah	1434-1443	<p>1. The nobles put Muhammad Shah on the throne, but could not survive the in-fighting among the nobles in the court.</p> <p>2. He was authorized to rule a meagre area of around 30 miles and rest of the Sultanate was ruled by the nobles.</p>

Alam Shah	1443-1451	The last Sayyid king descended in favour of Bahlol Lodhi and he retired. Thus began the Lodhi dynasty, which confined to Delhi and a few surrounding areas.
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The Lodhi Dynasty (1451-1526 AD)

Ruler	Period of Rule	Important facts
Bahlol Lodhi	1451-88	<ol style="list-style-type: none"> 1. Bahlol Lodhi was one of the Afghan sardars who established himself in Punjab after the invasion of Timur 2. He founded the Lodhi dynasty. He founded the rule of the Lodhi dynasty by usurping the throne from the last of the Sayyid rulers. 3. He was a strong and brave ruler. He tried to restore the glory of Delhi by conquering territories around Delhi and after the continuous war for 26 years, he succeeded in extending his authority over Jaunpur, Rewail, Itawah, Mewar, Sambhal, Gwalior etc. 4. He was a kind and generous ruler. He was always prepared to help his subjects. 5. Though he was himself illiterate, he extended his patronage to art and learning. He died in 1488.
Sikandar Lodhi	1489-1517	<ol style="list-style-type: none"> 1. Sikandar Lodhi was the son of Bahlol Lodhi who conquered Bihar and Western Bengal. 2. He shifted his capital from Delhi to Agra, a city founded by him. 3. Sikandar was a fanatical Muslim and he broke the sacred images of the Jwalamukhi 4. Temple at Naga Kot and ordered the temples of Mathura to be destroyed. 5. He took a keen interest in the development of agriculture. He introduced the Gaz-i-Sikandari (Sikandar's yard) of 32 digits for measuring cultivated fields. 6. He was a staunch Sunni and a Muslim fanatic. He lacked religious tolerance. In the name of religion, he perpetuated untold cruelties on the Hindus.

Ibrahim Lodhi	1517-26	<p>1. He was the last king of Lodhi dynasty and the last Sultan of Delhi</p> <p>2. He was the son of Sikandar Lodhi</p> <p>3. The Afghan nobility was brave and freedom-loving people but it was because of its fissiparous and individualistic tendencies that the Afghan monarchy was weakened. Moreover, Ibrahim Lodhi asserted the absolute power of the Sultan.</p> <p>4. At last Daulat Khan Lodhi, the governor of Punjab invited Babur to overthrow Ibrahim Lodhi; Babur accepted the offer and inflicted a crushing defeat on Ibrahim Lodhi in the first battle of Panipat in 1526.</p> <p>5. No Sultan of India except Sultan Ibrahim had been killed on the battlefield.</p>
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Important Central Departments

Department	Function
Diwan-i-Risalat (Foreign Minister)	Department of appeals
Diwan-i-Ariz	Military department
Diwan-i-Bandagan	Department of slaves
Diwan-i-Qaza-i-Mamalik	Department of justice
Diwan-i-Isthiaq	Department of pensions
Diwan-i-Mustakhraj	Department of arrears
Diwan-i-Khairat	Department of charity
Diwan-i-Kohi	Department of agriculture
Diwan-i-Insha	Department of correspondence

Important Central Officials

Post	Role
Wazir	The Chief Minister of the State in Charge of revenue and finances, controlled by other departments.
Ariz-i-Mamlik	Head of Military department
Qazi	Legal Officer(dispensed civil law based on Muslim law Shariat)
Wakil-i-dar	Controller of the royal households.
Barid-i-mumalik	Head of the state news agency
Amir-i-majlis	Officer-in-charge of royal feasts, conference and festivals.
Majlis-i-am	Council of friends and officers consulted on important affairs of the state.
Dahir-i-mumalik	Head of the royal correspondence.
Sadr-us-sudur	Dealt with religious matters and endowments.
Sadr-i-Jahan	Officers-in-charge of the religious and charitable endowment.
Amir-i-dad	Public prosecutors
Naib wazir	Deputy Minister
Mushrif-i-mumalik	Accountant general

Mughal Empire

Mughal Empire		
1526 – 1530 AD	Babur	Founder of Mughal empire after the 1 st Battle of Panipat
1530 – 1540 AD 1555 – 1556 AD	Humayun	He was defeated by Sher Shah

1540 – 1555 AD	Sur Empire	Sher Shah defeated Humayun and ruled from 1540-45 AD
1556	2 nd Battle of Panipat	Akbar Vs. Hemu
1556 – 1605 AD	Akbar	Established Din-i-illahi, expanded Mughal empire
1605 – 1627 AD	Jehangir	Captain William Hawkins and Sir Thomas Roe visited the Mughal court
1628 -1658 AD	Shahjahan	The pinnacle of Mughal empire and art and architecture
1658 – 1707 AD	Aurangazeb	Beginning of the decline of Mughal empire
1707 – 1857 AD	Later Mughals	Decline and disintegration of the Mughal empire with gaining strength of the British

Babur (1526 - 1530)

- **Babur**, the founder of Mughal Empire in India, traced his ancestry to the Timurid dynasty.
- In 1517 Ibrahim Lodhi succeeded Sikander Lodhi.
- Embassies from Daulat Khan and Rana Sanga inviting Babur to displace Ibrahim Lodhi led to *the 1st Battle of Panipat* in 1526.
- Babur used an Ottoman (Rumi) device in this war.
- Babur also heavily used Gunpowder in this war, though it was known in India in earlier times.
- *The Battle of Khanwa* (1527) was fought between Rana Sanga and Babur. With the defeat of Sanga, Babur's position got strengthened in the Gangetic plains.
- He declared the war as a *Jihad* and assumed the title *Ghazi* after his victory.
- Babur composed Tuzuk-i-Baburi, a Masnavi and the Turkish translation of a well-known Sufi work. Tuzuk-i-Baburi was translated into Persian as Baburnama by Abdur Rahim Khankhana
- He built two mosques, one at Kabulibagh, Panipat and another in Sambhal, Rohilkhand

Humayun (1530 – 1540 and 1555 - 1556)

- Humayun became the Mughal Emperor on 29 December 1530 at the age of 23.
- In the Battle of Chausa, 1539, Humayun was defeated for the first time by Shershah Suri.

- In the next year (1540) Shershah completely defeated Humayun in the Battle of Kanauj and founded the Sur dynasty.
- After the lapse of 15 years, Humayun re-captured the Empire by defeating the last Sur ruler Sikandar Shah Suri in the Battle of Sirhind, 1555, after which he ruled only for 6 months.
- The period from 1540 to 1555 is known as the period of the temporary eclipse of the Mughal.
- Humayun died by an accidental fall from the staircase of his Library 'Shermandal' at the Puranakwila in Delhi on 24 January 1556.
- Humayun was an accomplished mathematician and astronomer. He earned the title *Insan-i-Kamil* (Perfect Man), among the Mughals
- Humayun's biography Humayun Namah was written by Humayun's sister Gulbadan Begum. The language used to write this biography was a mixture of Turkish and Persian.

Architecture during Humayun's Period

- The Purnakwila was constructed by Humayun but its construction was completed by Shershah.
- Humayun's tomb is situated in Delhi (the first building in India having double domes) which was built by Haji Begum
- In 1533 Humayun built the city of Dinpanah (world refuge) in Delhi.

Sher Shah Suri (Sur Empire)

- Shershah's original name was Farid.
- His family came to India from Afghanistan.
- In *the Battle of Chausa*, 1539, Sher Khan defeated Humayun for the first time and assumed the name Shershah.
- Later in 1540 he completely defeated Humayun in *the Battle of Kanauj* and founded the Sur dynasty.

Architecture:

- Shershah constructed the Grand Trunk Road from Sohargaon to Attock (Calcutta to Amritsar) He introduced the National Highway concept for the first time in India. Now the Grand Trunk Road is known as Shershah Suri Marg. Its part from Delhi to Amritsar is known as National Highway -1.
- He also built roads from Agra to Jodhpur and Chittoor and Lahore to Multan. He built Sarais at a distance of every two Kos. These sarais later developed into Market towns, Qasbas. They were also used as stages for news-services, Dak-Chowkis.
- He built the Purana Qila in Delhi (its Construction was started by Humayun) and his own Mausoleum (Tomb) at Sasaram in Bihar.
- He also constructed the Khooni Darwaza (blood-stained gate) the gateway of Firozshah Kotla in Delhi.

Economy and Administration

- He was the first ruler to introduce Silver *Rupiya* (one rupiya was equal to 64 dams) and gold coin *Ashrafi*.
- Administrative divisions:
 1. Iqta – Province under Haqim or Amin
 2. Sarkar – District under Shiqdar-i-Shiqadaran or Munsif-i-Munsifan
 3. Pargana – Taluk under Shiqdar or Munsif
 4. Gram – Village under Muqqadam or Amil

- He made local Muqaddams/Zamindars responsible for local crimes
- Hindi poet Malik Muhammed Jayasi completed his Padmavat, during his reign.

Mughal Emperors

Akbar (1556 - 1605)

Year	Significance
1556	Akbar ascends the throne at the age of 14
1556	2 nd Battle of Panipat between Hemu and Bairam Khan(khan-i-khannan). Hemu gets defeated in the battle
1560	Akbar becomes independent at the age of 18 and dismisses Bairam Khan
1564	Abolition of Jizyah tax
1571	Foundation of Fatehpur Sikri, near Agra, was laid
1574	Mansabdari system introduced
1575	Ibadatkhana was built
1576	Battle of Haldihatti fought between Rana Pratap and the Mughal army led by Raja Man Singh
1580	Dahsala Bandobast system introduced
1582	Din-i-illahi – a new religion was propounded by Akbar which was a synthesis of values taken from several religions like Hinduism, Islam, Jainism etc. It was a move against religious orthodoxy and bigotry. He followed the policy of <i>Sulh-kul</i> or peace to all.

- Akbar was an **illiterate person**, but he was a patron of men of eminence. He maintained a Scholastic Assembly (Navratnas) in his court. They included the following personalities.
- Abul Fazal: Akbar's court historian who wrote Akbar's biographical works Ain-i-Akbari and Akbar Namah.
- Abul Faizi: Persian poet and brother of Abul Fazal. He translated Mahabharata into Persian in name 'Razam Namah' and Bhaskaracharya's mathematical work Leelavati into Persian.
- Mian Tansen: His original name was Ram Thanu Pande. He was the court Musician of Akbar. He composed a Raga, Rajdarbari in honour of Akbar.
- Birbal: His real name was Mahesh Das. He was the court jester of Akbar.
- Raja Todarmal: Raja Todarmal was Akbar's finance or revenue minister. He formulated Akbar's revenue system Zabt and Dashala systems. Raja Todermal also translated Bhagavatapurana into Persian.
- Maharaja Man Singh: Akbar's military commander.
- Bhagawandas: Son of Bharmal

- Abdur Rahim Khankhana: Hindi Poet
- Mulla Do Pyaja

Administration

Land revenue

- Akbar started the *Annual assessment* system where land was assessed by *Qanungos* or hereditary holders of land and tax collected by *Karoris*.
- In 1580, a new system *Dahsala* (prices over the last 10 years) were calculated. The land was measured using the *Zabti* system which was an improvement over the Dahsala system. It was also known as Todarmal's *Bandobast*
- In *Batai* system, the production was divided in fixed proportions.
- In *Nasaq* system, rough calculation of Peasant's payments over the past years was calculated and the empire's share was fixed.
- Types of Cultivable Lands
 1. Polaj – land under cultivation every year
 2. Paratti – fallow land
 3. Chanchar – land fallow for 2-3 years
 4. Banjar – land fallow more than 2-3 years
- Taccavi – loans to the peasants
- Land divisions for the purpose of revenue
 1. Khalisa – lands kept separately to meet the expenses of the emperor
 2. Jagir – land was given to nobles or mansabdars to meet their expenses
 3. Inam – land was given to religious persons

Mansabdari System: This was introduced to maintain a huge army. Ranks (Mansabs) were awarded to nobles. They were divided into Zat (Personal status) and Sawar (Cavalryman required to maintain). Along with this, Daggh and Chehra system were also followed. Mansabdars were assigned Jagirs which they used to pay the salary of soldiers

Important Posts:

- Wazir/Diwan – Head of Revenue department
- Subedar – Governor of a province
- Mir Bakshi – head of Military who was also the head of nobility
- Barids – Intelligence officers
- Waqia-navis – news reporters
- Mir Saman – in charge of imperial households and royal workshops (Karkhanas)
- Chief Qazi – head of Judicial departments
- Chief Sadr – responsible for charitable and religious endowments
- Diwan-i-am – open durbar
- Ghusal Khana – private consultation chamber

Architecture during Akbar's period

- He built Agra Fort, Lahore Fort, Allahabad Fort, Humayun's tomb and Fatehpur Sikri near Agra.
- At Fatehpur Sikri, Akbar built Ibadat Khana or Hall of Prayer in which he called selected theologians and mystics with whom he discussed religious and spiritual topics.
- Akbar built Buland Darwaza at Fatehpur Sikri in 1601 to commemorate his victory over Gujarat.
- He opened Ibadat Khana to people of all religions and took liberal views in discussing religions.

Jahangir (1605 - 1627)

- Jahangir came to the throne in 1605. He issued 12 ordinances. He established *Zanjir-il-Adal* – Chain of Justice in Agra Fort and was known for his strict administration of Justice.
- He married Mehrunnisa, an Afghan widow in 1611 and Later he gave her the titles Noor Mahal (light of the palace), Noor Jahan (light of the world) and Padshah Begum.
- In 1606 Jahangir executed fifth Sikh Guru, Guru Arjun Dev because he helped Jahangir's son Prince Khusru to rebel against him.
- In 1609, Jahangir received *William Hawkins*, an envoy of King James I of England, who reached India to obtain trade concession.
- In 1615, *Sir Thomas Roe* reached the court of Jahangir as the first ambassador of James I of England in the court of Jahangir. As a result of his efforts, the first English factory was established at Surat in Gujarat.
- Period of Jahangir is considered as the **Golden Age of Mughal Painting**. Jahangir himself was a painter. Ustad Mansur and Abul Hassan and Bishan das were famous painters in the court of Jahangir.
- Jahangir wrote his autobiography Tuzukh-i-Jahangiri in the Persian language.
- Jahangir died in 1627 and was cremated at Shahdara in Lahore.

Architecture

1. Jahangir built Shalimar and Nishant Gardens in Srinagar.
2. He completed the tomb of Akbar at Sikandara
3. Jahangir introduced the vigorous use of Marble instead of red sandstone and use of Pietra dura for decorative purposes. Nurjahan built Itimad-ud-daula/Mirza Ghiyas Beg's Marble tomb at Agra
4. He built Moti Masjid at Lahore and his own mausoleum at Shahdara

Shah Jahan (1628 - 1658)

- Shah Jahan was born on 5th January 1592 at Lahore. His childhood name was Khurram. He ascended the throne in 1628.
- He married Arjumand Benu Begum, daughter of Asaf Khan, brother of Noor Jahan. She later came to be known as Mumtaz Mahal which means beloved of the Palace.
- Shahjahan destroyed the Portuguese settlements at Hoogly in 1631-32.
- The Gateway of Red Fort is the Lahore Gate. It is here at the Lahore Gate that the Prime Minister of India hoists the National Flag and addresses the nation on the Independence Day.
- In 1656 Shahjahan constructed the Jama Masjid in Delhi. It is the biggest masjid in India. The first masjid in India was constructed at Kodungallur in Kerala (Cheraman Palli) in 644 AD by Malik Ibn Dinar.
- Shah Jahan's period is known as the **Golden Age of Mughal Empire**.
- The Portuguese introduced European painting in India during the reign of Shah Jahan
- In 1658 Shah Jahan was imprisoned by his son Aurangzeb and he died in 1666, after eight years. His daughter Jahan Ara was also kept in prison along with him at the Agra Fort.
- Shah Jahan's son Dara Shikoh was a famous scholar. He translated Bhagavat Gita and Sixty Upanishads into Persian. He also wrote a book titled Mujm-ul-Behrain (Mingling of the Oceans) He also translated Atharva Veda into Persian.

- Shah Jahan was a famous lyricist who wrote in Hindi. The famous Peacock Throne was built by Shah Jahan. It was abducted from here by Nadir Shah in 1739 during his Indian invasion (Persian conqueror). Now it is kept at the London Tower Museum, Britain.
- French travellers Bernier and Tavernier, Italian travellers Nicoli Manucci, Peter Mundi visited India during Shah Jahan's period.

Architecture

- Shah Jahan's period is considered as the Golden Age of Mughal Architecture and Shah Jahan is known as the **Prince of Builders**.
- In 1631, he started the construction of Taj Mahal in memory of his wife and completed in 1653. **Ustad Iza**, a Turkish/ Persian was its architect. British administrator Fergusson called it 'a love in marble'
- In 1638 Shah Jahan built his new capital Shahjahanabad in Delhi and shifted the capital from Agra to there. He also built Takht-i-Taus or Peacock throne.
- In 1639, he started the construction of **Red Fort in Delhi** on the model of Agra fort built by Akbar. The Diwan-i- Aam, Diwan-i-Khas and the Moti Masjid are situated inside the Red Fort. The Moti Masjid in Agra was constructed by Shah Jahan.

Aurangzeb (1658 - 1707)

- Aurangzeb imprisoned his father and made himself the Padshah in 1658. But his actual coronation was conducted in 1659. He defeated Dara and crowned himself under the title "*Alamgir*". He was the last great Mughal Emperor after which the disintegration had started.
- Aurangzeb is known as 'Zinda Pir' or living saint because of his simple life.
- He was a staunch and orthodox Muslim who banned singing and dancing in the Royal court. He reintroduced Jizyah and Pilgrimage tax.
- In 1675, he executed 9th Sikh Guru, Guru Teg Bahadur because of his reluctance to accept Islam. Guru Gobind Singh, the last Sikh Guru, organized his followers under Khalsa to fight the tyranny of Aurangzeb. He was assassinated in 1708.
- Aurangzeb's son built **Bibi ka Makbara** in 1679 AD in memory of his mother Rabia-Durrani.
- The only building by Aurangzeb in Red Fort is Moti Masjid. He also built the Badshahi Masjid in Lahore.

Later Mughals

Year	Ruler	Significance
1707 – 12	Bahadur Shah I	Original name – Muazzam
1712 – 13	Jahandar Shah	Ascended the throne with the help of Zulfikar Khan
1713 – 19	Farrukh Siyar	Sayyid brothers helped him in ascending the throne
1719 – 48	Muhammad Shah	Nadir Shah raided India. Weak successor

1748 – 54	Ahmad Shah	Ahmad Shah Abdali raided India. Mughals ceded Punjab and Multan
1754 – 59	Alamgir II	Delhi was occupied by Ahmad Shah Abdali and later plundered
1759 – 06	Shah Alam II	Lived outside Delhi
1806 – 37	Akbar II	Pensioner of East India Company conferred the title Raja on Raja Ram Mohan Roy
1837 – 57	Bahadur Shah II	1857 Revolt took place under his nominal leadership. Was deported to Burma

Arrival of English

- The English East India Company was formed in 1599 under a charter granted by Queen Elizabeth in 1600. Jahangir granted a Farman to **Captain William Hawkins** permitting the English to erect a factory at Surat (1613).
- In 1615, **Sir Thomas Roe** succeeded in getting an imperial Farman to trade and establish a factory in all parts of the Mughal Empire by ruler Jahangir.
- In 1690, a factory was established at Suttanati by **Jab Charnock**. In 1698, following the acquisition of zamindari of three villages of **Suttanati, Kalikata** and **Govindpur**, the city of Calcutta was founded. Fort William was set-up in 1700.
- In 1717, John Surman obtained a Farman from Farrukhsiyar, which gave large concessions to the company. This Farman has been called the Magna Carta of the Company.
- **Battle of Plassey** (1757) English defeated Sirajuddaula, the Nawab of Bengal.
- **Battle of Buxar** (1764) Captain Munro defeated joint forces of Mir Qasim (Bengal), Shujauddaula (Awadh) and Shah Alam II (Mughal).

The Revolt of 1857

The Revolt of 1857 is of steppingstone and is regarded as the primary outburst of resentment of simmering anger due to the prevailing discontent against the Britishers. Many revolts took place later such as battles of Plassey and Buxar, which are regarded as the landmark and decisive battles in shaping the modern historical regime.

The genesis of the revolt:

- The revolt was started by the soldiers and later spread across the country by peasants, artisans, and so on. The soldiers had worked for the East India Company and sacrificed their lives for the sake of others.
- People of different religions of India came together and fought united for one cause in this revolt.

Nature of the revolt

- Revolt of 1857 began as a revolt of the sepoys but eventually secured the participation of the masses.
- V.D. Savarkar called 1857 revolt as the First War of Indian Independence.
- Dr S.N. Sen describes it as "having begun as a fight for religion but ended as a war of independence."
- Dr R.C. Majumdar considers it as neither the first, nor national, nor a war of independence.
- As per some British historians, it was just a peasant sepoy mutiny.

Important facts of the Revolt

- Meerut incident
- 19th Berhampur Native Infantry refused to use the newly introduced Enfield rifle and mutiny broke out in February 1857, later dissolved in Mar' 1857.
- The 34th Native Infantry's young sepoy, Mangal Pandey, fired at his unit's sergeant major at Barrackpore.
- The 7th Awadh Regiment was also disbanded
- Meerut rose to revolt May 10, they released their imprisoned comrades, killed their officers and moved to Delhi after sunset.
- Delhi- Centre of the Great Revolt

Leaders of the revolt

- At **Delhi**, the symbolic leadership was to the Mughal emperor, Bahadur Shah, but the real command was led by **General Bakht Khan**.
- **Kanpur** rose under **Nana Saheb, Tantia Tope, AZimullah Khan**. Sir Hugh Wheeler, commanding the station, surrendered. Nana Saheb declared himself the Peshwa and Bahadur Shah as Emperor of India
- **Begum Hazrat Mahal** took over the reign of **Lucknow** and Birjis Qadir, her son, was declared Nawab. Henry Lawrence, the British resident, was killed. The remaining Europeans were evacuated by Sir Colin Campbell, the new commander - in - chief.
- At **Bareilly**, **Khan Bahadur**, in **Bihar**, **Kunwar Singh**, Zamindar of Jagdishpur and **Maulvi Ahmadullah of Faizabad** led the revolt at their respective places.
- **Rani Laxmibai**, the most outstanding leader of the revolt, was driven out of **Jhansi** with the application of Lapse's Doctrine as Lord Dalhousie, the Governor-General refused to allow her adopted son to succeed to the throne.

INDIAN NATIONAL MOVEMENT

EMERGENCE OF INDIAN NATIONAL CONGRESS (1885)

- Allan Octavian Hume, a retired civil servant in the British Government took the initiative to form an all-India organization.
- Thus, the Indian National Congress was founded and its first session was held at Bombay in 1885.
- The history of the Indian National Movement can be studied in three important phases:
 - The phase of moderate nationalism (1885-1905) when Congress continued to be loyal to the British crown.
 - The years 1906-1916 witnessed- Swadeshi Movement, the rise of militant nationalism and the Home Rule Movement. The repressive measures of the British gave rise to extremists within Congress like Bipin Chandra Pal, Bal Gangadhar Tilak and Lala Lajpat Rai (Lai, Bal, Pal), along with Aurobindo Ghosh

- The period from 1917 to 1947 is known as the Gandhian era.

Important Sessions of Indian National Congress

Year	Venue	President
1885	Bombay	W.C.Bannerji
1886	Calcutta	Dadabhai Naoroji
1893	Lahore	"
1906	Calcutta	"
1887	Madras	Badruddin Tyyabji (first Muslim President)
1888	Allahabad	George Yule (first English President)
1889	Bombay	Sir William Wedderburn
1890	Calcutta	Sir Feroze S.Mehta
1895, 1902	Poona, Ahmedabad	S.N.Banerjee
1905	Banaras	G.K.Gokhale
1907, 1908	Surat, Madras	Rasbehari Ghosh
1909	Lahore	M.M.Malviya
1916	Lucknow	A.C.Majumdar (Reunion of the Congress)
1917	Calcutta	Annie Besant (first woman President)
1919	Amritsar	Motilal Nehru
1920	Calcutta (sp.session)	Lala Lajpat Rai
1921,1922	Ahmedabad, Gaya	C.R.Das
1923	Delhi (sp.session)	Abdul Kalam Azad (youngest President)
1924	Belgaon	M.K.Gandhi
1925	Kanpur	Sarojini Naidu (first Indian woman President)
1928	Calcutta	Motilal Nehru (first All India Youth Congress Formed)
1929	Lahore	J.L.Nehru (Poorna Swaraj resolution was passed)

1931	Karachi	Vallabhbhai Patel (Here, resolution on Fundamental rights and the National Economic Program was passed)
1932, 1933	Delhi, Calcutta	(Session Banned)
1934	Bombay	Rajendra Prasad
1936	Lucknow	J.L.Nehru
1937	Faizpur	J.L.Nehru (first session in a village)
1938	Haripura	S.C.Bose (a National Planning Committed set-up under J.L.Nehru).
1939	Tripuri	S.C.Bose was re-elected but had to resign due to protest by Gandhiji (as Gandhiji supported Dr.Pattabhi Sitaramayya). Rajendra Prasad was appointed in his place.
1940	Ramgarh	Abdul Kalam Azad
1946	Meerut	Acharya J.B.Kriplani
1948	Jaipur	Dr.Pattabhi Sitaramayya.

Moderate Nationalism

- **Surendranath Banerjee:** was called the Indian Burke. He firmly opposed the Partition of Bengal. He founded the Indian Association (1876) to agitate for political reforms. He had convened the Indian National Conference (1883) which merged with the Indian National Congress in 1886.
- **Subramanya Aiyar** preached nationalism through the Madras Mahajana Sabha. He also founded the Hindu and Swadesamitran.
- **Dadabhai Naoroji** was known as the Grand Old Man of India. He is regarded as India's unofficial Ambassador in England. He was the first Indian to become a Member of the British House of Commons.
- **Gopal Krishna Gokhale** was regarded as the political guru of Gandhi. In 1905, he founded the **Servants of India Society** to train Indians to dedicate their lives to the cause of the country.

Indian National Movement (1905-1917)

- The period from 1905 was known as the era of extremism in the Indian National Movement.

- The extremists or aggressive nationalists believed that success could be achieved through bold means.
- The important extremist leaders were Lala Lajpat Rai, Bal Gangadhar Tilak, Bipin Chandra Pal and Aurobindo Ghosh.

Leaders of the Extremists

- The extremists were led by Bala Gangadhar Tilak, Lala Lajpat Rai, Bipin Chandra Pal and Aurobindo Ghosh
- Bal Gangadhar Tilak is regarded as the real founder of the popular anti-British movement in India. He was known as 'Lokamanya'. He attacked the British through his weeklies The Maratha and the Kesari. He was jailed twice by the British for his nationalist activities and in 1908 deported to Mandalay for six years. He set up the Home Rule League in 1916 at Poona and declared "Swaraj is my birth-right and I will have it."
- Lala Lajpat Rai is popularly known as the 'Lion of Punjab'. He played an important role in the Swadeshi Movement. He founded the Indian Home Rule League in the US in 1916. He was deported to Mandalay on the ground of sedition. He received fatal injuries while leading a procession against the Simon Commission and died on November 17, 1928.
- Bipin Chandra Pal began his career as a moderate and turned an extremist.
- Aurobindo Ghosh was another extremist leader and he actively participated in the Swadeshi Movement.
- He was also imprisoned. After his release, he settled in the French territory of Pondicherry and concentrated on spiritual activities

PARTITION OF BENGAL (1905)

- Curzon announced the partition of Bengal.
- The reason for partition was given as an attempt to improve administration.
- But the real aim was to 'Divide and Rule'. The partition was done in order to create a separate State for Muslims and so introduce the poison of communalism in the country.

Swadeshi Movement

- The Swadeshi Movement involved programmes like the boycott of government service, courts, schools and colleges and of foreign goods, Promotion of Swadeshi goods, Promotion of National Education through the establishment of national schools and colleges.
- It was both a political and economic movement
- In Bengal, even the landlords joined the movement
- The women and students took to picketing. Students refused using books made of foreign paper.
- It was Bal Gangadhar Tilak who realized the importance of boycott as a weapon that could be used to paralyze the whole British administrative machinery in India.
- The boycott and Swadeshi movements were instrumental in the establishment of swadeshi enterprises - textile mills, banks, hosiery, tanneries, chemical works and insurance companies. Swadeshi stores were opened.
- This made the British reverse the partition of Bengal and unite it in 1911.

Hind Swaraj

- When the movement against the partition of Bengal was at its height the annual session of the Congress was held at Calcutta in 1906 under the president ship of Dadabhai Naoroji.

- This session is very important because of the conciliation between the Moderates and Extremist
- The Congress condemned the Partition of Bengal. In the words of DadaBhai Naoroji, it is a bad blunder of England.
- Promotion of education was declared as the aim of Congress.
- The Swadeshi and the Boycott were accorded full support by the Congress. For the first time Boycott was authorised to be used as a political weapon.

Formation of Muslim League (1906)

- In December 1906, during the Muhammadan Educational conference in Dacca, Nawab Salim Ullah Khan raised the idea of establishing a Central Muhammadan Association to take care of Muslim interests.
- Accordingly, on 30th December 1906, the All India Muslim League was founded. Another prominent person, Aga Khan was chosen as its president.

Surat Session (1907)

- The INC split into two groups -The extremists and The moderates, at the Surat session in 1907.
- Extremists were led by Bal, Pal, Lai while the moderates by G.K. Gokhale.
- Controversy arose over the elected president, Ras Bihari Ghosh, as extremists didn't accept him.
- Extremists wanted Lala Lajpat Rai to be chosen.
- The government after this launched a massive attack on extremists by suppressing their newspapers and arresting their leaders.

MORLEY-MINTO REFORMS (1909)

- The Council Act of 1909 was an extension of the 1892 reforms, also known as the Morley-Minto Reforms after the names of the then Secretary of State (Lord Morley) and the then Viceroy (Lord Minto).
- It increased the members of the Legislative Assembly from sixteen to sixty.
- A few non-elected members were also added.
- Though the members of the Legislative Council were increased, they had no real powers. They remained mainly advisory in character.
- They could not stop any bills from being passed. Nor did they have any power over the budget.
- The British made another calculated move to sow the seed of communalism in Indian politics by introducing separate electorates for the Muslims.
- This meant that from the constituencies dominated by Muslims only Muslim candidates could be elected.
- Hindus could only vote for Hindus, and Muslims could only vote for Muslims.
- Many leaders protested against this communal electorate policy of the British to 'Divide and Rule'.

Annulment of Bengal Partition

- It was decided to annul the partition of Bengal in 1911 mainly to curb the menace of revolutionary terrorism.
- The annulment came as a rude shock to the Muslim political elite.
- It was also decided to shift the capital to Delhi as a sop to the Muslims, as it was associated with Muslim glory, but the Muslims were not pleased.
- Bihar and Orissa were taken out of Bengal and Assam were made a separate province.

Ghadar Party (1913)

- Formed by Lala Hardayal, Taraknath Das and Sohan Singh Bhakna.
- The name was taken from a weekly paper, Ghadar, which had been started on November 1, 1913 to commemorate the 1857 revolt.
- HQ was at San Francisco.
- The outbreak of the First World War provided the Ghadarites with an opportunity to free India from a Government which was indifferent to their cause.
- They began to return to India in thousands for a coordinated revolt in collaboration with the Bengal revolutionaries. Their plan was foiled at the last moment due to treachery.

Komagata Maru Incident

- The importance of this event lies in the fact that it created an explosive situation in Punjab.
- Komagata Maru was the name of a ship which was carrying 370 passengers, mainly Sikh and Punjabi Muslim would-be immigrants, from Singapore to Vancouver.
- They were turned back by Canadian authorities after two months of privation & uncertainty.
- It was generally believed that the Canadian authorities were influenced by the British Government.
- The ship finally anchored at Calcutta in September 1914 but the inmates refused to board the Punjab-bound train.
- In the ensuing with the police near Calcutta, 22 persons died.
- Inflamed by this and with the outbreak of the War, the Ghadr leaders decided to launch a violent attack on British rule in India.
- They urged fighters to go to India. Bengal revolutionaries were contacted; Political dacoities were committed to raising funds mainly in Punjab.
- Thus, an explosive situation was created in Punjab.

NATIONAL MOVEMENT DURING THE FIRST WORLD WAR

- The First World War started in the year 1914.
- This War was fought among the nations of Europe to get the colonial monopoly. During wartime, the British Government made an appeal to the Indian leaders to join hands with them in their time of crisis.
- Indian leaders agreed but they put their own terms and conditions i.e. after the war was over, the British government would give Constitutional (legislative and administrative) powers to the Indian People.
- Unfortunately, the steps taken by the British government during World War I created unrest among the Indian people. This was because the British government had taken a huge loan during wartime which they had to repay.
- They increased the rent from the land, i.e. lagan. They forcefully recruited Indians in the British Army.
- They increased the price of necessary goods and imposed taxes on personal and professional income.
- As a result, they had to face protest from Indian society.
- Farmers and workers of Champaran, Bardoli, Kheda and Ahmedabad actively protested against the exploitative policies of the British government.
- Lakhs of students left schools and colleges. Hundreds of lawyers gave up their practice. Women also significantly contributed to this movement and their participation became wider with the emergence of Gandhi.

- The boycott of foreign cloth became a mass movement, with thousands of bonfires of foreign cloth lighting the Indian sky.

Lucknow Session (1916)

- The 31st Session of the Congress was held at Lucknow in 1916.
- It was presided over by the Ambica charan Majumdar who was a prominent lawyer and was actively associated with the Congress since its birth.

Home Rule League Movement 1916

- By early 1915, Annie Besant had launched a campaign to demand self-government for India after the war on the lines of white colonies
- She campaigned through her newspapers, New India & Commonweal, and through public meetings and conferences
- Two Home Rule Leagues were established, one by BG Tilak at Poona in April 1916 and the other by Mrs Annie Besant at Madras in September 1916
- Tilak's Movement concentrated on Maharashtra (excluding Bombay), Karnataka, Central Provinces and Berar
- Annie Besant's Movement covered the rest of India (including Bombay)

Complete List of Newspapers and Journals during British India

Name of the Paper/Journal	Year and Place from which Published	Name of the Founder/Editor
<i>Bengal Gazette</i>	1780, Calcutta	James Augustus Hickey
<i>Sambad Kaumudi</i> (weekly in Bengali)	1821	Raja Ram Mohan Roy
<i>Mirat-ul Akbar</i> (First journal in Persian)	1822, Calcutta	Raja Ram Mohan Roy
<i>Banga-Duta</i> (A weekly in four languages- English, Bengali, Persian, Hindi)	1822, Calcutta	Raja Ram Mohan Roy and Dwarkanath Tagore

Bombay Times (from 1861 onwards, The Times of India)	1838, Bombay	Robert Knight and Thomas Bennett
<i>Rast Goftar</i> (A Gujarati fortnightly)	1851	Dadabhai Naoroji
Hindu Patriot	1853, Calcutta	Girishchandra Ghosh
<i>Somprakash</i>	1858, Calcutta	Dwarkanath Vidyabhushan
Indian Mirror	1862, Calcutta	Devendranath Tagore and NN Sen
<i>Bengalee</i> (this and <i>Amrita Bazar Patrika</i> - the first vernacular papers)	1862, Calcutta	Girishchandra Ghosh (taken over by SN Banerjea in 1879)
National Paper	1865, Calcutta	Devendra Nath Tagore
Amrita Bazar Patrika (Bengali in the beginning and later on English Daily)	1868, Jessore District	Sisirkumar Ghosh and Motilal Ghosh
Bangadarshana	1873, Calcutta	BankimChandra Chatterjee
The Statesman	1875, Calcutta	Robert Knight
The Hindu	1878, Madras	GS Aiyar, Viraraghavchari and Subba Rao Pandit
The Tribune	1881, Lahore	Dayal Singh Majeetia
Sudharak		Gopal Ganesh Agarkar
Hindustani and Advocate		GP Verma

Kesari (Marathi daily) and Maharatta (English Weekly)	1881, Bombay	Tilak, Chiplunkar, Agarkar
Swadeshamitran	Madras	GS Aiyar
Paridasak (Weekly)		Bipin Chandra Pal
Yugantar	1906, Bengal	Barindra Kumar Ghosh and Bhupendranath Dutta
Sandhya	1906, Bengal	Brhamanabandab Upadhyay
Indian Sociologist	London	Syamji Krishna Verma
Bande Matram	Parish	Madam Bhikaji Cama
Free Hindustan	Vancouver	Taraknath Das
Ghadr	San Francisco	Ghadar Party
Talwar	Berlin	Virendrnath Chattopadhyay
Bombay Chronical (a daily)	1913, Bombay	Pherozshahs Mehta, BG Horniman
The Hindustan Times	1920, Delhi	KM Pannikkar as a part of Akali Dal Movement
Leader (in English)		Madan Mohan Malviya
Bahishkrit Bharat	1927	BR Ambedkar
Kudi Arasu (Tamil)	1910	E.V. Ramaswamy Naicker (Periyar), SS Mirajkar, KN Joglekar
Bandi Jivan	Bengal	Sachindranath Sanyal
National Herald	1938, Delhi	Jawaharlal Nehru

Tagzin-ul-Akhlaq (journal)	1871	Sir Syed Ahmed Khan
Kesari (Marathi Daily Newspaper)	1881	Bal Gangadhar Tilak
Comrade (Weekly English Newspaper)	1911	Maulana Mohammad Ali
Al- Balagh and Al-Hilal (Both urdu weekly newspaper)	1912	Abul Kalam Azad
Pratap (Hindi Newspaper)	1913	Ganesh Shankar Vidyarthi
Independent (Newspaper)	1919	Motilal Nehru
Moon Nayak (Marathi Weekly)	1920	BR Ambedkar
Young India (Weekly Journal)	1919	M K Gandhi
Nav Jeevan (Weekly Newspaper)	1929	M K Gandhi
Harijan (Weekly Journal)	1931	M K Gandhi
Hindustan Dainik	1936	Madan Mohan Malviya

Indian National Movement (1917-1947)

Champaran Satyagraha (1917)

- The first civil disobedience movement by Gandhi in the freedom struggle.
- Persuaded by Rajkumar Shukla, an indigo cultivator, Gandhi went to Champaran in Bihar to investigate the conditions of the farmers there.
- Champaran struggle is called the first experiment on Satyagraha by Gandhi.
- It was during this time that Gandhi was given the names 'Bapu' and 'Mahatma' by the people.

Ahmedabad Mill Strike (Feb-March 1918)

- The next scene of Gandhiji's activity was in 1918 at Ahmedabad where an agitation had been going on between the labourers and the owners of a cotton textile mill for an increase of pay.
- While Gandhiji was negotiating with the mill owners, he advised the workers to go on strike and to demand a 35% increase in wages.
- The strike was withdrawn and retrieval later awarded the 35% increase that the workers had demanded.
- Ambalal Sarabhai's sister, **Anasuya Behn**, was one of the main lieutenants of Gandhiji in this struggle in which her brother and Gandhiji's friend was one of the main advisories.

Kheda Satyagraha (March 1918)

- 1918 was a year of failed crops in the Kheda district of Gujarat due to droughts.
- As per law, the farmers were entitled to remission if the produce was less than a quarter of the normal output.
- Sardar Vallabhbhai Patel, under Gandhi's guidance, led the farmers in protest against the collection of taxes in the wake of the famine.

Rowlatt Act (1919)

- In 1917, a committee was set up under the presidency of Sir Sydney Rowlatt to look into the militant Nationalist activities
- Rowlatt Act was passed in March 1919 by the Central Legislative Council
- As per this Act, any person could be arrested on the basis of suspicion.
- No appeal or petition could be filed against such arrests.
- This Act was called the Black Act and it was widely opposed.
- An all-India hartal was organized on 6 April 1919.
- Meetings were held all over the country.
- Mahatma Gandhi was arrested near Delhi.
- Two prominent leaders of Punjab, Dr Satya Pal and Dr Saifuddin Kitchlew, were arrested in Amritsar.

Jallianwala Bagh Massacre (13 April 1919)

- The Jallianwala Bagh Massacre took place on 13 April 1919 and it remained a turning point in the history of India's freedom movement
- In Punjab, there was unprecedented support to the Rowlatt Satyagraha
- On 13th April, the Baisakhi day (harvest festival), a public meeting was organized at the Jallianwala Bagh (garden)
- Dyer marched in and without any warning opened fire on the crowd
- According to the official report, 379 people were killed and 1137 wounded in the incident.
- Rabindranath Tagore renounced his knighthood as a protest

Khilafat Movement (1920)

- The chief cause of the Khilafat Movement was the defeat of Turkey in the First World War.
- The harsh terms of the Treaty of Sevres (1920) were felt by the Muslims as a great insult to them.
- The whole movement was based on the Muslim belief that the Caliph (the Sultan of Turkey) was the religious head of the Muslims all over the world
- Maulana Abul Kalam Azad, M.A. Ansari, Saifuddin Kitchlew and the Ali brothers were the prominent leaders of this movement.

- Mahatma Gandhi was particularly interested in bringing the Hindus and the Muslims together to achieve the country's independence.
- The Khilafat Movement merged with the Non-Cooperation Movement launched by Mahatma Gandhi in 1920:

Non-Cooperation Movement (1920-1922)

- It was approved by the INC at the Nagpur session in December 1920.
- The programmes of the Non-Cooperation Movement were:
 - Surrender of titles and honorary positions
 - Resignation of membership from the local bodies.
 - Boycott of elections held under the provisions of the 1919 Act
 - Boycott of government functions.
- Boycott of courts, government schools and colleges.
- Boycott of foreign goods
- Establishment of national schools, colleges and private panchayat courts.
- Popularizing Swadeshi goods and khadi.
- National schools such as the Kashi Vidyapeeth, the Bihar Vidyapeeth and the Jamia Millia Islamia were set up.
- No leader of the Congress came forward to contest the elections for the Legislatures
- In 1921, mass demonstrations were held against the Prince of Wales during his tour of India.
- Most of the households took to weaving cloths with the help of charkhas.
- But the whole movement was abruptly called off on 11th February 1922 by Gandhi following the Churi Chaura incident
- In the Gorakhpur district of U.P. Earlier on 5 th February an angry mob set fire to the police station at Churi Chaura and twenty-two policemen were burnt to death

Swaraj Party

- Leaders like Motilal Nehru and Chittaranjan Das formed a separate group within the Congress known as the Swaraj Party on 1 January 1923.
- In the Central Legislative Council Motilal Nehru became the leader of the party whereas in Bengal the party was headed by C.R. Das.
- After the passing away of C.R. Das in June 1925, the Swaraj Party started weakening.

Simon Commission

- In November 1927 the British Government appointed the Simon Commission to look into the working of the Government of India Act of 1919 and to suggest changes.
- The Commission consisted of Englishmen without a single Indian representative
- The Commission arrived in India in Feb 1928 and was met with countrywide protests.
- Peaceful demonstrators were beaten by the police in many places. Lala Lajpat Rai was assaulted and soon after died.

Nehru Report (1928)

- In the meanwhile, the Secretary of State, Lord Birkenhead, challenged the Indians to produce a Constitution
- The challenge was accepted by the Congress, which convened an all-party meeting on 28 February 1928
- A committee consisting of eight was constituted to draw up a blueprint for the future Constitution of India.
- It was headed by Motilal Nehru

Civil Disobedience Movement (1930-1934)

- In the prevailing atmosphere of restlessness, the annual session of the Congress was held at Lahore in December 1929.
- During this session presided over by Jawaharlal Nehru the Congress passed the Poorna Swaraj resolution
- Moreover, as the government failed to accept the Nehru Report, Congress gave a call to launch the Civil Disobedience Movement.
- The Congress had also observed January 26, 1930, as the Day of Independence.
- The same date later became the Republic Day when the Indian Constitution was enforced in 1950.

Dandi March

- On 12th March 1930, Gandhi began his famous March to Dandi with his chosen 79 followers to break the salt laws.
- He reached the coast of Dandi on 5 April 1930 after marching a distance of 200 miles
- On 6 April formally launched the Civil Disobedience Movement by breaking the salt laws.
- On 9 April, Mahatma Gandhi laid out the programme of the movement which included making of salt in every village in violation of the existing salt laws;

Round Table Conferences

First Round Table Conference

- Held in November 1930 at London and it was boycotted by the Congress.
- In January 1931 in order to create a conducive atmosphere for talks.
- The government lifted the ban on the Congress Party and released its leaders from prison.
- On 8 March 1931, the Gandhi-Irwin Pact was signed.
- As per this pact, Mahatma Gandhi agreed to suspend the Civil-Disobedience Movement and participate in the Second Round Table Conference.
- In September 1931, the Second Round Table Conference was held at London
- Mahatma Gandhi participated in the Conference but returned to India disappointed as no agreement could be reached on the demand for complete independence and on the communal question.
- In January 1932, the Civil-Disobedience Movement was resumed.
- The government responded to it by arresting Mahatma Gandhi and Sardar Patel and by reposing the ban on the Congress party

Communal Awards

- The Communal Award was announced by the British Prime Minister, Ramsay MacDonald, in August 1932.

Poona Pact (1932)

- On 16 August 1932, the British Prime Minister Ramsay MacDonald made an announcement, which came to be as the Communal Award.
- Mahatma Gandhi protested against the Communal Award and went on a fast unto death in the Yeravada jail on 20 September 1932.
- Finally, an agreement was reached between Dr Ambedkar and Gandhi.
- This agreement came to be called the Poona Pact. The British Government also approved of it.
- Accordingly, 148 seats in different Provincial Legislatures were reserved for the Depressed Classes in place of 71 as provided in the Communal Award.

Third Round Table Conference (1932)

- Congress again did not take part in it.
- Nonetheless, in March 1933, the British Government issued a White Paper.
- Which became the basis for the enactment of the Government of India Act, 1935.

Government of India Act, 1935

Main features of this act were -

- Provision for the establishment of an All India Federation at the Centre, consisting of the Provinces of British India and the Princely States
- It did not come into existence since the Princely States refused to give their consent for the union
- Division of powers into three lists viz. Federal, Provincial and Concurrent.
- Introduction of Diarchy at the Centre
- The Governor-General and his council administered the "Reserved subjects"
- The Council of Ministers were responsible for the "Transferred" subjects
- Abolition of Diarchy and the introduction of Provincial Autonomy in the provinces.
- The Governor was made the head of the Provincial Executive but he was expected (not bound) to run the administration on the advice of the Council of ministers.
- Provincial Legislatures of Bengal, Madras, Bombay, United Provinces, Bihar and Assam were made bicameral.
- Extension of the principle of Separate Electorates to Sikhs, Europeans, Indian Christians and Anglo Indians
- Establishment of a Federal Court at Delhi with a Chief Justice and 6 judges.

Second World War & National Movement

- In 1937 elections were held under the provisions of the Government of India Act of 1935
- Congress Ministries were formed in seven states of India.
- On 1 September 1939, the Second World War broke out.
- The British Government without consulting the people of India involved the country in the war.
- As a mark of protest the Congress Ministries in the Provinces resigned on 12 December 1939
- The Muslim League celebrated that day as the Deliverance Day
- In March 1940 the Muslim League demanded the creation of Pakistan.

August offer

During the course of the 2nd World War, in order to secure the cooperation of the Indians, the British Government made an announcement on 8 August 1940, which came to be known as the 'August Offer', which proposed –

- Dominion status as the objective for India.
- Expansion of viceroy's executive council & setting up of a constituent assembly after the war consisting of Indians to decide their constitution according to their social, economic and political conceptions subject to fulfilment of the obligation of the Government regarding defence, minority rights, treaties with states & all India services
- No future constitution to be adopted without the consent of minorities.

Individual Satyagraha

- In order to secure the cooperation of the Indians, the British Government made an announcement on 8 August 1940,
- The August Offer envisaged that after the War a representative body of Indians would be set up to frame the new Constitution.
- Acharya Vinoba Bhave was the first to offer Satyagraha and he was sentenced to three months imprisonment.
- Jawaharlal Nehru was the second Satyagrahi and imprisoned for four months.
- The individual Satyagraha continued for nearly 15 months.

Cripps Mission (1942)

- In the midst of worsening wartime international situation, the British Government in its continued effort to secure Indian cooperation sent Sir Stafford Cripps to India on 23 March 1942. This is known as Cripps Mission.

Quit India Movement (1942-1944)

- The failure of the Cripps Mission and the fear of an impending Japanese invasion of India led Mahatma Gandhi to begin his campaign for the British to quit India.
- Mahatma Gandhi believed that an interim government could be formed only after the British left India and the Hindu-Muslim problem sorted out.
- The All India Congress Committee met at Bombay on 8 August 1942 and passed the famous Quit India Resolution.
- On the same day, Gandhi gave his call of 'do or die'
- On 8th and 9th August 1942, the government arrested all the prominent leaders of the Congress.
- Mahatma Gandhi was kept in prison at Poona.
- Pandit Jawaharlal Nehru, Abul Kalam Azad, and other leaders were imprisoned in the Ahmednagar Fort.
- At this time, leadership was provided by Ram Manohar Lohia, Achyuta and S.M. Joshi.
- The role of Jayaprakash Narain in this movement was important.
- A large number of students also left their schools and colleges to join the movement.
- The youth of the nation also participated in this movement with patriotism.
- In 1944 Mahatma Gandhi was released from jail.
- Quit India Movement was the final attempt for the country's freedom.
- The British Government ordered for 538 rounds of firing. Nearly 60,229 persons were jailed.
- At least 7,000 people were killed.
- This movement paved the way for India's freedom. It aroused among Indians the feelings of bravery, enthusiasm and total sacrifice.

Rajgopalachari Formula

- Rajagopalachari, the veteran Congress leader, prepared a formula for Congress-League cooperation, accepted to Gandhi.
- It was a tacit acceptance of the League's demand for Pakistan.
- Hindu leaders led by Vir Savarkar condemned the CR Plan.

Desai-Liaquat Pact

- Bhulabhai Desai, leader of the Congress with Liaquat Ali Khan, leader of the Muslim drafted a proposal for the formation of an interim government at the centre, consisting of —
 - an equal number of persons nominated by the Congress & League in the central legislature
 - 20% reserved seats for minorities
- No settlement could be reached between the Congress and the League on these lines
- But the fact that a sort of parity between the Congress and the League was decided upon, which had far-reaching

Wavell Plan

- A conference was convened by the viceroy, Lord Wavell; at Shimla in June 1945
- Aimed to reconstruct the governor general's executive council pending the preparation of a new constitution.

Indian National Army=-

- On 2 July 1943, Subhas Chandra Bose reached Singapore and gave the rousing war cry of 'Dilli Chalo'
- He was made the President of Indian Independence League and soon became the supreme commander of the Indian National Army.
- The names of the INA's three Brigades were the Subhas Brigade, Gandhi Brigade and Nehru Brigade
- The women's wing of the army was named after Rani Lamiae
- The Indian National Army marched towards Imphal after registering its victory over Kohima.
- After Japan's surrender in 1945
- The INA failed in its efforts. Under such circumstances, Subhas went to Taiwan.
- Then on his way to Tokyo, he died on 18 August 1945 in a plane crash
- The trial of the soldiers of INA was held at Red Fort in Delhi
- Pandit Jawaharlal Nehru, Bhulabhai Desai and Tej Bahadur Sapru fought the case on behalf of the soldiers

Cabinet Mission (1946)

- After the Second World War, Lord Atlee became the Prime Minister of England.
- On 15 March 1946 Lord Atlee made a historic announcement in which the right to self-determination and the framing of a Constitution for India were conceded.
- Consequently, three members of the British Cabinet - Pethick Lawrence, Sir Stafford Cripps and A. V. Alexander - were sent to India. This is known as the Cabinet Mission.
- The Cabinet Mission put forward a plan for the solution of the constitutional problem.
- Provision was made for three groups of provinces to possess their separate constitutions.
- The Cabinet Mission also proposed the formation of a Union of India, comprising both British India and the Princely States.
- The Union would remain in charge of only foreign affairs, defence and communications. leaving the residuary powers to be vested in the provinces till a new government was elected.
- Both the Muslim League and the Congress accepted the plan.

- Consequently, elections were held in July 1946 for the formation of a Constituent Assembly.
- The Congress secured 205 out of 214 General seats.
- The Muslim League got 73 out of 78 Muslim seats.
- An Interim Government was formed under the leadership of Jawaharlal Nehru on 2 September 1946.

Mountbatten Plan (1947)

- On 20 February 1947, Prime Minister Atlee announced in the House of Commons the definite intention of the British Government to transfer power to responsible Indian hands.
- Thus, to effect the transference of that power Atlee decided to send Lord Mountbatten as Viceroy to India.
- Lord Mountbatten armed with vast powers became India's Viceroy on 24 March 1947.
- The partition of India and the creation of Pakistan appeared inevitable to him.
- After extensive consultation, Lord Mountbatten put forth the plan of partition of India on 3 June 1947.
- The Congress and the Muslim League ultimately approved the Mountbatten Plan. Indian Independence Act, 1947.
- The British Government accorded formal approval to the Mountbatten Plan by enacting the Indian Independence Act on 18 July 1947.
- The partition of the country into India and Pakistan would come into effect from 15 August 1947.

Revolutionary movements

Chapekar brothers (1897)

- This was the first political assassination of British officer post-1857.
- Damodar, Balkrishna and Vasudev Chapekar shot at WC Rand, Chairman of the Special Plague Committee.
- The Chapekar brothers were hanged.

Alipore Bomb Conspiracy (1908)

- Douglas Kingsford was a British Chief Magistrate who was the target of the bomb thrown at Muzaffarpur.
- Instead, two women died in the attack.
- Prafulla Chakki and Khudiram Bose, who threw the bomb. Prafulla Chakki committed suicide while Bose (18 years) caught and sentenced to death.
- Aurobindo Ghosh, Barin Ghosh, Kanailal Dutt and 30 other members of **Anushilan Samiti** were also tried in this case.

Curzon Wylie's assassination (1909)

- He was assassinated in London by Madan Lal Dhingra in the evening of 1 July 1909.
- Madan Lal Dhingra had close ties with the **Indian House**.

Howrah Gang Case (1910)

- Arrest and trials of 47 Bengali Indian Nationalist of Anushilan Samiti because of the murder of Inspector Shamsul Alam in Calcutta.
- He uncovered the revolutionary network of Anushilan Samiti that linked the murder and other robberies.

Delhi Lahore Conspiracy Case (1912)

- Assassination attempted on Lord Hardinge, the then Viceroy of India.

- On the occasion of the transfer of British capital from Calcutta to Delhi, a bomb was thrown into the viceroy's carriage. Lord Hardinge was injured and an Indian attendant was killed.
- it was led by Rash Bihari Bose and Sachin Chandra Sanyal.

The Ghadar Movement (1913)

- 1907 Lala Hardayal started a weekly called Ghadar.
- His association with more leaders led to the formation of the Ghadar party in 1913 in North America. This movement was planned to temper the loyalty of Indian troops, form secret societies and assassinate British officials etc.
- This movement was intensified because of the **Komagata Maru incident**.

Kakori Conspiracy (1925)

- Case of a train robbery near Kakori in Uttar Pradesh.
- It was led by the youth of **Hindustan Republican Association** including Ram Prasad Bismil, Chandrashekhar Azad, Thakur Roshan Singh, Ashfaqulla Khan and others.
- In 1924 Hindustan Republican Army was founded at Kanpur by Sachin Sanyal and Jogesh Chandra Chatterjee with an aim to organise armed revolution to overthrow colonial government.
- In September 1928 many of the major revolutionaries gathered at Firoz Shah Kotla, set up a new association by adding 'socialist' into their names.

Chittagong Armoury Raid (1930)

- It was led by Surya Sen and others were Loknath Bal, Kalpana Dutta, Ambika Chakraborty Subodh Roy etc. They were not able to raid arms but able to cut the telephones and telegraph wires.

Central Assembly Bomb Case (1929) and the Lahore Conspiracy Case (1931)

- Bhagat Singh, Sukhdev, Azad and Rajguru avenged the death of Lala Lajpat Rai by killing General Saunders in 1928.
- Batukeshwar Dutt and Bhagat Singh threw a bomb in the central assembly against the passage of public safety bill and trade dispute bill. The intention was to popularise the activities and philosophy.
- Bhagat Singh was arrested for the case of the killing of General Saunders; this was known as Lahore conspiracy case.
- After the trial, Bhagat Singh, Sukhdev and Rajguru executed by hanging in March 1931 and
- Chandrashekhar Azad also died the same year in February in the gun battle with the police in Allahabad.

Important Revolutionary Organisations

Name of Organisation	Year of Formation	Affected Area	Founders/Associated members

Anushilan Samiti	1902	Bengal region	Promodha Mitter, Jatindranath Banerjee, Barindra Kumar Ghosh and others.
Jugantar Party	Active during the first World War	Bengal region	Aurobindo Ghosh, Barin Ghosh and Jatindranath Mukherjee or Bagha Jatin
Mitra Mela	1899	Nasik, Bombay and Poona region	Savarkar and his brother
Abhinav Bharat/ Young India Society (Mitra mela merged into this)	1904	Nasik, Bombay and Poona region	Savarkar and his brother
Swadesh Bandhab Samiti	1905	Bengal region	Ashwini Kumar Dutta
Hindustan Republican Association (HRA)	1924	Kanpur	Sachindra Nath Sanyal, Narendra Mohan Sen, Pratul Ganguly
Hindustan Socialist Republican Association Army (HSRA)	1928	New Delhi	Chandrasekhar Azad, Bhagat Singh, Sukhdev Thapar
Bharat Naujawan Sabha	1926	Lahore	Bhagat Singh

Indian Home Rule Society	1905	London	Shyamji Krishna Varma
Gadar Party	1913	USA & Canada (North America)	Lala Hardayal
Indian Independence League	1907	California (USA)	Taraknath Das
Berlin Committee for Indian Independence	1915	Berlin	Virendranath Chattopadhyay, Bhupendra Nath Dutta, Lala Hardayal and others with the help of the German foreign office

GEOGRAPHY

India and the Administrative Units; the States and Union Territories

a. Physiography of India

- India lies in the northern hemisphere of the globe between 8° 4' N and 37° 6' N latitudes and 68° 7' E and 97° 25' E longitudes.
- The southern extent goes up to 6° 45' N latitude to cover the last island of the Nicobar group of islands. The southern extreme is called Pygmalion Point or India Point.

- The Tropic of Cancer passes through the middle part of India and crosses the eight states of Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram.
- The total land frontier of 15,200 km passes through marshy lands, desert, plains, mountains, snow-covered areas and thick forests.
- The maritime boundary of 6100 km along the main landmass which increases to 7516 km of the coastlines of Andaman-Nicobar and Lakshadweep Islands are added to it.
- India commands a total geographical area of 32,87,263 sq.km which is roughly 0.57% of the area of the earth and 2.4% of the total area of the land hemisphere.
- India is the seventh-largest country of the world after Russia, Canada, USA, China, Brazil and Australia (all are mentioned in the descending order).
- India's area is almost equal to the area of Europe (excluding Russia), one-third of Canada, one-fifth of Russia, eight times of Japan and twelve times of the United Kingdom.
- India has roughly a quadrangular shape. It measures about 3,214 km from north to south and about 2933 km from east to west, the difference between the two is just 281km.

b. Land frontiers of India

- The Himalayan ranges from a natural frontier between India and China. In the north-west, Jammu and Kashmir share the international border with Sinkiang and Tibet in China.
- In the east, Himachal Pradesh and the mountain region of Uttarakhand have a common frontier with Tibet.
- Nepal has its border with Uttar Pradesh and Bihar.
- West Bengal and Sikkim also touch the Nepalese border for a small distance.
- India-Afghanistan and Pakistan-Afghanistan international boundary are called the Durand Line, determined as a 'military-strategic border' between British India and Afghanistan.
- The boundary between with Pakistan and Bangladesh (East Pakistan) was finalized at the time of partition in 1947 through the 'Radcliff Award'.

- In Punjab, the frontier runs through a smooth and fertile plain, which is purely man-made. The Indian frontier with Pakistan in Kashmir is still disputed and has led to strained relations between the two countries since partition in 1947.
- The eastern boundary of India is formed by a complex chain of the Himalayan offshoots consisting of the Mishmi, the Patkai, the Naga hills, the Barail range, the Mizo hills and finally the Arakan Yoma mountain range.
- The Arakan Yoma is submerged in the Bay of Bengal for a sufficiently long stretch and emerges again in the form of Andaman and Nicobar Islands.
- The boundary line between India and Bangladesh crisscrosses the vast Ganga-Brahmaputra delta. This boundary runs through an entirely flat country in which there is not even a small mount or hill which could be used for demarcating the boundary between two countries.
- Bangladesh and India share a the fifth-longest land border in the world, including Assam, Tripura, Mizoram, Meghalaya, and West Bengal.
- There is a maritime boundary of 6100 km along with the main landmass which increases to 7156 km if the coastlines of Andaman and Nicobar Islands are added to it.
- The nearest neighbour in the south across the seas in Sri Lanka which is separated from India through the narrow channel of Palk Strait.
- Similarly, the Eight Degree Channel forms the boundary between the Lakshadweep and Maldives islands.

Name of the Country	Length in Km
Bangladesh	4,096.7
China	3,488
Pakistan	3,323

Nepal	1,751
Myanmar	1,643
Bhutan	699
Afghanistan	106
Total	15,106.7

The states having a common boundary with the neighboring countries.

Country	States
Pakistan	3 States: Punjab, Rajasthan, Gujarat and 2 Union Territories- Jammu & Kashmir and Ladakh
Afghanistan	1 Union Territory- Ladakh
China	4 States: Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh and 1 Union Territory- Ladakh
Nepal	5 States: Uttarakhand, Uttar Pradesh, Bihar, West Bengal, Sikkim
Bhutan	4 States: Sikkim, West Bengal, Assam, Arunachal Pradesh
Myanmar	4 States: Arunachal Pradesh, Nagaland, Manipur, Mizoram

Bangladesh	5 States: West Bengal, Meghalaya, Assam, Tripura and Mizoram
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Quick Glance at States Area-wise:

State	Area (Km ²)	Capital	Main Language
Rajasthan	342,239	Jaipur	Rajasthani, Hindi
Madhya Pradesh	308,245	Bhopal	Hindi
Maharashtra	307,713	Mumbai	Marathi
Uttar Pradesh	240,928	Lucknow	Hindi
Gujarat	196,024	Gandhinagar	Gujarati
Karnataka	191,791	Bengaluru	Kannada
Andhra Pradesh	162,968	Hyderabad	Telugu

Odisha	155,707	Bhubaneswar	Oriya
Chhattisgarh	135,191	Raipur	Hindi
Tamil Nadu	130,058	Chennai	Tamil
Telangana	112,077	Hyderabad	Telugu
Bihar	94,163	Patna	Hindi
West Bengal	88,752	Kolkata	Bengali
Arunachal Pradesh	83,743	Itanagar	Tribal
Jharkhand	79,714	Ranchi	Hindi
Assam	78,438	Dispur	Assamese
Himachal Pradesh	55,673	Shimla	Hindi
Uttarakhand	53,483	Dehradun	Hindi

Punjab	50,362	Chandigarh	Punjabi
Haryana	44,212	Chandigarh	Hindi
Kerala	38,863	Thiruvananthapuram	Malayalam
Meghalaya	22,429	Shillong	Khasi, Garo, English
Manipur	22,327	Imphal	Manipuri
Mizoram	21,081	Aizawl	Mizo, English
Nagaland	16,579	Kohima	Angami Ao
Tripura	10,486	Bengali, Tripuri	Agartala
Sikkim	7,096	Gangtok	Lepcha, Bhutia
Goa	3,702	Panaji	Marathi, Konkani

Union Territories	Area (sq. km)	Capital	Language
Andaman and Nicobar Is.	8,249	Port Blair	Andamanese, Nicobarese
Delhi	1,490	New Delhi	Hindi
Puducherry	492	Puducherry	Tamil, French
Dadra and Nagar Haveli and Daman and Diu	603	Daman	Gujarati, Marathi
Chandigarh	114	Chandigarh is itself the capital of two states i.e. Punjab and Haryana.	Hindi, Punjabi, and Haryanvi
Lakshadweep	32	Kavaratti	Malayalam

Jammu Kashmir	-	Srinagar (Summer capital) Jammu (winter capital)	Kashmiri, Urdu
Ladakh	-	Leh, Kargil	Urdu, Hindi, English

Physical Geography of India

- India has vast diversity in physical features.
- This diversity of landmass is the result of the large landmass of India formed during different geological periods and also due to various geological and geomorphological processes that took place in the crust.
- According to Plate Tectonic theory folding, faulting and volcanic activity are the major processes involved in the creation of physical features of Indian landscape. For example, the formation of the Himalayas in the north of the country attributed to the convergence of Gondwana land with the Eurasian plate.
- The Northern part of the country has a vast expanse of rugged topography consisting of a series of mountain ranges with varied peaks, beautiful valleys and deep gorges.
- The Southern part of the country consists of stable table land with highly dissected plateaus, denuded rocks and developed series of scarps.
- The Great Northern Plains lies between these two landscapes.
- The physical features of India can be grouped under the following Physiographic Divisions:
 1. The Himalayas
 2. The Northern Plains
 3. The Peninsular Plateau
 4. The Indian desert

5. The Coastal Plains

6. The Islands

The Himalayas

- The longest range of this system is Pir Panjal Range.
- This range consists of famous valley of Kashmir, the Kangra and the Kullu Valley.
- The Outer most range of the Himalayas is called the Shiwaliks. They composed of unconsolidated sediments brought down by rivers from the main Himalayan range located farther north.
- The Longitudinal valley lying between lesser Himalayas and Shiwaliks are known as Duns. Example: Dehra Dun, Kotli Dun, Patli Dun.
- The highest peak of Himalayas is: Everest, Nepal (8848 m); Kanchenjunga, India (8598 m); Makalu, Nepal (8481 m)
- On the basis of relief, alignment of ranges and other geomorphological features the Himalayas can be subdivided into following
 - North-western or Kashmir Himalayas
 - Himachal and Uttarakhand Himalayas
 - Darjeeling and Sikkim Himalayas
 - Arunachal Himalayas
 - Eastern Hills and Mountains

North-Western or Kashmir Himalayas

- Important Ranges: Karakoram, Ladakh, Zaskar and Pir Panjal
- Important Glaciers: Siachen, Baltoro, Remo, etc.,
- Important Pass: Zoji la, Bara Lacha la, Banihal, rohtang, etc.,
- Important Peaks: Nanga Parbat, K2, etc.,
- Kashmir valley: lies between Greater Himalayas and Pir Panjal Range.
- Cold Desert: between Greater Himalayas and Karakoram Range.
- Important Lakes: Dal and Wular are freshwater lakes, whereas Pangong Tso and Tso Moriri are saltwater lakes.

- The Southernmost part of this region consists of longitudinal valleys known as Duns.
Eg: Jammu dun, Pathankot dun, etc.,

Himachal and Uttarakhand Himalayas

- Important Ranges: Great Himalayas, Dhauladhar, Shiwaliks, Nagtibha, etc.,
- Important River System: Indus and Ganga
- Important Hill Stations: Dharamshala, Mussoorie, Shimla, Kausani, etc.,
- Important Pass: Shipki la, Lipu Lekh, Mana pass, etc.,
- Important Glaciers: Gangotri, Yamunotri, Pindari, etc.,
- Important Peaks: Nanda Devi, Dhaulagiri, etc.,
- Important Duns: Dehradun (largest), Haridwar Dun, Kota Dun, Nainital Dun, Chandigarh-Kalka Dun, etc.,
- This region is known for five Prayags (River Confluences). Valley of flowers is also situated in this region.

The Darjeeling and Sikkim Himalayas

- This lies between Nepal Himalayas in the west and Bhutan Himalayas in the east.
- It is the region of fast flowing rivers and high mountain peaks.
- Important Peaks: Kanchenjunga
- Duar formations replace the Shiwaliks (absent) in this region which enhanced the development of Tea gardens.
- Important Glaciers: Zemu Glacier
- Important Peaks: Nathu La and Jelep La

The Arunachal Himalayas

- This lies between Bhutan Himalayas and Diphu Pass in the east
- Important Peaks: Namcha Barwa and Kangto
- Important Rivers: Subansiri, Dihang, Dibang and Lohit
- Important Ranges: Mishmi, Abor, Dafla, Mihar, etc.,
- Important pass: Diphu pass

The Eastern Hills and Mountains

- These are the part of Himalayan Mountain system having their general alignment from the north to south direction.
- The Himalaya in the eastern boundary of the country is called Purvanchal. These are mainly composed of sandstones (sedimentary rocks).
- Important Hills: Patkai Bum, Naga Hills, Manipur Hills, Mizo hills, etc.

THE NORTHERN PLAINS

- The northern plain has been formed by the interplay of the three major river systems – the Indus, the Ganga and the Brahmaputra.
- **Bhabar** is a narrow belt ranging between 8-10 km parallel to the Shiwalik foothills at the break-up of the slope. The river after descending from the mountains deposit pebbles in a narrow belt. All the streams disappear in this belt.
- **Bhangar** is the region south of Terai region. This region is formed by older alluvium. The soil in this region contains calcareous deposits locally known as kankar.
- The region with new alluvium deposits is known as **Khadar**. They are renewed almost every year and are so fertile, thus ideal for intensive cultivation.
- Riverine Islands – these are the islands which are formed due to depositional work of rivers especially in the lower course due to the gentle slope and resultant decrease in the velocity of rivers. **Majuli** – in the Brahmaputra is the largest inhabited riverine island in the world
- Distributaries – the rivers in the lower course split into numerous channels sue to deposition of silt are called distributaries.
- Doab – the area which lies behind the confluence of two rivers.

Major Mountain Peaks in India

Major Mountain Peaks in India	Description
Godwin Austen (K2)	Highest peak of Karakoram range in POK

Nanga Parbat	Jammu and Kashmir
Nanda Devi	Uttarakhand, Second highest mountain in India and the highest entirely within the country
Kanchenjunga	Nepal and Sikkim (B/w Teesta river in east & Tamur river in the west), the Highest mountain in India & 3rd highest mountain in the world
Nokrek	Highest point of the Garo Hills (Meghalaya)
Gurushikhar	Mt. Abu, Rajasthan, highest point of the Aravalli Range
Kundremukh	Karnataka
Doddabetta	Highest point in Tamil Nadu, near Udhagamandalam (Nilgiri Hills) Second highest peak in the Western Ghats only next to Anaimudi
Anaimudi	Located in Kerala, It is the highest peak in the Western Ghats and in South India
Agasthyamalai	Lie at the extreme southern end of Western Ghats, straddle both sides in Kerala and in Tamil Nadu
Saddle Peak	Highest point of the archipelago in the Bay of Bengal, located in North Andaman

Mount Harriet	Third highest peak in the Andaman and Nicobar archipelago only next to, Saddle peak (Highest of Andaman) and Mount Thullier (Highest of Nicobar)
Mahendragiri	Orissa, the Highest peak of Eastern Ghats (According to NCERT)
Arma Konda	Andhra Pradesh

Important Passes in India

State	Pass name	Comment
Jammu and Kashmir	Banihal Pass	Jammu to Srinagar
Jammu and Kashmir	Chang-La	Ladakh with Tibet
Jammu and Kashmir	Pir-Panjal pass	Between Jammu and Kashmir Valley
Jammu and Kashmir	Zoji La	important road link between Srinagar on one side and Kargil and Leh on the other side
Himachal Pradesh	Bara Lacha La	Connecting Mandi in Himachal Pradesh with Leh in Jammu and Kashmir
Himachal Pradesh	Rohtang Pass	road link between Kullu, Lahaul and Spiti Valleys

Himachal Pradesh	Shipki La	Himachal Pradesh and Tibet
Uttarakhand	Lipu Lekh	trijunction of Uttarakhand (India), Tibet (China) and Nepal borders
Uttarakhand	Niti Pass	Uttarakhand with Tibet
Sikkim	Nathu La	Sikkim with Tibet
Sikkim	Jelep La	Sikkim-Bhutan border
Arunachal Pradesh	Bom Di La	Arunachal Pradesh with Bhutan
Arunachal Pradesh	Dihang Pass	Arunachal Pradesh and Myanmar.

The Peninsular Plateau

- It is an irregular triangle in structure extends as Delhi ridge in the north-west, Rajmahal hills in the east, Gir range in the west and Cardamom Hills in the south.
- The important physiographic features of this are - block mountains, rift valleys, spurs, bare rocky structures, series of hummocky hills and wall like quartzite dykes offering natural sites for water storage.
- On the basis of relief features, the peninsular plateau is divided into three broad groups –
 - The Deccan Plateau
 - The Central Highlands
 - The North-eastern Plateau

The Deccan Plateau

- The Deccan Plateau is a triangular landmass that lies to the south of R. Narmada.
- It is bordered by the Western Ghats in the west, the Eastern Ghats in the east and the Satpura, Maikal and Mahadeo range in the north and north-eastern part.
- An extension of the peninsular plateau is also visible in the north-east known as Karbi-Anglong Plateau and North Cachar Hills.
- The Deccan Plateau is higher in the west and slopes gently eastwards.
- Western and Eastern Ghats are prominent features of the Deccan plateau, the comparison between these two ranges are mentioned in the following table

Western and Eastern Ghats

S. NO.	WESTERN GHATS	EASTERN GHATS
1.	They are continuous and can be crossed only through passes.	They are discontinuous and irregular
2.	Average Elevation – (900 – 1600)m	Average Elevation – 600 m
3.	The altitude increases from north to south	The altitude has no general pattern
4.	Important Hills – Nilgiri, Anaimalai, Cardamom, Babubudan, etc.,	Important Hills – Javadi, Palkonda, Nallamala, Mahendragiri, etc.,
5.	Important Peaks – Anaimudi (highest), Doda Betta (Ooty), Kodaikanal etc.	Important Peaks – Mahendragiri (highest) etc.

6.	Most of the peninsular rivers originate here and acts as a water divide between west-flowing and east-flowing rivers.	They are dissected by major rivers like Mahanadi, Godavari, Krishna, Cauvery, etc., which are draining into the Bay of Bengal
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The Central Highlands

- The Central Highlands is a part of Peninsular Plateau lying north of R. Narmada covering a major area of Malwa plateau, Vindhyan Range covers the southern extent and Aravalis in the north-west.
- The plateaus like Bundelkhand, Bagelkhand, Chotanagpur makes the eastern extension of the central highlands.
- This region has undergone metamorphic processes in its geologic history, which can be corroborated by the presence of metamorphic rocks such as marble, slate, gneiss, etc.

The North-Eastern Plateau

- This region consists of many plateaus like Meghalaya Plateau, Karbi Anglong Plateau, etc.,
- Important Hills – Khasi, Garo, Jaintia, etc.,

The Indian Desert

- The Great Indian Desert lies in the north-western region of the country.
- The prominent desert features are – Mushroom Rocks, Shifting Dunes and Oasis.
- It is a land of undulating topography dotted with longitudinal dunes and Barchans.
- Most of the rivers in this region are ephemeral. Example: R. Luni
- Low precipitation and evaporation make it a water deficit region.
- The desert can be divided into two regions: Northern part sloping towards Sindh and the Southern part towards the Rann of Kachchh.

The Coastal Plains

- The Peninsular plateau is covered by marine water in 3 sides: the Indian Ocean in the South; the Bay of Bengal in the east and the Arabian Sea in the West.
- The extent of coastline in the country is 6100 km in the mainland and 7517 km in the entire geographical coast of the country (including Islands).
- On the basis of the location and active geomorphological processes, it can be broadly divided into two: the Western Coastal Plains and the Eastern Coastal Plains.

The Islands

- Besides the vast physical features in the mainland of the country, there are two major island groups located in both sides of the peninsular plateau.
- The island groups provide the site for Fishing and Port activities.
- Though more than 4000 islands present in Indian territory Andaman and Nicobar and Lakshadweep are the two major island groups.

ANDAMAN & NICOBAR ISLANDS

- Duncan passage lies between south Andaman and Little Andaman.
- Important Peaks: Saddle Peak, North Andaman (738 m); Mount Diavolo, middle Andaman (515 m); Mount Koyob, South Andaman (460 m); Mount Thuiller, Great Nicobar (642 m).

Note

- **Ten Degree Channel**- Between Little Andaman and Car Nicobar
- **Duncan Passage**- Between great Andaman and Little Andaman

THE LAKSHADWEEP ISLANDS

- Kavaratti Island is the administrative headquarters of Lakshadweep islands.
- Minicoy is the largest island in this group.
- This island group consists of storm beaches consisting of unconsolidated pebbles, shingles, cobbles and boulders.

Note

- **Nine Degree Channel**- Minicoy is separated from rest of the Lakshadweep
- **Eight Degree Channel**- Lakshadweep Group separated from the Maldives

Other Islands

- Newmoore Island- located in the Bay of Bengal on the mouth of Ganga.
- Pamban Island- located in the Gulf of Manner between Sri Lanka and India.

INDIAN DRAINAGE SYSTEM

Comparison between Himalayan and the Peninsular Rivers of India

S. No.	Aspect	Himalayan River	Peninsular River
1.	Place of origin	Himalayan mountain covered with glaciers	Peninsular plateau and central highland
2.	Nature of flow	Perennial; receive water from the glacier and rainfall	Seasonal; dependent on monsoon rainfall
3.	Type of drainage	Antecedent and consequent leading to the dendritic pattern in plains	Superimposed, rejuvenated resulting in trellis, radial and rectangular patterns

4.	Nature of river	Long course, flowing through the rugged mountains experiencing headward erosion and river capturing; In plains meandering and shifting of course	Smaller, the fixed course with well-adjusted valleys
5.	Catchment area	Very large basins	Relatively smaller basin
6.	Age of the river	Young and youthful, active and deepening in the valleys	Old rivers with the graded profile, and have almost reached their base levels

Important Rivers of India

Himalayan rivers come from the Himalayas and flow through the Northern Plains.

The major rivers in the Himalayan System are:

- The Indus River System
- The Ganga River System
- The Yamuna River System

- The Brahmaputra River System

The main source of Peninsular River System or Peninsular Drainage is the Western Ghats. Because the Western Ghats are forming a 'water divide,' these rivers either flow eastward into Bengal Bay or westward into the Arab Sea. Peninsular rivers are rivers that are essentially rain-fed.

The major rivers in the Peninsular system are:

- Mahanadi
- Godavari
- Krishna
- Cauvery

Drain into the Bay of Bengal as they flow on the plateau eastward and create 'delta' at their mouths; while the Narmada Tapti-the west-flowing rivers fall into the Arab Sea and create 'estuaries.'

Not from glaciers, but from rain-fed rivers. During summer, these rivers significantly decrease or dry up.

THE HIMALAYAN RIVERS

Indus River System

In the early Hindu mythological texts, the mention of Indus River or Sindhu River is witnessed. The river comes from Tibet near Lake Mansarovar. In Jammu and Kashmir, it flows westward into India, flows further through Himachal Pradesh, Punjab, and reaches Pakistan.

It enters the Arab Sea near Karachi, flowing further west. Indus is Pakistan's biggest river and the national river of the country. Its Indian tributaries are Zaskar, Nubra, Shyok, and Pakistan's Hunza. Sutlej, Ravi, Beas, Chenab and Jhelum are their other tributaries named after the state of Punjab.



Ganga River System

The Ganga river system (Ganges) is India's largest river system. It originates in the glaciers of Gangotri. The upstream Bhagirathi joins the other stream at Devprayag called Alaknanda to form the Ganga River. Ganga has tributaries on both banks; the Yamuna and Son are its right-bank tributaries.

Some of the left bank tributaries are Gomti, Ghaghara, Gandak, Kosi. The Ganges flows through the Uttarakhand, Uttar Pradesh, Bihar, and West Bengal Indian countries. It lastly reaches the Bay of Bengal.

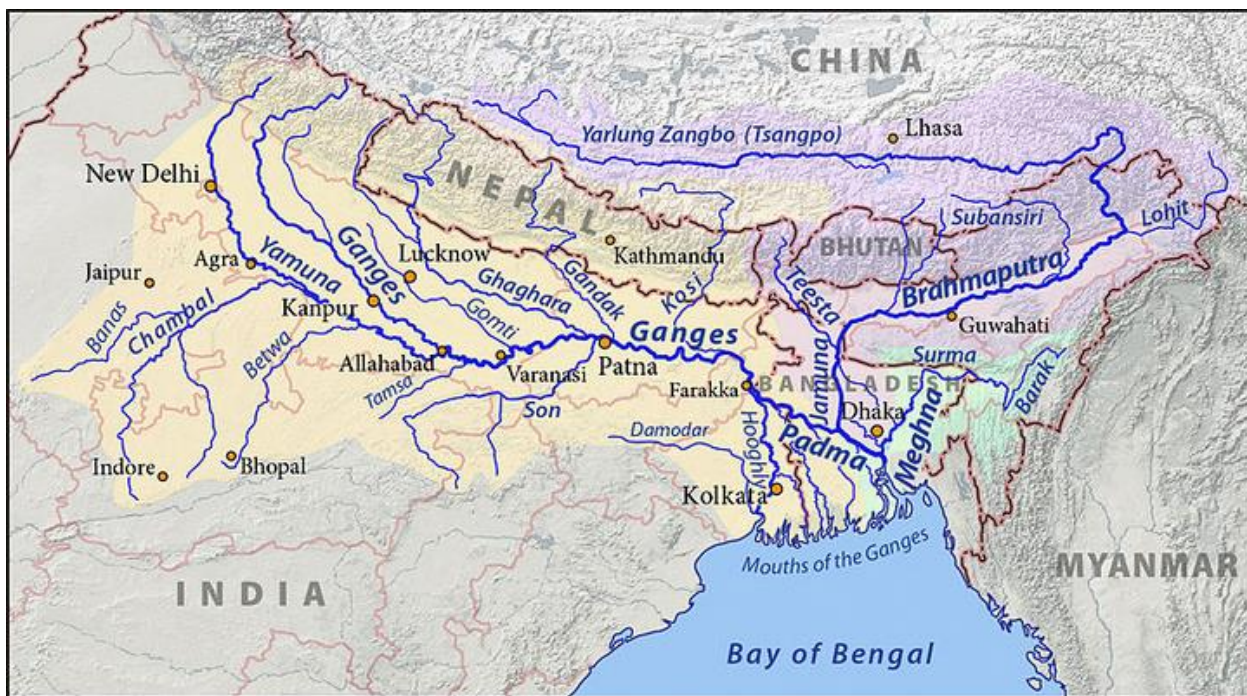
Yamuna River System

The Yamuna is Northern India's main river system. The river flows through Uttarakhand, Uttar Pradesh and Haryana from Yamnotri. It crosses Delhi, Mathura, Agra and meets the Chambal, Betwa and Ken rivers to lastly join the Allahabad Ganga. Tons, Chambal, Hindon, Betwa and Ken are Yamuna's major tributaries.

Brahmaputra River System

The Brahmaputra, one of India's main rivers, originates in Tibet's Himalayan Angsi glacier. It's called the Tsangpo River there. In Arunachal Pradesh, it enters India and is known as Dihang River.

Dibang, the Lohit, the Kenula are tributaries which form the primary Brahmaputra River and flow through Assam, its longest course, enter Bangladesh and lastly falls into the Bay of Bengal. The Brahmaputra has the largest water quantity of all India's rivers.



THE PENINSULAR RIVERS

Mahanadi

The Mahanadi in East-central India is a significant river. It originates in Chhattisgarh's Sihava hills and flows through the state of Orissa (Odisha) through its main course. This river deposits

more silt on the Indian subcontinent than any other river. Mahanadi runs through Sambalpur, Cuttack and Banki cities.

Godavari

The Godavari River, after the Ganga, covers India's second-longest course. The river originates from Triambakeshwar in Maharashtra and flows along with its tributaries (Pravara, Indravati, Maner Sabri etc.) through the countries of Maharashtra, Chhattisgarh, Madhya Pradesh, Orissa (Odisha), Telangana, Andhra Pradesh, Karnataka and Puducherry to lastly flow into the Bay of Bengal. The river is defined as Dakshina Ganga because of its lengthy course.

Krishna River

The Krishna is India's third-longest river, about 1300 km long. It originates from the Mahabaleshwar region of Maharashtra and flows through Karnataka, Telangana, and Andhra Pradesh to lastly pour into Bengal Bay.

Kaveri River

The Kaveri (Cauvery) is a significant river in southern India and originates in Kogadu, Karnataka.

As many tributaries like Hemavati, Moyari, Shimsha, Arkavati, Honnuhole, Kabini, Bhavani, Noyill and Amaravati join it, Kaveri River expands.

Narmada and Tapti

The Narmada & Tapti river is the only major flowing rivers into the Arab Sea. Narmada's complete length flowing through Madhya Pradesh, Maharashtra, and Gujarat countries is equal to 1312 km. Amarkantak is Narmada's location of origin in Shahdol, Madhya Pradesh. From east to west, Narmada flows primarily through Central India and flows into the Arabian Sea.

The Tapti river follows a parallel course to the south of Narmada, flowing through the Maharashtra and Gujarat states on their way into the Gulf of Khambat. Purna, Girna and Panjhra are its three main tributaries.

Like most ancient religions, rivers are considered sacred by the Hindu faith and its mythology. The Ganges, Yamuna (a Ganges tributary), Brahmaputra, Mahanadi, Narmada, Godavari, Tapi, Krishna, and Kaveri are nine major Indian rivers. Indian soil also flows through parts of the Indus River.

The Indian river system comprises eight important rivers together with their various tributaries. Most rivers discharge their waters into the Bay of Bengal; nevertheless, there are a number of rivers whose itineraries take them across the west end of India and into the Arab Sea in the east direction.

Northern parts of the Aravalli range, Ladakh parts, and the barren Thar Desert regions have Inland Drainage.



River Systems of India

Name	Length of River	Originates From	Area Covered	Ends in
Indus	3180/ 1114 in India	Tibet in northern slopes of Mount Kailash	India and Pakistan	Arabian sea
Ganga (Bhagirathi)	2525	Gangotri in Uttrakhand	Uttar Pradesh, Uttrakhand, Bihar, West Bengal	Bay of Bengal
Yamuna (Jamuna)	1376	Yamunotri in Garhwal	Delhi, Haryana and UP	Bay of Bengal

Brahmaputra	916 - in India	Angsi Glacier	Assam, Arunachal Pradesh	Bay of Bengal
Kaveri	765	Brahmagiri hills in Kogadu, Karnataka	Karnataka and Tamil Nadu	Bay of Bengal
Godavari (Dakshin Bharat ki Ganga)	1465	Triambakeshwar in Maharashtra	South-eastern part of Andhra Pradesh	Bay of Bengal
Krishna	1400	Mahabaleshwar in Maharashtra	Maharashtra & Andhra Pradesh	Bay of Bengal
Narmada	1312	Amarkantak in Madhya Pradesh	Madhya Pradesh and Maharashtra	Arabian Sea
Tapti	724	Betul, Madhya Pradesh district in the Satpura region	Madhya Pradesh and Maharashtra	Arabian Sea
Mahanadi	858	Sihava mountains of Chhattisgarh	Jharkhand, Chhattisgarh, Orissa	Bay of Bengal
Vaigai	258	Varusanadu Hills	Madurai in Tamil Nadu	Bay of Bengal
Periyar	244	Sivagiri peaks of Sundaramala, Tamil Nadu.	Tamil Nadu and Kerala	Bay of Bengal

Important dams in India

Some Facts about dams

- Tallest dam in the world- Nurek dam (Tajikistan)
- Longest dam in the world- Hirakund dam (Orissa)
- Longest dam in India- Hirakund dam (Orissa)
- Highest dam in India- Tehri dam (Uttarakhand)
- Highest straight gravity Dam in India- Bhakra dam
- First dam of India-Kallanai Dam (Grand Anicut) on river Kaveri (Tiruchirapalli, Tamilnadu)

Important Dams in India

State	Dam	River
Andhra Pradesh	Nagarjuna Sagar Dam	Krishna
	Srisaillam Dam	Krishna
	Polavaram Project	Godavari
Arunachal Pradesh	Ranganadi Dam	Ranganadi River, a tributary of the Brahmaputra River
Chhattisgarh	Minimata (Hasdeo) Bango Dam	Hasdeo
	Dudhawa Dam	Mahanadi
Gujarat	Ukai Dam	Tapti
	Sardar Sarovar Dam	Narmada
Himachal Pradesh	Pong Dam	Beas
	Bhakra Dam	Satluj
Jammu and Kashmir	Baglihar Dam	Chenab
	Uri Dam	Jhelum
	Kishenganga Dam	KISHANGANGA
Jharkhand	Panchet Dam	Damodar

	North Koel	North Koel
Karnataka	Krishnarajasagar Dam	Cauvery
	Tungabhadra Dam	Tungabhadra
Kerala	Cheruthoni Dam	Cheruthoni
	Idukki Dam	Periyar
Madhya Pradesh	Ban Sagar Dam	Son
	Gandhi Sagar Dam	Chambal
	Indira Sagar Dam	Narmada
	Omkareshwar Dam	Narmada
Maharashtra	Bhatsa Dam	Bhatsa and chorna
	Koyna Dam	Koyna
Odisha	Hirakud Dam	Mahanadi
	Indravati Dam	Indravati
Punjab	Ranjit Sagar Dam	Ravi
Rajasthan	Jawahar Sagar Dam	Chambal
	Rana Pratap Sagar Dam	Chambal
Tamil nadu	Mettur Dam	Kaveri

Telangana	Nagarjuna Sagar Dam	Krishna (Some Part of Dam also in Telangana)
	Srisaillam Dam	Krishna (Some Part of Dam also in Telangana)
Uttarakhand	Tehri Dam	Bhagirathi
	Ramganga Dam	Ramganga
Uttar Pradesh	Rihand Dam	Rihand

Important Lakes in India (State Wise)

- Largest freshwater lake in India – Wular Lake, Jammu and Kashmir
- Largest Saline water lake in India – Chilka Lake, Orissa
- Highest lake in India (Altitude) – Cholamu lake, Sikkim
- Longest Lake in India – Vembanad lake, Kerala
- Largest Artificial Lake in India – Govind Vallabh Pant Sagar (Rihand Dam)

Lakes in India

<u>S.No</u>	Name	State	District	Type of Lakes	Facts/Description
1	Pulicat Lake	Andhra Pradesh	Nellore	Brackish Water	It encompasses Pulicat Lake Bird Sanctuary; Satish Dhawan Space Centre located here

2	Kolleru Lake	Andhra Pradesh	West Godavari	Freshwater	Home to migratory birds
3	Nagarjuna Sagar	Telangana	Nalgonda	Freshwater	Artificially constructed; Krishna river
4	Maharana Pratap Sagar	Himachal Pradesh	Kangra	Freshwater	Ramsar site
5	Pangong Tso	J & K	Ladakh	Endorheic Lake (saline water)	Indo-China Border
6	Wular lake	J & K	Bandipora	Tectonic lake (fresh water)	Largest freshwater lake in India
7	Tso Moriri	J & K	Ladakh	Saltwater	High altitude lake
8	Ashtamudi Kayal	Kerala	Kollam	Brackish water	Ramsar wetland site
9	Lonar lake	Maharashtra	Buldhana	Crater lake	National Geo-Heritage monument

10	Loktak lake	Manipur	-	Lenticular freshwater	Ramsar wetland; Phumdis (Floating Islands); Multipurpose project
11	Chilika lake	Orissa	Puri	Brackish water	India's largest brackish water lake; lagoon
12	Sambhar lake	Rajasthan	Sambhar Lake-town	Saltwater	Ramsar wetland; largest inland saltwater lake in India
13	Hussain Sagar	Telangana	Hyderabad	Artificial lake	Artificial Gibraltar rock island
14	Govind Ballabh Pant Sagar	Uttar Pradesh	Sonbhadra	Man-made lake	Rihand dam

Soil and Agriculture in India

Soil Profile and Horizon of soil

- O - Horizon containing a high percentage of soil organic matter.
- A - Horizon darkened by the accumulation of organic matter.
- E - Horizon formed through the removal (eluviation) of clays, organic matter, iron, or aluminium. Usually lightened in colour due to these removals.

- B - Broad class used for subsurface horizons that have been transformed substantially by a soil formation process such as colour and structure development; the deposition (illuviation) of materials such as clays, organic matter, iron, aluminium, carbonates, or gypsum; carbonate or gypsum loss; brittleness and high density; or intense weathering leading to the accumulation of weathering-resistant minerals.
- C - A horizon minimally affected or unaffected by the soil formation processes.
- R - Bedrock.

Types of Indian Soil:

1. Alluvial Soil

- This type of soil mainly found in the Indo-Ganga and Brahmaputra plain i.e. the whole northern plain and in some parts of the river basin in the south and some plateau region.
- This soil is also found in the deltas of the Mahanadi, Godavari, Cauvery and Krishna.
- Alluvial soil can be broadly categorised in two types i.e. New alluvial soil (Khadar) and old alluvial soil (Bhangar). Both the Khadar and Bhangar soils contain calcareous concretions (Kankars).
- Crops Grown: the Alluvial soil is suitable for the Rabi and Kharif crop like cereals, cotton, oilseeds and sugarcane.
- They are generally rich in potash but poor in phosphorous.

2. Regur or Black soil

- The regur or black soils have developed extensively upon the Lava Plateaus of Maharashtra, Gujarat, Madhya Pradesh mainly Malwa and are formed due to volcanic activities.
- These soils are very fertile and contain a high percentage of lime, iron and a moderate amount of potash.
- The type of soil is especially suited for the cultivation of cotton and hence sometimes called 'black cotton soil.'

Crops Grown: Cotton, Jowar, Wheat, Linseed, Gram, Fruit and Vegetable.

- The black soil is highly retentive of moisture.

3. Red Soil

- Red soils develop on granite and gneiss rocks under low rainfall condition i.e. due to weathering of the metamorphic rocks.
- These soils are red in colour due to the high concentration of Iron Oxide.
- These soils are friable and medium fertile and found mainly in almost whole of Tamil Nadu, South-eastern Karnataka, North-eastern and South-eastern Madhya Pradesh, Jharkhand the major parts of Orissa, and the Hills and Plateaus of North-east India.
- These soils are deficient in Phosphoric acid, organic matter and nitrogenous material.
- Crops Grown: Wheat, Rice, Millet's, Pulses.

4. Laterite Soil

- Laterite is a kind of clayey rock or soil formed under high temperature and high rainfall and with alternate dry and wet period.
- Laterite and lateritic soils are found in South Maharashtra, the Western Ghats in Kerala and Karnataka, at places in Odisha, small parts of Chottanagpur and in some parts of Assam, Tamil Nadu, Karnataka, and in western West Bengal (particularly in Birbhum district).
- Crops Grown: Coffee, Cashew etc.
- This type of soil is unsuitable for agriculture due to the high content of acidity and inability to retain moisture.

5. Desert soil

This type of soils found in Rajasthan, Haryana and the South Punjab, and are sandy.

- In the absence of sufficient wash by rainwater, soils have become saline and rather unfit for cultivation.
- In spite of that cultivation can be carried on with the help of modern irrigation.
- Wheat, bajra, groundnut, etc. can be grown in this soil.
- This type of soil is rich in Phosphates and Calcium but deficient in Nitrogen and humus.

6. Mountain Soil

- Soil found in higher altitude on the mountain is called as Mountain soil.
- The characteristics of this type of soil are changed according to the altitudes.
- This type of soil is suitable for the cultivation of potatoes, fruits, tea coffee and spices and wheat.

Type of Soils based on the size of particles

1. Sandy Soil

- Particles are larger in size.
- The particles cannot fit close together and hence there is enough space among them.
- It is not fit for vegetation as it does not retain water.
- However, millets can be grown on sandy soil.

2. Clayey Soil

- Particles are very small in size.
- Very little space among the particles.
- Water does not drain quickly through clayey soil because of less space among particles.
- So, clayey soil is not well aerated and retains more water.

3. Loamy Soil

- Particles are smaller than sand and larger than clay.
- Loamy soil is the mixture of sandy soil, clayey soil and silt.
- Silt is the deposit in river beds.
- The soil has the right water holding capacity and is well aerated.
- It is considered the best soil for the growth of plants.

Types of Agriculture in India

There are different types of farming activities performed in India which are as follows:

Subsistence Farming

- Subsistence farming is a type of farming in which nearly all the crops or livestock raised are used to maintain the farmer and farmer's family leaving little.
- Subsistence farms usually consist of no more than a few acres, and farm technology tends to be primitive and of low yield.

Mixed farming

- Mixed farming is an agricultural system in which a farmer conducts different agricultural practice together, such as cash crops and livestock
- The aim is to increase income through different sources and to complement land and labour demands across the year.

Shifting cultivation

- Shifting cultivation means migratory shifting agriculture.
- Under this system, a plot of land is cultivated for a few years and then, when the crop yield declines because of soil exhaustion and the effects of pests and weeds, is deserted for another area.
- Here the ground is again cleared by slash-and-burn methods, and the procedure is repeated.

Other Names of Shifting Cultivation

Shifting Cultivation Name	Country
Chena	Sri Lanka
Ladang	Java and Indonesia
Jhum	North-eastern India
Podu	Andhra Pradesh

Milya	Mexico and Central America
Konuko	Venezuela
Roka	Brazil
Milpa	Yucatan and Guatemala

Extensive Farming

- This is a system of farming in which the farmer uses the limited amount of labour and capital on a relatively large area.
- This type of agriculture is practised in countries where population size is small and land is enough.
- Per acre yield is low but the overall production is in surplus due to less population.
- Here machines and technology are used in farming.

Intensive Farming

- This is a system of farming in which the cultivator uses a larger amount of labour and capital on a relatively small area.
- This type of farming is performed in countries where the population to land ratio is high i.e. the population is big and the land is small.
- Annually two or three types of crops are grown over the land.
- Manual labour is used.

Plantation Agriculture

- In this type of agriculture, cash crops are mainly cultivated.
- A single crop like rubber, sugarcane, coffee, tea is grown.
- These crops are major items of export.

Major Crops & Cropping Patterns in India

Major crops are generally classified as:

Food Crops Rice, Wheat, Millets, Maize, and Pulses.

Cash Crops Sugarcane, Oilseeds, Horticulture crops, Tea, Coffee, Cotton, Rubber, and Jute.

Cropping Season in India

	Kharif crops	Rabi crops	Zaid crops
Time	Kharif crop also known as the autumn crop or monsoon crop are the plants which are cultivated in the monsoon season which extends from June to September.	Also known as winter crops. They are cultivated during the period typically extending between September to April. These plants are cultivated in spring seasons.	These are summer season crops. These crops are grown between April and September or between Rabi season and Kharif season
Condition	Require wet and hot conditions to grow	Require cold and relatively dry conditions to grow	Mostly sown in Gangetic belts of the region.
Examples	Rice(Paddy), Maize, Groundnut, cotton, Soybean, Pigeon Pea(arhar), Mung bean, Red chilies, Sugarcane, Turmeric, Millets like Ragi, Jowar, Bajra	Wheat, Chickpea, mustard, linseed, barley, Sesame, Sunflower, Coriander, Peas, Onion, Potato, Tomato etc	Cucumber, watermelon, bitter gourd, Muskmelon, pumpkin, ridged gourd

Major Food Crops

Rice

- **Soil Type:** Deep clayey and loamy soil.
- **Temperature:** Between 22-32°C with high humidity.
- **Rainfall:** Around 150-300 cm.
- **Top Rice Producing States are West Bengal > Punjab > Uttar Pradesh > Andhra Pradesh > Bihar.**
- In **Odisha**, three varieties of paddy crops are grown in a year which is **Aus, Aman, and Boro.**
- **China** is the top rice-producing country in the world. **India comes 2nd.**

Wheat

- **Soil Type:** Well-drained fertile loamy soil
- **Temperature:** Between 10-15°C (Sowing time) & 21-26°C (Ripening & Harvesting) with bright sunlight.
- **Rainfall:** Around 75-100 cm.
- **Top Wheat Producing States in India: Uttar Pradesh > Punjab > Madhya Pradesh**

- India is the **2nd largest producer after** China.

Millets

Soil Type: It Can be grown in an inferior alluvial or loamy soil

- **Jowar-** Rainfed crop is grown in moist areas with less or no irrigation.
- **Bajra-** Sandy soils & shallow black soil.
- **Ragi-** Red, black, sandy, loamy & shallow black soils. (dry regions)

Temperature: Between 27-32°C

Rainfall: Around 50-100 cm.

Top Millets Producing States in India: Rajasthan > Karnataka > Maharashtra

- **Jowar:** Maharashtra > Karnataka > Madhya Pradesh
- **Bajra:** Rajasthan > Uttar Pradesh > Gujarat
- **Ragi:** Karnataka > Tamil Nadu > Uttarakhand

These are also known as **coarse grains**. They have a **high nutritional value**. E.g., Ragi is very **rich in calcium, iron, other micronutrients** and **roughage**.

Maize

- **Soil Type:** Old alluvial soil.
- **Temperature:** Between 21-27°C
- **Rainfall:** High rainfall.
- **Top Producing States:** Karnataka > Maharashtra > Madhya Pradesh
- India is the **seventh-largest producer**

Pulses

- **Soil Type:** Sandy-loamy soil.
- **Temperature:** Between 20-27°C
- **Rainfall:** Around 25-60 cm.
- **Top Producing States:** Madhya Pradesh > Rajasthan > Maharashtra
- India is the **largest producer** as well as the largest **consumer** of pulses in the world.
- Major pulses grown in India are **urad, tur (arhar), moong, masur, peas and gram**.
- Pulses are **leguminous crops**. They help in restoring soil fertility by **fixing nitrogen from the air (Except Arhar)**. This is why these crops are grown in rotation with other crops.

Sugarcane

- **Soil Type:** Deep rich loamy soil.
- **Temperature:** Between 21-27°C with a hot & humid climate.
- **Rainfall:** Around 75-100 cm.
- **Top Producing States:** Uttar Pradesh > Maharashtra > Karnataka

- India is the **2nd largest producer of sugarcane after Brazil.**
- It is the main source of **sugar, khandsari, gur (jaggery), and molasses.**

Oilseeds

- **Soil Type:** Loam to clayey loam & well-drained sandy loams.
- **Temperature:** Between 15-30°C
- **Rainfall:** Around 30-75 cm.
- **Top Producing States:** Madhya Pradesh > Rajasthan > Gujarat
- The main oilseeds produced in India are **groundnut, coconut, mustard, sesamum (til), soyabean, cotton seeds, castor seeds, linseed & sunflower.**
- **Groundnut is a Kharif crop** & accounts for about **half of the major oilseeds produced** in the country.
- **Sesamum is a Kharif crop in north & rabi crop in south India.**
- **Linseed and mustard are rabi crops.**
- **Castor seed is grown in both seasons i.e. rabi & Kharif.**

Tea

- **Soil Type:** Deep & fertile well-drained soil, rich in humus and organic matter.
- **Temperature:** Between 20-30°C
- **Rainfall:** Around 150-300 cm.
- **Top Producing States:** Assam > West Bengal > Tamil Nadu.
- India- **2nd largest producer of tea plants.**
- Slopes of eastern hills have **humid climate & evenly distributed rainfall without waterlogging** which are optimal conditions for **terrace farming** of tea plants.
- Tea is a **labor-intensive industry.** Tea requires abundant, cheap, and skilled labor. It is processed within the tea garden to retain its freshness.

Coffee

- **Soil Type:** Well-drained and deep friable loamy soil.
- **Temperature:** Between 15-28°C
- **Rainfall:** Around 150-250 cm.
- **Top Producing States:** Karnataka > Kerala > Tamil Nadu
- India is the **seventh-largest producer.**
- **Hills that have well-defined shade canopy, comprising evergreen leguminous trees** give the optimal condition for coffee cultivation which is why it is mainly concentrated in the hilly regions.
- **'Arabica' is the Indian variety of coffee which is famous worldwide.**

Rubber

- **Soil Type:** Rich well-drained alluvial soil.
- **Temperature:** Above 25°C with a moist & humid climate.
- **Rainfall:** More than 200 cm.
- **Top Producing States:** Kerala > Tamil Nadu > Karnataka.
- It is an **equatorial crop.** But under special conditions, it can **also be grown in tropical and sub-tropical.**

Cotton

- **Soil Type:** Cotton requires Well-drained black cotton soil of Deccan Plateau.
- **Temperature:** Between 21-30°C
- **Rainfall:** Around 50-100cm.
- **Top Cotton Producing States:** Gujarat > Maharashtra > Telangana
- Cotton needs **210 frost-free days & bright sun-shine for its growth.**
- Cotton is a Kharif crop and requires 6 to 8 months to mature.

Jute

- **Soil Type:** Well-drained alluvial soil
- **Temperature:** Between 25-35°C
- **Rainfall:** Around 150-250 cm
- **Top Producing States:** West Bengal > Bihar > Assam
- Jute is **mainly concentrated in eastern India because of the rich alluvial soil of Ganga-Brahmaputra delta.**
- It is known as the **golden fiber.**

India is the **largest producer of jute.**

Natural Vegetation, Different Types of Forests of India

Tropical Deciduous Forests

- These are the most widespread and the most extensive forests of India.
- They are also known as monsoon forests.
- These are connected with those parts of India which receive annual rainfall between 200 cm and 70 cm.
- Here rainfall is seasonal in nature.
- In this forest type, trees shed their leaves for about six to eight weeks in dry summer.
- The animals found in these are: *lion, tiger, pig, deer, elephant, a variety of birds, lizards, snakes, tortoise, etc.*

(i) Tropical Moist Deciduous Forests

- Annual rainfall between 200 & 100 cm.

- Found in: (a) an eastern part of India- northeastern states, along with the foothills of Himalayas, (b) Jharkhand, West Orissa and Chhattisgarh, (c) on the eastern slopes of the Western Ghats.
- Examples: *teak, bamboos, sal, shisham, sandalwood, khair, kusum, arjun, mulberry, etc.*

(ii) Tropical Dry Deciduous Forests

- Annual rainfall between 100 & 70 cm.
- Found in: (a) the rainier parts of the peninsular plateau and (b) the plains of Uttar Pradesh and Bihar.
- *Examples: teak, sal, peepal, neem etc.*

Tropical Thorn Forests

- These are connected with those parts which receive rainfall less than 70 cm.
- Here, rainfall is erratic, irregular and inconsistent.
- Xerophytes dominate regions covered with the tropical thorn.
- Found in the north-western part including *semi-arid areas of Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Uttar Pradesh and Haryana.*
- Main plant species here are *acacias (babool), palms, euphorbias, Cactus, khair, , keekar etc.*
- In this vegetation type, stem, leaves and roots of plants are adapted to conserve water.
- Stem is succulent and leaves are mostly thick and small to minimize evaporation.
- Common animals here are *rats, mice, rabbits, fox, wolf, tiger, lion, wild ass, horses, camels, etc.*

Tropical Montane Forests

- The decrease in temperature with the rise in altitude is responsible for the corresponding change in natural vegetation.
- There exists the same hierarchy from foothills of the mountain to the top of it as is observed from tropical to tundra region.

- Mostly found in the southern slopes of Himalayas, places having high altitude in Southern and Northeastern India.
- Upto 1500 m of height, tropical moist deciduous forests exist with *shesham* as the main tree.
- Between 1000-2000m of height, wet temperate type of climate persist wherein evergreen broad-leaf trees like *oaks and chestnut*
- Between 1500-3000 m of height, temperate forests covering coniferous trees like *Chir, pine, deodar, silver fir, spruce, cedar, etc.*
- At higher altitudes above 3500m wet temperate grasslands are common like *Merg (Kashmir), bugyals (Uttarakhand), etc.*
- Common animals that are found in these forests are *Kashmir stag, spotted deer, wild sheep, jackals, yak, snow leopard, rare red panda, sheep and goats with thick fur, etc.*
- In India, they are studied under two groups: Northern Montane Forests and Southern Montane Forests.
- Northern Montane Forests: These are connected with Himalayan mountain ranges. Vegetation types are controlled by sunlight, temperature and rainfall which is described above.
- Southern Montane Forests: These are connected with hills of *Nilgiris, Anaimalai and Cardamom*. These are wet temperate forests which have great endemic biodiversity and these are described as Shola forests.

Mangrove Forests

- Mangrove forests are connected with deltaic regions of tropical and sub-tropical zones.
- These are also known as tidal forests and littoral forests as these are connected with the inter-tidal region.
- Their biodiversity and forest density are comparable with equatorial rainforest and tropical evergreen and semi-evergreen forests.
- Mangroves are salt tolerant plants with roots being adapted to become pneumatophores (these roots emerged from the ground and grow in upward direction).
- Mangrove ecosystem is a unique ecosystem as it has tolerance for periodic flooding and dryness; and mild salinity as well.

- India has the largest cover of Mangrove forest in the world.
- Sunderban, Mahanadi, Godaveri-Krishna and Kaveri delta are most importantly covered with these forests.
- *Sunderban* is the largest mangrove in the world. It is famous for *Sundari tree* which provides durable hard timber.
- Some other example are Rhizophora, Avicennia etc.
- *Palm, coconut, keora, agar*, etc. also grow in some parts of the delta.
- *Royal Bengal Tiger* is a famous animal in these forests.
- *Turtles, crocodiles, gharials, snakes*, are also found in these forests.
 - Bhitarkanika mangrove of Mahanadi delta is also famous for its rich biodiversity.

World Geography

1. Important Mountain Ranges and Peaks of the Worlds

Sr.	Mountain Range	Important/Highest Peaks	Location	Description
1.	Rocky Mountains	Mt. Elbert (highest peak in the Rockies)	North America	It is one of the longest fold mountains in the world and extends from Canada to Western US (New Mexico State)

2.	Appalachian Mountains	Mt. Mitchell, North Carolina, US (highest peak of Appalachian Mountains)	North America	It is a fold mountain with rich in mineral resources
3.	Alps	Mont Blanc (French –Italian border)	Europe	It is a folded mountain and source for rivers like Danube, Rhine, etc.
4.	Sierra Nevada	Mt. Whitney	California, USA	Habitat for many Red Indian tribes
5.	Alaska Range	Mt. McKinley	North America	Mt. McKinley highest peak in North America
6.	Altai Mountains	Belukha mountain	Central Asia	Young folded mountain which extends from Kazakhstan to northern China.
7.	Andes Mountains	Mt. Aconcagua	South America	Longest mountain chain in the world

8.	Atlas Mountains	Mt. Toubkal	Northwestern Africa	Young fold mountain spreading over Morocco and Tunisia.
9.	Drakensberg Mountains	Mt. Lesotho	South Africa	Young folded mountain
10.	Caucasus Mountain	Mt. Elbrus	Europe	Located between the Black Sea and the Caspian Sea
11.	Ural Mountains	Mt. Narodnaya	Russia	This mountain range act as a boundary between Europe and Asia.
12.	Hindukush Mountains	Mt. Trich Mir	Pakistan and Afghanistan	Folded mountain with rugged topography which makes it difficult for transportation.

13.	Himalayas	Mt. Everest	Asia	Young fold mountains in Asia which separates Indian sub-continent from Asian plains
14.	Arakan Yoma	Mt. Kennedy peak	Myanmar	It extends from north to south direction. Shifting cultivation is practised.
15.	Kunlun Mountains	Mt. Muztag	North of Tibetan plateau and western China	It is one of the young folded mountains.
16.	Vosges	Mt. Grand Ballon	Eastern France, Europe	Famous for the cultivation of grapes and manufacture of wines.

17.	Great Dividing Range	Mt. Kosciuszko	Australia	This range is the source for the rivers Darling and Murray.
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2. List of Important Rivers of the World

Sr. No.	RIVER	LOCATION	DESCRIPTION
1.	River Amazon	South America	It is the second longest river which flows through Peru, Columbia, Brazil and drains into the Atlantic Ocean.
2.	River Mississippi	North America	It forms a bird-foot like a delta at the Gulf of Mexico, River Missouri is an important tributary of it.
3.	River St. Lawrence	North America	It drains into Gulf of St. Lawrence which is an important transport corridor of North America.

4.	River Orange	South Africa	Longest river of South Africa and contains diamond beds along its mouth.
5.	River Congo	Africa	This river crosses the equator twice and drains into the south Atlantic Ocean.
6.	River Nile	Africa	It is the longest river in the world, originates near Lake Victoria and drains in the Mediterranean Sea.
7.	River Rhine	Western Europe	It flows through Germany and Netherlands. It is one of the busiest waterways of Europe.
8.	River Danube	Europe	It passes through Germany, Hungary, Austria, Slovakia, Serbia, Romania and drains into the Black Sea.
9.	River Volga	Europe, Russia	It is the longest river in Europe, it drains into the Caspian Sea.
10.	River Tigris	Turkey, Iraq	Cities like Mosul, Baghdad, Basra were located along its banks and it drains into the Gulf of Persia.

11.	River Euphrates	Turkey, Syria, Iraq	Main source of water for Syria. It drains into the Persian Gulf.
12.	River Irrawaddy	Myanmar	Drains into Gulf of Martaban
13.	River Mekong	China, Laos, Cambodia, Vietnam	It is also called 'Danube of the east', and it merges with south china sea.
14.	River Yangtze	China	It originates from the Tibetan plateau and ends in east china sea. It is the longest river in China.

3. Important Lakes of The World

Sr. No.	NAME	LOCATION	FACTS
1.	Titicaca lake	South America	It is the highest navigable lake in the world located in the Andes mountains.
2.	Great bear lake	Canada, North America	It is a big glaciated lake of Canada. The Eskimos of Canada camp here during the summer season.

3.	Great lakes	North America	This comprise of five large lakes of North America such as Lake Superior, Michigan, Huron, Erie, Ontario. Lake Superior is the second largest lake in the world.
4.	Lake Malawi	Central Africa	It is the third largest lake of Africa and borders Tanzania, Mozambique.
5.	Lake Tanganyika	East Africa	It is deepest and second largest lake of Africa.
6.	Lake Victoria	Africa	Largest river of Africa and passes through the equator.
7.	Lake Kainji	Africa	Largest manmade lake of Africa, used for irrigation purposes.
8.	Dead sea	West Asia	It is bordered by Jordan in the east and Palestine, Israel in the west. It is known for high salinity.
9.	Aral Sea	Central Asia	Located between Uzbekistan and Kazakhstan. It is shrinking rapidly in recent years.
10.	Lake Baikal	Russia	It is the largest freshwater lake in Asia and deepest in the world.

11.	Caspian Sea	Eurasia	It is the largest lake in the world and is surrounded by Russia, Kazakhstan, Turkmenistan, Iran and Azerbaijan.
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Important Ocean Currents:

Major Ocean Currents of the Atlantic Ocean

Warm currents of the Atlantic Ocean	Cold Current of the Atlantic Ocean
1. North Equatorial Current which bifurcates into Antilles Current and Caribbean Current.	1. Labrador Current - Originates in the Baffin Bay drifts south eastwards Baffin and Greenland and merges with Gulf stream off New Foundland.
2. South Equatorial Current bifurcates at the Current protruding landmass of northeast Brazil into northern Cayenne Current and the southern Brazilian Current (South Atlantic Ocean).	2. The Irminger Current of Greenland Current Flows between Greenland and Iceland and merges with North Atlantic Drift.
3. Gulf stream - One of the strongest ocean system which originates in the Gulf of Mexico. It consists of (i) Florida Current - From the Strait of Florida to Cape Hatteras (USA) (ii) Gulf Stream (cold wall) - From Cape Hatters to the Grand Bank (Northeast USA) (iii) North Atlantic Drift - From the Grand Bank, near New Foundland to western Europe.	3. Canaries Current - Continuation of North Atlantic Drift along the western coast of the Iberian Peninsula and North Africa in the southern direction.
4. Counter Equatorial Current - Flows from west to east in between the North and South Equatorial Current.	4. Falkland Current - Flows northwards along the eastern coast of South America up to Argentina.
	5. South Atlantic Drift - Under the influence of westerlies at about 40°S latitude, Brazilian Current continues as the South Atlantic Current.
	6. Benguela Current - Flows northwards along the western coast of South Africa.

Major Ocean Currents of the Pacific Ocean

WARM CURRENTS OF THE PACIFIC OCEAN	COLD CURRENTS OF THE PACIFIC OCEAN
1. North Equatorial Current - Flows westwards from the western coast of Mexico to the Philippines.	1. Oyashio (Kurile) Current - Bering Current or Alaskan Current and Okhotsk Current meet to form Oyashio Current.
2. South Equatorial Current - Flows westwards in the southern Pacific Ocean and bifurcates into northern and southern branches near new Guinea.	2. California Current - Flows along with the west-tern cost of USA and finally merges with North Equatorial Current (Warm) to complete the circulation.
3. Counter Equatorial Current - Flows between north and south Equatorial Current in the opposite direction.	3. West Wind Drift - Flows from west to east in the zone of 400-500S latitude under the influence of Westerlies.
4. Kuroshio or Japan Current - Flows from Taiwan to Bering Strait.	4. Peruvian (Humboldt) Current - Flows northwards along the western coast of South America is actually the continuation of West Wind Drift.

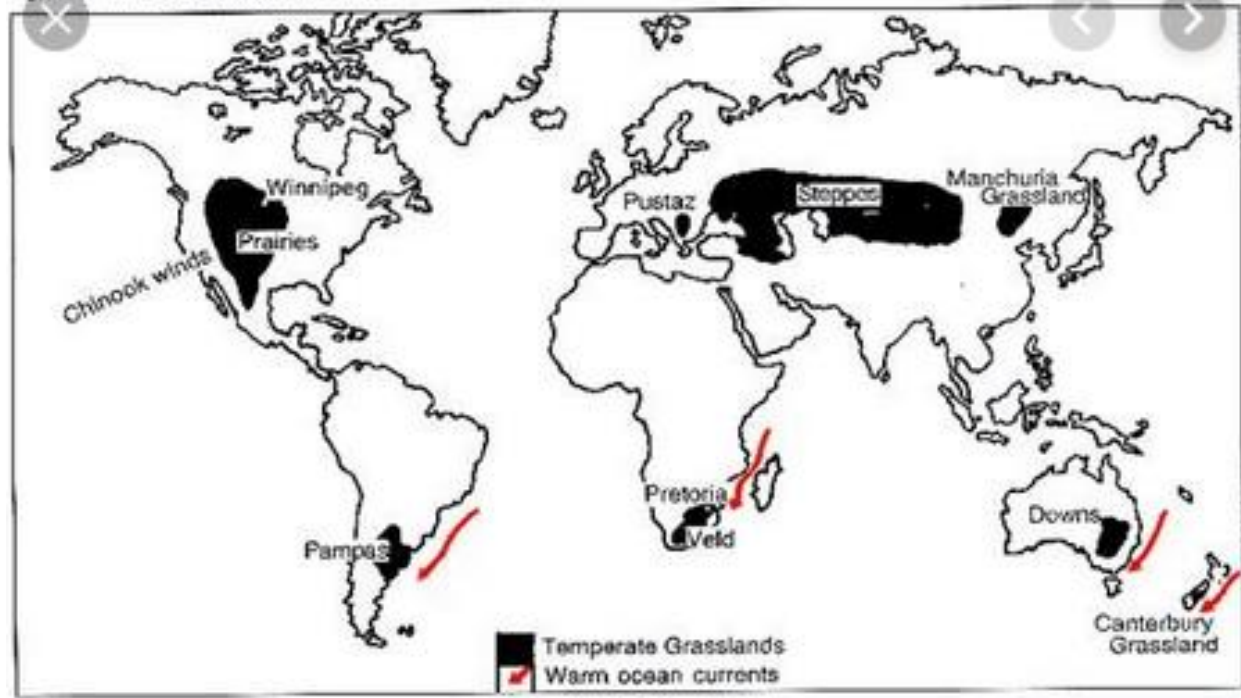
Major Ocean Currents of the Indian Ocean

WARM CURRENTS OF THE INDIAN OCEAN

1. Indian Equatorial Current: Flows westwards in the south Indian Ocean, bifurcates at Madagascar and flows are Mozambique and Aughulas Current in the southern direction.
2. South West Monsoon Current: Flows along the coasts of India in an easterly direction.
3. North-West Monsoon Current: Flows along the eastern coasts of India during winter.

List of temperate Grasslands and their location:

Fig. 137 The Temperate Grasslands



Distribution

- They lie in interiors of continents, bordering deserts and away from the Mediterranean region.
- Placed under the Westerly wind belt.
- In the northern hemisphere, grasslands are entirely continental and extensive.
- In Eurasia, they are called Steppes stretched from shores of Black sea eastwards to foothills of Altai Mountains.
- Grasslands are known by different names as given below:

Region	Grassland
Hungary and plains of Manchuria	Pustaz
North America	Prairies
Argentina and Uruguay	Pampas
Northern South Africa	Bush-Veld (more tropical)
Southern South Africa	High Veld (more Temperate)
Murray-Darling basin of Australia	Downs
New Zealand	Canterbury

Hot and Cold Local winds and their locations:

- Local Winds are caused by the local difference in temperature and pressure.
- Local Winds are of four types including hot, cold, conventional, and slope.
- These Winds effects only the smaller areas.
- Local Winds blow during a particular period of the day or year in a smaller area.
- These winds are found in the lowest levels of the troposphere.



- There are many such winds that blow all over the world, some of them are cool, some are warm, some wet and some dry.
- **Cold Winds** includes Bore, Mistral, Gregale, Chinook, Purga, etc.
- **Warm Winds** include Zonda, Sirocco, Chinook, Loo, etc.
- **Moist wind** includes Elephanta.
- **Dry wind** includes Calima.

Countries around important water bodies:

1. Countries surrounding Caspian Sea

Russia, Iran, Azerbaijan, Kazakhstan and Turkmenistan

2. Countries surrounding Black Sea

Ukraine , Russia, Georgia, Turkey, Bulgaria, Romania

3. Countries surrounding Red Sea

Eastern shore: Saudi Arabia. Yemen.

Western shore: Egypt. Sudan. Eritrea. Djibouti.

4. Countries surrounding the Adriatic Sea

Albania, Bosnia and Herzegovina, Croatia, Italy, Montenegro and Slovenia

5. Countries surrounding Mediterranean Sea

Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Slovenia, Spain, Syria, Tunisia, and Turkey

Top Mineral Producer in India (State-wise) and other Countries

Mineral	Type	Mines	Top Producers (States)	Top Producers (Countries)	Top Reserves (States)
IRON ORE	Metallic	Barabil – Koira Valley(Orissa) Bailadila Mine (Chattisgarh) Dalli-Rajhara(CH) – the largest mine in India	1. Orissa 2. Chattisgarh 3. Karnataka	1. Australia 2. Brazil 3. China 4. India	1. Orissa 2. Jharkhand 3. Chattisgarh

MANGANESE	Metallic	Nagpur-Bhandara Region (Maharashtra) Gondite Mines, Khondolite deposits (Orissa)	1. Madhya Pradesh 2. Maharashtra	1. China 2. Gabon 3. South Africa 5. India	1. Orissa 2. Karnataka 3. Madhya Pradesh
CHROMITE	Metallic	Sukinda Valley (Orissa) Hasan Region (Karnataka)	1. Orissa 2. Karnataka 3. Andhra Pradesh	1. South Africa 2. India 3. Russia	1. Sukinda Valley (OR) 2. Guntur Region (AP)
NICKEL	Metallic	Sukinda Valley (Orissa) Singhbhum Region (Jharkhand)	1. Orissa 2. Jharkhand	1. Phillipines 2. Russia 3. Canada	1. Orissa 2. Jharkhand 3. Karnataka
COBALT	Metallic	Singhbhum Region(Jharkhand) Kendujhar (Orissa) Tuensang (Nagaland)	1. Jharkhand 2. Orissa 3. Nagaland	1. Democratic Republic of Congo 2. China 3. Canada	
BAUXITE	Metallic	Balangir(Orissa) Koraput (Orissa) Gumla(Jharkhand) Shahdol (Madhya Pradesh)	1. Orissa 2. Gujarat	1. Australia 2. China, 3. Brazil	1. Junagarh (GJ) 2. Durg (CH)

COPPER	Metallic	Malanjkhand Belt (MP) Khetri Belt(Rajasthan) Kho-Dariba(Rajasthan)	1. Madhya Pradesh 2. Rajasthan 3. Jharkhand	1. Chile 2. China 3. Peru	1. Rajasthan 2. MP 3. Jharkhand
GOLD	Metallic	Kolar Gold Field (Karnataka) Hutti Gold Field (Karnataka) Ramagiri Mines (Andhra Pradesh) Sunarnarekha Sands (Jharkhand)	1. Karnataka 2. Andhra Pradesh	1. China 2. USA 3. South Africa	1. Bihar 2. Rajasthan 3. Karnataka
SILVER	Metallic	Zawar Mines (Rajasthan) Tundoo Mines (Jharkhand) Kolar Gold Fields (Karnataka)	1. Rajasthan 2. Karnataka	1. Mexico 2. Peru 3. China	1. Rajasthan 2. Jharkhand
LEAD	Metallic	Rampura Aghucha (Rajasthan) Sindesar Mines (Rajasthan)	1. Rajasthan 2. Andhra Pradesh 3. MP	1. China 2. Australia 3. USA	1. Rajasthan 2. Madhya Pradesh
TIN	Metallic	Dantewada (Chhattisgarh)	Chhattisgarh (only state in India)	1. China 2. Indonesia 3. Peru	Chhattisgarh
MAGNESIUM	Metallic	Chalk Hills (Tamilnadu)	1. Tamil Nadu	1. China 2. Russia	1. Tamil Nadu

		Almora (Uttarakhand)	2. Uttarakhand 3. Karnataka	3. Turkey	2. Karnataka
LIMESTONE	Non-Metallic	Jabalpur (Madhya Pradesh) Satna (Madhya Pradesh) Cuddapah (AP)	1. Rajasthan 2. Madhya Pradesh	1. China 2. India	1. Andhra Pradesh 2. Rajasthan 3. Gujarat
MICA	Non-Metallic	Gudur Mines (Aandhra Pradesh) Aravalis (RaJasthan) Koderma (Jharkhand)	1. Andhra Pradesh 2. Rajasthan 3. Orissa	1. India 2. Russia	
DOLOMITE	Non-Metallic	Bastar, Raigarh (Chhattisgarh) Birmitrapur (Orissa) Khammam Region (Aandhra Pradesh)	1. Chhattisgarh 2. Andhra Pradesh	1. India	1. Chhattisgarh 2. Orissa
ASBESTOS	Non-Metallic	Pali (Rajasthan) – largest mine Cuddapah (Andhra Pradesh)	1. Rajasthan 2. Andhra Pradesh 3. karnataka	1. Russia 2. China	1. Rajasthan 2. Andhra Pradesh
GYPSUM	Non-Metallic	Jodhpur, Bikaner, Jaisalmer-Rajasthan	1. Rajasthan 2. Tamil Nadu 3. Gujarat	1. China 2. USA 3. Iran	1. Rajasthan 2. Tamil Nadu 3. J & K
DIAMOND	Non-Metallic	Majhgawan Panna Mines (MP) – only	1. MP – only diamond	1. Russia 2. Bostwana	

		active diamond mine in India	producing state	3. Democratic Republic of Congo	
COAL	Non-Metallic	Korba Coalfield, Birampur-Chhattisgarh Jharia Coalfield, Bokaro Coalfield, Girdih –(Jharkhand) Talcher field – (Orissa) Singaruli coalfields (Chhattisgarh) - Largest	1. Chhattisgarh 2. Jharkhand 3. Orissa	1. China 2. USA 3. India	1. Jharkhand 2. Orissa 3. Chhattisgarh
PETROLEUM	Non-Metallic	Lunej, Ankleshwar, Kalol–Gujarat Mumbai high Maharashtra – largest oil field Digboi–Assam– Oldest oil field in India	1. Maharashtra 2. Gujarat	1. Russia 2. Saudi Arabia 3. USA	1. Gujarat 2. Maharashtra
URANIUM	Atomic	Jaduguda mine (Jharkhand) Tummalapalle mine (Andhra Pradesh) – largest mine Domiasiat Mine (Meghalaya)	1. Andhra Pradesh 2. Jharkhand 3. Karnataka	1. Kazakhstan 2. Canada 3. Australia	1. Jharkhand 2. Andhra Pradesh 3. Karnataka

THORIUM	Atomic		1. Kerala 2. Jharkhand 3. Bihar	1. Australia 2. USA 3. India	1. Andhra Pradesh 2. Tamil Nadu 3. Kerala
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List of Major Straits of the World

Sr. No.	Strait Name	Remarks
1	PALK STRAIT	It connects the Bay of Bengal with the Gulf of Mannar.
2	STRAIT OF GIBRALTAR	It connects the Atlantic Ocean with the Mediterranean Sea and separates Gibraltar and Spain in the north from Morocco in the south.
3	DUNCAN PASSAGE	It is a strait separating Rutland to the North and Little Andaman to the south.
4	NINE DEGREE CHANNEL	This Channel connects Laccadive Islands of Kalapeni, Suheli Par & Maliku Atoll.
5	TEN DEGREE CHANNEL	It separates the Andaman Islands from the Nicobar Islands in the Bay of Bengal.

6	STRAIT OF HORMUZ	It lies between UAE and Oman on the south-west and Iran on the north-east. It connects the Persian Gulf with the Gulf of Oman. It is strategically very important as it controls the oil trade from the Gulf countries.
7	STRAIT OF BAB-EL-MANDAB	It connects the Red Sea with the Gulf of Aden and separates Asia from Africa.
8	MALACCA STRAIT	It separates Peninsular Malaysia from Sumatra island of Indonesia. It connects the Pacific Ocean to the Indian Ocean. It provides a shorter route from the Andaman Sea to the South China Sea and therefore is the busiest waterway of the world.
9	SUNDA STRAIT	It connects the Java Sea to the Indian Ocean and separates Java island of Indonesia from its Sumatra island.
10	BERING STRAIT	It separates Russia and Alaska and connects the East Siberian Sea in the Arctic Ocean with the Bering Sea in the Pacific Ocean.
11	ORANTO STRAIT	Connect the Adriatic Sea with the Ionian Sea and separates Italy from Albania.

12	BOSPHORUS STRAIT	Connects the Black Sea with the Sea of Marmara. It is the world's narrowest navigable strait.
13	DARDANELLES STRAIT	It lies between the Asian Turkey and European Turkey and connects the Aegean Sea with the Sea of Marmara. It is a vital link of transportation between the Black Sea and the Mediterranean Sea.
14	LA PAROUSES STRAIT	It lies between the Sakhalin island and Hokkaido island of Japan and connects the Sea of Okhotsk with the Sea of Japan.
15	STRAIT OF TARTARY/TARTAR	It separates Russian Island Sakhalin from Mainland Asia. It connects the Sea of Okhotsk in the north to the Sea of Japan in the south.
16	TSUGARU STRAIT	It lies between Hokkaido and Honshu in northern Japan and connects the Sea of Japan to the Pacific Ocean.
17	TAIWAN STRAIT OR FORMOSA STRAIT	It lies between Taiwan (Republic of China) and Mainland China (People's Republic of China). It connects South China Sea with the East China Sea.
18	MOZAMBIQUE STRAIT	It lies in the Indian Ocean between Mozambique from Madagascar.

19	YUCATAN STRAIT	It lies between Mexico and Cuba and connects the Gulf of Mexico with the Caribbean Sea.
20	FLORIDA STRAIT	It lies between the Florida state of the USA and Cuba.
21	HUDSON STRAIT	It connects the Hudson Bay (Canada) with the Labrador Sea.
22	DAVIS STRAIT	It connects the Baffin Bay with the Atlantic Ocean.
23	COOK STRAIT	It lies between the North and the South islands of New Zealand and connects the Tasman Sea with the South Pacific Ocean.
24	BASS STRAIT	It separates Tasmania from the Australian mainland.
25	TORRES STRAIT	It lies in the Pacific Ocean, between Cape York Peninsula of Australia and Papua New Guinea
26	MAGELLAN STRAIT	It separates Mainland South America from Tierra Del Fuego (an archipelago off the southern-most tip of the South American Mainland)
27	DOVER STRAIT	It lies in the narrowest part of the English Channel, connecting it with the North Sea.

		It separates Britain from Continental Europe.
28	NORTH CHANNEL	It separates Ireland from Scotland and connects the Irish Sea with the Atlantic Ocean.

Climate and its Factors

The Atmosphere

- Gases and vapours form the atmosphere. When they receive solar energy, it gives rise to 'Climate'. Thus, the climate is defined as the *average atmospheric conditions of an area over a considerable period of time*. When this consideration of atmospheric condition is about certain place at certain time then it is called weather.
- There are five layers of the atmosphere. Those are:



Elements of climate

1. Temperature
2. Precipitation
3. Rainfall
4. Pressure and planetary winds
5. Land and sea breezes
6. Cyclonic activity

Temperature

Temperature decides the following factors-

- Amount of water vapour, the moisture-carrying capacity of the air.

- Rate of evaporation and condensation, governing degree of stability of the atmosphere.
- Relative humidity affecting nature and types of cloud formation and precipitation.

Factors that affect temperature:

1. Latitude – Temperature diminishes from equatorial regions to poles because of the earth's inclination. Direct rays travel a shorter distance and heat up smaller surface whereas oblique rays travel a longer distance and heat up large area.
2. Altitude – Temperature of air decreases with increasing height above sea level. This rate of decrease in temperature with increasing altitude is called as 'Lapse rate'. This rate is not constant. The lapse rate is greater by day than at night, greater on elevated highlands than on level plains.
3. Continentality – Land surface gets heated more quickly than water surface because of the higher specific heat of the water. (Specific heat is energy required to raise the temperature of given volume by 1 degree Fahrenheit)
4. Ocean currents and winds – Both transport their heat or coldness into adjacent regions. On-shore winds carry ocean currents landwards thereby affecting the temperature of an area. Local winds also change temperature according to their own temperature.
5. Slope, shelter and aspect – Steep slope show a rapid change in temperature than a gentle slope. Sheltered slope (north facing) has less temperature than sunny slope (south-facing).
6. Natural vegetation and soil – Thick vegetation has less temperature than open spaces. Colour of soil (light or dark) give rise to slight variation in temperature.

Precipitation

- When condensation occurs at ground level, haze, mist or fog are formed.
- When condensation of water vapour takes place in the atmosphere at a temperature below freezing point, snowfall occurs.
- When moist air ascends rapidly cooler layers of the atmosphere, water droplets freeze and fall to the earth as hail or hailstone.
- Frozen raindrops melt and refreeze forming sleet.

Rainfall

- **Convictional rain:** When earth surface gets heated by conduction, it comes into contact with air. This heated air contains the capacity to hold moisture. This air rises up and cools down. When saturation point is reached, rainfall occurs. In regions with high relative humidity, this moisture carrying capacity is huge, resulting in torrential downpours. Convection current goes through the process of expansion, cooling, saturation and finally condensation.
- **Orographic rain:** When moist air ascends the windward side of a mountain barrier, it cools down until complete saturation and orographic clouds form. Precipitation occurs on the upwind side. Leeward side acts as a rain shadow area where usually low precipitation occurs.
- **Cyclonic or frontal rain:** When air masses with different temperatures and different physical properties meet, warmer air rises over cooler air. In ascent, air expands and cools. Condensation takes place in the form of frontal rainfall.

Important facts of Census 2011

Census 2011

- Census is a process of collecting, compiling, analyzing, evaluating, publishing and disseminating statistical data regarding the population of a country.
- It covers demographic, social and economic data.
- It is conducted every 10 years.
- It started in 1871.

- Census 2011 data was released on 31st March 2011 by Union Home Secretary and RGCCI (Registrar General and Census Commissioner of India) of India.
- Census 2011 was the 15th census of India & 7th census after Independence.
- The motto of census 2011 was “Our Census, Our future”.
- Registrar General & Census Commissioner under whom census 2011 was conducted – C.Chandra Mouli
- Present Registrar General & Census Commissioner – Shri Sailesh,
- Total Population – 1,210,569,573 (1.21 Billion)
- India in 2nd rank in the population with 17.64% decadal growth.
- Increase in population during 2001 – 2011 is 181 Million
- Census 2011 was held in two phases:
- Houselisting & Housing Census
(April to September 2010)
- Population Enumeration
(9th to 28th February 2011)
- Number of Administrative Units in Census 2011
States/UTs 35
Districts 640
Sub-districts 5,924
Towns 7,936
Villages 6.41 lakh

Facts about districts

- Thane district of Maharashtra is the most populated district of India.
- Dibang Valley of Arunachal Pradesh is the least populated.
- Kurung Kumey of Arunachal Pradesh registered highest population growth rate of 111.01 Percent.
- Longleng district of Nagaland registered negative population growth rate of (-)58.39.
- Mahe district of Puducherry has the highest sex ratio of 1176 females per 1000 males.
- Daman district has the lowest sex ratio of 533 females per 1000 males.
- Serchhip district of Mizoram has the highest literacy rate of 98.76 Percent.

- Alirajpur of MP is the least literate district of India with the figure of 37.22 Percent only.
- North East Delhi has the highest density with the figure of 37346 people per square kilometre.
- Dibang Valley has the least density of 1 person per sq. km

Facts about cities

- Mumbai city of Maharashtra is the most populated city in India.
- Kapurthala city of Punjab is the least populated.
- Kozhikode of Kerala has the highest sex ratio of 1093 females per 1000 males.
- Bhiwandi city of Maharashtra has the lowest sex ratio of 709 females per 1000 males.
- Aizawl city of Mizoram has the highest literacy rate of 98.76 Percent.
- Sambhal of UP is the least literate city in India with the figure of 48 Percent only.
- North East Delhi has the highest density with the figure of 37346 people per square kilometre.

FEATURE	INDIA	TOP 3 STATES	BOTTOM 3 STATE	OTHER FACT
Average annual growth rate	1.64 %	1. Meghalaya (2.49 %) 2. Arunachal Pradesh (2.3 %) 3. Bihar (2.26 %)	1. Goa (.79%) 2. Andhra Pradesh (1.07%) 3. Sikkim (1.17%)	During 2001-2011, as many as 25 States/UTs with a share of about 85% of the country's population registered an annual growth rate of Less than 2%.

Decadal growth rate	17.60%	1. Meghalaya (27.8 %) 2. Arunachal Pradesh (25.9 %) 3. Bihar (25.1 %)	1. Nagaland (- 0.5 %) 2. Kerala (4.9 %) 3. Goa (8.2 %)	<ul style="list-style-type: none"> ● Nagaland is only the state that has negative growth rate. ● Districts with highest and lowest decadal growth rate were Kurung Kumey and Longleng respectively.
Population Density	382	1. Bihar (1,106 per sq km) 2. West Bengal (1030 per sq km) 3. Kerala (859 per sq km)	1. Arunachal Pradesh (17 per sq km) 2. Mizoram (52 per sq km) 3. J&K (56 per sq km)	<ul style="list-style-type: none"> ● Top 2 Districts: North East (NCT of Delhi) and Chennai ● Bottom 2 district: Dibang Valley and Samba.
Population (in terms of numbers)	Total - 1210.19 million Males – 623.7 million (51.54%) Females – 586.46 million (48.46%)	Total 1. Uttar Pradesh (19.9 million, 16.5%) 2. Maharashtra (11 million - 9.28%) 3. Bihar (10 million - 8.6%)	Total 1. Sikkim (6.07 lakh - 0.05%) 2. Mizoram (10.9 lakh - 0.09 %) 3. Arunachal Pradesh (13.8 lakh - 0.11%)	<ul style="list-style-type: none"> ● Top Metros 1. Mumbai (18,394,912) 2. Delhi 3. Chennai ● The population of India is almost equal to the combined population of U.S.A., Indonesia, Brazil, Pakistan, Bangladesh and

	Rural population— 833 million Urban population - 377 million			<p>Japan put together (1214.3 million)!</p> <ul style="list-style-type: none"> ● Top 2 Districts: Thane(Maharashtra) and North Twenty Four Parganas (West Bengal) ● Bottom 2 Districts: Dibang Valley and Anjaw (Arunachal Pradesh).
Sex ratio	940	1. Kerala (1084) 2. Tamil Nadu (996) 3. Andhra Pradesh (993)	1. Haryana (879) 2. Jammu and Kashmir (889) 3. Sikkim (890)	<ul style="list-style-type: none"> ● Top 2 Districts: Mahe and Almora ● Bottom 2 Districts: Daman and Leh
Fertility rate (2013)	2.3	1. Bihar (3.4) 2. U.P. (3.17) 3. Meghalaya (3.1)	1. Sikkim (1.45) 2. West Bengal (1.64) 3. Tamil Nadu (1.7)	
Literacy Rate	Overall -74% Male – 82.14% Female - 65.46	Overall 1. Kerala (93.9%) 2. Mizoram (91.6%) 3. Tripura (87.8%)	Overall 1. Bihar (63.80%) 2. Arunachal Pradesh (67%) 3. Rajasthan (67.11%)	<ul style="list-style-type: none"> ● Highest literacy rate according to Religion – Jain (94 %) > Christian (80%) > Buddhist (74%) ● Top 2 Districts: Serchhip and Aizwal

				<ul style="list-style-type: none"> Bottom 2 Districts Alirajpur and Bijapur
Work participation rate	Overall (39 %) <ul style="list-style-type: none"> Male (45 %) Female (14 %) 	1. Mizoram	1. Kerala 2. Goa	
Tribe	550 tribes <ul style="list-style-type: none"> 8.2% of the total Population of India 10 million population 	Population wise 1. MP (1.5 million) 2. Maharashtra (1.0 million) 3. Gujrat (.89 million) Tribal density wise 1. Mizoram 2. Nagaland 3. Meghalaya	Population wise 1. Punjab (zero) 2. Haryana (zero) 3. Goa (32,000) Tribal density wise 1. Punjab (zero) 2. Haryana (zero)	
State (Area)	32.87 Lakh km ²	1. Rajasthan (3.42 Lakh km ²) 2. M.P. (3.08 Lakh km ²) 3. Maharashtra (3.07 Lakh km ²)	1. Goa (3702 km ²) 2. Sikkim (7096 km ²) 3. Tripura (10,486 km ²)	

Urbanization		1. Goa (62%) 2. Mizoram (52%) 3. Tamil Nadu (48%)	1. Himachal Pradesh (10%) 2. Bihar (10.29%) 3. Assam (14%)	Maharashtra has highest no. of cities – 18 in numbers
Child sex ratio	914	1. Mizoram (971) 2. Meghalaya (970) 3. Chhattisgarh (964)	1. Haryana (830) 2. Punjab (846) 3. J&K (859)	The Child Sex Ratio at India level (914) is lowest since Independence
Per Capita Net State Domestic Product at Current Prices (2011-12)	60972 Rs.	1. Goa (1,92,000 Rs) 2. Haryana (1,09,000 Rs) 3. Tamil Nadu (84,000 Rs)	1. Bihar (24,000 Rs) 2. U.P. (29,000 Rs) 3. Jharkhand (32,000 Rs)	

Age structure	Adolescent (36.5 %) Adult (56.7%) Old (6.8 %)		
Major language	Hindi (40%) Bengali (8%) Telugu (7.8%)		
	Language family 1. Indo – European (Aryan – 73%) 2. Dravidian (20%) 3. Austric (Nishad - 1.3%)		
Religion- Percentage of population	Hindu 96.63 crore (79.8 %) Muslim 17.22 crore (14.2%) Christian 2.78 crore (2.3%) Sikh 2.08 crore (1.7%)	Hindu, Muslim, Christian, and Sikhs are in majority in 28,4,2,1 state respectively.	

	Buddhist 0.84 crore (0.7%) Jain 0.45 crore (0.4%)	
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ECONOMY

List of 5 Year Plans of Indian Economy

1. Visvesvaraya Plan

- The era of economic planning in India started with Visvesvaraya's ten-year Plan.

- Sir M. Visvesvaraya published a book titled “Planned Economy in India” in 1934 wherein he presented a draft to double the national income in a decade.
- He proposed to shift the labor from the agrarian set up to the industries thereby advocating for democratic capitalism (similar to the USA) with emphasis on industrialization. However, there was no follow up of this plan in British Government, it successfully stirred an urge for national planning among the educated citizens of the country.

2. National Planning Committee (NPC)

- It was the first attempt to develop a national plan for India emanated in 1938 with the set-up of NPC under the chairmanship of Jawahar Lal Nehru.
- However, because of the commencement of World War II, the reports of the committee could not be prepared. The papers finally came out after independence in 1948-49.

3. Bombay Plan

- Eight leading industrialists and technocrats formulated a draft titled “A Brief Memorandum Outlining a Plan of Economic Development for India” under the editorship of Purushottamdas Thakurdas in 1944.
- This draft is known as the ‘Bombay Plan’.
- The basic objectives of the plan were doubling the output of the agricultural sector and a five-fold growth in the industrial sector in 15 years.
- A key principle of the Bombay Plan was that the economy could not grow without government intervention and regulation.
- Officially the plan was never accepted, however, its ideas were replicated in future economic plans.

4. People’s Plan

- People’s plan was drafted by M. N. Roy, the communist leader, on behalf of the Post-War Reconstruction Committee of the Indian Federation of Lahore in 1944.
- It was based on ‘Marxist Socialism’ and gave primacy to agriculture. It advocated for the nationalization of agriculture and all production activities.

5. Gandhian Plan

- The Gandhian Plan was drafted by S. N. Aggarwal, the principal of Wardha Commercial College in 1944.
- The plan articulated a ‘decentralized economic structure’ for India with ‘self-contained villages’.
- Unlike the NPC and Bombay Plan, the plan laid more emphasis on agriculture.
- And wherever industrialization was talked about, it stressed upon promoting cottage and village level industries.

6. Sarvodaya Plan

- This plan was drafted by Jai Prakash Narayan in 1950.
- It was inspired by Gandhi Plan and Vinoba Bhave’s principles of self-reliance.
- It laid stressed upon agriculture as well as small and cotton industries.
- It advocated self-sufficiency by curtailing the use of foreign technology and implementing land reforms and decentralized participatory planning.

7. Planning Commission

- After independence, the Economic Programme Committee (EPC) was formed by the All India Congress Committee.
- Pandit J.L. Nehru was its chairman.
- In 1948, this committee recommended the formation of the planning commission.
- It was an extra-constitutional body, charged with the responsibility of formulating five-year plans.

8. National Development Council (NDC)

- It was founded on August 6, 1952. It was presided over by the Prime Minister.
- It is the apex body for decision creating and deliberations on development matters in India.
- It gives the final approval to the Five-Year Plan of India.

Summary of First three Five-year plans

Plans	Time frame	Objective and Remarks
First Plan	1951-1956	<ul style="list-style-type: none"> · Focus: agriculture, price stability, and infrastructure. · It was based on Harrod Domer model (growth rate of the economy depends upon investment rate and productivity of capital in a positive manner).
Second Plan (target growth: 4.5% Actual growth: 4.27%)	1956-1961	<ul style="list-style-type: none"> · Focus: rapid industrialization · It was also known as Mahalanobis Plan (advocated planning shift from agriculture to industries). · It laid emphasis on heavy and basic industries. · Also advocated import substitution; export pessimism and overvalue exchanges.
Third Plan (Target growth: 5.6% Actual growth: 2.84%)	1961-1966	<ul style="list-style-type: none"> · Focus: heavy and basic industry which was then shifted to agriculture (PL480). · Due to two wars- war with China, 1962 and war with Pakistan, 1965 and severe drought of 1965-66; it failed on many fronts.

- 1966-67, 1967-68 and 1968-69 were annual plans. Discontinuation of five-year planning for three consecutive years is regarded as plan holiday.
- Due to the prevailing food crisis, annual plans were primarily focused on agriculture.
- During these plans, the foundation of the green revolution was laid down which included widespread use of HYV (high yielding varieties) seeds, chemical fertilizers and extensive exploitation of irrigation potentials. During these years, the shocks of a third-year plan were absorbed and a five-year planning system was resumed from 1969.

Summary of IV to XII FYPS

Plans	Time Frame	Objective and Remarks
Fourth Plan (Target Growth: 5.7% Actual Growth: 3.30%)	1969-1974	<ul style="list-style-type: none"> · Focus: Self-sufficiency in food and self-reliance · Objective was to improve domestic food production. · It was aimed at saying no to foreign aid. · First oil shock of 1973, made remittances a major source of foreign exchange reserve.
Fifth Plan (Target Growth: 4.4% Actual Growth: 4.8%)	1974-1979	<ul style="list-style-type: none"> · Focus: 'removal of poverty' and 'attainment of self-reliance'. · It was drafted and launched by D. D. Dhar. · This plan was terminated in the year 1978. · There were rolling plans for the year 1978-1979 and 1979-1980.
Sixth Plan (Target Growth: 5.2% Actual Growth: 5.4%)	1980-1985	<ul style="list-style-type: none"> · Focus: poverty eradication and productivity enhancement · Stressed upon modernization of technology. · For the first time, the frontal attack was made on poverty by adopting ambitious poverty eradication programmes (trickle down strategy was discarded).
Seventh Plan (Target Growth: 5.0% Actual Growth: 6.01%)	1985-1990	<ul style="list-style-type: none"> · Focus: productivity and work i.e. employment generation. · For the first time, the private sector got priority over the public sector. · Due to volatile political situations at the center, two annual plans were commenced for the year 1990-1991 and 1991-1992.
Eighth Plan (Target Growth: 5.6% Actual Growth: 6.8%)	1992-1997	<ul style="list-style-type: none"> · Focus: 'Plan with a human face' i.e. human resource development. · During this plan, new economic policy was launched with LPG (Liberalization, Privatization, and Globalization). · It gave primacy to human capital and the private sector.

Ninth Plan (Target Growth: 7.1% Actual Growth: 6.8%)	1997-2002	<ul style="list-style-type: none"> · Focus: 'Growth with justice and equity' · It stressed upon four dimensions: quality of life; generation of productive employment; regional balance and self-reliance.
Tenth Plan (Target Growth: 8.1% Actual Growth: 7.7%)	2002-2007	It was aimed to double the per capita income of India in the next 10 years. And to reduce the poverty ratio by 15% by 2012.
Eleventh Plan (Target Growth: 8.1% Actual Growth: 7.9%)	2007-2012	Focus: Faster growth and more inclusive growth.
Twelfth Plan (Target Growth: 8%)	2012-2017	Focus: Faster, more inclusive growth and sustainable growth.

NITI Aayog

- NITI Aayog, the National Institution for Transforming India, is a policy think tank of the Government of India established in 2015.
- It replaced the Planning Commission.
- It has a dual objective of achieving sustainable development goals and to enhance cooperative federalism with 'bottom to top' approach. Its initiatives include
 - (a) Action Plan- 3 Years
 - (b) Strategy Plan- 7 Years
 - (c) Vision Plan- 15

National Income

About National Income

- National Income is usually defined as the total Value of all final goods and services produced in a country in a particular period (Generally one year).
- Following are the measures of National Income-
 - (A) GDP (Gross Domestic Product)
 - (B) GNP (Gross National Product)
 - (C) NNP (Net National Product)
 - (D) PI (Personal Income)
 - (E) DPI (Disposable Personal Income)

(A) GDP (Gross Domestic Product)-

- GDP is the total value of all final goods and services produced within the geographical boundary of the country during a particular period (Generally one year).
- In this, we consider all goods/ services, produced by both resident citizens and foreign nationals who reside within the boundary of that country.

(B) GNP (Gross National Product)-

- GNP is defined as the total value of the final goods and services produced by Indians in India as well as abroad during a particular period.
- GNP includes the value of goods produced by resident and non-resident citizens of a country whereas the income of foreigners who reside in India is excluded.

(C) Net National Product (NNP)-

- It is calculated by deducting depreciation from Gross National Product (GNP)
- $NNP = GNP - \text{Depreciation}$

Note-

Factor Cost- Cost incurred to produce goods and service

Market price- For calculating market price we add Indirect taxes and deduct subsidies given by the government in Factor cost.

$\text{Market Price} = \text{Factor cost} + \text{Indirect Taxes} - \text{Subsidy}$

- $NNP \text{ at factor cost} = NNP \text{ at market price} - \text{Indirect taxes} + \text{subsidy}$
- Usually, we called NNP at factor cost as National Income.
- Likewise, NNP at factor cost, we can also calculate GDP at factor cost.

(D) Personal income-

- It is the sum of all the income received by the people of the country in one year.
 $\text{Personal Income} = \text{National Income} + \text{Transfer payments} - \text{Undisclosed profits of corporate} + \text{Payment for social security provisions}$
- Transfer Payments are the payments that are not against any productive work. (Example- Old Age Pension, Unemployment compensation etc.)
- Social Security Provisions- Payment made by employees towards PF, Insurance etc.

(E) Disposable Personal Income-

- Income available to individuals after deducting direct taxes.
- $\text{Disposable Personal Income} = \text{Personal Income} - \text{Direct Taxes}$

Real Income and Nominal Income-

- If we use base year price for calculating National Income, this is called the real income.
- If we use a particular year (current year) price for calculating National Income, this income is called the Nominal income.

GDP Deflator-

- Used to calculate overall price rise.

Estimation of National Income in India

- In 1868, Dadabhai Naoroji wrote a book 'Poverty and Un British Rule in India'. It was the first attempt at the calculation of National Income.
- The first person to estimate National Income scientifically was Dr V. K. R. V. Rao who estimated national income for the period 1925-29.
- After Independence National Income committee was formed in 1949 under the chairmanship of P.C. Mahalanobis.
- After some years the Central Statistical Organisation (CSO) was formed.

Various Price Indices in India

Price Indices in India

Various weighted price indices are calculated in India.

These are-

1. Wholesale Price Index (WPI)
2. Old Consumer Price Index
 - (a) Consumer Price Index for Industrial Workers (CPI- IW)
 - (b) Consumer Price Index for Urban Non- Manual Employees (CPI- UNME)
 - (c) Consumer Price Index for Agriculture Labourers (CPI-AL)
 - (d) Consumer Price Index for Rural Labourers (CPI- RL)
3. New Consumer Price Index (Introduced in February 2011)
 - (a) CPI (Rural)
 - (b) CPI (Urban)
 - (c) CPI (Combined)
4. Consumer Food Price Index

Till April 2014, the Inflation rate was measured with the help of WPI (Wholesale Price Index).

Currently, in India inflation rate is measured with the help of Consumer Price Index- combined.

1. Wholesale Price Index

- It measures the change in the price of commodities traded in the wholesale market.
- It is also known as headline inflation.
- Current base year- 2011-12.
- The index basket of the current series has a total of 697 items (117 items for Primary Articles, 16 items for Fuel & Power and 564 items for Manufactured Products.)
- Published by- Economic Advisor, Ministry of Commerce & Industry.

2. Old Consumer Price Index

(a) Consumer Price Index for Industrial Workers (CPI- IW)

- It measures the change in the price of commodities consumed by industrial workers.
- Current base year- 2001
- Published by- Labour Bureau

(b) Consumer Price Index for Urban Non- Manual Employees (CPI- UNME)

- It measures the change in the price of commodities consumed by Non- Manual Employees.
- Published by- CSO (Central Statistics Office, Ministry of Statistics)
- It has been discontinued.

(c) Consumer Price Index for Agriculture Labourers (CPI-AL)

- It measures the change in the price of commodities consumed by agriculture labourers.

- It is a subset of CPI-RL.
- Current base year- 1986-87
- Published by- Labour Bureau
- Used for revising minimum wages

(d) Consumer Price Index for Rural Labourers (CPI- RL)

- It measures the change in the price of commodities consumed by rural labourers (include agriculture labourers, labourers of village and cottage industries).
- Current base year- 1986-87
- Published by- Labour Bureau
- Used for revising minimum wages.

3. New Consumer Price Index (Introduced in February 2011)

(a) CPI (Rural)-

- Current base year- 2012
- Published by- CSO (Central Statistics Office, Ministry of Statistics)

(b) CPI (Urban)-

- Current base year- 2012
- Published by- CSO

(c) CPI (Combined)-

- Current base year- 2012
- Published by- CSO
- Currently, in India inflation rate is measured with the help of Consumer Price Index-combined.

4. Consumer Food Price Index-

- It is a measure of change in retail prices of food items consumed by the people.
- Current base year- 2012
- Published by- CSO

GDP Deflator

- Used to calculate overall price rise.
- Known as implicit price deflator.
- $\text{GDP Deflator} = (\text{Nominal GDP} / \text{Real GDP}) \times 100$
- Here Real GDP- GDP calculated at constant Price
- Nominal GDP- GDP calculated at current Price
- The GDP deflator is the most accurate because it covers all goods and services produced in the economy. The other indices (WPI and CPI) derive from price quotations for select commodity baskets.
- The government does not use it because GDP deflator data comes quarterly (not weekly/monthly basis).

RBI and Monetary Policy

RBI (Reserve Bank of India)

- RBI was established in April 1935 under Reserve Bank of India, 1934.
- On the recommendation of Hilton-Young Commission.
- Central Bank of India which was nationalized in 1949.
- Central office initial was established in Calcutta and later moved to Mumbai in 1937.
- Official Directors- Governors and not more than four deputy governors.
- RBI performs his function under the guidance of the Board of financial supervision.

Other facts related to Reserve Bank of India

- The first governor of RBI- Sir Osborne Smith
- The first governor of RBI after nationalization- C. D. Deshmukh
- First women Deputy Governor of RBI -K.J.Udeshi.
- RBI Emblem: Tiger and Palm tree

What is Monetary Policy?

- The policy made by the central bank (Reserve Bank of India) to control the money supply in the economy.

MPC (Monetary Policy Committee)

- The Monetary Policy Committee of India is a committee of the Reserve Bank of India that is responsible for fixing the benchmark interest rate in India.
- Section 45ZB of the amended RBI Act, 1934 provides for an empowered six-member monetary policy committee (MPC) to be constituted by the Central Government to determine the interest rate that is required to achieve the inflation target.
- The MPC is required to meet at least four times in a year.
- Six-membered MPC is headed by RBI governor Urjit Patel.
- The Members of the Monetary Policy Committee appointed by the Central Government shall hold office for a period of four years.

Liquidity Adjustment Facility (LAF)

- Liquidity adjustment facilities (LAF) is also a tool used by RBI to control the short-term money supply.
- Liquidity adjustment facilities (LAF) has two instruments namely Repo rate and Reverse Repo Rate.
- **Repo Rate:** The interest rate at which the Reserve Bank provides loans to commercial banks by mortgaging their dated government securities and treasury bills.
- **Reverse Repo Rate:** The interest rate at which the Reserve Bank borrows from commercial banks by mortgaging its dated government securities and treasury bills.
- While repo rate injects liquidity into the system, the Reverse repo absorbs the liquidity from the system.

Types of Unemployment

1. Structural Unemployment

- Caused by structural change.
- Example- technological change, growing population etc.

2. Frictional Unemployment

- When people shift from one job to another and remain unemployed during this interval period.

3. Cyclical Unemployment (Demand Deficient Unemployment)

- When people are thrown out from the job due to a decrease in demand.
- Example- recession

4. Disguised Unemployment

- In this type of employment, people are employed but their marginal productivity is zero.
- Example- One man is engaged in some agriculture work, his friend joins him but the productivity of both remains same. His friends come under disguised unemployment.

5. Educated Unemployment

- If one educated person is not able to get a suitable job suited to his qualification.
- Example- Engineering graduate is getting clerk post instead of engineer post.

6. Open Unemployment

- A condition in which people do not find any work to do.
- It includes both skilled and unskilled people.

7. Under Unemployment

- When people obtain work but their efficiency and capability are not utilized at their optimum and they contribute to the production up-to a limited level.

8. Voluntary Unemployment

- In this type of unemployment, jobs are available but individuals want to remain idle.
- Example- lazy people, people who have ancestor property do not want to earn.

9. Natural Unemployment

- 2 to 3 % unemployment is considered natural and cannot be eliminated.

10. Chronic Unemployment

- Caused due to the long-term unemployment present in the economy.

11. Seasonal Unemployment

- In this type of unemployment, people are unemployed for a few months of the year.
- Example- Farmers

Inflation (Types and Effects)

Inflation

- The general rise in the price level of goods and services.
- It is estimated as the percentage rate of change in price index over the reference time period.
- Currently in India inflation rate is measured with the help of the Consumer Price Index-combined (Base year- 2012).
- Till April 2014, the Inflation rate was measured with the help of WPI (Wholesale Price Index).
- Rate of Inflation= $\frac{\text{Current period price index} - \text{Reference period price index}}{\text{Reference Period Price Index}} \times 100$

Type of Inflation

Based on the rate of rising in Inflation

1. Creeping Inflation

- Price rise at the very small rate ($< 3\%$)
- It is considered safe and essential for the economy.

2. Walking or Trotting Inflation

- Price rise at moderate rate ($3\% < \text{Inflation} < 10\%$)
- Inflation at this rate is a warning signal for the Economy.

3. Running Inflation

- Price rise at high rate ($10\% < \text{Inflation} < 20\%$)

- It affects the economy adversely.

4. Hyperinflation or Galloping Inflation or Runway Inflation

- Price rise at very high rate ($20\% < \text{Inflation} < 100\%$)
- This situation brings the total collapse of the Economy.

Based on the causes

- Demand Pull Inflation: When Inflation arises due to higher demand for goods and services over the limited supply.
- Cost-Push Inflation: When Inflation arises due to higher input cost (Example- raw material, wages etc.) for goods and services over the limited supply.

Other definitions

1. Deflation

- It is opposite to Inflation.
- Reduction of general level of price in an economy.
- In this price index measured is negative.

2. **Stagflation:** When stagnation and inflation coexist in the economy.

3. **Stagnation:** low national income growth and high unemployment.

4. **Disinflation**

- When the rate of Inflation is at a slower rate.
- Example:
If the Inflation of last month was 4 % and the rate of inflation in the current month is 3 %.

5. **Reflation:**

- Deliberate action of government to increase the rate of inflation to redeem the economy from a deflationary situation.

6. **Core Inflation:**

- It is a measure of price rise in the economy excluding the price rise of some products (whose price is volatile and temporary in nature).

Measures to control Inflation

1. **Credit control**

- It is used by RBI.

2. **Increase in Direct Taxes**

- Due to the increase in direct taxes, people have less money available to them and low demand from them leads to a lower price.

3. **Price Control**

- By fixing the maximum price limit by authorities.

4. **Trade measures**

- Maintain proper supply in the economy by export and import of goods and services.

Poverty in India

Poverty

- A condition in which section of society is unable to fulfil its basic necessities of life.
- It is of two types-
 - (a) Absolute Poverty
 - (b) Relative Poverty

(a) **Absolute Poverty**

- In this, we calculate an aggregate value (a figure expressing per capita consumer expenditure) of the minimum quantity of commodities which are necessities of life.
- The population whose level of income (or expenditure) is below this aggregate value is Below Poverty Line (BPL).
- In this measure of poverty, we expressed the number of poor as a proportion of the total population. This measure also is known as the headcount ratio. Example: 13 Percent of People are BPL.
- Why we prefer consumption expenditure method instead of income- In per capita income we cannot separate dependent people (children, senior citizens etc.) who are consuming but not earning. So, for correct data calculation, we prefer the consumption expenditure method instead of income.

(b) **Relative Poverty**

- In this type of poverty, a person may be above Below Poverty Line but happens to be poor in comparison with the other person whose income is above his income/consumption.
- In this type of poverty calculation, income/consumption distribution of the population in different percentile groups is estimated and compare them.
- It provides inequality present among the total population.
- Quintile ratio is one of the measures of inequality.
Quintile Income Ratio= Average income of richest 20 Percent/ Average income of poorest 20 persons

Poverty estimation in Independent India

(A) Dr. V.M. Dandekar and Nilantha Rath (1968-69)

- Fixed desired minimum nutrition = 2250 calories/day
- In Rural, money required to purchase this amount of nutrition- 170 Rs. / year
- In Urban, money required to purchase this amount of nutrition- 271 Rs. / year
- Using this reference, they found that 40 Percent of rural resident and 50 Percent of urban residents were below the below poverty line in 1960-61.

(B) Planning commission expert group

- Poverty line concept was first introduced by the planning commission working group of the planning commission in 1962.

(i) Alagh Committee

- **Chairman-** Y K Alagh
- Till 1979 poverty estimation was done on the basis of lack of income, but in 1979 Y K Alagh Committee adopted a new approach based on household per capita consumption expenditure basis.
- This committee defines the first poverty line in India.
- Daily consumption fixed by the committee in Rural= 2400 calories/day
Daily consumption fixed by the committee in Urban= 2100 calories/day
Note- In rural India value of consumption was put high because of physical labour they undergo.

(ii) Lakdawala Committee

- Formed in 1989.
- Chairman- D.T. Lakdawala
- Submitted report in 1993.
- Daily consumption fixed by the committee in Rural= 2400 calories/day
Daily consumption fixed by the committee in Urban= 2100 calories/day
- The committee used CPI-IL and CPI-AL for estimation of Poverty
Note- CPI-IL (Consumer Price Index for Industrial Labourers)
CPI-AL (Consumer Price Index for Agriculture Labourers)

(ii) Tendulkar Committee

- Formed in 2005.
- Chairman- Suresh D. Tendulkar
- Submitted its report in 2009.
- Changed calorie based estimation to nutrition, health and other expenditure based
- Introduce a new term Poverty Line Basket (PLB) which is the basket of all goods selected to determine poverty.
- Consumption quantity fixed the same for both rural and urban people but price differs-
Daily per capita expenditure for Rural- Rs. 27
Daily per capita expenditure for Urban- Rs. 33

(iii) Rangarajan Committee

- Formed in June 2012.
- Chairman- Rangarajan
- Submitted its report in June 2014.
- Again, adopted the calorie-based approach which was used in past.
- Daily per capita expenditure for Rural- Rs. 33
Daily per capita expenditure for Urban- Rs. 47

History of Banking in India (Before & After Independence)

Phases of Indian Banking System

The advancement in the Indian banking system is classified into 3 distinct phases:

1. The Pre-Independence Phase i.e. before 1947
2. Second Phase from 1947 to 1991
3. Third Phase 1991 and beyond

1. The Pre-Independence Phase i.e. before 1947

- This phase is characterized by the presence of a large number of banks (more than 600).
- Banking system commenced in India with the foundation of Bank of Hindustan in Calcutta (now Kolkata) in 1770 which ceased to operate in 1832.
- After that many banks came but were not successful like:

- (1) General Bank of India (1786-1791)
- (2) Oudh Commercial Bank (1881-1958) – the first commercial bank of India.

Whereas some are successful and continue to lead even now like:

- (1) Allahabad Bank (est. 1865)
- (2) Punjab National Bank (est. 1894, with HQ in Lahore (that time))
- (3) Bank of India (est. 1906)
- (4) Bank of Baroda (est. 1908)
- (5) Central Bank of India (est. 1911)

- While some others like Bank of Bengal (est. 1806), Bank of Bombay (est. 1840), Bank of Madras (est. 1843) merged into a single entity in 1921 which came to be known as Imperial Bank of India.
- Imperial Bank of India was later renamed in 1955 as the State Bank of India.
- In April 1935, Reserve Bank of India was formed based on the recommendation of Hilton Young Commission (set up in 1926).
- In this time period, most of the banks were small in size and suffered from the high rate of failures. As a result, public confidence is low in these banks and deposit mobilization was also very slow. People continued to rely on the unorganized sector (moneylenders and indigenous bankers).

2. The second phase from 1947 to 1991

- Broadly the main characteristic feature of this phase is the Nationalization of the bank.
- With the view of economic planning, nationalization emerged as the effective measure.
- Need for nationalization in India:

(a) The banks mostly catered to the needs of large industries, big business houses.

(b) Sectors such as agriculture, small-scale industries and exports were lagging behind.

(c) The poor masses continued to be exploited by the moneylenders.

- Following this, in the year 1949, 1st January the Reserve Bank of India was nationalized.
- Fourteen commercial banks were nationalized on 19th July 1969. Smt. Indira Gandhi was the Prime Minister of India, during in 1969. The following banks are nationalized:

1. Central Bank of India
2. Bank of India
3. Punjab National Bank
4. Bank of Baroda
5. United Commercial Bank
6. Canara Bank
7. Dena Bank
8. United Bank
9. Syndicate Bank
10. Allahabad Bank
11. Indian Bank
12. Union Bank of India
13. Bank of Maharashtra
14. Indian Overseas Bank

Six more commercial banks were nationalized in April 1980. These are mentioned below:

1. Andhra Bank
2. Corporation Bank
3. New Bank of India
4. Oriental Bank of Commerce
5. Punjab & Sindh Bank
6. Vijaya Bank.

- Meanwhile, on the recommendation of Narasimham committee, Regional Rural Banks (RRBs) were formed on Oct 2, 1975. The objective behind the formation of RRBs was to serve the large unserved population of rural areas and promoting financial inclusion.

- With a view to meet the specific requirement from the different sector (i.e. agriculture, housing, foreign trade, industry) some apex level banking institutions were also setup like: (a) NABARD (est. 1982)

(b) EXIM (est. 1982)

(c) NHB (est. 1988)

(d) SIDBI (est. 1990)

Impact of Nationalization

- Improved efficiency in the Banking system – since the public's confidence got boosted.
- Sectors such as Agriculture, small and medium industries started getting funds which led to economic growth.
- Increased penetration of Bank branches in rural areas.

3. Third phase 1991 and beyond

- This period saw a remarkable growth in the process of development of banks with the liberalization of economic policies.
- Even after nationalization and the subsequent regulations that followed, a large portion of masses is untouched by the banking services.
- Considering this, in 1991, the Narasimham committee gave its recommendation i.e. to allow the entry of private sector players into the banking system.
- Following this, RBI gave license to 10 private entities, out of which few survived the market demands, which are- ICICI, HDFC, Axis Bank, IndusInd Bank, DCB.
- In 1998, the Narsimham committee again recommended entry of more private players.

As a result, RBI gave license to the following newbies:

(a) Kotak Mahindra Bank (2001)

(b) Yes Bank (2004)

Points to Note

1. Allahabad Bank, established in 1865 – Allahabad Bank is the oldest Public Sector Bank in India having branches all over India and serving the customers for the last 145 years.
2. Imperial Bank of India was later renamed in 1955 as the State Bank of India.
3. Punjab National Bank is the first bank purely managed by Indians, which was established in Lahore in 1895.
4. First Truly Swadeshi bank – Central Bank of India is called India's First Truly Swadeshi bank, which was established in 1911 and wholly owned and managed by Indians.
5. Union Bank of India was inaugurated by Mahatma Gandhi in 1919.
6. Osborne Smith was the first governor of the Reserve Bank.
7. CD Deshmukh was the first Indian to be the governor of the Reserve Bank.
8. The first Indian bank to open an overseas branch is Bank of India. It established a branch in London in 1946.
9. State Bank of India has the maximum number of overseas branches.

Money Market- Banking System in India

The banking structure is divided into many parts like Capital Market, Money Market etc.

Money Market

- In this, borrowing and lending of funds take place up to 1 year.
- It is used for short-term credit.

- It includes Reserve Bank of India, Commercial Banks, Cooperative Banks, Regional Rural Banks, some NBFC's etc.

Composition of Money Market

Indian Money market consists of organised sector and unorganized sector. But here, we will put a focus on the organised sector.

Organised Sector:

It is divided into two categories:

A. Banking

Classification of Banks based on the schedule of RBI Act 1934

All banks (Commercial Banks, RRB, Cooperative Banks) can be classified into scheduled and non-scheduled banks.

1. Scheduled Banks

- Banks are listed in the second schedule of RBI Act, 1934.
- Eligible for obtaining loans from RB on Bank Rate.

2. Non- Scheduled Banks

- Banks that are not listed in the second schedule of RBI Act, 1934.
- Generally, not eligible for obtaining loans from RBI.
- Keep CRR with itself, not with RBI.

Commercial Banks

- It is divided into two parts i.e. Public and Private Sector Banks.
- Regulated under Banking Regulation act 1949.
- They can accept deposits, can provide loans and other financial services to earn the profit.

(a) Public Sector Banks

- In these banks, the majority of shares (more than 50%) are held by the Government.
- Currently, in India, there are 21 Public sector banks after the merger of SBI with their associate banks and Bhartiya Mahila Bank (BMB).
- The Nationalisation of banks was done by government in two stages:
The first stage of nationalization took place in July 1969, in which fourteen banks were nationalized.
The second stage of nationalization of Banks took place in April 1980, in which six banks were nationalized.

Objectives of Nationalization of Banks:

1. Reducing Private Monopolies
2. Social Welfare
3. Expansion of Banking Facilities
4. Focus on Priority Sector Lending

(b) Private Sector Banks

- In these banks, the majority parts of shares are not held by the government.
- Private sector banks consist of both Indian Banks as well as foreign banks.
- Private banks which were set up before 1990 (liberalisation of the economy) are categorised as Old Banks.
- Private banks which were set up after 1990 (liberalisation of the economy) are categorised as New Banks.

- Local Area Banks- Private Banks which are allowed to operate in the limited area called local area banks and registered under the companies act, 1956. The minimum capital required for these banks is Rs. 5 crores.

Regional Rural Banks

- Established under RRB Act, 1976.
- Regional Rural Banks are set up by public sector banks.
- The objective of RRBs is to increase credit flow to rural areas.
- After the Kelkar committee's recommendations in April 1987, no new RRBs have been opened.

Cooperative Banks

- Established with the aim of funding agriculture, cottage industries etc.
- Can perform both deposits and lending activities.
- NABARD (National Bank for Agriculture and Rural development) is the apex body of the cooperative sector in India.

Composition of Cooperative Banks

1. Rural Cooperative Credit Institutions

(a) Short Term Structure

- Lend up to one year.
 - It is further divided into a three-tiered setup.
- (i) State Cooperative Bank: Apex body for cooperative banks in the state.
(ii) Central or District Cooperative Banks: Operate at the district level.
(iii) Primary Agriculture Credit Societies: Operate at the village level.

(b) Long-Term Structure

- Lend for more than one year to twenty-five years.
- It is divided into two-tiered setup:
 - (i) State Cooperative Agriculture and Rural Development Banks and
 - (ii) Primary Cooperative Agriculture and Rural Developments Banks

2. Urban Cooperative Credit Institutions

- Set up in urban and semi-urban areas.
- Lend to small businesses and borrowers.

B. Sub Markets

- Sub Market, market to generate resources for investment and to meet the shortage of money for regular activities.
- The government, Financial Institutions and Industries take part in the submarket.

The composition of the Sub Market-

(i) Call Money Market

- Known as Short Notice Market.
- Generally used for inter-bank borrowing and lending.
- Loans for a range from one to fourteen Days.
- It is also divided into two categories- A. Call market or Overnight Market (Within one Day)
 - B. Short Notice market (up to fourteen days)

(ii) Bill Market or Discount Market

(a) Treasury Bills

- Issued by Government treasury.
- Used for short-term credit.
- Non-interest bearing (Zero Coupon bonds), issued at discount price.

(b) **Commercial Bill Market**

- Bills other than treasury bills.
- Issued by traders and industries.

(iii) **Dated Government Securities**

- Used for long-term maturity.

(iv) **Certificates of Deposits**

- Issued by commercial banks and financial Institution

(v) **Commercial Paper**

- Issued by corporate, Primary dealers and financial institutions.

Capital Market

Financial Market is the market where borrowing and lending of funds of all individual, institutions, companies and of the government take place. In India, Financial Market can be divided into two main categories-(A) Money Market (B) Capital Market. In this article, we will read the "Basics of Capital market, Stock market, their types, and features"

Money Market

- It is used for short-term credit.
- Generally, we use it for borrowing and lending of money up to 1 year.
- It includes Reserve Bank of India, Commercial Banks, Cooperative Banks, Regional Rural Banks, Some NBFC's etc.

Capital Market

- It is used for long-term credit.
- Generally, we use it for borrowing and lending of money above 1 year.
- It includes Stock exchanges, Housing finance companies, Insurance companies etc.
- All the institutions listed in the capital market are called Non-banking financial companies (NBFC's). But it is not Necessary that all NBFCs are part of the capital market.

NBFCs

NBFCs is a company registered under the companies act, 1956. It differs from banks in the following aspects-

- (i) It cannot accept demand deposits.
- (ii) They do not have insurance coverage on their deposits however bank deposits have insurance cover of Deposit Insurance and Credit Guarantee Corporation.

Balance Of Payments

Introduction

- International Monetary Fund (IMF) defines the Balance of Payments (BoP) as a statistical statement that summarizes economic transactions between residents and non-residents during a specific time period.
- The BoP, thus, includes all transactions showing:
 - (a) Transactions in goods, services and income between an economy and the rest of the

world,

(b) Change of ownership and other changes in that economy's monetary gold, special drawing rights (SDRs), and financial claims on and liabilities to the rest of the world

(c) Unrequited transfers- transfer of money in which nothing is expected in return. Example- Foreign aid, debt forgiveness etc.

- These transactions are categorized into
(i) Current Account
(ii) Capital Account and Financial Account (capital account is redesignated as capital and financial account)
- The balance of payments is, basically, the record of all international financial transactions made by a country's residents.
- The balance of payments tells us whether the country has a surplus or deficit. It also reveals whether the country produces enough economic output to pay for its growth.

When BoP is deficit it implies

- A balance of payments deficit means the country imports more goods, services and capital than it exports.
- The country must borrow from other countries to pay for its imports.
- In the short-term, that fuels the economic growth. But, in the long-term, the country becomes a net consumer, not a producer, of the world's economic output.
- The country goes into debt to pay for consumption instead of investing in future growth. If the deficit continues for long, the country gets into the debt trap and might end up selling its assets to pay off its debt.

When BoP is surplus it implies

- A balance of payments surplus means the country exports more than it imports.
- The country basically saves more than it earns. This boosts the capital formation with its additional income. They might even lend outside the country.
- A surplus boosts economic growth in the short term.
- In the long run, the country becomes too dependent on export-driven growth. It must encourage its residents to spend more. A larger domestic market will protect the country from exchange rate fluctuations

BOP Components

- The BoP can be broadly divided into two accounts namely-
(a) Current Account
(b) Capital and financial account.

Current Account

- The current account measures the transfer of real resources (goods, services, income and transfers) between an economy and the rest of the world.
- The current account is further subdivided into a merchandise account and invisible account.
- The merchandise account consists of transactions relating to exports and imports of goods.
- In the invisible account, there are three broad categories namely-
(a) non-factor services such as travel, transportation, insurance and miscellaneous services;

- (b) transfers which do not involve any value in exchange, and
- (c) income which includes compensation for employees and investment income.

Current Account Deficit (CAD)

- Current Account Deficit (CAD) = Trade Deficit + Net Income From Abroad + Net transfers
- Note: Here Trade Deficit = Export - Import
- So we can see here that Trade Deficit and Current Account Deficit both are different and the Trade Deficit is one component of Current Account Deficit.

Capital Account and Financial Account

- The capital and financial account reflect the net changes in financial claims on the rest of the world.
- Note-
- The former balance of payments capital account has been redesigned as the capital and financial account as per the fifth edition of Balance of Payments Manual (IMF).
- The capital account can be broadly broken up into two categories namely-
 - (a) Non-debt flows such as direct and portfolio investments
 - (b) Debt flows such as external assistance, commercial borrowings, non-resident deposits, etc.
 - The financial account records an economy's transaction in external financial assets and liabilities.
 - All components are classified according to type of investment or by functional subdivision
 - (a) Direct investment
 - (b) Portfolio investment
 - (c) Other investment
 - (d) Reserve assets
 - The sum of the current account and capital account indicates the overall balance, which could either be in surplus or in deficit. The movement in overall balance is reflected in changes in the international reserves of the country.

Sr. No.	Articles	Opportunity cost
1.	Free goods like clean air, abundant fresh water, etc.	No
2.	Common goods (in abundant)	No
3.	Common goods (scarce)	Yes
4.	Government expenditure in defence	Yes
5.	Government freebies to citizens	Yes
6.	Public goods like roads, railways, infrastructure, etc.	Yes

- The opportunity cost is considered to be zero for naturally occurring abundant resources like free unpolluted air, water etc. and also for common goods like grazing land, oceans etc.
- For government expenditures, the Opportunity cost is never zero because the authorities always have choices to make.
- So, whatever is chosen, there would exist something forgone as well. Like if the government decides to build a bridge, the government could have spent that price onto increasing more personnel to ensure safety.
- In the case of freebies, for consumers/ citizens, there is no opportunity cost because it is transferred from them to the government.

PRODUCTION POSSIBILITY CURVE:

- With the available amount of resources and technology, the various alternative combinations of production of a set of two goods are plotted to give a production possibility curve.
- It is also known as the Production Possibility Frontier or Transformation curve.
- The curve helps in deciding “what to produce”.
- Thus, the curve provides all the production possibilities available, out of which the most economically or physically viable one could be chosen to maximize profit and minimize the losses attached.

Different points on a curve

Point X represents underutilization of resources.

point Y represents infeasible option i.e., non-feasibility of the chosen combination (beyond the capacity);

while points A, B and C represent the full utilization of resources.

If the resources and technology available increases, the curve shifts towards the right and if resources and technology fall short, the curve shifts towards the left.

SUPPLY-DEMAND CURVE:

Supply curve:

- It represents the relationship between the price and quantity of a product produced which the seller is ready to supply in the market, keeping other variables to be constant.
- Herein quantity of the product is plotted horizontally on x-axis and price of the same product on the y-axis.
- It is generally a straight line sloping upward from left to right as shown in the graph. This is so because price and quantity of a product are directly related, i.e. if the price of a product is increasing in the market, its quantity in the market will also increase in the same manner (increase in price acts as an incentive for the suppliers to produce more).
- With the change in variables, the supply curve can shift in either direction. If it shifts towards the left, it implies a decrease in the quantity of product supplies in the market and rightward shift implies an increase in quantity supplies with respect to the price of the product.

Demand curve:

- It represents the relationship between the price and quantity of the product demanded by the consumers, keeping all other variables to be constant.
- It generally represents a downward sloping straight line from left to right as shown in the graph below.

- This is so because price and quantity of the product demanded are inversely related to each other, i.e. if the price of a commodity falls, its demand rises.
- Conforming to the supply curve, if it shifts leftwards, it implies a decrease in demand and if rightwards, it implies an increase in demand of a product.

Keynesian Theory

Keynesian Economics

- It was developed by the British economist John Maynard Keynes during the 1930s. It was an attempt to understand the Great Depression.
- It suggested increasing government expenditures and lower taxes to stimulate demand and pull the global economy out of the depression.

Keynesian Theory of Employment

- This theory rejected the notion of full employment and instead suggested full employment as a special case and not a general case.
- It said if there is an increase in national income, there would be an increase in level of employment and vice versa.
- According to this theory, the level of employment is dependent on national income and output and factors of production remain unchanged while determining the level of employment.

Laissez-faire Theory

- This theory opposed any government intervention in business affairs.

World Trade Organisation: Structure, Objectives, Agreements, Subsidies

Introduction

- WTO is an international organization set up in 1995 by replacing the General Agreement on Trade and Tariffs (GATT) under the Marrakesh Agreement.
- It is the only global international organization dealing with the international Trade between nations.
- Its HQ is located in Geneva, Switzerland.
- Currently, WTO has 164 members and India is a founding member of WTO.
- Currently, the head (Director-General) of WTO is Roberto Azevedo.

Evolution of WTO

- After the end of World War-II, various international organizations were formed to facilitate collaboration between countries in dealing with economic, social, and technical problems.
- For the development of the world economy and seamless trade among all the countries, a dire need was felt for an international organization for regulating international trade.
- In 1945 a conference known as the Bretton Woods Conference (by two Bretton wood institutions- IMF and World Bank) was held for the creation of international trade organization (ITO) which finally could not be ratified due to lack of approval by the US and many other major countries.
- As the US was an emerging world power after World War-II, hence the creation of ITO without the US was meaningless.
- Meanwhile, through negotiations, a multilateral agreement was concluded in 1947 known as the General Agreement on Tariffs and Trade (GATT).

- Various conferences of GATT were held on periodic intervals for negotiations on trade. Finally, during the Uruguay round of conference held from 1986-1994, agreement on the creation of WTO was finally ratified through the Marrakesh Agreement.
- India has been a member of GATT since 1948 and a founding member of WTO. China joined WTO only in 2001 and Russia in 2012.

Objectives of WTO

- To formulate and implement rules for international trade.
- To provide a platform for negotiating and monitoring further trade liberalization.
- To provide a platform for the settlement of disputes.
- Providing assistance to the developing, least-developed and low-income countries in transition to adjust to WTO rules and disciplines through technical cooperation and training.
- To cooperate with the other major economic institutions (like UN, World Bank, IMF etc) involved in global economic management.

Structure of WTO

The basic structure of WTO is as appended below:-

- Ministerial Conference – It is the topmost decision-making body of the WTO. Usually, it meets after every two years. It brings together all WTO participants.
- The General Council – It is composed of representatives of all the member states. It is responsible for the day-to-day business and management of the WTO.
- Other councils/bodies - There are many other bodies like Goods Council, Services Council, Trade Policy Review Body, Dispute Settlement Body etc. which deals with other specific issues.

Principles of WTO

The WTO Agreements are based on the following simple and fundamental principles:-

- Non Discrimination
- Most Favored Nation - All nations should be treated equally. No one country can grant any other member country any special favour. For example, if one country lower tariff to one country then it has to be lowered to all other member countries.
- National Treatment- Same treatment to all products, either local or foreigners. Fair and equal treatment is given to local as well as the products imported from other countries.
- Reciprocity - Lowering of import duties and other trade barriers in return for similar concessions from another country.
- Predictability through Binding and enforceable commitments - To make the business environment stable and predictable.
- Transparency - The WTO members need to publish their trade regulations and to notify changes in trade policies to the WTO.
- Encouraging Development and Economic Reforms - All efforts are made by the WTO system to contribute to development.

Important Trades Agreements of WTO

The important trade agreements concluded under WTO are -

- Agreement on Agriculture (AoA),
- Agreement on TRIPS (Trade-Related Aspects of Intellectual Property Rights),
- Agreement on the Application of Sanitary and Phytosanitary Measures (SPS),

- Agreement on Technical Barriers to Trade (TBT),
- Agreement on Trade-Related Investment Measures (TRIMS),
- General Agreement on Trade in Services (GATS) etc.

Agreement on Agriculture (AoA)

- It was negotiated during the Uruguay Round of the GATT and was concluded with the establishment of the WTO in 1995.
- Through AoA, WTO aims at reforming trade in agriculture with a fair and market-driven system.
- The Agreement allows governments to support their rural economies, but only allows those policies that cause less trade “distortions”.
- This agreement has fixed commitments from all member states on the following three agricultural supply chain system:-

1. **Improving Market access**– This can be done by removing various trade barriers by the member states. By fixing the tariffs and progressively promoting free trade among member states which will ultimately lead to an increase in market access.

2. **Domestic Subsidies**- It basically motivates for the reduction in domestic subsidies that distorts free trade and fair prices. This is based on the premise that not all subsidies distort trade to the same extent. Under this agreement, Subsidies can be categorized into the following three boxes –

(a) Green Box – All those subsidies that do not distort trade or cause minimal distortion, come under the green box. Ex-All government services such as research, disease control, and infrastructure and food security. Also, all those subsidies given to the farmers that directly do not affect international trade also comes under the green box.

(b) Amber Box - All kinds of domestic subsidies or support that can distort production and trade (with some exceptions) fall into the Amber Box. The measures to support prices come under this box. The exception is the provision that accepts subsidies upto 5% of agricultural production for developed countries, 10% for developing countries.

(c) Blue Box – All those Amber Box subsidies which tend to limit the production comes under Blue Box. This can be increased without limit as long as subsidies are linked to production-limiting programs.

3. Export subsidies – All those subsidies that make the export of agricultural products cheaper are called export subsidies. These are basically presumed to have trade-distorting effects. This agreement prohibits the use of export subsidies by the member states for agriculture products.

India's trade concerns and WTO

Appended below please find India's concerns related to trade in WTO:-

- Tariff on steel and aluminium – Recently the USA govt imposed 10% tariff on aluminium and 25% tariff on steel against various trade partners. India wants that it should be removed or it will raise the issue in WTO.

- Export Subsidy Issue – Recently USA dragged India to WTO and raised concern on the export subsidy regime provided to the Indian companies in the form of SEZ, MEIS, EPCG, etc. USA argues that as India's Per Capita Income has increased from \$ 1000, India can't use the export subsidy regime as per the ACSM.
- Agricultural subsidies - The present quota of subsidies is based on the price levels of 1986-88. Presently the minimum support price (MSP) concept which provides subsidies to the farmers in India falls under the Amber box. It can directly affect India's food security program. India wants that it should be at the current price level and the amber box concept should be done away with. However, a 'peace clause' agreed to during the Bali conference allows India to carry on with its PDS program as of now. But the developed member states are not taking any steps for a permanent solution of this problem.
- Special and differential treatment (SDT) - During Doha round, member states agreed to provide favourable treatment to developing nations. However, developed countries are denying the emerging economies such as India and China as unworthy of this provision.
- Issues related to intellectual property rights – The issues of compulsory licensing of medicines have been resolved through TRIPS. However, the developed nations are trying to push for TRIPS commitments.

NITI Aayog

- NITI Aayog is created for the financial planning at pan-India and the important reports it releases for the development assessing various parameters.
- The Planning Commission was established in March 1950 by a resolution of the Government of India.
- It was made responsible for assessing national resources and drafting five-year plans for the effective use of the resources.
- The objective was to the proper and effective utilization of resources. With changing times, and growing needs of the people and effectively address them, a new version of planning body i.e. NITI Aayog was established by a resolution of the Union Cabinet on January 1, 2015, replacing the Planning Commission.
- NITI Aayog is regarded as the premier policy 'Think Tank' of the Government of India. It provides both directional and policy inputs.
- Besides designing the strategic and long-term policies and programmes for the Government of India, the Aayog also provides relevant technical advice to the Centre as well as the States.

Role of International Labour Organization (ILO) in Social Security

- It was created as part of the "Treaty of Versailles" that ended World War I to ensure social justice for people of work.
- It became a specialized agency of newly formed united nations after the second world war and today has a membership of 186 states that continues to grow. The tripartite structure is unique to the ILO where representatives from the government, employers and employees openly debate and create labour standards.

- The ILO received the Nobel Peace prize in 1969 and today is recognized as the world's authority on the world of work.
- Its impact has seen key moments in history. Headquartered in Geneva with over 40 new offices around the globe, the ILO is unique amongst international organizations, where not only governments but employers and workers as well have equal voices.
- They work together to create Labour standards and qualities that impact today's global economy.
- In 2008, the ILO adopted a Declaration on Social Justice for fair globalization to respond to our world faced with the economic crisis. It made decent work the core of ILO policy and with the decent work agenda into practice. The Decent Work Agenda has forced to teach objectives:
 - Promote decent employment opportunities
 - Enhance social protection
 - Strengthen tripartism and social dialogue
 - Guarantee Fundamental principles and rights at work

Pradhan Mantri Garib Kalyan Yojana

About Pradhan Mantri Garib Kalyan Yojana

- The Pradhan Mantri Garib Kalyan Yojana (PMGKY) was originally launched by PM Narendra Modi in 2015 as a scheme built with the objective of addressing poverty.
- However, with the recent demonetization drive launched by the government to curb the spread of black money, an amendment has been made to the existing Income Tax Bill and the PMGKY has been made a part of the Taxation Laws (Second Amendment) Act, 2016.

Quick Glance at the announced highlights:

- Insurance cover of Rs 50 Lakh per health worker fighting COVID-19 to be provided under Insurance Scheme
- 80 crore poor people will get 5 kg of wheat or rice and 1 kg of preferred pulses for free every month for the next three months
- 20 crore women Jan Dhan account holders to get Rs 500 per month for next three months
- Increase in MNREGA wage to Rs 202 a day from Rs 182 to benefit 13.62 crore families
- Ex-gratia of Rs 1,000 to 3 crore poor senior citizen, poor widows and poor disabled
- Government to front-load Rs 2,000 paid to farmers in the first week of April under existing PM Kisan Yojana to benefit 8.7 crore farmers
- Central Government has given orders to State Governments to use Building and Construction Workers Welfare Fund to provide relief to Construction Workers

MGNREGA: The Contribution to Strengthening the Rural Economy

What is MGNREGA?

- The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is a law whereby any adult who applies for employment has to be given a guarantee of 100 days of work on local public works within fifteen days of registration. If employment is not given, then the unemployment allowance has to be paid.

- The Act enacted in 2005 is regarded as the largest work guarantee program in the world, guarantees 100 days of wage employment per year to rural households. Roughly one-third of the stipulated workforce must be women.

Note: Previously, this social security scheme was called 'National Rural Employment Guarantee Act, but after April 2008, it was renamed as Mahatma Gandhi National Rural Employment Guarantee Act. Presently, the minimum number of days of work have been increased up to 150 days.

The objective of the MGNREGA Scheme

- It aims at addressing the causes of chronic poverty through the works that are undertaken and ensuring sustainable development.
- The Act was introduced with the aim of improving the purchasing power of the rural people, primarily semi or unskilled work to people living below the poverty line in rural India.
- It also aims to strengthen the process of decentralization and empowers Panchayati Raj Institutions (PRIs) for the planning and implementation of these works.

Operation flood

In 1970, the National Dairy Development Board (NDDB) launched "Operation Flood," which became India the world's largest milk producer. This programme was dubbed "The White Revolution" because of its enormous success. Dr. Verghese Kurien, commonly known as the "Father of the White Revolution," was the principal architect of this successful endeavour.

Mr. Kurien voluntarily left a government post as a dairy engineer in 1949 to join the Kaira District Co-operative Milk Producers' Union (KDCMPUL), today known as Amul.

Since then, Kurien has grown this organisation into one of India's largest and most successful institutions. The Amul cooperative model was so successful that in 1965, then-Indian Prime Minister Shri Lal Bahadur Shastri established the National Dairy Development Board (NDDB) to replicate it across the country, praising Kurien for his "exceptional and vigorous leadership."

Operation Flood:

The Operation Flood was completed in three phases:

Phase I (1970-79):- During this phase, consumers in the four metros of Mumbai, Delhi, Chennai, and Kolkata were connected to 18 of the country's primary milk sheds. This phase cost a total of Rs.116 crores. The main goals were to gain control of the milk market and to accelerate the growth of dairy animals in rural areas.

Phase II (1981–1985):- Milk sheds were increased from 18 to 136, and milk outlets were expanded to 290 metropolitan marketplaces. By the end of 1985, 43,000 village cooperatives with 42.5 lakh milk producers had been covered, resulting in a self-sustaining system. By 1989, domestic milk powder production had risen from 22,000 to 140,000 tonnes.

Phase III (1985–1996):- Dairy cooperatives were able to grow and develop the infrastructure needed to buy and market rising milk volumes. Cooperative members now have access to veterinary first-aid health care, feed, and artificial insemination services, as well as increased member education. During Phase II, it was decided to add 30,000 new dairy cooperatives to the 42,000 already existing societies. In 1988-89, the number of milk sheds reached a high of 173, with the number of women members and Women's Dairy Cooperative Societies expanding dramatically.

Amul:

("priceless"). The dairy cooperative "Amul," derived from the Sanskrit "Amoolya," was founded in 1946. It is a brand name controlled by Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF), an apex cooperative organisation controlled by 2.8 million milk farmers in Gujarat, India. Amul was the model dairy board for the White Revolution. The

NDDB's entire programme was built on the success of this dairy board. The three-tiered 'Amul Model' was crucial in bringing about the country's White Revolution.

Achievements of the White Revolution

- It has enabled India's unprecedented development in milk output, which has gone from 20 million MT to 100 million MT in just 40 years. As a result, India has risen to become the world's greatest milk producer today.
- The dairy cooperative movement has also pushed Indian dairy producers to retain more animals, resulting in the world's largest cattle and buffalo population of 500 million.
- More than 125,000 communities in 180 districts across 22 states have joined the dairy cooperative movement.
- Because of a well-developed procurement system and supported federal structures at the District and State levels, the movement has been effective.

DEVELOPMENT OF MIXED ECONOMY: PUBLIC AND PRIVATE

India's progress is inextricably linked to its decision to opt for a mixed economy at the outset of the planning process. There has never been a consensus among social scientists on whether the mixed economy model is the best option for India, and this lack of consensus continues to this day.

In a mixed economy, the public and private sectors must work together. It prevents the market mechanism from running freely, and the government intervenes in or regulates the private sector in such a way that the two sectors mutually reinforce one another. Individual initiative and social interests can be reconciled in a mixed economy.

Capitalism:

Capitalism is defined as an economic system that emphasises individual initiative with a central role for a market economy, the profit motive, and private individual and corporate ownership of means of production. All means of production, including as farms, factories, mines, and transportation, are owned and controlled by private individuals and businesses under capitalism. Owners of these industrial assets are free to use them as they see fit in order to generate private profit. The state or government plays the smallest role in people's economic activity. The government looks after only such matters as defence, foreign affairs, currency and coinage and some important civil works such as the construction of roads and bridges because private individuals may not find it profitable to undertake such works. Adam Smith was of the opinion that interests of individuals and those of the society coincide.

Features of Capitalism

- 1) The Right of Private Property
- 2) Freedom of Enterprise: no restriction in any business or enterprise
- 3) Profit Motive
- 4) Competition
- 5) Consumers Sovereignty
- 6) Price System
- 7) Unequal distribution of incomes

Socialism

"Socialism is an economic organisation in which the material means of production are owned by the entire community according to a general economic plan, with all members entitled to benefit from such socialised planned production on the basis of equal rights; democratic socialism, on the other hand, is defined by public ownership of at least the "strategically important material means of production."

Salient Features of Mixed Economy :

Between the two extremes of capitalism and socialism, let's define a mixed economy in functional terms.

- It is a balance between the market economy and the planning mechanism;
- It has clear demarcation of the boundaries of public sector and private sector so that 'the core sector and strategic sectors are invariably in the Public sector;
- While profit motive influences decision-making in the private sector, the economic viability criteria for investment decisions in the public sector is based on social cost-benefit analysis;
- The ownership of means of production as between public sector, private sector, joint sector and cooperative sector is so decided that there is a balance between personal and social incentives and sectional and general interests;
- There is occupational freedom and freedom of consumers' choice;
- The government intervenes to prevent undue concentration of economic power, and monopolistic and restrictive trade practices;
- The government endeavors to take care of the consumption levels and objectives of the weaker sections of the society through public distribution system, poverty alleviation programs etc.;

- Social objectives of equity, employment, balanced regional development, family welfare are emphasized;

The doctrinaire rigidities of socialism are avoided and a pragmatic approach to decision-making for promoting economic growth is usually adopted, mixed economy is not merely an economic concept and the rights of the individual are respected and protected subject only to the requirements of public law and order and morality.

As early as the First Five Year Plan, the Indian policy makers decided that the State must not only assume the responsibility of providing the infrastructure facilities and the social overheads, but should also undertake direct promotional work. It was recognised that the government should intervene in the industrial field and accordingly the development of basic and strategic industries was earmarked to the public sector. It was also recognised that the task of economic development of the country was so large that the initiative of both the private and public sectors had to be harnessed for optimal growth.

With the announcement of the Industrial Policy Resolution, 1956, the concept of mixed economy was given a definite shape and policy direction. Even before that, the Industrial Policy Resolution of 1948 had sought to establish mixed economy, with both private and public sectors, increasing controls in government hands for regulating all industries.

The two main instruments of industrial policy were the Industries (Development and Regulation) Act of 1951 and the Companies Act of 1956. These two Acts conferred on the government, through licensing procedure, the power of regulating location, production and expansion of major industries in the country.

Industrial Policy Resolution, 1956 - The Avasi Resolution of the Indian National Congress declared the establishment of a socialistic pattern of society as the aim of economic and industrial policy of the government.

Schedule A : Those industries which were to be the sole responsibility of the State. This list included 17 industries - arms and ammunition, atomic energy, iron and steel, heavy machinery required for mining etc.

Schedule B : There were about a dozen industries in the list, where the State might establish new units or existing units might be progressively nationalised.

Schedule C : Industries that would be in the hands of private sector and would be subject to the social and economic policy of the government.

Industrial Policy Resolution, 1977: "Unemployment has increased, rural-urban imbalances have deepened, and the pace of actual investment has stalled," the new

Industrial Policy of 1977 said of the 1956 Resolution. The average annual growth rate of industrial output has been between three and four percent.

- The new policy focused on the development of small scale sector, cottage and household industries and the tiny sector.
- It further provided for using provisions of the Monopolies and Restrictive Trade Practices Act against expansion of larger industrial houses.
- The public sector was to be used for providing strategic goods of basic nature and also for maintaining supplies of essential goods

Industrial Policy 1980: It reiterated the Industrial Policy, announcements of 1956 showing the merit of constructive flexibility. The task of raising the pillars of economic infrastructure in the country was entrusted to the public sector for reasons of its greater reliability. The policy accorded priority to optimum utilisation of installed capacity, balanced regional development, agro-based, export-oriented industries and promoting "economic federalism" by equitable spreading of investment over small but growing industrial units in urban as well as rural areas.

Post 1991 Reforms

LPG Reforms in India was a very crucial step forward for the economic development of India.

Since independence, India followed the mixed economy framework by combining the advantages of the capitalist economic system with those of the socialist economic system. In 1991, India met with an economic crisis relating to its external debt — the government was not able to make repayments on its borrowings from abroad as the foreign exchange reserves were exhausted. The crisis was further compounded by rising prices of essential goods. All these led the government to introduce a new set of policy measures which changed the direction of our developmental strategies.

Background of the crisis:

- Inefficient management of the Indian economy in the 1980s. India being an agro-based economy neglected other sectors like industry, banking, insurance, foreign trade, etc.
- When expenditure is more than income, the government borrows to finance the deficit from banks and also from people within the country and from international financial institutions.
- Development policies required that even though the revenues were very low, the government had to overshoot its revenue to meet challenges like unemployment, poverty and population explosion.
- The continued spending on development programmes of the government did not generate additional revenue.
- Moreover, the government was not able to generate sufficiently from internal sources such as taxation.

- The income from public sector undertakings was also not very high to meet the growing expenditure.
- Foreign exchange, borrowed from other countries and international financial institutions, was spent on meeting consumption needs.
- Also, sufficient attention was not given to boost exports to pay for the growing imports.
- In the late 1980s, government expenditure began to exceed its revenue by such large margins that meeting the expenditure through borrowings became unsustainable.
 - Prices of many essential goods rose sharply.
 - Imports grew at a very high rate without matching the growth of exports.
 - Foreign exchange reserves declined to a level that was not adequate to finance imports for more than two weeks.

India approached the International Bank for Reconstruction and Development (IBRD), popularly known as **World Bank** and the **International Monetary Fund** (IMF), and received \$7 billion as a loan to manage the crisis. For availing the loan, India agreed to the conditionalities of the World Bank and IMF and announced the **New Economic Policy** (NEP).

1 st Generation Reforms	2 nd Generation Reforms
Committees were formed.	Government Institutions were formed.
Could be done by Executive Order of Government.	Requires building consensus for Amendment/ Act to be passed.
Committee	Authority
Malhotra Committee	Insurance Regulatory Development Authority
Damodran Committee	Security Exchange Board of India
Foreign Exchange Regulation Act (FERA), 1973	Foreign Exchange Management Act (FEMA), 1999

This set of policies can broadly be classified into two groups: the stabilisation measures and the structural reform measures.

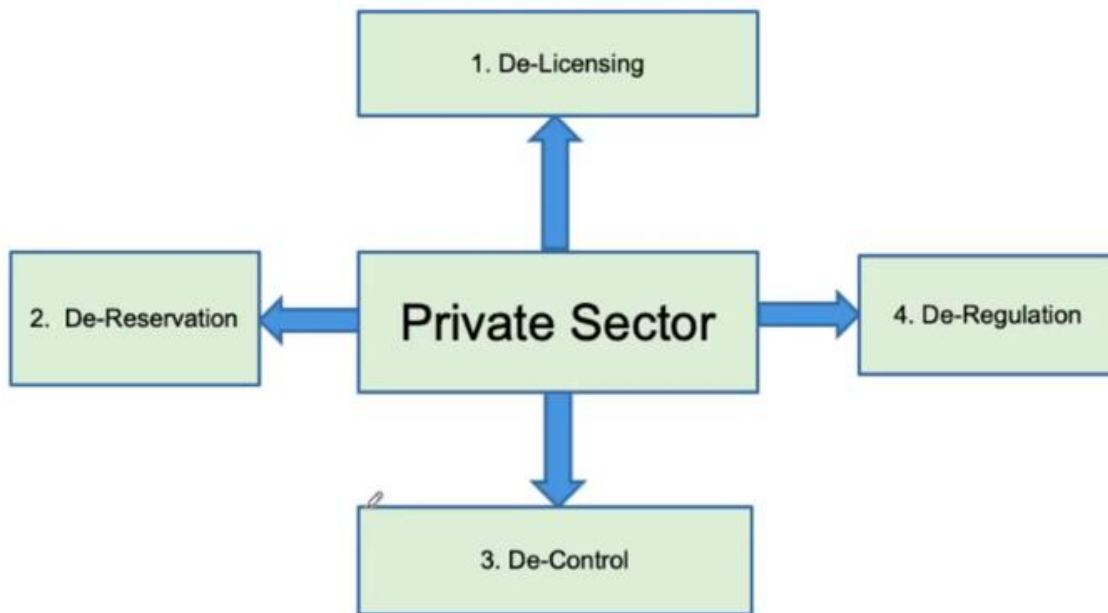
Stabilisation measures are short-term measures, intended to correct some of the weaknesses that have developed in the balance of payments and to bring inflation under control. In simple words, this means that there was a need to maintain sufficient foreign exchange reserves and keep rising prices under control.

Structural reform policies are long-term measures, aimed at improving the efficiency of the economy and increasing its international competitiveness by removing the rigidities in

various segments of the Indian economy. The government initiated a variety of policies which fall under three heads viz., liberalisation, privatisation and globalisation.

Liberalisation

Though a few liberalisation measures were introduced in the 1980s in areas of industrial licensing, export-import policy, technology upgradation, fiscal policy and foreign investment, reform policies initiated in 1991 were more comprehensive.



In India, regulatory mechanisms were enforced in various ways:

- Industrial licensing under which every entrepreneur had to get permission from government officials to start a firm, close a firm or decide the amount of goods that could be produced
- The private sector was not allowed in many industries
- Some goods could be produced only in small-scale industries, and
- Controls on price fixation and distribution of selected industrial products.

1. Delicensing: End of License Raj

The reform policies introduced in and after 1991 removed many of these restrictions. Industrial licensing was abolished for almost all **but** product categories — alcohol, cigarettes, hazardous chemicals, industrial explosives, electronics, aerospace and drugs and pharmaceuticals.

Delicensing and De-Reservation Exception List

De-Licensing	De- Reservation
Arms & Ammunitions	Existing Public Sectors except critical sectors
Industrial Explosives	
Defense Equipment	Atomic Energy
Mining of Minerals	Space
Hazardous Chemicals	Railway Operations
Drugs and Pharmaceuticals	Mining of rare minerals
Alcohol & Tobacco Products	

2. De-Reservation

The only industries which are now reserved for the public sector are a part of defence equipment, space, atomic energy generation, railway transport, mining of rare minerals, etc. Many goods produced by small-scale industries have now been de-reserved. In many industries, the market has been allowed to determine prices.

3. De-Control

Pricing of commodities done by the government was restricted only for the critical commodities present in the following list.

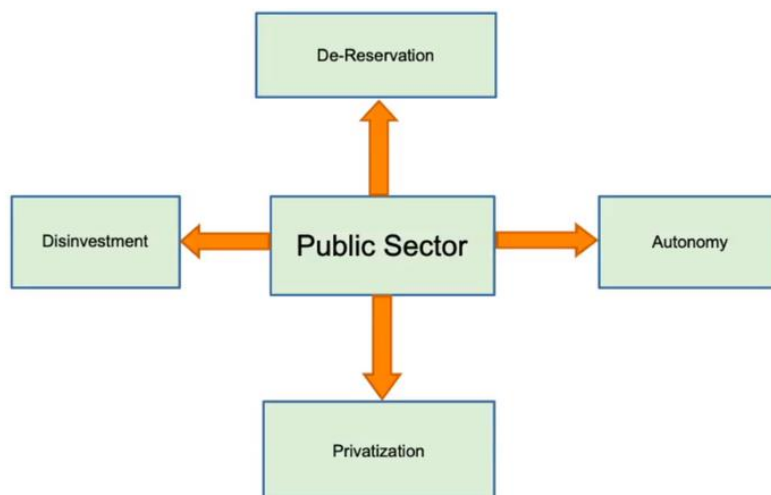
De-Control	De-Regulation
Minerals	All licenses were discontinued for capacity, more machines, diversification, importing, exporting
CNG/LNG/Gas	
Kerosene	No private sector company would be categorized as MRTP company or FERA company, so no raids (Raids could only be conducted by court order)
Fertilizers (Urea)	Labour/Factory inspects only for compliance with labour and factory laws
Sugar	Factory can only be inspected once a year.
Price of utilities (Electricity, Water, Transport)	

4. De-Regulation

All other additional restrictions were removed as listed in the above table.

Privatisation

It implies shedding of the ownership or management of a government-owned enterprise. Government companies are converted into private companies in two ways (i) by the withdrawal of the government from ownership and management of public sector companies and or (ii) by the outright sale of public sector companies.



As per the provisions of De-Reservation, the government was to limit its role for few sectors only and for all other sectors, there would be scope for free participation of private players.

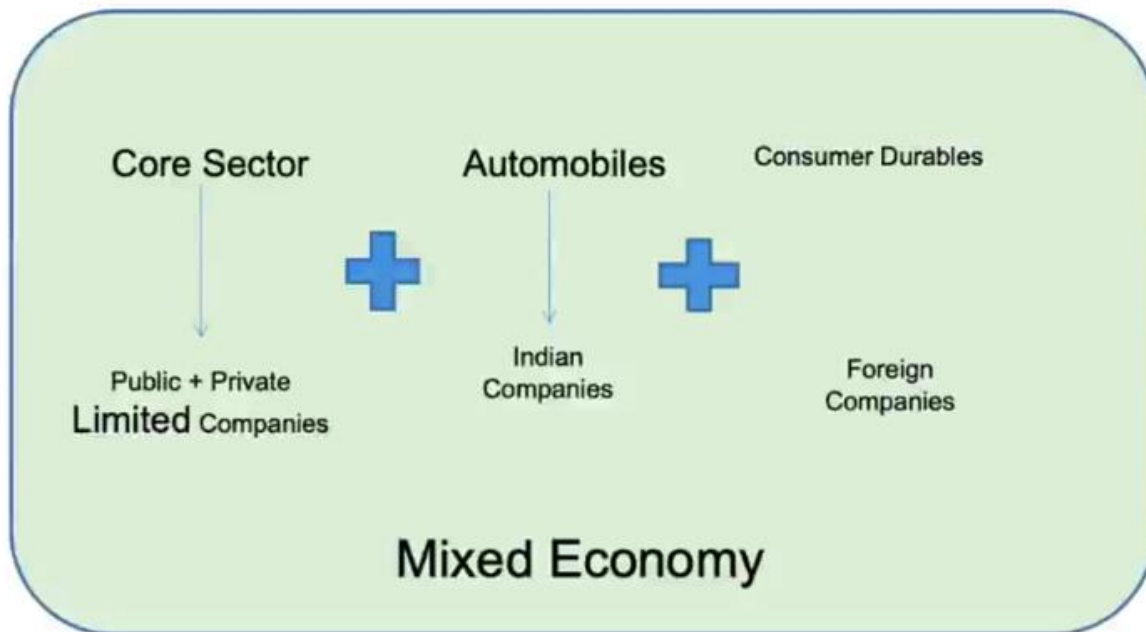
Privatisation of the public sector enterprises by selling off part of the equity of PSEs to the public is known as disinvestment. The purpose of the sale, according to the government, was mainly to improve financial discipline and facilitate modernisation.

Disinvestment	Privatization
Selling shares with the objective of raising resource for the government.	Selling shares with the objective of Transfer of Management Control
Shares will be sold to general public	Shares will be sold to a specific buyer.

The government envisaged that privatisation could provide a strong impetus to the inflow of FDI. The government has also made attempts to improve the efficiency of PSUs by giving them autonomy in taking managerial decisions. For instance, some PSUs have been granted special status as Maharatnas, Navratnas and Miniratnas.

Impact of Economic Reforms

The reform process has completed three decades since its introduction. Let us now look at the performance of the Indian economy during this period.



- The post– 1991 India witnessed a rapid growth in GDP on a continual basis for two decades. The growth of GDP increased from 5.6 percent in 1990–91 to 7.2 percent in 2017–18.
- During the reform period, the growth of agriculture has declined. Public investment in agriculture sector especially in infrastructure, which includes irrigation, power, roads, market linkages and research and extension (which played a crucial role in the Green Revolution), has fallen in the reform period. There has been a shift from production for the domestic market towards production for the export market focusing on cash crops in lieu of production of food grains. This puts pressure on the prices of food grains.
- While the industrial sector reported fluctuation, the growth of the service sector has gone up. Industrial growth has also recorded a slowdown. This is because of the decreasing demand for industrial products due to various reasons such as cheaper imports, inadequate investment in infrastructure etc. Moreover, a developing country like India still does not have access to developed countries' markets because of high non-tariff barriers.
- The foreign investment, which includes foreign direct investment (FDI) and foreign institutional investment (FII), has increased from about US \$100 million in 1990-91 to US \$ 30 billion in 2017-18.
- There has been an increase in the foreign exchange reserves from about US \$ 6 billion in 1990-91 to about the US \$ 413 billion in 2018-19.
- Economic reforms have placed limits on the growth of public expenditure, especially in social sectors.

The process of globalisation through liberalisation and privatisation policies has produced positive as well as negative results. It has provided greater access to global markets, high technology, and increased the possibility of large industries of developing countries to

become important players in the international arena. Viewed from the Indian context, some studies have stated that the crisis that erupted in the early 1990s was basically an outcome of the deep-rooted inequalities in Indian society and the economic reform policies initiated as a response to the crisis by the government, with externally advised policy package, further aggravated the inequalities. Further, it has increased the income and quality of consumption of only high-income groups and the growth has been concentrated only in some select areas in the services sector such as telecommunication, information technology, finance, entertainment, travel and hospitality services, real estate and trade, rather than vital sectors such as agriculture and industry which provide livelihoods to millions of people in the country.

Green Revolution

What is Green Revolution?

Norman E. Borlaug, a Noble Laureate, and an American agronomist, who led initiatives worldwide that contributed to the extensive increases in agricultural production termed the Green Revolution. He is, thus, called as the Father of Green Revolution.

Green Revolution can be defined as *a process of achieving a great increase in the production of food grains with the application of modern methods and techniques*. In other words, it means achieving high productivity or multiple folds of food grains per unit of land.

What were the factors responsible for the adoption of Green Revolution in India?

Before the green revolution, India had faced a lot of difficulties in food production:

- **Frequent Famines:** In 1964–65 and 1965–66, India experienced **two severe droughts** which led to food shortages.
- **Lack of Institutional Finance:** Marginal farmers found it very difficult to get finance and credit at economical rates from the government and banks.
- **Low Productivity:** India's traditional agricultural practices yielded insufficient food production.

M.S. Swaminathan, who is also known as the **Father of Green Revolution in India** has contributed to the development of high-yielding variety seeds (Wheat and Rice) thereby helping India achieve food security.

Components of Green Revolution

Green Revolution required timely and adequate supply of various agronomic components or inputs, such as:

- **High Yielding variety seeds:** Agronomists like Norman E. Borlaug developed a **dwarf variety of wheat seeds** in Mexico that helped farmers in Asia and Latin America and later whole world could produce high yields.

- **Chemical Fertilizers:** Green revolution requires essential nutrients for seeds or plants - primarily nitrogen, phosphorus, and potassium. But these nutrients from traditional composting methods are not sufficient to produce high yields. Hence, Sprinkling /application of chemical fertilizers provides high nutrients to the soil and thereby helps plants produce high yields.
- **Irrigation:** Controlled supply of water resources is essential for adequate dilution of chemical fertilizers and controlled growth of crops.
- **Pesticides and Germicides:** Since the new seed varieties are non-acclimatised to local pests and germs, application of pesticides and germicides to kill them is essential for secured harvest.
- **Herbicides and Weedicides:** While sowing HYV seeds, application of herbicides and weedicides is required to prevent the chemical fertilisers from not being consumed by herbs and weeds in the farmlands.
- **Farm mechanisation:** Farm mechanisation makes farm work easier and faster. As the green revolution supports mono-cropping over large tracts, mechanisation is essential.
- **Credit, Storage and Marketing:**
 - **Credit:** Buying all the above-mentioned inputs – farm machinery, HYV seeds, chemical fertilisers, irrigation (pump sets, borewells), pesticides & germicides and herbicides & weedicides -are costlier. Hence farmers require the availability of affordable credit.
 - **Storage:** As green revolution is region specific-ex: a region with reliable irrigation facilities- Bhakra-Nangal multi-purpose dam provides irrigation to 135 Lakh acres in Punjab, Haryana and Rajasthan- gives bumper cropping, storage facilities in the local regions is essential to distribute to various markets.
 - **Marketing & Distribution:** A proper chain of marketing, distribution and transport connectivity is essential to distribute the food, to deficient areas and different markets. For building logistics, many countries including India opted for concessional funding or cheaper loans from multilateral agencies like World Bank.

Impact of Green Revolution

Green Revolution has both positive and negative impact on the Indian economy in general and agriculture and the environment in particular.

Positive Impact

- **Ensure food security:** India could achieve self-sufficiency in food production and also emerge as a food surplus country (exporter).
- **Food Distribution:** Areas with deficient food could get food with the development of storage and marketing facilities. PDS system alleviated hunger among poor vulnerable sections.
- **Improved Farm Incomes:** Green revolution has raised a farmer's income with bumper crop production.

- **Development of Agro-based Industries:** Green Revolution led to the growth of agro-based industries like Seed companies, fertilizer industries, Pesticides Industries, Auto and Tractor industries etc.

Negative impact

- **Inter-personal disparities:** Since green revolution favoured individual farmers with huge tracts of land got benefited, while the poor farmer was deprived of the same.
- **Regional Disparities:** Since green revolution requires a consistent supply of irrigation facilities, regions with good irrigation facilities (Punjab, Haryana etc.) got benefitted, whereas north-east India and some parts of central India could not.
- **Skewed cropping pattern:** Choice of crops have been in favour of **wheat** and **rice** impacted the crops like pulses, oilseeds, maize, barley etc. negatively.
- **Decrease in Soil fertility:** Monocropping or growing a single crop year after year on the same land, in the **absence of rotation through other crops** or growing multiple crops on the same land (polyculture) lead to degradation of soil.
- **Irrigation:**
 - **Waterlogging:** Rice cultivation requires huge quantities of water, which leads to waterlogging. Waterlogging impairs root growth as roots cannot get oxygen. Water-logging has also led to the **incidence of malaria**.
 - **Salinity of soil:** Salinization of soil occurs when the small amounts of salts in irrigation water become highly concentrated on the soil surface through evaporation.
 - **Reduced water table:** Excess drawing of water for irrigation of crops from bore wells and aquifers lead to the reduced water table.
- **Fertilizers, Pesticides and Herbicides:**
 - Excess application of fertilizers, pesticides and herbicides has led to environmental degradation by polluting water, land and air.
 - **Algal blooms:** Synthetic or organic fertilizers run-off into adjacent water bodies causing algal blooms and eventually death of marine species.
 - **Bioaccumulation:** An increased concentration of chemicals (fertilizers and pesticides) within the fatty tissues of an organism over time. Toxic level in the food chain of India has increased so much that nothing produced in India is fit for human consumption.

Way Forward

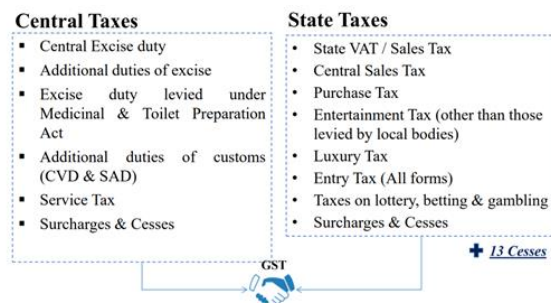
- To overcome the above negative impact, Swaminathan advocated “**evergreen revolution**”- using environmentally sustainable agriculture, sustainable food security and the preservation of
- To reverse imbalanced cropping pattern, Indian Government has envisioned for **Rainbow Revolution**- promoting integrated farming etc.

Post 2014 Developments

A comprehensive indirect tax, levied on manufacture, sale, and consumption of goods and services throughout India is known as Goods and Services Tax (GST).

Introducing GST

- GST came out as the one indirect tax for the whole of India.
- GST or Goods and Services Tax is an indirect tax levied on the supply of commodities and services.
- This law has replaced many indirect tax laws that existed earlier in the country which included the following:
 - Excise Duty
 - Service Tax
 - Entertainment Tax
 - Additional Customs Duty
 - Surcharges
 - State Level VAT
 - Octroi Tax



- It was implemented on 1st July 2017 through introduction of the Constitution (122nd Amendment) Bill or 101 amendment act 2016 in December 2014.
- It created a unified common national market for India, giving a boost to foreign investment and "Make in India" campaign

Components of GST

There are 3 taxes applicable under this system: CGST, SGST & IGST.

- **CGST:** Collected by the Central Government on an intra-state sale (Eg: transaction happening within Uttar Pradesh)
- **SGST:** Collected by the State Government on an intra-state sale (Eg: transaction happening within Uttar Pradesh)

- **Integrated Goods & Services Tax (IGST):** Collected by the Central Government for inter-state sale (Eg: Maharashtra to Uttar Pradesh)

GST Council

As per Article 279A, GST Council is a joint forum of the Centre and the States to regulate GST in India. GST rates are notified on the recommendation of the GST Council. It consists of the following member:

- **Chairperson:** Union Finance Minister (Current- Nirmala Sitharaman)
- **Member:** Union Minister of State, in-charge of Revenue, Min. of Finance
- **Other Members:** Minister In-charge of Finance or Taxation or any other Minister nominated by each State Government

List of items exempted from GST

- Eggs, Honey and Milk Products
- Oil Seeds, Fruit and Part of Plants
- Gums, Resins, Vegetable SAP & Extracts
- Sugar, Jaggery, Honey & bubble Gums
- Tea & Coffee Extract & Essence
- Water, Mineral & Aerated
- Flours, Meals & Pellets
- Salts & Sands
- Fossil Fuels – Coal and Petroleum
- Drugs & Pharmaceuticals
- Fruits and Dry Fruits

Reforms Brought About by GST

2. **Creation of common national market** by amalgamating a large number of Central and State taxes into a single tax.
3. **Mitigation of cascading effect:** It mitigated ill effects of cascading or double taxation in a major way and paved the way for a common national market.
4. **Reduction in Tax burden:** From the consumers' point of view, biggest advantage would be in terms of reduction in the overall tax burden on goods.
5. **Making Indian products more competitive:** Introduction of GST is making Indian products more competitive in the domestic and international markets owing to the full neutralization of input taxes across the value chain of production.
6. **Easier to administer:** Because of the transparent and self-policing character of GST, it would be easier to administer.

Challenges

- State GST (SCGT) and Central GST (CGST) input credit cannot be cross utilized.
- Manufacturing states lose revenue on a bigger scale, so reform is needed keep this in mind
- High rate to tax to compensate the revenue collected now from multiple taxes i.e High Revenue Neutral Rate.

- There was a reduction in the fiscal autonomy of the States after the GST law
- Concerns raised by banks and insurance companies over the need for multiple registrations under GST.
- The capacity of State tax authorities, so far used to taxing goods and not services, to deal with the latter is an unknown quantity.
- The success of GST depends on political consensus, technology and the capacity of tax officials to adapt to the new requirements.

POST 2014 REFORM: LABOUR REFORM

The Ministry of Labour & Employment is among one of the oldest and crucial Ministries of the Government of India. The major responsibility of this Ministry is the protection and safeguarding the interests of workers with special emphasis on poor, deprived and disadvantage sections of the society. This along with making sure of creating a healthy work environment for enhanced production as well as productivity and further to develop vocational skill training and employment services.

Government Schemes: Ministry of Labour and Employment

Scheme	Objective	Few Points to remember
DEEN DAYAL UPADHYAY SHRAMEV JAYATE KARYAKRAM	Provide a conducive environment for the development of Industries in India and labour reforms.	<ul style="list-style-type: none"> • A dedicated Shram Suvidha Portal: • Allocating Labor Identification Number (LIN) to almost six lakhs units and enabling them to file online compliance with 16 of 44 labour laws. • Transparent Labour Inspection Scheme for random selection of Units for inspection: • Utilizing technology to eliminate human discretion in the selection of units for Inspection o Uploading of Inspection Reports within 72 hours of inspection mandatory. • Universal Account Number is allotted to EPF beneficiary which makes Provident Fund account portable and universally accessible
PRADHAN MANTRI ROJGAR PROTSAHAN YOJANA	The objective is to incentivize employers to promote employment generation and to provide social security benefits to the workers.	<ul style="list-style-type: none"> • It is being introduced through the Provident Fund Organization of Employees (EPFO) by the Ministry of Labor and Work. • Under the scheme, the government pays 12 percent full employers' contribution (to both the Provident Fund for Workers and the Pension Scheme for Retirees) for a period of 3 years for new workers who were enrolled with the

		<p>EPFO on or after April 1, 2016, with salaries of up to Rs. 15,000 per month.</p> <ul style="list-style-type: none"> The whole program is online, and AADHAR is based on the application of the scheme with no human interface.
NATIONAL CHILD LABOUR PROJECT SCHEME	<p>The object is to eliminate all forms of child labour.</p> <p>Raising awareness amongst stakeholders and target communities.</p>	<ul style="list-style-type: none"> The overall Motive of the project is to create an encouraging atmosphere in the target area where children are inspired and encouraged by various interventions to enrol and refrain from working in schools, and alternatives are given to households to increase their income levels.
PLATFORM FOR EFFECTIVE ENFORCEMENT FOR NO CHILD LABOUR (PENCIL) PORTAL	<p>The objective is to foster the creation of a child labour free India, which will seamlessly integrate implementing and monitoring mechanisms for both enforcement of the legislative provisions and effective implementation of the National Child Labour Project (NCLP).</p>	<ul style="list-style-type: none"> It is an online portal that connects the Centre to the state government, district, and to all project societies to combat the menace of child labour and trafficking. It has five components -- Child Tracking System, Complaint Corner, State Government, NCLP, and Convergence.
NATIONAL CAREER SERVICE	<p>The goal is to bridge the gap between the two who need work and those who want to recruit them, between those who need career guidance and training and those who can offer advice and training.</p>	<ul style="list-style-type: none"> It is the transformation of National Employment Service to provide a variety of employment-related services like job matching, career counselling, vocational guidance, information on skill development courses, etc. which are offered through the Employment Exchanges The scheme also provides for part funding to states for IT up-gradation as well as minor refurbishing of employment exchanges and for organizing job fairs.
ATAL BIMIT VYAKTI KALYAN YOJNA	<p>It aims to provide unemployment allowance to</p>	<ul style="list-style-type: none"> It is a scheme approved by the Employees' State Insurance Corporation (ESIC) that aims to benefit

	workers rendered jobless due to the "changing employment pattern."	its subscribers, who are mainly formal sector workers who have become unemployed for whatever reason, by providing cash through bank account transfer.
PM SHRAM-YOGI MAANDHAN YOJANA	The objective is to provide a pension to the unorganized sector.	<ul style="list-style-type: none"> • Pension: They shall receive a minimum assured pension of Rs 3000/- per month after the age of 60 years. • In case of death during the receipt of a pension, his/her spouse, shall have the right to earn 50 percent of the pension earned as a family pension. • In the event of death before the age of 60, his / her spouse shall consequently be entitled to enter and continue the scheme by paying monthly contributions or leaving the scheme as provided for in exit and withdrawal provisions. The family pension is for partners only. • Contribution by the Subscriber: He/she is required to contribute the prescribed contribution amount from the age of joining PM-SYM till the age of 60 years • Matching contribution by the Central Government: PMSYM is a voluntary and contributory pension scheme on a 50:50 basis where prescribed age-specific contribution shall be made by the beneficiary and the matching contribution by the Central Government.

Agricultural Reform: Schemes

Government Schemes launched by the Government of India with the aim of addressing the socio-economic welfare of the citizens of this nation. Such schemes play a very important role in solving many problems that beset Indian society and helps in achieving the goals to achieve welfare nation as enshrined in our Constitution. In this article, we will look at the complete list of schemes by the Ministry of Commerce & Industry launched in past years along with their objectives and some important features of the scheme. This is very crucial for the preparation of UPSC and State PCS exams as the number of questions from the Government schemes have increased in recent years.

Government Schemes: Ministry of Agriculture & Farmers' Welfare

Scheme Name	Objective	Few Points to remember
Pradhan Mantri Kisan Maan Dhan Yojana	The Scheme provides for payment of minimum pension of Rs 3000 per month to the eligible small and marginal farmers after the age of 60 years	<ul style="list-style-type: none"> The pension scheme is voluntary and contributory with an entry age of 18 to 40 years The farmer can contribute monthly between Rs.55 to 200. Central Government will also give an equal amount in the pension scheme LIC will be the pension fund manager and responsible for the pension payout.
Pradhan Mantri Kisan Samman Nidhi(PM-KISAN)	<p>The Scheme provides for the transfer of an amount of Rs. 6000/- per year in three equal instalments of Rs. 2000/</p> <p>The amount will be sent directly into the bank account of beneficiary farmer families.</p>	<ul style="list-style-type: none"> This is a Central Sector Scheme and will be funded fully by the Government of India. The Scheme initially covered only small and marginal farmer families with landholding up to 2 hectares as beneficiaries, subject to certain exclusion criteria for higher-income status. The Government later extended the Scheme with effect from 1st June 2019 to all farmer families irrespective of landholding size, subject to applicable exclusions. Farmers through common service centre can register, edit the name on PM KISAN web portal
Soil Health Card Scheme	To issue soil health cards every three years, to all farmers of India, so as to address nutrient deficiencies in fertilization practices	<ul style="list-style-type: none"> It is a centrally sponsored scheme Soil Health Card issued to farmers carries crop-wise recommendations of nutrients and fertilizers required for the individual farms. It will check the status of his soil with respect to 12 parameters, namely N, P, K (Macronutrients). Based on this, the SHC will also indicate fertilizer recommendations

		and soil amendments required for the farm.
Kisan Credit Card(KCC)	To provide timely credit support from the banking system under a single window.	<ul style="list-style-type: none"> The loan disbursed under KCC is broad-based and can be used for short term credit requirements for cultivation of crops, and other expenses The loans disbursed under the Kisan Credit Card Scheme for notified crops are covered under the Crop Insurance Scheme. The Kisan Credit Card has been extended to fisheries and animal husbandry farmers to help them meet their working capital needs. The Scheme covers the risk of KCC holders against death or permanent disability resulting from accidents caused by external, violent and visible means. Self Help Groups(SHG) and Joint Liability Groups are also eligible for this scheme.
Pradhan Mantri Krishi Sicchai Yojana	<p>Its objective is to achieve convergence in irrigation at the field level,</p> <p>To enhance the recharge of aquifers and introduce sustainable water conservation practices.</p>	<ul style="list-style-type: none"> The convergence of various Scheme such as Accelerated Irrigation Benefit Program, On-Farm Water Management (OFWM), Integrated Watershed Management Programme (IWMP) Long Term Irrigation Fund has been started under Pradhan Mantri Krishi Sicchai Yojana in NABARD for funding and fast-tracking the implementation of incomplete major and medium irrigation projects. It will be supervised by Inter-Ministerial National Steering Committee (NSC) under Prime Minister with Union Ministers of all concerned Ministries.
PM Fasal Bima Yojana	<ul style="list-style-type: none"> To provide the stability of 	<ul style="list-style-type: none"> Umbrella scheme of the insurance-related Scheme

	<p>income of the farmer</p> <ul style="list-style-type: none"> • To provide insurance facility and financial support to the farmers in the event of natural calamities such as earthquake, pests & diseases. • To ensure the flow of credit to the agriculture sector. 	<ul style="list-style-type: none"> • It replaced all other insurance schemes that were existing except the Restructured Weather-Based Crop Insurance Scheme • The farmer has to pay a 2% premium for all Kharif crops and a 1.5% premium for all Rabi crops. • In the case of annual horticultural crops, the premium to be paid by farmers will be only 5%. • It is compulsory for the loanee farmer and voluntary for the non-loanee farmer • Post-harvest losses are also covered • Recently, the Government has comprehensively revised the Operational Guidelines of the Scheme. • The farmers will get 12% interest by the insurance companies for the delay in settlement claims after two months of the prescribed cut-off date.
Strengthening and modernization of the pest management approach in India(SMPMA)	<p>The aim is to minimize environmental pollution in soil, water, and air due to pesticides</p> <p>Minimize occupational health hazards due to chemical pesticides</p>	<ul style="list-style-type: none"> • It is a central sector scheme launched with the following components <ul style="list-style-type: none"> ◦ Integrated Pest Management ◦ Locust Control and Research ◦ Implementation of Insecticides Act, 1968 • Implementing agency- 35 central Integrated Pest Management Centres
Interest Subvention Scheme	<p>To provide short term crop loans at an affordable rate to give a boost to agricultural productivity and production in the country</p>	<ul style="list-style-type: none"> • It provides a concession of 2% per annum for short-term crop loans to farmers, up to Rs. 3 lakh at a 7% rate of interest. • An additional interest subvention of 3 percent per annum is given to the "prompt payee farmers."

<p>PM Annadata Aay Sanrakshan Abhiyan(PM-AASHA)</p>	<p>To plug the gaps in the procurement system, address issues in the MSP system and give better returns to the farmer</p>	<p>It has three components complementing the existing schemes of the Department of Food and Public distribution for the procurement of paddy, wheat, and other cereals and coarse grains where procurement takes place at MSP.</p> <p>3 Components:</p> <ul style="list-style-type: none"> • Price Support system(PSS) • Price Deficiency Payment Scheme(PDPS) • The pilot of private procurement and stockiest Scheme (PPSS) <p>PSS:</p> <ul style="list-style-type: none"> • Under the PSS, physical procurement of pulses, oilseeds and copra are to be done by Central Nodal Agencies. Besides, NAFED and Food Cooperation of India(FCI) will also take up the procurement of crops under the PSS. • The expenditure and losses due to the procurement will be borne by the Centre. <p>PDPS:</p> <ul style="list-style-type: none"> • Under the PDPS, the Centre proposes to cover all oilseeds for which MSP is notified. The difference between the MSP and actual selling/modal price will be directly paid into the farmer's bank account. • This scheme doesn't involve any physical procurement of crops as farmers are paid the difference between the MSP price and Sale/modal price on disposal in the notified market.
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		PPSS: <ul style="list-style-type: none"> • In the case of oilseeds, States will have the option to roll out PPSSs in select districts. • Under this, a private player can procure crops at MSP when market prices drop below MSP and whenever authorized by the state/UT government to enter the market. • The private player will then be compensated through a service charge up to a maximum of 15% of the MSP.
National Agricultural Higher Education Project	To attract talent and strengthen higher agricultural education in India	<ul style="list-style-type: none"> • World Bank and the Indian Government are doing a project on a 50:50 basis. • The aim of the National Agricultural Higher Education Project for India is to support agricultural universities and ICAR in providing higher quality education to Agricultural University students. • In addition, a four-year degree in Agriculture, Horticulture, Fisheries, and Forestry has been declared a professional degree.
Krishi Kalyan Abhiyan	To assist and advice farmers on how to improve farming techniques and raise their incomes	<ul style="list-style-type: none"> • It was undertaken in 25 villages with more than 1000 population each in aspiration districts identified with the help of the Ministry of Rural Development as per the direction of NITI Aayog.
ARYA Project	To attract and empower the Youth, in particular, the rural Areas to take up various Agriculture, allied and service sector enterprises for income and gainful employment in selected districts	<ul style="list-style-type: none"> • The GOI launched ARYA – “Attracting and Retaining Youth in Agriculture” in 2015. • It is implemented through Krishi Vigyan Kendra in one district from each State.

		<ul style="list-style-type: none"> • Agricultural Universities and ICAR Institutes will work as Technology Partners with KVKs • In a district, 200-300 Rural youths will be selected for their skill development in entrepreneurial activities and establishment of related micro-enterprise units
National Food Security Mission	Increasing the production of rice, wheat, pulses, coarse cereals, and commercial crops with the help of area expansion and productivity increase in a sustainable manner	<p>It is a Centrally Sponsored Scheme</p> <p>launched with the objective to enhance the production of Rice, Wheat, Coarse Cereals, Pulses and also commercial crops (Jute, Cotton and Sugarcane).</p> <p>Funding - 50:50 by Centre & State for food crops while 100% funding by centre for cash crops.</p> <p>It was launched in 2007.</p>
Rashtriya Krishi Vikas Yojana-RAFTAAR	To make farming a remunerative economic activity by strengthening the farmer's efforts, and promoting agri-business	<ul style="list-style-type: none"> • It was started in 2007 as an umbrella scheme for the holistic development of agriculture and allied sectors, has been recently revamped as RKVY-RAFTAAR(Remunorative approaches for agriculture and allied sector rejuvenation for 2017-19 and 2019-20)
National Mission on Agricultural Extension and Technology	To make the extension system farmer driven	<ul style="list-style-type: none"> • It is an umbrella scheme • It envisages strengthening the extension machinery through 4 sub-schemes: <ul style="list-style-type: none"> ◦ Sub Mission on Agricultural Extension (SMAE) ◦ Sub Mission on Seed and Planting Material (SMSP) ◦ Sub Mission on Agricultural Mechanization (SMAM) ◦ Sub Mission on Plant Protection and Plant Quarantine (SMPP)

National Mission on Bovine Productivity	To enhance milk and production productivity	<ul style="list-style-type: none"> It was launched in 2016 to boost milk production and increase productivity and making dairy more remunerative for farmers. The Scheme is being implemented through the following four components <ul style="list-style-type: none"> Pashu Sanjivani Advanced Reproductivity technique E-Pashu Haat portal Establishment of National Bovine Genomic Centre for Indigenous Breeds
Rashtriya Gokul Mission	Enhancement of milk and production productivity	<ul style="list-style-type: none"> Breed improvement program for indigenous breeds to improve their genetic makeup and increase the stock Upgradation of cattle using elite indigenous breeds like Gir, Sahiwal, Rathi, Deoni, Tharparkar, Red Sindhi Establishment of Integrated Indigenous Cattle Centres or Gokul Grams in the native breeding tracts of indigenous breeds. The Scheme is implemented on 100% grant-in-aid basis
Blue revolution: Integrated development and Management of Fisheries	To fully tap the total fish potential of the country both in the inland and the marine sector and triple the production by 2020	<ul style="list-style-type: none"> It is a Core Centrally Sponsored Scheme on Blue Revolution (the Neel Kranti Mission). It is an umbrella scheme formulated by merging all the existing schemes It aims at enhancing fish production from 107.95 lakh tonne (2015-16) to about 150 lakh tonne by the end of 2019-20.
Zero Hunger Program	The program aims to address the intergenerational and multifaceted	<ul style="list-style-type: none"> It will act as a model of an integrated approach to deal with hunger and malnutrition

	malnutrition through sectoral coordination	
National Agricultural Market(NAM)	Increases farmers' options to sell and access to markets Liberal licensing of traders, buyers, and agents. A single license for traders is valid across all markets in the State.	<ul style="list-style-type: none"> NAM is a pan-India electronic trading portal that aims to network the existing APMCs and other market systems to create a unified national market for agricultural commodities. Small Farmers Agribusiness Consortium (SFAC) has been selected as the main agency to implement it. Central Government will give the software free of cost to the states, and with this, a grant of Rs. 30 lakhs per mandi or market or private mandis will be given for related equipment and infrastructure requirements. 585 wholesale regulated markets/ APMC Markets have been so far integrated with the e-NAM platform in 16 States and 2 Union Territories (UTs). For the local trade in the mandi/market, NAM provides the opportunity to access a larger national market for secondary trading. The first inter-state trade on e-nam was carried out between Andhra Pradesh and Telangana
National Innovations on climate-resilient agriculture	The aim is to enhance the resilience of Indian Agriculture covering crops, livestock and fisheries to climate change	<ul style="list-style-type: none"> It is a network of projects of ICAR It takes into account the critical assessment of different crops in the country for the vulnerability of rainfall
Mission Fingerling		Under this mission, potential states are to be identified in order to strengthen the fish seed infrastructure as well as facilitate the establishment of hatcheries and Fingerling rearing pond.

Project CHAMAN	development to the horticulture sector for increasing farm's income	It is implemented by the National Crop Forecast Centre (MNCFC) using the remote sensing technology The Geo-Spatial Studies like crop intensification, orchard rejuvenation and aqua-horticulture are deployed for preparing reliable estimates of crop production.
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Industrial Development: Post 2014

Government Schemes: Ministry of Commerce & Industry

Scheme	Objective	Points to remember
Startup India	The aim is to build a strong ecosystem nurturing innovations and startups in India	<ul style="list-style-type: none"> The Action Plan is based on three pillars – Simplification and handholding Funding support and incentives Industry-academia partnership and incubation. Department of Promotion of Industry and Internal trade (DPI&IT) (formerly DIPP) is the implementing agency.
Make in India	The objective is to promote India as an important manufacturing design and innovation	<ul style="list-style-type: none"> The “Make in India” initiative is based on four pillars <ul style="list-style-type: none"> New Processes New Infrastructure New Sectors New Mindset Department of Promotion of Industry and Internal trade (DPI&IT) coordinates action plans for 15 manufacturing sectors while the Department of Commerce coordinates 12 service sectors.
Trade Infrastructure for the export scheme	To enhance export competitiveness by bridging gaps in export infrastructure, creating focused export	<ul style="list-style-type: none"> It would provide financial assistance for setting up and up-gradation of existing infrastructure with export linkages

	infrastructure, first mile and last-mile connectivity and export-oriented projects	like border haats, cold chains, dry ports, etc
Government e-marketplace	To facilitate the procurement of goods and services by various central and state Government.	<ul style="list-style-type: none"> • It aims to bring transparency and efficiency in public procurement. • GeM provides the tools of e-bidding, reverses e-auction to facilitate the government users to achieve the best value for their money. I • GeM 3.0 was announced which would offer standardized and enriched catalogue management, powerful search engine, real-time price comparison, user rating, advanced MIS and analytics
Merchandise Exports From India Scheme	It is an export-promotion scheme launched under the Foreign Trade Policy (FTP) 2015-20 to reduce infrastructural inefficiencies and associated costs involved in exporting goods that are manufactured in India.	<ul style="list-style-type: none"> • It has replaced five different schemes of earlier <ul style="list-style-type: none"> ◦ FTP (Focus Product Scheme) ◦ Market Linked Focus Product Scheme ◦ Focus Market Scheme ◦ Agri. Infrastructure Incentive Scrip ◦ Vishesh Krishi and Gram Udyog Yojana) for rewarding merchandise exports, which had varying conditions (sector-specific or actual user only) attached to their use. • The scheme provides incentives to the exporter in the form of credit scrip • It helps to compensate for any losses on payment of duties
Service Exports from India Scheme (SEIS)	To promote export of service from the country	<ul style="list-style-type: none"> • The scheme was launched under the Foreign Trade Policy (FTP), 2015-20 replacing the earlier scheme 'Served from India Scheme.' • SEIS shall apply to `Service Providers' located in India instead of `Indian Service Providers'.

		<ul style="list-style-type: none"> Thus, it rewards to all Service providers of notified services, who are providing services from India, irrespective of the constitution or profile of the service provider.
'SWAYATT' initiative	SWAYATT is an initiative to promote Startups, Women and Youth Advantage Through transactions on Government e-Marketplace (GeM)	<ul style="list-style-type: none"> It will bring together the key stakeholders within the Indian entrepreneurial ecosystem to Government e-Marketplace, the national procurement portal
Integrate to Innovate Programme	It is a 3-month corporate acceleration program for energy startups	<ul style="list-style-type: none"> The selected startups will get a cash prize of up to ₹ 5 Lakh per startup along with an opportunity to sell their product with corporates
eBiz	To bring transparency	<ul style="list-style-type: none"> It will serve as a 24X7 online single-window system for efficient and convenient Government to business (G2B) services to investors and businesses It reduces the complexity in obtaining information and services related to starting businesses in India and dealing with licenses and permits across the business life-cycle. It is being implemented by Infosys Technologies Limited (Infosys) under the guidance and aegis of the Department of Promotion of Industry and Internal trade (DPI&IT)
Revenue Insurance Scheme for Plantation Crops	insurance scheme for those plantation crops whose insurance can't be availed from PM Fasal Bima Yojna.	<ul style="list-style-type: none"> It covers small growers of Rubber, Tobacco, Tea, Coffee and Cardamom having 10 hectares or less landholding. The scheme is compulsory for growers registered with the respective Commodity Boards (CBs) and it is implemented on a pilot basis in 7 states. The scheme to be operated on the principle of 'Area Approach'

		<p>and Commodity Board in consultation with the concerned State Govt shall designate an area as Insurance Unit (IU), which can be a village panchayat or any other equivalent unit. Losses arising out of war & nuclear risk, malicious damage and other preventable risks are excluded.</p> <ul style="list-style-type: none">• Note: PSF for pulses and Agri-horticultural commodities is under Ministry of Consumer Affairs
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INDIAN POLITY

Historical Evolution of Indian Constitution

The Company Administration

Regulating Act - 1773

- (1) The post of 'GOVERNOR' was now made 'GOVERNOR-GENERAL' and Bengal was the first province to have Warren Hastings as the first Governor-General. He was assisted by an executive council of four members.
- (2) The Supreme Court at Calcutta was established with one chief justice and three other judges. Sir Elijah Impey was the Chief Justice.

Pitt's India Act – 1784

- (1) Created another body- 'BOARD OF CONTROL' to manage political affairs in India. COURT OF DIRECTORS kept on managing commercial affairs though.
- (2) Thus, companies' possessions were for the first time called 'British possessions in India' and the commercial wing was headed by the court of directors and political wing headed by the board of control.
- (3) The Act was introduced by the then British Prime Minister William Pitt.

Charter Act – 1813:

- (1) Ended the monopoly of the trading rights of British East India Company and allowed other companies to participate in trading activities with India.

Charter Act – 1833

- (1) Created the post of 'GOVERNOR GENERAL OF INDIA' in place of Governor-General of Bengal. The presidencies of Madras and Bombay were taken away with their respective legislative powers and were made subordinate to the Presidency of Calcutta. William Bentick was the first Governor-General of India.
- (2) This act completely ended the commercial activities of the company. The company existed but it became a purely administrative and a political organization.

Charter Act – 1853

- (1) Established a separate Governor General's Legislative council.
- (2) Introduced an open system of competition for Indians into Civil Services. Macaulay committee was formed (1854) for this purpose. Satyendra Nath Tagore became the first Indian to qualify that service in 1863.

The Crown Administration

Government of India Act of 1858

- (1) Also known as Act for Good Government of India.
- (2) Abolished the British East India Company. Abolished the Mughal administration as well.
- (3) Abolished the Governor General's post and created a new post Viceroy. Lord Canning became the first Viceroy of India.
- (4) Also created a new office – Secretary-of-State for India and a 15-member council to assist him. He was a member of British parliament.

Indian Councils Act 1861

- (1) Expanded the viceroy's executive council. Made provisions for him to nominate some Indians as non-official members. Lord Canning nominated the Raja of Benaras, the Maharaja of Patiala and Sir Dinkar Rao.
- (2) New Legislative councils for Bengal (1862), North Western Frontier Province (1866) and Punjab (1897) were established.

Indian Councils Act 1892

- (1) Power of discussing the budget was given to the legislative council in the then India.
- (2) Expanded the councils and some members could be nominated to both Central as well as Provincial Legislative Councils.

Indian Councils Act 1909

- (1) Also known as Morley-Minto reforms.
- (2) The number of members in the Central Legislative council was increased from 16 to 60.
- (3) Satyendra Prasad Sinha became the first Indian to be nominated as a law member to the Viceroy's Executive Council.
- (4) The communal electorate was introduced. Muslims were given separate representation to elect their representatives. Hence, Minto is also referred to as 'Father of Communal Electorate'.

Government of India Act 1919

- (1) Also called as Montague-Chelmsford reforms and it came into effect in 1921.
- (2) Central and provincial subjects or lists were introduced where they could frame laws in their respective lists. Provincial subjects were further divided into transferred and reserved. Thus, this act introduced *diarchy*.
- (3) Introduced Bicameralism and direct elections.

Government of India Act 1935

- (1) Provided for the establishment of an All-India Federation with provinces and princely states as units. The Federation never came into being as princely states did not join it.
- (2) Abolished diarchy in the provinces and introduced 'provincial autonomy' in its place. But in centre, it introduced diarchy; however that never came into being.
- (3) Introduced bicameralism in provinces as well extended separate electorates to depressed classes as well.
- (4) Established RBI and a federal court at the centre.

Indian Independence Act 1947

- (1) Partition Plan or the Mountbatten Plan (3rd June 1947) was to give effect to partition of the country and Atlee's declaration (20th February 1947) to provide independence to the Nation.
- (2) Created two independent dominions of India and Pakistan, ended British rule and authorised the two independent Nations' constituent assemblies to frame their respective constitutions.
- (3) The Indian independence bill got the royal assent on 18th July 1947.

Making of the Indian Constitution

1. It was **M.N Roy** who proposed the idea of an independent constituent assembly for India in 1934.
2. The constituent assembly was formed as per the guidelines suggested by the Cabinet Mission Plan, 1946. The mission was headed by Pethick Lawrence and included two other members apart from him – Stafford Cripps and A.V Alexander.
3. The total strength of the assembly was 389. However, after partition only 299 remained. It was partly elected and partly nominated.
4. The elections to form the assembly took place in July-August 1946 and the process was completed by November 1946. The first meeting of the assembly took place on 9th December 1946 and was attended by 211 members.
5. Dr. Sachhidanand Sinha became the temporary President of the assembly following the French practice.
6. On 11th December 1946, Dr. Rajendra Prasad and H.C Mukherji were elected as President and Vice-President respectively.
7. Sir B.N Rau was appointed as the constitutional advisor to the assembly.
8. On 13th December 1946, Pt. Nehru moved the Objectives resolution which later went on to become the Preamble of the constitution in slightly modified form. The resolution was unanimously adopted on 22nd January 1947.
9. The Constituent Assembly ratified India's membership of the commonwealth in May 1949. Also, it adopted the National Song and National Anthem on 24th January 1950. Adopted the National Flag on 22nd July 1947.
10. The assembly met for 11 sessions, took 2 years, 11 months and 18 days to frame up the final draft, sat for 141 days in total and the draft constitution was considered for 114 days. Total amount incurred was around rupees 64 lakhs.
11. Some **important committees of the constituent assembly** along with their respective chairpersons are as follows:
 - **Union Powers Committee - Jawahar Lal Nehru**
 - **Union Constitution Committee - Jawahar Lal Nehru**
 - **Provincial Constitution Committee - Sardar Patel**
 - **Drafting Committee - B.R Ambedkar**
 - **Rules of Procedure Committee - Dr. Rajendra Prasad**
 - **Steering Committee - Dr. Rajendra Prasad**
 - **Flag Committee - J.B. Kripalani**
12. The following were the members of the Drafting Committee-
 - **Dr. B.R Ambedkar (Chairman)**
 - **Alladi Krishnaswamy Ayyar**
 - **Dr. K.M Munshi**
 - **N. Gopalaswamy Ayyangar**
 - **Syed Mohammad Saadullah**
 - **N Madhava Rau**
 - **TT Krishnamachari**
13. The final draft of the constitution was adopted on 26th November 1949 and it contained 8 schedules, 22 parts, and 395 articles.

VARIOUS SOURCES OF THE INDIAN CONSTITUTION

1. **Government of India Act of 1935**- Federal Scheme, Office of the governor, Judiciary, Public Service Commissions, Emergency provisions and administrative details.
2. **British Constitution**- Parliamentary government, Rule of Law, legislative procedure, single citizenship, cabinet system, prerogative writs, parliamentary privileges, and bicameralism.
3. **US Constitution**- Fundamental rights, independence of the judiciary, judicial review, impeachment of the president, removal of Supreme Court and high court judges and post of vice-president.
4. **Irish Constitution** - Directive Principles of State Policy, the nomination of members to Rajya Sabha and method of election of the president.
5. **Canadian Constitution** - Federation with a strong Centre, vesting of residuary powers in the Centre, the appointment of state governors by the Centre, and advisory jurisdiction of the Supreme Court.
6. **Australian Constitution** - Concurrent List, freedom of trade, commerce and intercourse, and the joint sitting of the two Houses of Parliament.
7. **Weimar Constitution of Germany** - Suspension of Fundamental Rights during Emergency.
8. **Soviet Constitution (USSR, now Russia)** - Fundamental duties and the idea of justice (social, economic and political) in the Preamble.
9. **French Constitution** - Republic and the ideals of liberty, equality, and fraternity in the Preamble.
10. **South African Constitution** - Procedure for amendment of the Constitution and election of members of Rajya Sabha.
11. **Japanese Constitution** - Procedure established by Law.

THE PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity;

and to promote among them all FRATERNITY

assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this 26th day of November 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

1. The term 'preamble' refers to the introduction or preface to the Constitution. It's a kind of summary or essence of the Constitution.
2. The American Constitution was the first, to begin with, a preamble.
3. N.A Palkiwala has termed preamble as 'the identity card of the constitution'.
4. The Preamble is somewhat based on the 'Objectives Resolution' moved by Nehru in the Constituent Assembly.

5. The Preamble has been amended only once so far, that is by 42nd Amendment Act of 1976. Three words were added by that amendment – SOCIALIST, SECULAR, INTEGRITY.
6. The Preamble reveals four ingredients or components:
7. Source of the authority of the Constitution: The Preamble states that the Constitution derives its authority from the people of India.
8. Nature of Indian State: It declares India as a sovereign, socialist, secular democratic and republican polity.
9. Objectives of the Constitution: To provide justice, liberty, equality and fraternity to the citizens of India.
10. Date of adoption of the Constitution: 26th November 1949.
11. In *Berubari Union* case (1960) - the Supreme Court said that the Preamble isn't a part of the Constitution.
12. In *Kesavananda Bharati* case (1973) - the Supreme Court rejected the earlier opinion and held that Preamble *is* a part of the Constitution.
13. The Preamble is neither a source of power to legislature nor a prohibition upon the powers of the legislature. Provisions in the preamble are non-enforceable in the court of law, that is, it's non-justiciable.

THE UNION & ITS TERRITORY

1. **Article 1** declares India, that is, Bharat as a 'Union of States'.
2. **Article 2** empowers the Parliament to 'admit into the Union of India, or establish, new states on such terms and conditions as it thinks fit'. Thus, Article 2 grants two powers to the Parliament: (a) the power to admit into the Union of India new states; and (b) the power to establish new states.
3. **Article 3** relates to the formation of or changes in the existing states of the Union of India. In other words, Article 3 deals with the internal re-adjustment *inter se* of the territories of the constituent states of the Union of India.

CITIZENSHIP

1. The Constitution confers the following rights and privileges on the citizens of India (and denies the same to aliens):
 - Rights conferred under Articles 15, 16, 19, 29 & 30.
 - Right to vote in elections to the Lok Sabha and state legislative assembly.
 - Right to contest for the membership of the Parliament and the state legislature.
 - Eligibility to hold certain public offices, that is, President of India, Vice-President of India, judges of the Supreme Court and the high courts, governor of states, attorney general of India and advocate general of states.
3. No person shall be a citizen of India or be deemed to be a citizen of India if he has voluntarily acquired the citizenship of any foreign state (**Article 9**).
4. Every person who is or is deemed to be a citizen of India shall continue to be such citizen, subject to the provisions of any law made by Parliament (**Article 10**).
5. Parliament shall have the power to make any provision with respect to the acquisition and termination of citizenship and all other matters relating to citizenship (**Article 11**).

6. The five modes of acquisition of citizenship as per the citizenship act are (a) By Birth (b) By Descent (c) By Registration (d) By Naturalization (e) By acquisition of any other territory into the Indian Union.

- The Government of India provides citizenship to the people residing in the area that is acquired by a notification. Person occupying such area do not automatically become citizen of Indian on an acquisition of territory.

7. Loss of Citizenship is by – Termination, Renunciation and Deprivation.

8. India provides for single citizenship.

9. PIO- A person registered as PIO card holder under the Ministry of Home Affairs' scheme dated 19-08-2002.

10. OCI- A person registered as Overseas Citizen of India (OCI) under the Citizenship Act, 1955. The OCI scheme is operational from 02-12-2005.

Fundamental Rights

- Fundamental Rights have been described as the Magna Carta of India.
- The concept has been taken from the US' bill of rights. Earliest known evidence of rights was also present in ancient India, Iran etc.
- Following are the articles related to the fundamental rights-
 - ✓ **Article 12- Definition of the State**
 - ✓ **Article 13- Laws inconsistent with part-3 or Fundamental Rights**

Right to Equality (Article 14- Article 18)

- ✓ **Article 14**-Equality before the law
- ✓ **Article 15**-Prohibition of discrimination on the grounds of religion, race, caste, sex. Or place of birth
- ✓ **Article 16**- Equality of opportunity in matters of public employment.
- ✓ **Article 17**- Abolition of the untouchability
- ✓ **Article 18**- Abolition of titles

Right to Freedom (Article 19- Article 22)

- ✓ **Article 19**- Guarantees to all the citizens of India
 - Right to freedom of speech and expression
 - Right to assemble peacefully and without arms
 - Right to form associations or unions
 - Right to move freely throughout the territory of India
 - Right to reside and settle in any part of the territory of India
 - Right to practice any profession or to carry on any occupation, trade, and business
- ✓ **Article 20**- Protection in respect of conviction for offences
- ✓ **Article 21**- Protection of life & personal liberty
- ✓ **Article 21A**- Right to Education
- ✓ **Article 22**- Protection against arrest and detention in certain cases

Right Against Exploitation (Article 23- Article 24)

- ✓ **Article 23-** Prohibition of traffic in human beings and forced labour
- ✓ **Article 24-** Prohibition of employment of children in factories and mines for under the age of 14

Right to Freedom of Religion (Article 25- Article 28)

- ✓ **Article 25-** Freedom of conscience and free profession, practice and propagation of religion
- ✓ **Article 26-** Freedom to manage religious affairs
- ✓ **Article 27-** Freedom as to pay taxes for promotion of any particular religion
- ✓ **Article 28-** Freedom from attending religious instruction

Cultural & Educational Rights (Article 29-Article 30)

- ✓ **Article 29-** Protection of interest of minorities
- ✓ **Article 30-** The right of minorities to establish and administer educational institutions

Right to Constitutional Remedies (Article 32)

- ✓ **Article 32-** Right to move the Supreme Court for the enforcement of fundamental rights including the writs of (i) ***habeas corpus***, (ii) ***mandamus***, (iii) ***prohibition***, (iv) ***certiorari***, and (v) ***quo warranto***.

❖ **Habeas Corpus:** It means “to have the body of”. This writ is used to enforce the fundamental right of individual liberty against unlawful detention against both private and public authorities.

❖ **Mandamus:** It means “We command”. This writ is used by the court to order the public official who has failed to perform his duty or refused to do his duty, to resume his work. This writ is not available against the private individuals.

❖ **Prohibition:** It means “We Forbid”. A court that is higher in position issues a Prohibition writ against a court that is lower in position to prevent the latter from exceeding its jurisdiction. This writ is available only against judicial and quasi-judicial bodies.

❖ **Certiorari:** It means “To be Certified”. This writ is issued by a court higher in authority to a lower court or tribunal ordering them either to transfer a case pending with them to itself or squash their order in a case. It is used as both cure and prevention.

❖ **Quo Warranto:** It means “By what Authority”. Supreme Court or High Court issue this writ to prevent illegal usurpation of a public office by a person.

- Article 33 deals with the power of Parliament to modify the fundamental rights.
- Article 34 deals with Martial Law

- Article 35 deals with legislation required to deal with fundamental rights
- Fundamental Rights which are available **only to citizens - 15, 16, 19, 29 and 30.**
- Fundamental Rights those are available to both citizens as well as non-citizens – 14, 20, 21, 21A, 22, 23, 24, 25, 26, 27 and 28.

Directive Principles of the State Policy

Some Important Articles in DPSPs are:

- a. To promote the welfare of the people by securing a social order permeated by justice—social, economic and political—and to minimise inequalities in income, status, facilities and opportunities (Article 38).
- b. To secure (a) the right to adequate means of livelihood for all citizens; (b) the equitable distribution of material resources of the community for the common good; (c) prevention of concentration of wealth and means of production; (d) equal pay for equal work for men and women; (e) preservation of the health and strength of workers and children against forcible abuse; and (f) opportunities for healthy development of children (Article 39).
- c. To promote equal justice and to provide free legal aid to the poor (Article 39 A). This was added by 42nd constitutional amendment act, 1976.
- d. To secure the right to work, to education and to public assistance in cases of unemployment, old age, sickness and disablement (Article 41).
- e. To make provision for just and humane conditions for work and maternity relief (Article 42).
- f. To take steps to secure the participation of workers in the management of industries (Article 43 A). Also added by 42nd constitutional amendment act, 1976.
- g. To organise village panchayats and endow them with necessary powers and authority to enable them to function as units of self-government (Article 40).
- h. To promote cottage industries on an individual or co-operation basis in rural areas (Article 43).
- i. To prohibit the consumption of intoxicating drinks and drugs which are injurious to health (Article 47).
- j. To prohibit the slaughter of cows, calves and other milch and draught cattle and to improve their breeds (Article 48).
- k. To secure for all citizens a uniform civil code throughout the country (Article 44).

l. To provide early childhood care and education for all children until they complete the age of six years (Article 45). Also, amended by the 86th constitutional amendment act, 2002.

m. To separate the judiciary from the executive in the public services of the State (Article 50).

n. To promote international peace and security and maintain just and honourable relations between nations; to foster respect for international law and treaty obligations, and to encourage settlement of international disputes by arbitration (Article 51).

Fundamental Duties

Following is the list of FDs:

- (a) To abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) To cherish and follow the noble ideals that inspired the national struggle for freedom;
- (c) To uphold and protect the sovereignty, unity and integrity of India;
- (d) To defend the country and render national service when called upon to do so;
- (e) To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities and to renounce practices derogatory to the dignity of women;
- (f) To value and preserve the rich heritage of the country's composite culture;
- (g) To protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures;
- (h) To develop scientific temper, humanism and the spirit of inquiry and reform;
- (i) To safeguard public property and to abjure violence;
- (j) To strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement; and
- (k) To provide opportunities for education to his child or ward between the age of six and fourteen years. **This duty was added by the 86th Constitutional Amendment Act, 2002.**

President of India

- (1) Article 52 – There shall be a President of India
- (2) Article 53 – the Executive power of the Union: The executive power shall be vested in the President and shall be exercised by him either directly or through officers' subordinate to him.
- (3) He is the supreme commander of the defence forces in India.
- (4) Though he's only the constitutional head, or titular head, *de jure head* or nominal executive or just a symbolic head.

Important Articles related to the President:

Articles	Provisions
Article 52	The President of India
Article 53	Executive power of the Union
Article 54	Election of the President
Article 55	Manner of Election of President
Article 56	Term of office
Article 57	Eligibility for re-election
Article 58	Qualifications of President's office
Article 59	Conditions of President's office
Article 60	Oath and Affirmation by President
Article 61	Procedure for impeachment

Election of the President

1. The President shall be elected by the members of an ELECTORAL COLLEGE consisting of:

- (a) The Elected MPs
- (b) The Elected MLAs of the states
- (c) The Elected MLAs of National Capital Territory of Delhi (added by 70th Amendment Act, 1992 and with effect from 1-06-1995) and Union territory of Puducherry.

2. Thus, **nominated members of parliament and legislative assemblies and members of legislative councils do not participate in the presidential election.**

3. The election is held in accordance with the system of proportional representation by means of single transferable vote and voting is done by secret ballot.

4. All doubts and disputes arising out of the Presidential elections are decided into and enquired by the Supreme Court whose decision is final.

5. The elections are monitored and conducted by the Election Commission of India.

Impeachment of the President (Article 61)

1. He is impeached for the 'Violation of the Constitution'. However, **the term is NOT defined in the constitution.**

2. The charges can be preferred by either house of the parliament. However, a 14-days' notice shall be served to the President before the acceptance of such a resolution.

3. Also, that notice must be signed by at least one-fourth members of the total members of that house which initiated the charges.

4. After the acceptance of that bill in that house, that impeachment bill must be passed by the majority of 2/3rd of the total membership of that house.

5. Then that bill goes in another house which should investigate the charges and the President shall have the right to appear and to be represented at such an investigation.

6. If another house sustains the charges and finds the President of violation, and passes that resolution by 2/3rd of the total membership of that house, the President stands removed from the date the resolution is so passed.

7. Hence, impeachment is a quasi-judicial process. And though, the **nominated members of Parliament do not participate in his election, they take part in the**

impeachment process. Also, states' legislatures do not have a role in the impeachment process.

Important Powers of the President:

Veto Powers

The President of India has three types of Veto powers, namely

1. **Absolute Veto**- Withholding the assent to the bill. The bill then ends and does not become an Act. Example- in 1954, Dr. Rajendra Prasad withheld his assent to the PEPSU Appropriation Bill. Also, in 1991 R. Venkataram withheld his assent to the MPs Salaries, allowances bill.
2. **Suspensive Veto**- Returning the bill for reconsideration. In 2006, President APJ Abdul Kalam used the suspensive veto in the office of profit bill. However, the President can return the bill for reconsideration to the legislature only once, after which he has to give his consent.
3. **Pocket Veto**- Taking no action on the bill sent to the President. There's no time limit provided in the constitution within which the President has to give his assent or sign the bill. Hence, he has a 'bigger pocket' than the American President. In 1986, President Zail Singh applied Pocket Veto to Indian Post Office Amendment bill.

Judicial Powers:

President has the power to grant Pardon, Reprieve, Respite, Remit, Commute the sentence of a convicted person.

- ❖ **Pardon**: It absolves the offender from all sentences and punishment.
- ❖ **Reprieve**: It means a temporary suspension of the execution of the sentence.
- ❖ **Remission**: It reduces the amount of sentence without changing its character.
- ❖ **Respite**: It leads to awarding of a lesser sentence in some special cases. E.g. in case of a pregnant woman
- ❖ **Commutation**: It substitutes one form of punishment for another of a lighter character.

Note:

- ✓ The judicial power of the President extends to cases where the sentence has been awarded by court martial and in the cases where punishment is a death sentence. The judicial power of Governor does not extend to both these cases.

Legislative Powers:

The legislative powers of the President are as follows:

1. The President summons the houses of the Parliament at least twice a year at the place of his choice.
2. He nominates 12 members to the Rajya Sabha.
3. Some bills such as follows need President's recommendation for their introduction into the Parliament:
 - A bill for formation of new states or alteration of boundary of existing states.

- A money Bill
- A Finance Bill
- A bill involving taxation or distribution of financial resources to states.
- A state bill that seeks to restrict freedom of trade.

Vice-President of India

Important Articles related to Vice-President:

Article	Provisions
Article 63	The Vice-President of India
Article 66	Election of Vice-President
Article 67	Term of office
Article 69	Oath and Affirmation by the Vice-President

- The Vice-President shall be ex-officio Chairman of the Council of States and shall not hold any other office of profit.
- The first Chairperson of the Rajya Sabha - Dr. Sarvepalli Radhakrishnan
- Provided that during any period when the Vice-President acts as President or discharges the functions of the President under article 65, he shall not perform the duties of the office of Chairman of the Council of States and shall not be entitled to any salary or allowance payable to the Chairman of the Council of States under article 97.
- This is the second most important function of the V.P. He can act as the President in case of the death, impeachment, resignation or otherwise of the President of India. However, he can act as the president only for a maximum period of six months (question asked) within which a new president has to be elected.
- The V.P gets the salary, allowance etc. of the President when he acts as the president, not as the chairperson of the Rajya Sabha.
- The **salary, emoluments etc. of the chairperson of the Rajya Sabha is mentioned in the second schedule** of the Constitution of India.

Article 66: Election of Vice-President

- The Vice-President of India is elected by an electoral college consisting of: **Elected and nominated members of both house (Lok Sabha and Rajya Sabha)** of parliament. (MLAs are not included)
- Vice-President of India is elected by proportional representation system by means of the single transferable vote.
- Voting in Vice-President election is done by secret ballot.
- A candidate to be elected to the office of Vice-President, He/she must secure a fixed quota of Votes.
- All disputes related to the election of Vice-President are inquired into and decided by the supreme court whose decision is final.

Eligibility Criteria for Vice-President

- He/she should be the citizen of India
- He/she has completed the age of 35 years.
- He/she should be qualified for the member of Rajya Sabha
- Does not hold any office of profit under union, state or local authority.
- However, for this purpose, the President, Vice-President, Governor of a State and a Minister of the Union or a State, are not held to be holding an office of profit. (An office of profit is an office that would give its occupant the opportunity to gain a financial advantage or benefit).

Removal of Vice-President

- Vice-President can be removed by a resolution of Rajya Sabha passed by a majority of all the then members of Rajya Sabha and agreed to by Lok Sabha.
- A 14 days day notice needs to be given to the Vice-President.
- Procedure of removal of Vice-President cannot be initiated in Lok Sabha.

Parliament of India

Organization of the Parliament

1. The Parliament consists of the President, the Lok Sabha and the Rajya Sabha.
2. Lok Sabha is the Lower House (First Chamber or Popular House) and Rajya Sabha is the Upper House (Second Chamber or House of Elders).

Composition of Rajya Sabha

1. Under Article 80, The maximum strength of the Rajya Sabha is fixed at 250, out of which, 238 are to be the representatives of the states and union territories (elected indirectly) and 12 are nominated by the president.
2. At present, the Rajya Sabha has 245 members. Of these, 229 members represent the states, 4 members represent the union territories, and 12 members are nominated by the president.
3. The Fourth Schedule of the Constitution deals with the allocation of seats in the Rajya Sabha to the states and union territories.
4. The representatives of states in the Rajya Sabha are elected by the elected members of state legislative assemblies. The seats are allotted to the states in the Rajya Sabha are based on their population.

Composition of Lok Sabha

1. The maximum strength of the Lok Sabha is fixed at 552. Out of this, 530 members are to be the representatives of the states, 20 members are to be the representatives of the union territories and 2 members may be nominated by the president from the Anglo-Indian community.
2. At present, the Lok Sabha has 545 members.
3. The representatives of states in the Lok Sabha are directly elected by the people from their respective constituencies.
4. The voting age was reduced from 21 to 18 years by the 61st Constitutional Amendment Act, 1988.

Qualification, disqualifications to be an MP

1. Eligibility

- (a) Citizen of India.
- (b) Minimum age – 30 years in Rajya Sabha and 25 years in Lok Sabha.
- (c) He must possess other qualifications prescribed by Parliament. (Hence, the Representation of People Act, 1951).

2. Criteria for disqualifying an MP:

Only the following criteria are mentioned in the constitution for disqualification of an MP.

- (a) If he holds any office of profit under the Union or state government
- (b) If he is of unsound mind and stands so declared by a court.
- (c) If he is an undischarged insolvent.
- (d) if he is not a citizen of India or has voluntarily acquired the citizenship of a foreign state or is under any acknowledgement of allegiance to a foreign state; and
- (e) If he is so disqualified under any law made by Parliament (RPA, 1951).

3. The Constitution also lays down that a person shall be disqualified from being a member of Parliament if he is so disqualified on the ground of defection under the provisions of the Tenth Schedule.

Note: Under the tenth schedule a MP may be disqualified if:

- He voluntarily gives up the membership of his political party,
- If he abstains from voting in the house contrary to any direction given by his party (unless party condones his actions in 15 days)
- An independent member is disqualified if he joins any political party after his election.

4. Double Membership - A person cannot be a member of both Houses of Parliament at the same time.

5. A House can declare the seat of a member vacant if he is absent from all its meetings for a period of sixty days without its permission.

Speaker of the Lok Sabha

1. The Speaker is elected by the Lok Sabha from amongst its members (as soon as may be, after its first sitting). The date of election of the Speaker is fixed by the President.
2. The Speaker offers his resignation to the Deputy Speaker and he can be removed by a resolution passed by a majority of members of Lok Sabha, however, only after giving him a 14-day notice.
3. He presides over a joint sitting of the two Houses of Parliament. Such a sitting is summoned by the President to settle a deadlock between the two Houses on a bill.
4. He **decides whether a bill is a money bill or not** and his decision on this question is final.
5. Under the Anti-defection law, the authority of the speaker is final on disqualification of a member (subject to judicial review).

6. He can't vote in the first instance, though can vote in the event of a tie. When his removal motion is under consideration, he can take part and speak in the proceedings and can vote as well but not in the case of a tie.

Deputy Speaker

1. The deputy speaker is elected by the members of Lok Sabha from amongst themselves by simple majority of the members present and voting.
2. The speaker and the deputy speaker give their resignation to each other.
3. Deputy Speaker can be removed by a resolution passed by a majority of all the then members of the house after serving a 14-day notice to him.

Speaker Pro-tem

1. As soon as a new Lok Sabha is elected, the President appoints a Speaker Pro-tem who is usually the senior most member of the house.
2. His functions include administering the oath to new speaker and preside over the election of the speaker.

Attorney-General for India

1. Attorney-General is not a member of Parliament or the Council of Ministers, but he has a right to take part in the proceedings of either house, but he cannot vote.
2. A person qualified to be a judge of the Supreme Court is appointed the Attorney-General by the President.
3. He holds the office during the pleasure of the President.

Deputy Chairman of Rajya Sabha

1. He is elected by the Rajya Sabha from amongst its members and he remains in the office until the expiry of his term as a member.
2. In the absence of Chairman, Deputy Chairman presides over the functions and proceedings of Rajya Sabha.

Sessions of Parliament

- ❖ The Budget Session (February to May)
- ❖ The Monsoon Session (July to September); and
- ❖ The Winter Session (November to December).

The maximum gap between two sessions of Parliament cannot be more than six months
The President summons and prorogues the two houses of parliament.

Important terms related to Sessions of the Parliament:

1. **Prorogation:** A session of the house if terminated by an order called the "Prorogation order" made by the President.
2. **Adjournment sine die:** It means termination of the sitting of the house without specifying or fixing any date for its next sitting. Such order is made by the Presiding order of the house.
3. **Hung Parliament:** When no single party has majority to form the government.

4. **Quorum:** Minimum number of members required to carry out business of the house. There should be **at least one-tenth members present** to conduct the business of the house.
5. **Starred and Unstarred Question:** A starred question is one to which a member desires an oral answer, and an Un-starred question is one to which written answer is desired by the asking member.
6. **Guillotine:** When due to lack of time, demands for grant are put to vote whether they are discussed or not in the house on the last day, it is called Guillotine.

Important points regarding bills:

1. Money and Finance bills can not be introduced in the Rajya Sabha.
2. Money, Finance and an Ordinary Bill under Article 3 can only be introduced only on the recommendation of the President.
3. Constitutional Amendment Bill can be introduced in either house.
4. The President cannot send back a Money Bill for reconsideration of the of Parliament, he shall give his assent to the Money Bill. A Money bill is defined under the Article 110.
5. There is no provision for the joint sitting of two houses for Money Bills and Constitutional Amendment Bill.(So far, Joint Session of the Parliament of India has been called for only three bills that have been passed at joint sessions: the Dowry Prohibition Act, 1961, the Banking Service Commission Repeal Bill, 1978, and the Prevention of Terrorism Act, 2002.)

Types of Amendment Procedures:

1. By simple majority:

Simple Majority means the majority of the members present and voting. i.e. more than 50%. The following Articles are amended under this method:

- Admission of new states
- Changes in the names and boundaries of the states.
- Creation or abolition of legislative councils in the states by the Parliament.
- Salaries, allowances of President, Governors and Judges of SC and HC.
- Quorum for Houses
- Power, Privileges of MPs.
- Delimitation of Constituencies.

2. By Special Majority:

Under this a bill is passed by each house of the parliament by a majority of the total membership of that house and by a majority of not less than $\frac{2}{3}^{\text{rd}}$ of the members in the house present and voting. All the Articles of the constitution can be amended by this method except the specific provisions which are mentioned in the Article 368 of the constitution.

3. By Special majority with ratification by the states:

Some federal matters are amended by this method, under this, the bill is required to be passed by the parliament under special majority and needs to be ratified by

more than 50% of the states. There is no time limit within which the states must ratify such bills.

Following provisions fall under this category:

- Election and manner of election of the President
- Extent of executive power of the union (Art.73) and states (Art. 162)
- Union Judiciary
- High Courts
- Legislative relations between the centre and the states
- 7th schedule
- Provisions dealing with amendment of the constitution (Art. 368)

Important Parliamentary Finance Committees:

1. Committee on Public Accounts:

- The committee on Public Accounts consists of 15 members from Lok Sabha and 7 Members from Rajya Sabha.
- The term of office of the members is not more than 1 year.
- The committee examines: Account showing the appropriation of sums granted by parliament, Annual Financial Accounts of GoI, Reports of CAG.

2. Committee on Estimates:

- The Estimates Committee consists of 30 members- all from Lok Sabha- who are elected by the Lok Sabha every year from amongst its members according to the principle of proportional representation by means of single transferrable vote.
- Functions: to examine whether the money is well laid out within the limits of the policy implied in the estimates, to suggest the form in which estimates shall be presented to Parliament.

3. Committee on Public Undertakings

- The committee consists of 15 members elected from Lok Sabha and 7 Members from Rajya Sabha.
- Functions: to examine the Reports and Accounts of the public undertakings, Reports of CAG, may also examine such matters which may be referred to it by the house or by the speaker.

Provisions under which the Parliament can make laws on state subjects:

- 1. Article 249:** If Rajya Sabha passes a resolution with not less than 2/3rd majority, on the ground that it is in national interest, it can allow the parliament to legislate on the state subjects. Such law can be in force of 1 year but can be extended any number of times. It ceases to have effect 6 months after the resolution ceases to be in force.
- 2. Article 250:** If a national emergency is declared under Article 352, the parliament has the right to make laws with respect to all the 61 subjects in the state list automatically.

3. **Article 252:** If legislatures of 2 or more states request the parliament to make a law on the state subject, the parliament can do so. However, such law can be amended or repealed only by the parliament. E.g. Wildlife (Protection) Act, 1972.
4. **Article 253:** The Parliament can make laws on the state subjects to comply with any international agreements to which India is a party.
5. **Article 356:** If President's rule is imposed in a state the power of the legislature of the state is exercised by the Parliament.

Emergency Provisions in the Constitution:

There are 3 kinds of emergency mentioned in the constitution:

1. **National Emergency-** Emergency caused by threat to the security of India by war or external aggression or armed rebellion (Article 352).
 - Armed rebellion word replaced the word "internal disturbance" in the 44th Amendment Act, 1978.
 - So far National Emergency has been declared 3 times in India.
 - **Duration: Initially 1 month**, during which it has to be approved by the parliament by a special majority. If parliament approves the proclamation, then it stays in force for 6 months, it can be approved any number of times but **not more than 6 months at a time**.
 - **Revocation:** The proclamation can be revoked by the President at any time, it does not require approval of the Parliament. Also, If not less than **1/10th members** of Lok Sabha issue a notice disapproving the emergency, to the president when Lok Sabha is not in the session, then a special sitting of Lok Sabha has to be held in **the next 14 days to consider such resolution**.
 - **Effects:** The administration is converted to unitary. Parliament can enact laws on subjects in state list.
 - **Effect on Fundamental Rights:**
 - Article 358 states that when emergency is declared on the grounds of war or external aggression (not on the ground of armed rebellion) the six FRs under Article 19 are automatically suspended.
 - The President, under Article 359, may by order, suspend the operation of any of the other FRs when an emergency is declared on the grounds of War or external aggression.
 - However, the FRs under Article 20 (Protection in respect to conviction for offences) and Article 21 (Right to life) cannot be suspended even during a national emergency.
2. **President's Rule:** Emergency caused by failure of constitutional machinery in the state (Article 356)
 - President makes the proclamation with or without the report of the governor.
 - President cannot assume the powers of the High Court

- **Duration:** Initially for 2 months, after approval of the parliament- 6 months. At a stretch it can be in force maximum for one year. It can be extended beyond one year but in no case beyond 3 years in following cases:
 - An emergency under Article 352 exists,
 - If EC certifies that there is difficulty in holding elections in the concerned state.
 - **Effects:**
 - Council of Ministers headed by CM is dismissed.
 - Assembly is incapable of making laws.
 - There is no effect on the FRs of the people of the state.
3. **Financial Emergency:** Under Article 360, a proclamation is made by the President if he is satisfied that a situation has arisen where financial stability of the India or any of its territory has been threatened.
- **Duration:** Initially for 2 months, after approval of the parliament it stays in force until it is revoked by the President.
 - **Effects:**
 - Union government may give directions to states regarding financial matters.
 - President may ask the states to reduce the salary of all persons in government service.
 - All money bills of the states may be asked to be reserved for the consideration of the President.
 - President may also direct to reduce salary and allowances of central government employees and judges of SC and HC.

Indian Judiciary

Supreme Court

1. Articles 124 to 147 mentioned in Part V of the Constitution deal with the organisation, independence, jurisdiction, powers, and procedures and so on of the Supreme Court.
2. At present, the strength of the Supreme Court's judges stands at 34 judges (including the chief justice).
3. Originally, the strength of the Supreme Court was fixed at eight (one chief justice and seven other judges).
4. Appointment- The judges of the Supreme Court are appointed by the president. The appointment of the Chief Justice is made by the president after consultation with such judges of the Supreme Court and high courts as he deems necessary. The other judges are appointed by the president after consultation with the chief justice and such other judges of the Supreme Court and the high courts as he deems necessary. The consultation with the chief justice is obligatory in the case of appointment of a judge other than Chief justice.

5. In 2015 the National Judicial Appointments Commission was declared Ultra Vires by the Supreme Court and hence the collegium system still holds the ground mentioned above.

6. **Qualification-** A person to be appointed as a judge of the Supreme Court should have the following qualifications:

(i) He should be a citizen of India.

(ii) (a) He should have been a judge of a High Court (or high courts in succession) for five years, or

(b) He should have been an advocate of a High Court (or High Courts in succession) for ten years; or

c) He should be a distinguished jurist in the opinion of the president.

8. **Oath-** The oath to the judges and CJI is administered by the President or any other person appointed by him for this purpose.

9. **Tenure of Judges –**

A. He holds office until he attains the age of 65 years.

B. He can resign his office by writing to the president.

C. He can be removed from his office by the President on the recommendation of the Parliament.

10. **Removal of Judges-** A judge of the Supreme Court can be removed from his Office by an order of the President. However, he can do so only after an address by Parliament has been presented to him in the same session for such removal. The address must be supported by a **special majority of each House** of Parliament - a majority of the total membership of that House and a majority of not less than two-thirds of the members of that House present and voting. The grounds of removal are —proved misbehaviour or incapacity.

11. The jurisdiction and powers of the Supreme Court can be classified into- Original Jurisdiction, Writ Jurisdiction, Appellate Jurisdiction, Advisory Jurisdiction, A court of Record and so on.

12. The Constitution has constituted the Supreme Court as the guarantor and defender of the fundamental rights of the citizens.

13. The Supreme Court is empowered to issue writs including *habeas corpus*, *mandamus*, prohibition, *quo-warranto* and *certiorari* for the enforcement of the fundamental rights of an aggrieved citizen.

High Court

1. At present, there are 24 high courts in the country. Out of them, three are common high courts. Delhi is the only union territory that has a high court of its own (since 1966). The other union territories fall under the jurisdiction of different state high courts.

2. Unlike Supreme court the number of judges in High courts is flexible and is decided by the President based on the amount of work before a high court.

3. Appointment of Judges The judges of a high court are appointed by the President. The chief justice of the High Court is appointed by the President after consultation with the chief justice of India and the governor of the state concerned. For appointment of other judges, the chief justice of the concerned high court is also consulted. In case of a common high court for two or more states, the governors of all the states concerned are consulted by the president.

- No appointment can be made without conformity with opinion of CJI.
- Under Article 222, President after consultation with CJI (who consults 4 senior most judges of SC and two chief justices of HCs where the transfer is taking place) can transfer a judge from one HC to other.
- The opinion provided by the CJI is binding on the President.

3. Qualifications of Judges A person to be appointed as a judge of a high court should have the following qualifications:

A. He should be a citizen of India.

B. (a) He should have held a judicial office in the territory of India for ten years, or

(b) He should have been an advocate of a high court (or high courts in succession) for ten years.

4. Oath or Affirmation Oath to the judge is administered by the governor of the state or some person appointed by him for this purpose.

5. Tenure of Judges –

A. He holds office until he attains the age of 62 years.

B. He can resign his office by writing to the president.

C. He can be removed from his office by the President on the recommendation of the Parliament.

D. He vacates his office when he is appointed as a judge of the Supreme Court or when he is transferred to another high court.

E. The salaries and allowances of the High Court judges is charged on the consolidated fund of the state, while pensions are charged on the consolidated fund of India.

Note:

- The writ jurisdiction of HC is wider than SC. Under Article 32 SC can issue writs only when fundamental right is infringed, while HC, Under Article 226 can issue writs for the enforcement of fundamental rights as well as other ordinary legal rights.
- SC is bound to issue writs under Article 32, while High Courts issue writs at their discretion.

The Governor

Important Articles related to Governor

Articles	Provisions
Article 153	Governors for states
Article 155	Appointment of Governor

Article 156	Term of office of Governor
Article 157	Qualifications for Appointment as Governor
Article 158	Conditions of Office
Article 159	Oath by the Governor

The Governor is the De Jure executive head at the state level. His position is analogous to that of the President at the centre.

- The Governor is appointed by the president.
- To be appointed as the Governor of any state or two or more states as a person:
 - (a) Should be a citizen of India.
 - (b) And should have attained 35 years of age.
 - (c) He should not hold any office of profit as well.
- Like the President, the governor is also entitled to several immunities and privileges. During his term of office, he is immune from any criminal proceedings, even in respect of his personal acts.
- **The oath** - is administered by the chief justice of the corresponding state high court and in case he's absent, the senior-most judge of that particular court.
- A governor holds office for a term of five years from the date on which he enters upon his office. He holds office until the pleasure of the President, and he offers his resignation to the President.
- He appoints the advocate general of a state and determines his remuneration. The advocate general holds office during the pleasure of the governor.
- He appoints the state election commissioner. However, the state election commissioner can be removed only in the like manner and on the like grounds as a judge of a high court.
- He appoints the chairman and members of the state public service commission. However, they can be removed only by the president and not by a governor.
- He nominates one-sixth of the members of the state legislative council.
- He can promulgate ordinances when the state legislature is not in session. The ordinances must be approved by the state legislature within six weeks from its reassembly. He can also withdraw an ordinance anytime (Article 213).
- He can grant pardons, reprieves, respites, and remissions of punishment or suspend, remit and commute the sentence of any person convicted of any offense against any law relating to a matter to which the executive power of the state extends (Article 161).

Article 371:

Some governors have to discharge certain special responsibilities under Article 371 to 371J. Such special states and respective articles are listed below:

Article	State
Article 371	Gujarat and Maharashtra
Article 371A	Nagaland
Article 371B	Assam
Article 371C	Manipur

Article 371D and 371E	Andhra Pradesh
Article 371F	Sikkim
Article 371G	Mizoram
Article 371H	Arunachal Pradesh
Article 371I	Goa
Article 371J	Karnataka

Chief Minister and State Council of Ministers

- Chief Minister is the real executive authority (de facto executive). He is the head of the government.
- The total strength of the number of ministers, including the C.M, in the state's CoM should not exceed 15 percent of the total strength of the legislative assembly of that state. However, the number of ministers, including the C.M, in a state should also not be less than 12. This provision was added by the 91st Amendment Act of 2003.
- A member of either House of state legislature belonging to any political party who is disqualified on the ground of defection shall also be disqualified to be appointed as a minister. The provision was also added by the 91st Amendment Act of 2003.

The State Legislature

Organization of the State Legislature

- Most of the states in India have a Unicameral Legislature. Six States have Bicameral Legislature, that is-Telangana, Andhra Pradesh, Maharashtra, Bihar, U.P. and Karnataka.
- The Legislative Council (Vidhan Parishad) is the upper house (second chamber or house of elders), while the Legislative Assembly (Vidhan Sabha) is the lower house (first chamber or popular house). Delhi and Puducherry are the only two UTs that have a Legislative Assembly.

Composition of the State Legislature

- The legislative assembly consists of representatives directly elected by the people based on universal adult franchise. Its maximum strength is fixed at 500 and minimum strength at 60 depending on the population size of the state. However, in the case of Sikkim it is 32; and Goa and Mizoram it's 40.
- The members of the legislative council are indirectly elected. The maximum strength of the legislative council is fixed at 1/3rd of the total strength of the corresponding assembly and the minimum strength is fixed at 40. But an exception being Jammu and Kashmir having 36 members.
- Manner of Election Of the total number of members of a legislative council:

- (a) 1/3 are elected by the members of local bodies in the state such as municipalities etc.,
- (b) 1/12 are elected by graduates of three years standing and residing within the state,
- (c) 1/12 are elected by teachers of three years standing in the state, not lower in standard than secondary school,
- (d) 1/3 are elected by the members of the legislative assembly of the state from amongst persons who are not members of the assembly, and

(e) The remainder are nominated by the governor from amongst the persons who have special knowledge or practical experience of literature, science, art, cooperative movement, and social service.

- Thus, 5/6 of the total number of members of a legislative council is indirectly elected and 1/6 are nominated by the governor. The members are elected in accordance with the system of proportional representation by means of a single transferable vote.

Duration of the two Houses

- Analogous to the Lok Sabha, the legislative assembly is also not a permanent chamber. The term of the assembly is five years from the date of its first meeting after the general elections.

- Analogous to the Rajya Sabha, the legislative council is a continuing chamber, that is, it is a permanent body and is not subject to dissolution. But, one-third of its members retire on the expiration of every second year.

Membership of the State Legislature

The Constitution lays down the following qualifications for a person to be chosen as a member of the State legislature.

(a) Citizen of India.

(b) He must be not less than 30 years of age in the case of the legislative council and not less than 25 years of age in the case of the legislative assembly.

He should not have been found guilty as per the provisions of RPA, 1951. In defection case also a member is liable to be disqualified as per the Anti-Defection Act (10th Schedule).

Also, he should not be of unsound mind, he should not hold any office of profit; he isn't declared an un-discharged insolvent etc.

Presiding Officers of State Legislature

- Each House of the state legislature has its own presiding officer. There is a Speaker and a Deputy Speaker for the legislative assembly and Chairman and a Deputy Chairman for the legislative council. A panel of chairmen for the assembly and a panel of vice-chairmen for the council are also appointed.

- The Speaker is elected by the assembly itself from amongst its members.

- Like the Speaker, the Deputy Speaker is also elected by the assembly itself from amongst its members. He is elected after the election of the Speaker has taken place.

- The Chairman is elected by the council itself from amongst its members.

- The Speaker decides whether a bill is a Money Bill or not and his decision on this question is final.

Local Government system in India

Evolution of Panchayati Raj System

- The first Panchayati raj system in India was established by the state of Rajasthan in 1959, in Nagaur district followed by Andhra Pradesh. Thereafter the system was adopted by most of the states. The major concern regarding the local self-government was its architecture, amount of power to be devolved, finances etc. Several committees were constituted by respective union governments to devise a method for the same.

Some of the important committees are:

- Balwant Rai Mehta Committee, 1957
It suggested a 3-tier structure at village, block and district level.
- Ashok Mehta Committee, 1977
It suggested a 2-tier system.
- G V K Rao Committee, 1985
Recommended revival of Panchayati Raj institutions and a 3-tier system.
- L M Singhvi Committee, 1986
Recommended Constitutional status to Panchayati Raj institutions, also recommended setting up a finance commission for Panchayats.
- Thungon Committee, 1989
Recommended Constitutional recognition to Panchayats.
- Gadgil Committee, 1988

73rd Amendment Act, 1992

This Act has added PART IX to the constitution and consists of provisions from Articles 243-243O. Also, it has added 11th Schedule consisting of 29 items of the Panchayat.

Important Articles added under the Act:

Article	Provisions
243A	Gram Sabha
243B	Three tier system
243D	Reservation of seats
243F	Qualification (Min. age 21 years)
243I	State Finance Commission
243K	State Election Commission

74th Amendment Act, 1992

This Amendment Act inserted a new Part IX A which deals with the administration of Municipalities and Nagar Palikas. It consist of Articles 243P to 243ZG. It also added a new 12th Schedule to the constitution.

Important Articles added under the Act:

Article	Provisions
Article 243R	Composition of Municipalities
Article 243S	Wards Committee
Article 243Q	Duration
Article 243T	Reservation of seats for SC, ST & Women
Article 243V	Qualifications (21 years)

Constitutional Bodies

ELECTION COMMISSION

- Article 324 of the Constitution mentions about the election commission mentioned in part XV.
- The institution of Election Commission presently consists of the chief election commissioner and two other election commissioners, appointed by the President.
- They hold office for a term of six years. The age of retirement is 65 years, whichever comes earlier.
- The first election commissioner of India was Sukumar Sen.
- The administrative expenditure of the Election Commission is NOT charged upon the Consolidated fund of India.
- Commission has advisory jurisdiction in the matters of post-election disqualification of sitting members of Parliament and State Legislatures. The opinion of the commission on all such matters is binding on the President/Governor.
- Political Parties are recognised by the Election Commission. The conditions for recognition of a Party as National Party and State Party are as follows:

National Party:

- **2 % seats in Lok Sabha from at least 3 different states in general election.**
- **In election to Lok Sabha or State Legislature, the party has polled 6 % of total valid votes from at least 4 different states, in addition to winning 4 Lok Sabha.**
- **A party has recognition as a state party in at least 4 states.**

State Party:

- **Secure at least 6% of the valid vote and win at least 2 seats in an assembly election.**
- **Secure 6% valid votes and at least 1 Lok Sabha seat.**
- **Win at least 3% of the seats or at least 3 seats, whichever is more, in a Assembly Election.**

- **Win at least 1 out of every 25 seats from a state in Lok Sabha General Election.**
- **Secure at least 8% of the total valid votes in Assembly or Lok Sabha Elections.**

UNION PUBLIC SERVICE COMMISSION

- Mentioned under articles 315 to 323 in Part XIV of the Constitution (Article 315 mentions about the public service commission for the union and the states).
- The UPSC consists of a chairman and other members appointed by the president of India.
- The term is of six years or the retirement age is 65 years, whichever is earlier.
- The chairman of UPSC (on ceasing to hold office) is not eligible for further employment in the Government of India or a state.

STATE PUBLIC SERVICE COMMISSION

- A State Public Service Commission consists of a chairman and other members appointed by the governor of the state.
- The term of office is 6 years or retirement age is 62 years, whichever is attained earlier. They offer their respective resignations to the governor.
- The chairman and members can be removed only by the President, though they're appointed by the Governor. The ground for removal is same as that of a chairman or a member of the UPSC.
- A JPSC is/can be created by an act of parliament on the request of the respective states, unlike UPSC and SPSC which are constitutional bodies. Hence, a JPSC is a statutory body not a constitutional one.
- The chairman and members of a JSPSC are appointed by the president. The term of office is again six years or the age of retirement is 62 years, whichever comes earlier.

FINANCE COMMISSION

- Article 280 of the Constitution of India provides for a Finance Commission. It is constituted by the president of India every fifth year or at such earlier time as he considers necessary.
- The Finance Commission consists of a chairman and four other members to be appointed by the president. They hold office for such period as specified by the president in his order. They are eligible for reappointment.
- It is majorly an advisory body though and it advises on the distribution of net proceeds of taxes to be shared between the centre and the states and the allocation between the states the respective shares of such proceeds.
- The Chairman of the first finance commission was K.C Neogi and presently it is the 15th F.C. whose chairman is N.K Singh.

NATIONAL COMMISSION FOR SCs

- Mentioned in Article 338 of the Constitution of India.

NATIONAL COMMISSION FOR STs

- Mentioned in Article 338-A of the Constitution of India.

SPECIAL OFFICER FOR LINGUISTIC MINORITIES

- It is mentioned in 350-B in Part XVII of the Constitution.

COMPTROLLER and AUDITOR GENERAL of INDIA

- The Constitution of India (Article 148) provides for an independent office of the Comptroller and Auditor General of India (CAG).
- He is the head of the Indian Audit and Accounts Department.
- He is the guardian of the public purse and controls the entire financial system of the country at both the levels—the Centre and the state.
- This is the reason why Dr. B R Ambedkar said that the CAG shall be the most important Officer under the Constitution of India.
- The CAG is appointed by the president of India by a warrant under his hand and seal.
- He holds office for a period of six years or up to the age of 65 years, whichever is earlier.
- The method to remove CAG is same as that of Supreme court judge.
- He is not entitled to hold any further employment after he retires or is removed, either at the centre or at the state government level.
- The administrative expenses of the office of the CAG, including all salaries, allowances, and pensions of persons serving in that office are charged upon the Consolidated Fund of India. Thus, they are not subject to the vote of Parliament.
- He audits the accounts related to all expenditure from the Consolidated Fund of India, consolidated fund of each state and consolidated fund of each union territory having a Legislative Assembly.
- He audits all expenditure from the Contingency Fund of India and the Public Account of India as well as the contingency fund of each state and the public account of each state.
- He submits his audit reports relating to the accounts of the Centre to President, who shall, in turn, place them before both the Houses of Parliament (Article 151).
- He submits his audit reports relating to the accounts of a state to the governor, who shall, in turn, place them before the state legislature (Article 151).
- The President lays the reports submitted by CAG before both the Houses of Parliament. The Public Accounts Committee then scrutinizes them and reports the findings to the Parliament.

ATTORNEY GENERAL OF INDIA

- Mentioned in Article 76 of the Constitution of India.
- Titled as the highest law officer in the country.
- Appointed by the President.
- An AGI is one who is qualified to be appointed a judge of the Supreme Court.
- The term is not fixed and he holds office during the pleasure of the President.

ADVOCATE GENERAL OF THE STATE

- The Constitution (Article 165) has provided for the office of the advocate general for the states. He is the highest law officer in the state. Thus he corresponds to the Attorney General of India.
- The advocate general is appointed by the governor. He must be a person who is qualified to be appointed a judge of a high court.

Non-Constitutional Bodies

NITI (National Institution for Transforming India) Aayog

- It is established in 2015 by the government to replace the Planning commission (was based on top-down model).
- It is based on the bottom-up model.
- It is the policy-making body for whole India.
- The Ex-officio chairman of aayog is prime minister.
- Current Vice Chairman of aayog is Rajiv Kumar.
- Permanent members of the governing council- (a) All state Chief Ministers (b) Chief ministers of Delhi and Puducherry (c) Lieutenant Governor of Andaman and Nicobar (d) Vice chairman nominated by the Prime Minister.

NATIONAL DEVELOPMENT COUNCIL

- The National Development Council (NDC) was established in August 1952 by an executive resolution of the Government of India on the recommendation of the first five year plan (draft outline). Like the Planning Commission, it is neither a constitutional body nor a statutory body.
- The NDC is composed of the following members:
 - P.M of India (as its chairman/head).
 - All Union cabinet ministers (since 1967).
 - Chief Ministers of all the states.
 - Chief Ministers/administrators of all the union territories. E. Members of the Planning Commission.

NATIONAL HUMAN RIGHTS COMMISSION

- The NHRC is a statutory (and not a constitutional) body. It was established in 1993 under a legislation enacted by the Parliament, namely, the Protection of Human Rights Act, 1993. This Act was amended in 2006.
- The Act was amended by Protection of Human Rights(Amendment) Bill,2019 to facilitate following provision:
 - Now, ex chief justice as well as ex judge of SC can be appointed as the chairperson of NHRC.
 - The bill allows 3 members to be appointed of which at least one has to be a woman.
 - **Members of NHRC:** The chairpersons of the National Commission for Scheduled Castes, National Commission for Scheduled Tribes, and National Commission for Women, National Commission for Backward

Classes, the National Commission for the Protection of Child Rights, and the Chief Commissioner for Persons with Disabilities.

- An ex chief justice of HC or an ex-judge of HC can be appointed chairperson of SHRC.
 - The term of office is reduced to 3 years or until the age of 70 whichever is earlier. The 5 year limit for reappointment is also removed.
 - Cases relating to human rights violations come under the purview of NHRC.
- The chairman and members are appointed by the President on the recommendations of a six-member committee consisting of the prime minister as its head, the Speaker of the Lok Sabha, the Deputy Chairman of the Rajya Sabha, leaders of the Opposition in both the Houses of Parliament and the Central home minister. Further, a sitting judge of the Supreme Court or sitting chief justice of a high court can be appointed only after consultation with the chief justice of India.

CENTRAL INFORMATION COMMISSION

- The CIC was established by the Central Government in 2005. It was constituted through an Official Gazette Notification under the provisions of the Right to Information Act (2005). Hence, it is not a constitutional body.
- The Commission consists of a Chief Information Commissioner and not-more-than ten Information Commissioners.
- They are appointed by the President on the recommendation of a committee consisting of the Prime Minister as Chairperson, the Leader of Opposition in the Lok Sabha and a Union Cabinet Minister nominated by the Prime Minister.
- They should be persons of eminence in public life with wide knowledge and experience in social service, science, and technology, mass media, management, journalism, law, or administration and governance.
- They should not be MPs or MLAs of any State or Union Territory. They should not hold any other office of profit or connected with any political party or carrying on any business or pursuing any profession.
- By an amendment, the term of office and allowances, salaries of Information Commissioners are to be prescribed by the Central government.

CENTRAL VIGILANCE COMMISSION

- The CVC is the main agency for preventing corruption in the Central government. It was established in 1964 by an executive resolution of the Central government.
- Its establishment was recommended by **the Santhanam Committee on Prevention of Corruption** (1962–64).
- Thus, originally the CVC was neither a constitutional body nor a statutory body. In September 2003, the Parliament enacted a law conferring statutory status on the CVC.
- The CVC is a multi-member body consisting of a Central Vigilance Commissioner (chairperson) and not more than two vigilance commissioners.
- They are appointed by the president by warrant under his hand and seal on the recommendation of a three-member committee consisting of the prime minister as

its head, the Union minister of home affairs and the Leader of the Opposition in the Lok Sabha.

- They hold office for a term of four years or until they attain the age of 65 years, whichever is earlier. After their tenure, they are not eligible for further employment under the Central or a state government.

Lokpal and Lokayukta Act

Important Facts

- The Lokpal and Lokayukta is an anti-corruption ombudsman established by the Lokpal and Lokayukta Act, 2013.
- It has the provision of appointing 'Lokpal' at the centre and 'Lokayukta' on every state.
- These are statutory bodies established without any constitutional status.
- The former Supreme Court Judge Justice Pinaki Chandra Ghose is the first Lokpal of India.

Composition of the Lokpal

- The office of Lokpal consists of a chairperson and a maximum of 8 members.
- The Chairman and half of the members should be from legal backgrounds.
- The 50% of the seats are reserved for SC, ST, OBC, minorities or women.

Evolution of Lokpal and Lokayukta in India

- For the first time, an office ombudsman was established in Sweden in 1809.
- The concept of ombudsman developed significantly after the Second World War. The United Kingdom adopted it in 1967.
- In India, this concept was first proposed by the then law minister Ashok Kumar Sen in the early 1960s.
- In 1966 the recommendations of the First Administrative Reforms Commission suggested the setting up of independent authority for looking after the complaint against public functionaries.
- In 2005 the 2nd ARC chaired by Veerappa Moily also recommended for provision of Lokpal.
- In India for the first time, the Lokpal bill was introduced in the Lok Sabha in 1968 but could not be passed, and till 2011 a total of eight failed attempts were made to pass the Bill.
- Finally, massive pressure from civil societies and demand from the social groups resulted in the passing of the Lokpal and Lokayuktas Bill, 2013.

Criteria for selection of Chairperson

- She/he should be either former Chief Justice of India or Judge of the Supreme Court.
- She/he should be an eminent person with impeccable integrity and outstanding ability with at least 25 years experience in matters related to anti-corruption policy, law, management etc.

Appointment of Chairperson and Members

- The President appoints the chairperson and members on the recommendation of a select committee consisting of the following :-
 - The Prime Minister
 - The Speaker of Lok Sabha
 - The Leader of Opposition in Lok Sabha
 - The Chief Justice of India
 - One eminent jurist appointed by the President

Term of Office

- The Chairman and members of Lokpal hold office for five years or upto the age of 70 yrs.
- The salary, allowances and other condition of service of the chairperson shall be equivalent to the Chief Justice of India, and members are comparable to the Judge of the Supreme Court.
- All expenses are charged from the consolidated fund of India.

Basic Structure of Constitution

Following are the components of the Constitution:

- The supremacy of the Constitution
- Rule of law
- The Sovereign, Democratic and Republican nature of Indian polity
- The principle of Separation of Powers between the executive, legislative and judiciary
- Federal Character of the Constitution
- Unity and integrity of the Nation
- Independence of the Judiciary
- Judicial Review
- Freedom and dignity of the individual
- The Parliamentary system of government
- The balance between Fundamental Rights and DPSP.]
- The principle of equality
- Secular character of the Constitution
- Restriction on amending the power of Parliament.
- Effective access to justice
- Principle of reasonableness
- Free and fair elections
- The Powers of the Supreme Court under Articles 32, 136, 141, 142
- The concept of Welfare State consisting of social and economic justice.

List of Most Important articles of Indian Constitution

1. Article No. 1:- Name and territory of the Union
2. Article No. 3:- Formation of new states and alteration of areas, boundaries or names of existing states

3. Article No. 13:- Laws inconsistent with or in derogation of the Fundamental Rights
 4. Article No. 14:- Equality before the law
 5. Article No. 16:- Equality of opportunity in matters of public employment
 6. Article No. 17:- Abolition of untouchability
 7. Article No. 19:- Protection of certain rights regarding freedom of speech, etc.
 8. Article No. 21:- Protection of life and personal liberty
 9. Article No. 21A:- Right to elementary education
 10. Article No. 25:- Freedom of conscience and free profession, practice and propagation of religion
 11. Article No. 30:- Right of minorities to establish and administer educational institutions
 12. Article No. 31C:- Saving of laws giving effect to certain Directive Principles
 13. Article No. 32:- Remedies for enforcement of Fundamental Rights including writs
 14. Article No. 38:- State to secure a social order for the promotion of the welfare of the people
 15. Article No. 40:- Organisation of village panchayats
 16. Article No. 44:- Uniform Civil Code for the citizens
 17. Article No. 45:- Provision for early childhood care and education to children below the age of 6 years.
 18. Article No. 46:- Promotion of educational and economic interests of scheduled castes, scheduled tribes and other weaker sections
 19. Article No. 50:- Separation of judiciary from the executive
 20. Article No. 51:- Promotion of international peace and security
 21. Article No. 51A:- Fundamental Duties
 22. Article No. 72:- Powers of President to grant pardons, suspend, remit or commute sentences in certain cases
 23. Article No. 74:- Council of Ministers to aid and advise the President
 24. Article No. 76:- Attorney-General of India
 25. Article No. 78:- Duties of the Prime Minister as respects the furnishing of information to the President, etc.
 26. Article No. 110:- Definition of Money Bills
 27. Article No. 112:- Annual Financial Statement (Budget)
 28. Article No. 123:- Power of President to promulgate ordinances during recess of Parliament
 29. Article No. 143:- Power of President to consult Supreme Court
 30. Article No. 148:- Comptroller and Auditor-General of India
 31. Article No. 149:- Duties and powers of the Comptroller and Auditor-General of India
 32. Article No. 155:- Appointment of the Governor
 33. Article No. 161:- Power of Governor to grant pardons, etc., and to suspend, remit or commute sentences in certain cases
 34. Article No. 163:- Council of Ministers to aid and advise the Governor
 35. Article No. 165:- Advocate-General of the state
- Which British Laws are still used in India
36. Article No. 167:- Duties of Chief Minister with regard to the furnishing of information to the Governor, etc.
 37. Article No. 168:- Constitution of Legislatures in the states
 38. Article No. 169:- Abolition or creation of Legislative Councils in the states
 39. Article No. 170:- Composition of Legislative Assemblies in the states

40. Article No. 171:- Composition of Legislative Councils in the states
41. Article No. 172:- Duration of State Legislatures
42. Article No. 173:- Qualification for membership of the State Legislature
43. Article No. 174:- Sessions of the State Legislature, prorogation and dissolution
44. Article No. 178:- Speakers and Deputy Speaker of the Legislative Assembly
45. Article No. 194:- Powers, privileges, and immunity of Advocate-General
46. Article No. 200:- Assent to bills by the governor (including reservation for President)
47. Article No. 202:- Annual financial statement of the State Legislature
48. Article No. 210:- Language to be used in the State Legislature
49. Article No. 212:- Courts not to inquire into proceedings of the State Legislature
50. Article No. 213:- Power of governor to promulgate ordinances during recess of the State Legislature
51. Article No. 214:- High courts for the states
52. Article No. 217:- Appointment and the conditions of the office of the judge of a High Court
53. Article No. 226:- Power of high courts to issue certain writs
54. Article No. 239AA:- Special provisions with respect to Delhi
55. Article No. 243B:- Constitution of Panchayats
56. Article No. 243C:- Composition of Panchayats
57. Article No. 243G:- Powers, authority and responsibilities of Panchayats
58. Article No. 243K:- Elections to the Panchayats
59. Article No. 249:- Power of Parliament to legislate with respect to a matter in the State List in the national interest
60. Article No. 262:- Adjudication of disputes relating to waters of inter-state rivers or river valleys
61. Article No. 263:- Provisions with respect to an inter-state council
62. Article No. 265:- Taxes not to be imposed save by authority of law
63. Article No. 275:- Grants from the Union to certain states
64. Article No. 280:- Finance Commission
65. Article No. 300:- Suits and proceedings
66. Article No. 300A:- Persons not to be deprived of property save by authority of law (Right to property)
67. Article No. 311:- Dismissal, removal or reduction in rank of persons employed in civil capacities under the Union or a state.
68. Article No. 312:- All-India Services
69. Article No. 315:- Public Service Commission for the Union and for the states
70. Article No. 320:- Functions of Public Service Commissions
71. Article No. 323-A:- Administrative Tribunals
72. Article No. 324:- Superintendence, direction and control of elections to be vested in an Election Commission
73. Article No. 330:- Reservation of seats for scheduled castes and scheduled tribes in the House of the People
74. Article No. 335:- Claims of Scheduled Castes and Scheduled Tribes to services and posts
75. Article No. 352:- Proclamation of Emergency (National Emergency)

76. Article No. 356:- Provisions in case of failure of constitutional machinery in states (President's Rule)

77. Article No. 360:- Provisions as to Financial Emergency.

78. Article No. 365:- Effect of failure to comply with or to give effect to, directions given by the Union (President's Rule)

79. Article No. 368:- Power of Parliament to amend the Constitution and procedure therefore.

General Science

PHYSICS

WORK

- Work is said to be done, if force acting on a body is able to actually move it through some distance in the direction of the force. Its SI unit is a **joule**.

ENERGY

- Energy is a scalar quantity and its unit is **Joule**.

- The sum of all kinds of energies in an isolated system remains constant at all times. This is the law of conservation of energy.

POWER

Its unit is **watt**.

- **1 watt hour** = 3600 Joule
- **1 kilowatt hour** = 3.6×10^6 joule
- **1HP** = 746 watt

GRAVITATION

- Everybody in the universe attracts other body by a force called force of gravitation.
- The gravitational force of the earth is called **gravity**.
- The acceleration produced in a body due to force of gravity is called **acceleration** due to gravity (g) and its value is **9.8 m/s'**
- Acceleration due to gravity is independent of shape, size and mass of the body.
- Escape velocity is the minimum velocity with, which an object just crosses the Earth's gravitational field and never returns. Escape velocity at the Earth's surface is **11.2 km/s**.
- Escape velocity at the **Moon's** surface is **2.4 km/s**. Due to low escape velocity there is no atmosphere on the moon.
- Value of g decreases with height or depth from Earth surface.
 - g is maximum at **poles**.
 - g is minimum at **equator**.
 - g decreases due to **rotation of Earth**.
 - g decreases if angular speed of Earth increases and increases if angular speed of Earth decreases.
- The acceleration due to gravity at the moon is **one-sixth** that of the Earth. So, the weight of a person on the surface of the moon will be **1/6** of his actual weight on the Earth.

SATELLITE

- Satellites are natural or artificial bodies revolving around a planet under its gravitational force of attraction.
- **Moon** is a **natural satellite**, while **INSAT-B** is an artificial satellite of Earth.
- The period of revolution of satellite revolving near the surface of earth is 1 hour 24 minutes (34 minutes).
- Geo-stationary satellite revolves around the Earth at a height 36000 km (approx).
- Time period of rotation of geo-stationary satellite is 24 hours.
- The Earth rotates on its axis from **West to East**. This rotation makes the Sun and the stars appear to be moving across the sky from **East to West**.
- A **geosynchronous satellite** is a satellite in geosynchronous orbit, with an orbital period the same as the Earth's rotation period.
- A special case of geosynchronous satellite is the **geostationary satellite**, which has a geostationary orbit – a circular geosynchronous orbit directly above the Earth's equator.
- **Geo-stationary satellite is used** to telecast. TV programmes from one part of the world to another, in weather forecasting, in predictions of floods and droughts.

- Polar Satellite Revolves around the earth in polar orbit at a height of **800km** (app.)
Time periods of these satellites is **84 min**.

ATOMIC AND NUCLEAR PHYSICS

Cathode Rays

Cathode rays, discovered by Sir William Crooke and its properties are

- travel in **straight lines**.
- Produce fluorescence.
- can penetrate through thin foils of metal and deflected by both electric and magnetic fields.
- have velocity ranging **1/30th** to **1/10th** of the velocity of light.

Positive or Canal Rays

- These rays were discovered by **Goldstein**.
- The positive ray consists of **positively charged particles**.
- These rays travel in **straight line**.
- These rays are deflected by **electric and magnetic fields**.
- These rays can produce ionization in gases.

X-Rays

- X-rays are electromagnetic waves with wavelength **range 0.1 A-100 A**.
- X-rays were discovered by **Roentgen**.
- X-rays travels in **straight line**.
- Long exposures of X – rays in injurious for human body.
- X – rays shows **photoelectric effect**.

Uses of X-Rays

- **In medical sciences** X-rays are used in surgery for the detection of fracture, diseased organs, foreign matter like bullet, stones etc. They are used in treatment of cancer and in skin diseases.
- **In Engineering**, X-rays are used in detecting faults, cracks, flaws and gas pockets in the finished metal products and in heavy metal sheets.
- **In Scientific Work**, X-rays are used in studying crystal structure and complex molecules.
- **In Custom Department** X-rays are used in custom department for detection of banned materials kept hidden.

Radioactivity

- Radioactivity was discovered by **Henry Becquerel, Madame Curie** and **Pierre Curie** for which they jointly won Nobel Prize.

Nuclear Fission

- Atom Bomb is based on nuclear fission. U^{235} and Pu^{239} are used as fissionable material.

- Nuclear fission was first demonstrated by Halin and Fritz Strassmann.

Nuclear Fusion

- When two or more light nuclei combined together to form a heavier nucleus is called as **nuclear fusion**.
- For the nuclear fusion, a temperature of the order of **10^8 K** is required.
- **Hydrogen Bomb** was made by the American Scientist in **1952**. This is based on **nuclear fusion**. It is **1000** times more powerful than atom bomb.

Nuclear Reactor or Atomic Pile

- Nuclear reactor is an arrangement, in which controlled nuclear fission reaction takes place.
- **First nuclear reactor was** established in Chicago University under the supervision of **Prof Enrico Fermi**.
- Heavy water, graphite and beryllium oxide are used to slow down the fast moving neutrons. They are called moderate.

Uses of Nuclear Reactor

- (i) To produce electrical energy from the energy released during fission.
- (ii) To produce different isotopes, this can be used medical, physical and agriculture science.

There are several components of nuclear reactor which are as follows

- Fissionable Fuel U^{235} or U^{239} is used.
- Moderator decreases the energy of neutrons, so that they can be further used for fission reaction.
- **Heavy water** and graphite are used as moderator.
- **Control Rod rods of cadmium** or boron are used to absorb the excess neutrons produced in fission of uranium nucleus, so that the chain reaction.

NEWTON'S LAWS OF MOTION

- **First Law:** Everybody maintains its initial state of rest or motion with uniform speed on a straight line unless an external force acts on it. It is also called Galileo's law or law of inertia.

Example: While jumping from a slowly moving train/bus one must run for short distance, in the direction of motion.

- **Second Law:** The form acting on an object is directly proportioned to the product of the mass of the object and the acceleration produced on it.
- **Third Law:** To every action, there is an equal and opposite reaction.

Example : Bogies of the trains are provided with buffers to avoid severe jerks during shunting of trains. Rocket moves up due to reaction of downward ejection of gas.

CIRCULAR MOTION

- When an object moves along a circular path, its motion is called circular motion.
- The external force required to act radially inward over the circular motion of the body is called **Centripetal force**.

- **Centrifugal force** is such a pseudo force that. is equal and opposite to **Centripetal force**.
- Cream separator, centrifugal dryer work on the principle of centrifugal force.

FRICTION

- In the opposing force that is set-up between the surfaces of contact, when one body slides or rolls or tends to do so on the surface of another body.
- Due to friction, we are able to move on the surface of Earth.
- While applying brakes in automobiles, it stops only due to friction.

Pascal's Law of Pressure

- Hydraulic lift, hydraulic press and hydraulic brakes are based on the **Pascal's law of pressure**.

Archimedes Principle

- When a body is immersed partly or wholly in a liquid, there is an apparent loss in the weight of the body, which is equal to the weight of liquid displaced by the body.
- The weight of water displaced by an iron ball is less than its own weight. Whereas water displaced by the immersed portion of a ship is equal to its weight. So, small ball of iron ball sink in water, but large ship float.
- A fat person will quickly learn the swimming as compared to a slim person because he will displace more water. So, it will be more balanced.
- Hydrogen filled balloon float in air because hydrogen is lighter than air. A person can lift more weight in water.

WAVE

A wave is a disturbance, which propagates energy from one place to the other without the transportation of matter.

Waves are broadly of two types:

- Mechanical wave (longitudinal wave and transverse wave)
- Electromagnetic wave
- Following are the electromagnetic (Non-mechanical) waves-
 - a. Gamma rays (**Highest frequency**)
 - b. X-rays
 - c. UV rays
 - d. Visible radiation
 - e. infra-red rays
 - f. short radio waves
 - g. Long radio waves (**Lowest frequency**)

All are in decreasing order of the frequency

Following waves are not electromagnetic.

- a. Cathode rays
- b. Canal rays
- c. alpha rays

- d. beta rays
- e. sound wave
- f. ultrasonic wave

Longitudinal Waves

- In this wave the particles of the medium vibrate in the direction of propagation of wave.
- Waves on springs or sound waves in air are examples of longitudinal waves.

Transverse Waves

- In this wave, the particles of the medium vibrate perpendicular to the direction of propagation of wave.
- Waves on strings under tension, waves on the surface of water are the examples of transverse waves.

Electromagnetic Waves

- The waves, which do not require medium for their propagation i.e., which can propagate even through the vacuum are called electromagnetic waves.
- Light radio waves, X-rays etc are the examples of electromagnetic wave. These waves propagate with the velocity of light in vacuum.

Sound Waves

Sound waves are longitudinal mechanical waves. Eased on their frequency range sound waves are divided into following categories.

- The sound waves which lie in the frequency range 20 Hz to 20000 Hz are called audible waves.
- The sound waves having frequencies less than 20 Hz are called infrasonic
- The sound waves having frequencies greater than 20000 Hz are called ultrasonic waves.
- Ultrasonic waves are used for sending signals, measuring the depth of see, cleaning clothes and machinery parts, remaining lamp short from chimney of factories and in ultrasonography.

Speed of Sound

- Speed of sound is **maximum in solids minimum in** gases.
- When sound goes from one medium to another medium, its speed and wave length changes, but frequency remain unchanged. The speed of sound remains unchanged by the increase or decrease of pressure.
- The speed of sound increases with the increase of temperature of the medium.
- The speed of sound is more in humid air than in dry air because the density of humid air is less than the density.

Echo: The repetition of sound due to reflection of sound waves is called an echo.

Intensity: It is defined as amount of energy passing normally per unit area held around that point per source unit time.

Pitch: The sensation of a frequency is commonly referred to as the pitch of a sound.

Sonar: It stands for sound navigation and ranging. It is used to measure the depth of a sea, to locate the enemy submarines and shipwrecks.

LIGHT

- Light is a form of energy, which is propagated as an electromagnetic **wave**.
- It is the radiation which makes our eyes able to 'see' the object. Its speed is **3 x 10⁸ m/s**. It is the form of energy. It is a **transverse wave**.
- It takes **8 min 19s** to reach on the earth from the sun and the light reflected from moon takes **1.28s** to reach earth.
- **Primary Colours**- Blue, Red, Green
- **Secondary Colours**- The coloured produced by mixing any two primary colors
- **Complementary Colours**- Any two colours when added produce white light.
- Blue colour of the sky is due to scattering of light.
- The brilliant red colour of rising and setting sun is due to scattering of light.

Human Eye

- Least distance of distinct vision is 25 cm.
- Myopia or short sightedness- far objects cannot see clear
- Hyperopia or hypermetropia or Long-sightedness- Near objects cannot see clear
- **Presbyopia**- in elder person, both far and near cannot see clear

Reflection of Light

- When a ray of light falls on a boundary separating two media comes back into the same media, then this phenomenon is called reflection of light.

Spherical Mirror

Spherical mirrors are of two types

1. **Concave mirror**
2. **Convex mirror**

- Image formed by a convex mirror is always virtual, erect and diminished.
- Image formed by a concave mirror is generally real and inverted.

Uses of Concave Mirror

- (i) As a shaving mirror
- (ii) As a reflector for the head lights of a vehicle, search light
- (iii) In ophthalmoscope to examine eye, ear, nose by doctors.
- (iv) In solar cookers.

Uses of Convex Mirror

- (i) As a rear-view mirror in vehicle because it provides the maximum rear field of view and image formed is always erect.
- (ii) In sodium reflector lamp.

Refraction of Light

- The bending of the ray of light passing from one medium to other medium is called refraction. When a ray of light enters from one medium to other medium, its

frequency and phase do not change, but wavelength and velocity change. Due to refraction from Earth's atmosphere, the stars appear to twinkle.

Total Internal Reflection

- Sparkling of diamond, mirage and looming, shining of air bubble in water and optical Fiber are examples of total internal reflection.

Power of a lens

- Power of a lens is its capacity to deviate a ray. It is measured as the reciprocal of the focal length in meters.
- SI Unit of Power is diopter.

ELECTRICITY AND MAGNETISM

Charge

Charge is the basic property associated with matter due to which it produces and experiences electrical and magnetic effects. Similar charges repel each other and opposite charges attract each other. The SI unit of charge is **coulomb**.

Conductor: Conductors are those materials, which allow electricity to pass through them. Metals like silver, iron, copper and earth acts like a conductor. Silver is the best conductor.

Insulator: Insulators are those materials which do not allow electricity to flow through them. Metals like wood, paper, mica, glass, ebonite are insulators.

Electric Current

- Its unit is Ampere. It is a scalar quantity.
- **An electric bulb makes a bang when it is broken** because there is a vacuum inside the electric bulb, when the bulb is broken air rushes at great speed from all sides to fill the vacuum. The rushing of air produces a noise generally referred to as the bang.
- A Galvanometer can be converted into an ammeter by connecting a shunt parallel to it.
- The sodium and mercury street lamps light up due to atomic emission.
- The purpose of choke coil in fluorescent is to produce high voltage to ionize the gas in the tube required for high current to flow through filament.

Magnetism

- Diamagnetic substance- when placed in magnetic field, acquire feeble magnetism opposite to the direction of the magnetic field.
- Examples- Gold, Diamond, Copper, Water, Mercury etc.
- Paramagnetic substance- when placed in magnetic field, acquire feeble magnetism in the direction of the magnetic field.
- Example- Al, Na, Mn etc.

- Ferromagnetic substance-when placed in magnetic field, are strongly magnetized in the direction of the magnetic field.
- Examples- Iron, Cobalt, Nickel
- Curie temp- the Curie temperature (TC), or Curie point, is the temperature at which certain materials lose their permanent magnetic properties, to be replaced by induced magnetism.
- **Isogonic lines** are lines on the Earth's surface along which the declination has the same constant value, and lines along which the declination is zero are called **agonic lines**.
- **Isoclinic lines** are imaginary lines on the earth's surface connecting points where the earth's magnetic field has the same angle.
- **The aclinic line** is the magnetic equator, where the magnetic field is inclined neither north or south, so it's a special case of an isoclinic line.
- **Isodynamic line**- A line on a map connecting points of equal strength of the earth's magnetic field.

Surface Tension and capillary

- Lubricating oil spread easily on all parts because of their low surface tension.
- Dirt get removed when detergents are added while washing clothes because surface tension of water is reduced.
- The absorption of ink by a blotting paper is due to capillary action
- The supply of water to the leaves at the top of even a tall tree is through capillary rise.

Heat

- Unit of heat-
C.G.S- Calorie
F.P.S- British Thermal Unit (B. Th. U)
- Absolute Zero Temp- minus 273 K (-273 K)
- 1 calorie= 4.2 J
- The specific heat is the amount of heat per unit mass required to raise the temperature by one degree Celsius.
- **Newton's Law of Cooling** states that the rate of change of the temperature of an object is proportional to the difference between its own temperature and the ambient temperature (i.e. the temperature of its surroundings).
- **Hoar Frost**-is the reverse process of sublimation.

MEASUREMENT UNITS

- **Angstrom** : For measuring length of light waves
- **Barrel** : For measuring liquids. One barrel is equal to 31½ gallons or 7,326.5 cubic inches
- **Cable**: For measuring length of cables. It is about 183m. in length
- **Carat** : Used for measuring precious stones. It is also a measure for the purity of gold alloy
- **Fathom** : It is used for measuring depth of water. One fathom is equal to 4 inches

- **Knot:** For measuring speed of ships

SOME CONVERSION FACTORS

Mass and Density

- 1 Kg = 1000 g = 6.02 u
- 1 Slug = 14.6 kg
- 1 u = 1.66 kg

Length and Volume

- 1 m = 100 cm = 39.4 inch = 3.28 ft
- 1 mile = 1.61 km = 5280 ft
- 1 inch = 2.54 cm
- 1 nm = m = 10 A
- 1 pm = m = 1000 fm
- 1 light year = 9.46 m
- 1 = 1000 L = 35.3 = 264 gal

Angular Measure

- 1 m/s = 3.28 ft/ s = 2.24 mi / h
- 1 km / h = 0.621 mi / h = 0.278 m/s

Force and Pressure

- 1 lb = 4.45 N
- 1 ton = 2000 lb
- 1 Pa = 1 N/ = 10 dyne/ = 1.45 lb/
- 1 atm = 1.01 x 10⁵ Pa = 14.7 lb/ = 76 cm – Hg

SOME IMPORTANT SCIENTIFIC INSTRUMENTS

Accumulator: Electrical energy is stored

- **Altimeter:** Used in aircraft for measuring altitudes
- **Ammeter:** Measuring the electrical current in amperes
- **Anemometer:** Measuring the strength of winds
- **Audiometer:** Measuring intensity of wind
- **Audiophone:** It is used for improving imperfect sense of hearing.
- **Barometer:** Measuring atmospheric pressure
- **Binocular:** An optical instrument designed for magnified view of distant objects by both eyes simultaneously
- **Bolometer:** To measure heat radiation
- **Cardiogram:** For recording the heart movements
- **Calorimeter:** Measuring of quantities of heat
- **Chronometer:** A clock that keeps very accurate time as the one that is used to determine longitude at sea.
- **Colorimeter:** An instrument for comparing intensities of colour.

- **Commutator:** An instrument to change or remove the direction of an electric current, in dynamo used to convert alternating current into direct current.
- **Cyclotron:** Studying the properties of atoms by smashing them.
- **Dynamo:** A device for converting mechanical energy into electrical energy
- **Dynamometer:** An instrument for measuring the electrical power
- **Electroscope:** An instrument for detecting the presence of electric charge.
- **Endoscope:** To examine internal parts of the body
- **Fathometer:** Measure depth of the ocean
- **Galvanometer:** For detecting and measuring electric current
- **Hygrometer:** Measure level of humidity
- **Phonograph:** For reproducing sound
- **Pyrometer:** Measure very high temperature
- **Quartz Clock:** A highly accurate clock used in astronomical observations and other precision work
- **Radiometer:** An instrument for measuring the emission of radiant energy
- **Radio Micrometer:** An instrument for measuring heat radiations
- **Rain Gauge:** An instrument for measuring rainfall
- **Rectifier:** An instrument used for the conversion of AC into DC.
- **Refractometer:** An instrument used to measure the refractive index of a substance
- **Resistance Thermometer:** Used for determining the electrical resistance of conductors
- **Salinometer:** A type of hydrometer used to determine the concentration of salt solutions by measuring their densities
- **Seismometer (Seismograph):** An Apparatus for measuring and recording earthquake shock
- **Sextant:** For guiding ships or surveying land.
- **Spectroscope:** An instrument used for spectrum analysis
- **Speedometer:** It registers the speed at which the vehicle is moving
- **Spherometer:** For measuring curvature of surfaces
- **Sphygmomanometer:** An instrument used to detect blood pressure in a human body. It is also called B.P.Apparatus
- **Sphygmophone:** Instrument with the help of which, a pulse beat makes a sound
- **Spring Balance:** Useful for measuring weight
- **Stereoscope:** It is used to view two dimensional pictures.
- **Stethoscope:** An instrument which is used by the doctors to hear and analyze heart and lung sounds.
- **Stroboscope:** It is used to view rapidly moving objects.
- **Tachometer:** An instrument used in measuring speeds of aero planes and motor boats.
- **Teleprinter:** This instrument receives and sends typed messages from one place to another.
- **Telescope:** It views distant objects in space.
- **Theodolite:** It measures horizontal and vertical angles.
- **Transistor:** A small device which may be used to amplify currents and perform other functions usually performed by a thermionic valve

- **Viscometer:** For measuring viscosity
- **Voltmeter:** To measure potential difference between two points
- **Udometer:** Rain guage

CHEMISTRY

MATTER

In general it exists in 3 states i.e.,

- (i) Solid
- (ii) liquid
- (iii) gas.

Now-a-days there is a discussion on two more states of matter i.e., **Plasma** (Ionised gases containing super energetic and super excited particles and **Bose-Einstein** condensates or BEC (a gas at super low temperatures with extremely low density).

Boiling Point

- The temperature at which liquid converts in to vapours is called its boiling point.
- Boiling point **of water is 100°C**.
- The boiling point **increases in the presence of impurities**. That's why boiling point of **sea water is more than the boiling** point of pure water (as the former contains impurity).
- **It usually decreases at high altitudes, that's why at high altitudes, the boiling point of water is less than 100°C and more time is required to cook a food.**

Melting Point

- It is a temperature at which a substance **converts from its solid state to liquid state**.
- Melting point **of ice is 0°C**; It decrease in the presence of impurity

Atom, Molecule and Element

- Atom is the smallest particle of a matter that takes part in chemical reactions, but cannot exist in free state.
- **Atom is made 43 of electrons**, protons and neutrons.
- Protons and neutrons reside in the nucleus (**at the centre of atom**) whereas electrons revolve around the nucleus.
- **Atoms combine to form molecules**, the smallest part of matter which can exist in free state.

Isotopes and Isobars

- **Isotopes have the same number of protons** (*i.e.*, atomic number), but different number of neutrons and mass number (atomic number + number of neutrons), *e.g.*, **1111, 1H2**.
- **Isobars have the same mass number** but different atomic number.
- **Example:** 18Ar40, 19K40

Dating Techniques

- **Radiocarbon** dating is used to **determine the age of carbon** bearing materials like wood, animal fossils etc.
- **Uranium** dating is used to **determine the age of Earth, minerals and rocks**.

Battery

- Battery is a device, used to convert **chemical energy into electrical energy** and is of two types
 - (i) **Primary batteries** (non-rechargeable) act as galvanic cell, *e.g.*, dry cell, mercury cell etc.
 - (ii) **Secondary Batteries:** (rechargeable) Act as galvanic as well as voltaic cell *E.g.*, lead storage battery, nickel cadmium battery etc.

Corrosion

- The oxidative deterioration of a metal surface by the action of environment is called **corrosion**, an electrochemical process.
- When **iron exposed in to air, iron surface turns brown** due to the formation of **hydrated ferric oxide ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$)** which is also called rust,
- **Silver - Surface turns black** due to the formation of **silver sulphide (Ag_2S)**

Renewable Non-renewable Natural Resources

- **Renewable resources are available in large excess, i.e., never ends, e.g,** air, sunlight etc.
- **Non-renewable resources are** available in limited quantity and end, if used excessively, after a limited period of time. **e.g.,** mineral, coal, petroleum, natural gas etc.

Fuels

- The substance, which produce heat and light on combustion are called fuels.
- A strong foul smelling substance, called ethyl mercaptan is added to LPG to detect its leakage as LPG is an odourless gas.

Some important fuels and their compositions

Fuel	Composition	Sources
Water Gas	Carbon monoxide (co) + hydrogen(h ₂)	By passing steam over red hot coke
Producer Gas	Carbon monoxide (CO) + Nitrogen (N ₂)	By passing insufficient air over red hot coke
Coal Gas	Hydrogen + methane + Ethylene + Acetyene + CO +Nitrogen	By fractional distillation
Natural Gas	Methane(83%) + Ethane	From petroleum
Liquefied Petroleum Gas (LPG)	Butane (CH ₄) 95%	From petroleum
Compressed Natural Gas (CNG)	Methane (CH ₄) 95%	From petroleum
Biogas or Gobar Gas	Methane (CH ₄) + Carbon dioxide (CO ₂) + Hydrogen (H ₂)+ Nitrogen (N ₂)	From organic wastes

Physical and Chemical Changes

- Physical changes are the change, which only affect the physical properties like colour, hardness, density, melting point etc. of matter, but do not affect the composition and chemical properties of matter.
 - A physical change is temporary, while a chemical change is **permanent**.
 - Crystallisation, sublimation, 'boiling, melting, vaporisation, cutting of trees, dissolving sugar or salt in water etc. are physical changes.
 - Chemical changes affect the composition as well as chemical properties of matter and result in the formation of a new substance.
 - Burning of fuel, burning of candle and paper, electrolysis of water, photo synthesis, ripening of fruits etc, are examples of chemical changes
-
- Coal is obtained by carbonization of vegetable matter and is available in different varieties:
 - **Peat**- 60% C
 - **Lignite or Brown Coal** – 70% C
 - **Bituminous** – 60 to 80 % C
 - Anthracite Coal – 90% C
 - **Fame**

Flame contains three parts

1. **Innermost Part**- which is black due to the presence of unburned carbon particles- has lowest temperature.
2. **Middle part** – is yellow due to incomplete of fuel.
3. **Outermost part**- which is blue due to complete combustion of fuel is the hottest and used by goldsmith to heat the gold.

Fire Extinguishers

- Water extinguishes fire because as it evaporates, the vapours surround the burning substance, cutting off the oxygen supply, thus inhibiting burning process.
- In case of electrical or oil (petrol) fires, water cannot be used as extinguisher. This is because water is a conductor of electricity and heavier than oil. Thus, oil floats over it and continues to burn.
- Carbon dioxide, which is generated by the reaction of baking soda with acid, is used to extinguish electrical or oil fires. Quality of petrol is measured in terms of octane number and that of diesel in terms of cetane number.

Safety Matches

- In safety matches, the stick consists of mixture of antimony trisulphide and potassium chlorate at its one end. The box side contains a mixture of powdered glass and phosphorus.

Acids, Bases and Salts

Acids

- These are the substance, which **have sour taste** and turn blue litmus red.
- These are **good conductor of electricity** in aqueous solution.
- Pickles are always kept in glass jar because acid present in them reacts with metal to **produce hydrogen gas**.

Bases

- These are the substances, **which have bitter taste and turn red litmus**, blue.
- They give different colours in acid and base solutions.

Salts

- These are the product of neutralisation reaction between an acid and a base.
- pH is the measure of acidity/basicity.

INORGANIC AND ORGANIC CHEMISTRY

Carbon Dioxide

- It is an acidic oxide of carbon and is used by green plants for photosynthesis. It does not help in burning.

Air and our breath contain carbon dioxide. Thus, when lime water is kept in air or we pass our breath into it, the lime water turns milky.

Carbon Monoxide

- It is a neutral oxide of air and has more affinity towards haemoglobin than oxygen (about 200 times more). That's why in the environment of carbon monoxide – which is a non- poisonous gas - people die for the need of oxygen.

It is dangerous to sleep in an unventilated room with fire burning inside because the fire produces carbon monoxide and carbon dioxide gases.

Plaster of Paris

It is chemically calcium sulphate hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$) and is prepared by heating gypsum – which is calcium sulphate dehydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) at 373 K. On Mixing with water, plaster of Paris further sets into a hard solid, called gypsum. Thus, it is used to plaster fractured bones, for making toys, materials for decoration and for making surfaces smooth.

Portland Cement

It is a complex mixture of silicates and aluminates of calcium with small amount of gypsum. Raw materials used for the manufacture of Portland cement are **limestone and clay**.

The composition of Portland cement is calcium oxide (50-60%), alumina (5-10%), and magnesium oxide (2-3%). Gypsum is added to cement to decrease its rate of setting.

In cement, if lime is in excess, cement cracks during setting and if lime is less, cement is of weak strength.

Mortar a mixture of sand, cement and water is used for joining bricks and plastering walls.

Concrete—a mixture of gravel, sand, cement and water is used for flooring and making roads.

Reinforced Concrete Cement (RCC)— which is concrete with steel bars and wires is used for constructing roofs, bridges and pillars

Glass

Glass—an amorphous solid or super- cooled liquid—contains maintz silica (SiO_2).

Different substances are added to obtain glass of different colour

Colour	Substance Added
Red	Copper oxide (CuO)
Green	Chromium oxide (Cr_2O_3)
Blue	Cobalt oxide (CoO)
Brown	Iron oxide (Fe_2O_3)

Heavy water

- Heavy water is water that contains **heavy hydrogen or deuterium**. Deuterium differs from the hydrogen usually found in water, protium, in that each atom of deuterium contains a proton and a neutron. Heavy water may be deuterium oxide, **D_2O** or it may be deuterium protium oxide, DHO.
- Note: **Heavy water occurs naturally, although** it is much less common than regular water. **Approximately one water molecule per twenty million water molecules is heavy water.**

Hard Water

- The water in which soluble bicarbonates of calcium and magnesium are present, is called temporary hard water and in which soluble sulphates and chlorides of magnesium and calcium are present is called permanent hard water.
- The temporary hardness of water is removed by boiling or by adding calcium hydroxide, Ca(OH)_2 —the **Clark's process**. The permanent hardness of water is removed by adding sodium carbonate (Na_2CO_3), or calgon (sodium hexametaphosphate, $\text{Na}_2[\text{Na}_4\text{P}_3\text{O}_{10}]$).

Hardening of Oil (Hydrogenation)

Oil, an unsaturated fat when heated with nickel catalyst and hydrogen gets converted into a solid mass, called ghee, a saturated fat. This process is called hardening of oil and is carried out through hydrogenation in the presence of nickel as a catalyst.

Some Important Ores of Metals

Ores - Those minerals from which the metals are extracted commercially and economically and with minimum effort are called Ores of Metals.

Name of Elements	Ores	Chemical Formulae
1. Aluminum (Al)	(a) Bauxite (b) Corundum (c) Kryolite	$\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ Al_2O_3 Na_3AlF_6
2. Iron (Fe)	(a) Hematite (b) Magnetite (c) IronPyrite (d) Siderite	Fe_2O_3 Fe_3O_4 FeS_2 FeCO_3
3. Copper (Cu)	(a) Copper Pyrite (b) Copper Glance (c) Malachite	CuFeS_2 Cu_2S $2\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
4. Zinc (Zn)	(a) Zinc Blende (b) Calamine	ZnS ZnCO_3
5. Sodium (Na)	(a) Rock Salt (b) Sodium Carbonate	NaCl Na_2CO_3
6. Potassium (K)	(a) Karnalite (b) Salt Petre	$\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ KNO_3
7. Lead (Pb)	(a) Galena (b) Anglesite	PbS PbCl_2
8. Tin (Sn)	(a) Tin Pyrites (b) Classiterite	$\text{Cu}_2\text{FeSnS}_4$ SnO_2
9. Silver (Ag)	(a) Silver Glance	Ag_2S

10. Gold (Au)	(a) Calve rite (b) Sybarite	AuTe ₂ AgAuTe ₂
11. Mercury (Hg)	(a) Cinnabar (b) Calomel	HgS Hg ₂ Cl ₂
12. Magnesium (Mg)	(a) Dolomite (b) Karnalite	
13. Calcium (Ca)	(a) Lime Stone (b) Dolomite	CaCO ₃ MgCO ₃ CaCO ₃
14. Phosphorous (P)	(a) Phosphorite (b) Floreopetite	Ca ₃ (PO ₄)CaFe ₂ 3Ca ₃ (PO ₄)CaFe ₂

BIOLOGY

Vitamins:

- Organic compound required in small amounts in the diet to maintain normal metabolic functions are known as 'Vitamins'.
- Many vitamins act as (or) are converted into coenzymes; they neither provide energy nor are incorporated into tissues.
- These also regulate the Bio-chemical processes in the body.

Vitamins are classified into two groups

1. **Fat soluble vitamins** (A, D, E, K). These are rich in liver cells.
2. **Water soluble vitamins** (C, B-complex). These are present in much smaller amounts in cells.

Fat soluble vitamins:

Vitamin A:

- Vitamin A is also known as '**Retinol**'.
- **Deficiency diseases:** Night blindness, redness in eyes (Exophthalmia), degeneration of lachrymal glands.

Vitamin D:

- Vitamin D is also known as '**Calciferol**'.
- **Deficiency diseases:** Rickets in children, Osteomalacia in adults.

Vitamin E:

- Vitamin E is also known as '**Tocopherol**'.
- Deficiency diseases: Sterility nutritional nuclear dystrophy, neurosis of heart muscles.

Vitamin K:

- Vitamin K is also known as '**Anti hemorrhagic**'.
- Deficiency diseases: Blood coagulation is prevented, continuous bleeding occurs.

Water soluble vitamins:

Vitamin 'B Complex': Vitamin B Complex is a mixture of B1, B2, B3, B5, B6, B7, B9, and B12.

Vitamin B1:

- Vitamin B1 is also known as **Thiamin**.
- **Deficiency diseases:** Beri Beri disease which affects the legs.

Vitamin B2:

- Vitamin B2 is also known as Riboflavin.
- **Deficiency diseases:** Dark red tongue, dermatitis, cheilosis occurs at the corners of mouth & lips.

Vitamin B3:

- Vitamin B3 is also known as **Pantothenic acid**.
- **Deficiency diseases:** Burning sensations of feet.

Vitamin B5:

- Vitamin B5 is also known as Nicotinic acid/Niacin.
- **Deficiency diseases:** Pellagra, dermatitis, diarrhea.

Vitamin B6:

- Vitamin B6 is also known as **Pyridoxine**.
- **Deficiency diseases:** Dermatitis and convulsions.

Vitamin B7:

- Vitamin B7 is also known as **Biotin** (also considered as vitamin H).
- **Deficiency diseases:** Dermatitis, blood cholesterol increases, loss of hair and paralysis.

Vitamin B9:

- Vitamin B9 is also known as Folic acid.
- **Deficiency diseases:** Anemia, inflammation of tongue, gastro intestinal disorders.

Vitamin B12:

- Vitamin B12 is also known as '**Cynocobal amine**'.
- **Deficiency diseases:** Pernicious anemia, hyperglycemia.

Vitamin C:

- Vitamin C is also known as '**Ascorbic acid**'.
- **Deficiency diseases:** Scurvy, delay in wound healing.

Human Diseases Caused by Fungi :-

- Ringworm caused by Microsporum, Trichophyton by direct contact from unbathed cats and dogs or objects handled by infected individuals.
- Athlete's foot caused by Trichophyton by Bad foot hygiene where skin remains warm and moist for long period, fungi finds optimal condition, invade dead outer layer of skin.

Human Diseases Caused by Viruses -

- **Smallpox** caused by Variola Virus by direct contact (droplets), indirect by infected articles.
- **Chicken pox** caused by Varicella virus by direct contact (droplets) indirect by infected objects.
- **Common cold** caused by Rhinovirus by contact.
- Influenza/Flu caused by Orthomixovirus by contact (droplets) virus transmitted through discharge from respiratory tracts of persons infected with disease
- **Mumps** caused by Mumps virus by direct contact, virus in Saliva and secretion of nose invades salivary glands.
- **Viral encephalitis** caused by Encephalitis virus (arbovirus) by some domestic animals' reservoir of virus, transmitted by mosquito bite to man.
- **Polio** caused by Poliovirus by contact, houseflies, fleas, food and water.
- **Rabies** (Hydrophobia) caused by Rabies virus (Rhabdovirus) by Bite a mad (rabid) dog
- **Dengue** fever or breakbone fever caused by Dengue virus (arbovirus) by Mosquito (Aedes) bite.
- Acquired Immunodeficiency Syndrome (**AIDS**) caused by Human T-cell
- Leukemia virus (**HTLV-III**) also called LAV (Retrovirus) by blood and sperm among homosexuals, heterosexuals, intravenous drug users, haemophiliacs, promiscuous individuals and prostitutes.

Human Diseases Caused by Bacteria

- **Septic sore throat** caused by Streptococcus Sp by Bacteria infect throat and nasal membranes by droplets and direct contact.
- **Diphtheria** caused by Irregular rod (Corynebacterium diphtheria) by Bacteria infect respiratory tract by carrier, through contact, droplets and food items.
- **Pneumonia** caused by Diplococcus pneumonia by Bacteria transmitted to respiratory tract, including the lungs by droplet infection.

- **Tuberculosis** caused by Irregular rod (Mycobacterium tuberculosis) by Bacteria transmitted to lungs, bones and other organs by direct contact droplet infection, food and milk.
- **Plague** or **Bubonic** caused by Short rod (Yersinia pestis) by Rat flea spreads disease from rat to man.
- **Tetanus** or **Lock-Jaw** caused by Clostridium tetani by Bacteria in soil, enters through wound.
- **Typhoid** or enteric fever caused by Salmonella typhi by Flies, food, faces water and carriers.
- **Cholera** caused by Vibrio cholerae by Flies food, stools, water and carriers.
- **Bacillary** dysentery caused by short rod (Shigella dysenteriae) by Flies, food, faeces, water and carriers.
- **Whooping cough** caused by small short rod (Hemophilus pertussis) by Droplets protected during coughing and sneezing.
- Syphilis caused by Spiral-shaped organism (Treponema pallidum) by direct contact, chiefly sexual intercourse.
- **Leprosy** caused by Mycobacterium Leprae by long and close contact with infected persons
- **Botulism** caused by Clostridium botulinum by organism produces poison in food.

Human Diseases Caused by Protozoans

- Amoebic dysentery (Amoebiasis) caused by Entamoeba histolytica by Transmission from man to man through ingestion of cysts in drinking water vegetables and food contaminated with faeces.
- Diarrhea 'Giardiasis' caused by Giardia intestinalis by Transmission from man to man through ingestion of cysts in drinking water vegetables and food contaminated with faeces.
- Malaria caused by Plasmodium vivax by Transmitted to man by bite of an infected female anopheline mosquito.
- Sleeping sickness (Trypanosomiasis) caused by Trypanosoma brucei by Transmitted by bite of tse-tse fly

Some Important Information & Facts Related to Biology

1. **Melvin Kelvin** was awarded Nobel Prize for his work on Photosynthesis
2. The **largest flower** in the world is Rafflesia and the **smallest one** is Wolffia.
3. **Penicillin** is obtained from **penicillium Notatum**.
4. Reserpine derived from the plant 'serpentine' is used to alleviate high blood pressure.
5. Plants, living in acidic soils, are called **oxalophytes**.
6. **Photosynthesis** is most **active** in **blue** and red light in which light energy is converted into chemical energy.
7. **The smallest bone**, **stapes** is found in the human ear.
8. **Enzymes** are basically **proteins**.
9. **Mitochondria** is called the '**power house of the cell**'
10. **Pancreas** is both an endocrine and **exocrine gland**.
11. Persons of blood group '**0**' are called '**Universal Donor**' while that of '**AB**' are called '**Universal Acceptors**'.

12. **Seedless** fruits are formed by **parthenogenesis**.
13. Simple plants that contain **no chlorophyll** are called **fungi**.
14. **Spirogyra** is commonly known as '**pond silk**'
15. The **longest muscle** in the human body is found in **thigh**.
16. In a leaf, the opening between two guard cells is **stomata**.
17. **Gibberellins** are responsible for cell elongation.
18. The chemical **name of chlorophyll** is magnesium Dihydro prophyisin.
19. **Bile** is produced in liver and stored in **gel bladder**.
20. All arteries, except pulmonary artery carry oxygenated blood.
21. The main function of **W.B. C.** is to produce **antibodies**.
22. **Retina** in the eye, acts as a film in the **camera**.
23. Human tears contain a mild antibacterial agent, named **Lysozyme**.
24. The biggest bone in the human body is **femur**.
25. Vitamin **B12** is almost never found in plants.
26. **Agrostology** is the study of **grasses**.
27. **Phycology** is the study of a algae while the study of fossils is called paleontology
28. **Hydroponics** is cultivating plants without using soil.
29. Palco botany is the study of fossils of **botanical specimens**.
30. **Pepsin & Lactose** enzymes add proteins in the digestive system.
31. The water soluble vitamins are **vitamin B and C**
32. A chemical change in **DNA molecule** is called **mutation**.
33. **Glycogen** acts as a short -term food reserve in animals.
34. **Estrogen** is a female sex **hormone**.
35. The enzyme amylase aids in the digestion of starch.
36. **ATP** synthesis takes place in **mitochondria**.
37. **70%** of the body weight of a man is **water**.
38. The tough transparent membrane that protects the eye ball is called cornea.
39. Energy is produced in human body by Carbohydrates.
40. Sugar is the product of the dark reactions of photosynthesis.

List Of Scientific Laws and Theories

4. **Archimede's principle** - It states that a body when wholly or partially immersed in a liquid experience an upward thrust which is equal to the weight of the liquid displaced by it. Thus, the body appears to lose a part of its weight.
5. **Aufbau principle** - It states that in an unexcited atom, electrons reside in the lowest energy orbitals available to them.
6. **Avogadro's Law** - It states that equal volumes of all gases under similar conditions of temperature and pressure contain an equal number of molecules.
7. **Brownian motion** - It is a zigzag, irregular motion exhibited by small solid particles when suspended in a liquid or gas due to irregular bombardment by the liquid or gas molecules.
8. **Bernoulli's principle** - It states that as the speed of a moving fluid, liquid or gas, increases, the pressure within the fluid decreases. The aerodynamic lift on the wing of an aeroplane is also explained in part by this principle.

9. **Boyles's Law** - It states that temperature remaining constant, the volume of a given mass of a gas varies inversely with the pressure of the gas. Thus, $PV = K$ (constant), where, P = Pressure and V = Volume.
10. **Charles's Law** - It states that pressure remains constant, the volume of a given mass of gas increases or decreases by $\frac{1}{273}$ part of its volume at 0-degree Celsius for each degree Celsius rise or fall of its temperature.
11. **Coulomb's Law** - It states that the force of attraction or repulsion between two charges is proportional to the amount of charge on both charges and inversely proportional to the square of the distance between them.
12. **Heisenberg principle (uncertainty principle)** - It is impossible to determine with accuracy both the position and the momentum of a particle such as an electron simultaneously.
13. **Gay-Lussac's Law of combining volumes** - Gases react together in volumes which bear simple whole number ratios to one another and also to the volumes of the products, if gaseous — all the volumes being measured under similar conditions of temperature and pressure.
14. **Graham's Law of Diffusion** - It states that the rates of diffusion of gases are inversely proportional to the square roots of their densities under similar conditions of temperature and pressure.
15. **Kepler's Law** - Each planet revolves around the Sun in an elliptical orbit with the Sun at one focus. The straight line joining the Sun and the planet sweeps out equal areas in equal intervals. The squares of the orbital periods of planets are proportional to the cubes of their mean distance from the Sun.
16. **Law of Floatation** - For a body to float, the following conditions must be fulfilled: The weight of the body should be equal to the weight of the water displaced. The centre of gravity of the body and that of the liquid displaced should be in the same straight line.
17. **Law of conservation of energy** - It states that energy can neither be created nor destroyed but it can be transformed from one form to another. Since energy cannot be created or destroyed, the amount of energy present in the universe is always remain constant.
18. **Newton's First Law of Motion** - An object at rest tends to stay at rest, and an object in motion tends to stay in motion, with the same direction and speed in a straight line unless acted upon by some external force.
19. **Newton's Second Law of Motion** - The rate of change of momentum of a body is directly proportional to the force applied and takes place in the direction in which the force acts.
20. **Newton's Third Law of Motion** - To every action, there is an equal and opposite reaction.
21. **Newton's Law of Gravitation** - All particles of matter mutually attract each other by a force directly proportional to the product of their masses and inversely proportional to the square of the distance between them.
22. **Ohm's Law** - It states that the current passing through a conductor between two points is directly proportional to the potential difference across the two points provided the physical state and temperature etc. of the conductor does not change.

23. **Pauli exclusion principle** - It explains that no two electrons in the same atom or molecule can have the same set of quantum numbers.
24. **Raman effect** - It is the change in wavelength that occurs when light is scattered by the atoms or molecules in a transparent medium.
25. **Tyndall effect** - The scattering of light by very small particles suspended in a gas or liquid.

Diseases and its Affected Area

Parts of the Body Affected by Diseases

Disease	Affected Body Part
Arthritis	Joints
Asthma	Bronchial Muscles
Cataract	Eyes
Diabetes	Pancreas
Diphtheria	Throat
Eczema	Skin
Glaucoma	Eyes
Goitre	Thyroid Gland
Jaundice	Liver
Leukemia	Blood
Malaria	Spleen
Meningitis	Brain and Spinal Cord
Otitis	Ears
Paralysis	Nerves
Pneumonia	Lungs
Polio	Legs
Pyorrhoea	Teeth and Gums

Rheumatism	Joints
Sinusitis	Inflammation of sinus linings
Tonsillitis	Tonsils
Trachoma	Eyes
Tuberculosis	Lungs
Typhoid	Intestines

Diseases and Causative Agents

Causative Agent	Disease
Bacteria	Diphtheria, Gonorrhoea, Meningitis, Cholera, Leprosy, Typhoid, Tetanus, Tuberculosis, Plague, Whooping Cough, Pneumonia
Virus	Chicken Pox, Small Pox, Measle, Mumps, AIDS, Yellow fever, Influenza, Dengue fever, Rabies, Polio-meritis phlebotomus
Protozoans	Malaria, Sleeping sickness, Kala-azar, Leishmaniasis, Amoebic dysentery
Fungus	Athlete's foot, Ringworms, Madura foot, Dhobi's itch
Helminths	Filaria, Tapeworm and Hookworm transmission

Important Information about Human Body

- Biggest Organ: *Liver*
- Heart Beat: *72 times in a minute*
- Master Gland: *Pituitary*
- Number of Bone: *206*
- Number of Muscles: *640*
- Number of chromosomes: *46 or 23 pairs*

- Normal Blood Pressure: 80 to 120
- Teeth: 32
- The volume of Blood: *About 7 litres in normal body or about 7% of the total body weight.*
- Largest; Part of human Brain: *Cerebru*

General Awareness

India and its neighboring countries

India is the largest country in the Indian subcontinent and second largest country in southeast Asia. India is also the seventh largest country in the world as per the area and second largest as per the population. India is surrounded by 9 other countries of the southern Asian region which are as follows:

Afghanistan, Pakistan, China, Nepal, Bhutan, Bangladesh, Sri Lanka, Maldives and Myanmar.

India:

Physiography of India

- India lies on the Indian Plate, which is the northern part of the Indo-Australian Plate. The continental crust of the Indo-Australian Plate forms the Indian subcontinent.
- India lies in the northern hemisphere of the globe between 8° 4' N and 37° 6' N latitudes and 68° 7' E and 97° 25' E longitudes.
- The southern extent goes up to 6° 45' N latitude to cover the last island of the Nicobar group of islands. The southern extreme is called Pygmalion Point or India Point.
- The Tropic of Cancer passes through the middle part of India and crosses the eight states of Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram.
- The total land frontier of 15,200 km passes through marshy lands, desert, plains, mountains, snow-covered areas and thick forests.
- The maritime boundary of 6100 km along the main landmass which increases to 7516 km of the coastlines of Andaman-Nicobar and Lakshadweep Islands are added to it.
- India commands a total geographical area of 32,87,263 sq.km which is roughly 0.57% of the area of the earth and 2.4% of the total area of the land hemisphere.
- India is the seventh-largest country in the world after Russia, Canada, USA, China, Brazil and Australia (all are mentioned in the descending order).

- India's area is almost equal to the area of Europe (excluding Russia), one-third of Canada, one-fifth of Russia, eight times of Japan and twelve times of the United Kingdom.
- India has roughly a quadrangular shape. It measures about 3,214 km from north to south and about 2933 km from east to west, the difference between the two is just 281km.

Indian States Area-wise:

State	Area (Km ²)	Capital	Main Language
Rajasthan	342,239	Jaipur	Rajasthani, Hindi
Madhya Pradesh	308,245	Bhopal	Hindi
Maharashtra	307,713	Mumbai	Marathi
Uttar Pradesh	240,928	Lucknow	Hindi
Gujarat	196,024	Gandhinagar	Gujarati
Karnataka	191,791	Bengaluru	Kannada
Andhra Pradesh	162,968	Hyderabad	Telugu
Odisha	155,707	Bhubaneswar	Oriya
Chhattisgarh	135,191	Raipur	Hindi
Tamil Nadu	130,058	Chennai	Tamil
Telangana	112,077	Hyderabad	Telugu
Bihar	94,163	Patna	Hindi
West Bengal	88,752	Kolkata	Bengali
Arunachal Pradesh	83,743	Itanagar	Tribal
Jharkhand	79,714	Ranchi	Hindi
Assam	78,438	Dispur	Assamese
Himachal Pradesh	55,673	Shimla	Hindi
Uttarakhand	53,483	Dehradun	Hindi
Punjab	50,362	Chandigarh	Punjabi
Haryana	44,212	Chandigarh	Hindi
Kerala	38,863	Thiruvananthapuram	Malayalam
Meghalaya	22,429	Shillong	Khasi, Garo, English
Manipur	22,327	Imphal	Manipuri
Mizoram	21,081	Aizawl	Mizo, English
Nagaland	16,579	Kohima	Angami Ao
Tripura	10,486	Agartala	Bengali, Tripuri
Sikkim	7,096	Gangtok	Lepcha, Bhutia
Goa	3,702	Panaji	Marathi, Konkani
Union Territories	Area (sq. km)	Capital	Language
Andaman and Nicobar Is.	8,249	Port Blair	Andamanese, Nicobarese
Delhi	1,490	New Delhi	Hindi

Puducherry	492	Puducherry	Tamil, French
Dadra and Nagar Haveli and Daman and Diu	603	Daman	Gujarati, Marathi
Chandigarh	114	Chandigarh is itself the capital of two states i.e. Punjab and Haryana .	Hindi, Punjabi, and Haryanvi
Lakshadweep	32	Kavaratti	Malayalam
Jammu Kashmir	-	Srinagar (Summer capital)	Kashmiri, Urdu
		Jammu (winter capital)	
Ladakh	-	Leh, Kargil	Urdu, Hindi, English

As seen earlier, India has 15,106.7 Km of land border and a coastline of 7,516.6 Km including island territories. The data shared in the table is as per the Ministry of Home Affairs, Govt of India.

Name of the Country	Border Length in Km	Capital	Bordering States
Bangladesh	4,096.7	Dhaka	West Bengal, Meghalaya, Mizoram, Tripura and Assam
China	3,488	Beijing	Ladakh, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh
Pakistan	3,323	Islamabad	Jammu and Kashmir, Ladakh, Punjab, Rajasthan and Gujarat
Nepal	1,751	Kathmandu	West Bengal, Sikkim, Arunachal

			Pradesh & Assam
Myanmar	1,643	Naypyidaw	Arunachal Pradesh, Nagaland, Mizoram and Manipur
Bhutan	699	Thimpu	West Bengal, Sikkim, Arunachal Pradesh & Assam
Afghanistan	106	Kabul	Ladakh (PoK)
Sri Lanka	Sea Border	Colombo (Commercial), Sri Jayawardenepura Kotte (Legislative)	-
Maldives	Sea Border	Male	-

List of Countries, Capital & its Currency

North America

Sr. No.	Country	Capital	Currency
1	Antigua and Barbuda	St. John's	East Caribbean dollar
2	Bahamas	Nassau	Bahamian dollar
3	Barbados	Bridgetown	Barbadian dollar
4	Belize	Belmopan	Belize dollar
5	Canada	Ottawa	Canadian dollar
6	Costa Rica	San Jose	Costa Rican colon
7	Cuba	Havana	Cuban peso
8	Dominica	Roseau	East Caribbean dollar
9	Dominican Republic	Santo Domingo	Dominican peso
10	El Salvador	San Salvador	United States dollar
11	Grenada	St. George's	East Caribbean dollar
12	Guatemala	Guatemala city	Guatemalan Quetzal
13	Haiti	Port-au-Prince	Haitian gourde
14	Honduras	Tegucigalpa	Honduran Lempira
15	Jamaica	Kingston	Jamaican dollar
16	Mexico	Mexico city	Mexican peso
17	Nicaragua	Managua	Nicaraguan Cordoba
18	Panama	Panama City	Panamanian Balboa

19	Saint Kitts and Nevis	Basseterre	East Caribbean dollar
20	Saint Lucia	Castries	East Caribbean dollar
21	Saint Vincent and the Grenadines	Kingstown	East Caribbean dollar
22	Trinidad and Tobago	Port of Spain	Trinidad and Tobago dollar
23	United States	Washington, D.C.	United States dollar

South America

	Country	Capital	Currency
1	Argentina	Buenos Aires	Argentine peso
2	Bolivia	Sucre	Bolivian Boliviano
3	Brazil	Brasilia	Brazilian real
4	Chile	Santiago	Chilean peso
5	Colombia	Bogota	Colombian peso
6	Ecuador	Quito	United states dollar
7	Guyana	Georgetown	Guyanese dollar
8	Paraguay	Asuncion	Paraguayan guarani
9	Peru	Lima	Peruvian Nuevo sol
10	Suriname	Paramaribo	Surinamese dollar
11	Uruguay	Montevideo	Uruguayan peso
12	Venezuela	Caracas	Venezuelan bolivar

Europe

	Country	Capital	Currency
1	Aland Islands	Mariehamn	Euro
2	Albania	Tirana	Albanian lek
3	Andorra	Andorra La Vella	Euro
4	Austria	Vienna	Euro
5	Belarus	Minsk	Belarusian ruble
6	Belgium	Brussels	Euro
7	Bosnia and Herzegovina	Sarajevo	Bosnia and Herzegovina convertible mark
8	Bulgaria	Sofia	Bulgarian lev
9	Croatia	Zagreb	Croatian kuna
10	Czech Republic	Prague	Czech koruna
11	Denmark	Copenhagen	Danish Krone

12	Estonia	Tallinn	Euro
13	Faroe Islands	Torshavn	Faroese krona
14	Finland	Helsinki	Euro
15	France	Paris	Euro
16	Germany	Berlin	Euro
17	Gibraltar	Gibraltar	Pound sterling
18	Greece	Athens	Euro
19	Guernsey	Saint Peter Port	Guernsey pound
20	Hungary	Budapest	Hungarian forint
21	Iceland	Reykjavik	Icelandic krona
22	Ireland	Dublin	Euro
23	Isle of Man	Douglas	Manx pound
24	Italy	Rome	Euro
25	Jersey	Saint Helier	Jersey pound
26	Kosovo	Pristina	Euro
27	Latvia	Riga	Euro
28	Liechtenstein	Vaduz	Swiss franc
29	Lithuania	Vilnius	Euro
30	Luxembourg	Luxembourg	Euro
31	Macedonia	Skopje	Second Macedonian dinar
32	Malta	Valletta	Euro
33	Moldova	Chisinau	Moldovan Leu
34	Monaco	Monaco	Euro
35	Montenegro	Podgorica	Euro
36	Netherlands	Amsterdam	Euro
37	Norway	Oslo	Norwegian krone
38	Poland	Warsaw	Polish zloty
39	Portugal	Lisbon	Euro
40	Romania	Bucharest	Fourth Romanian Leu
41	Russia	Moscow	Russian Ruble
42	San Marino	San Marino	Euro
43	Principality of Sealand	HM Fort Roughs	Sealand dollar
44	Slovakia	Bratislava	Euro
45	Sweden	Stockholm	Swedish krona
46	Slovenia	Ljubljana	Euro
47	Spain	Madrid	Euro
48	Transnistria	Tiraspol	Transnistrian ruble
49	Svalbard	Longyearbyen	Norwegian krone
50	Switzerland	Bern	Swiss franc
51	Ukraine	Kiev	Ukrainian hryvnia
52	Vatican City/Holy See	Vatican City	Euro
53	United Kingdom	London	Pound sterling
54	Serbia	Belgrade	Serbian dinar

Asia

	Country	Capital	Currency
1	Afghanistan	Kabul	Afghan afghani
2	Armenia	Yerevan	Armenian dram
3	Azerbaijan	Baku	Azerbaijani manat
4	Bahrain	Manama	Bahraini dinar
5	Bangladesh	Dhaka	Taka
6	Bhutan	Thimphu	Bhutanese ngultrum
7	Brunei	Bandar Seri Begawan	Brunei dollar
8	Cambodia	Phnom Penh	Combodian reil
9	China	Beijing	Renminbi (Yuan)
10	Cyprus	Nicosia	Euro
11	Georgia	Tbilisi/T'bilisi	Lari
12	India	New Delhi	Indian rupee
13	Indonesia	Jakarta	Rupiah
14	Iran	Tehran	Iranian rial
15	Israel	Jerusalem	Israeli new shekel
16	Japan	Tokyo	Yen
17	Jordon	Amman	Jordonian dinar
18	Kazakhstan	Nur Sultan	Kazakhstani tenge
19	Korea, North	Pyongyang	North Korean won
20	Korea, South	Seoul	South Korean won
21	Kuwait	Kuwait city	Kuwaiti dinar
22	Kyrgyzstan	Bishkek	Kyrgyzstani som
23	Laos	Vientiane	Lao kip
24	Lebanon	Beirut	Lebanese pound
25	Malaysia	Kuala Lumpur	Ringgit
26	Maldives	Male'	Maldivian rufiyaa
27	Mongolia	Ulaanbaatar	Mongolian togrog
28	Myanmar	Nay Pyi Taw	Kyat
29	Nepal	Kathmandu	Nepalese rupee
30	Oman	Muscat	Omani rial
31	Pakistan	Islamabad	Pakistani rupee
32	Philippines	Manila	Philippine peso
33	Qatar	Doha	Qatari riyal
34	Russia	Moscow	Russian ruble
35	Saudi Arabia	Riyadh	Saudi riyal
36	Singapore	Singapore	Singapore dollar
37	Sri Lanka	Sri Jayawardenepura Kotte, Colombo	Sri Lankan rupee
38	Syria	Damascus	Syrian pound

39	Tajikistan	Dushanbe	Somoni
40	Thailand	Bangkok	Baht
41	Timor-Leste/East Timor	Dili	US dollar
42	Turkey	Ankara	Turkish lira
43	Turkmenistan	Ashgabat	Turkmen new manat
44	United Arab Emirates	Abu Dhabi	UAE dirham
45	Uzbekistan	Tashkent	Uzbekistan som
46	Vietnam	Hanoi	Dong
47	Yemen	Sana'a	Yemeni rial

Africa

	Country	Capital	Currency
1	Algeria	Algiers	Algerian dollars
2	Angola	Luanda	Kwanza
3	Benin	Porto-Novo	CFA franc
4	Botswana	Gaborone	Pula
5	Burkina Faso	Ouagadougou	CFA franc
6	Burundi	Bujumbura	Burundi franc
7	Cameroon	Yaounde	CFA franc
8	Cape Verde	Praia	Cape Verdean escudo
9	Central African Republic	Bangui	CFA franc
10	Chad	N'Djamena	CFA franc
11	Comoros	Moroni	Comorian franc
12	Democratic Republic of the Congo	Kinshasa	Congolese franc
13	Republic of the Congo	Brazzaville	CFA franc
14	Djibouti	Djibouti City	Djiboutian franc
15	Egypt	Cairo	Egyptian pound
16	Equatorial Guinea	Malabo	CFA franc
17	Eritrea	Asmara	Nakfa
18	Ethiopia	Addis Ababa	Ethiopian birr
19	Gabon	Libreville	CFA franc
20	Gambia	Banjul	Dalasi
21	Ghana	Accra	Ghanaian cedi
22	Guinea	Conakry	Guinean franc
23	Guinea Bissau	Bissau	CFA franc
24	Ivory Coast	Yamoussou	CFA franc
25	Kenya	Nairobi	Kenyan shilling
26	Lesotho	Maseru	Loti
27	Liberia	Monrovia	Liberian dollar
28	Libya	Tripoli	Libyan dinar
29	Madagascar	Antananarivo	Malagasy ariary
30	Malawi	Lilongwe	Malawian kwacha
31	Mali	Bamako	CFA franc

32	Mauritania	Nouakchott	Ouguiya
33	Mauritius	Port Louis	Mauritian rupee
34	Morocco	Rabat	Moroccan dirham
35	Mozambique	Maputo	Mozambican metical
36	Namibia	Windhoek	Namibian dollar
37	Niger	Niamey	CFA franc
38	Nigeria	Abuja	Naira
39	Rwanda	Kigali	Rwandan franc
40	Sao Tome and Principe	Sao Tome	Dobra
41	Senegal	Dakar	CFA franc
42	Seychelles	Victoria	Seychellois rupee
43	Sierra Leone	Freetown	Sierra Leonean Leone
44	Somalia	Mogadishu	Shilling
45	South Africa	Bloemfontein	South African Rand
46	South Sudan	Juba	South Sudanese pound
47	Sudan	Khartoum	Sudanese pound
48	Swaziland	Lobamba	Lilangeni
49	Tanzania	Dodoma	Tanzanian shilling
50	Togo	Lome	CFA franc
51	Tunisia	Tunis	Tunisian dinar
52	Uganda	Kampala	Ugandan shilling
53	Zambia	Lusaka	Zambian kwacha
54	'Zimbabwe	Harare	Zimbabwean dollar

Australia/Oceania

	Country	Capital	Currency
1	Australia	Canberra	Australian dollar
2	Federated States of Micronesia	Palikir	US dollar
3	Fiji	Suva	Fiji dollar
4	Kiribati	Tarawa	Australian dollar
5	Marshall Islands	Majuro	US dollar
6	Nauru	Yaren	Australian dollar
7	New Zealand	Wellington	New Zealand dollar
8	Palau	Ngerulmud	US dollar
9	Papua New Guinea	Port Moresby	Kina
10	Samoa	Apia	Tala
11	Solomon Islands	Honiara	Solomon Islands dollar
12	Tonga	Nuku'alofa	Pa'anga
13	Tuvalu	Funafuti	Australian dollar
14	Vanuatu	Port Vila	Vatu

Part V of the Indian Constitution: Parliament of India

Organization of the Parliament

1. The Parliament consists of the President, the Lok Sabha and the Rajya Sabha.
2. Lok Sabha is the Lower House (First Chamber or Popular House) and Rajya Sabha is the Upper House (Second Chamber or House of Elders).

Composition of Rajya Sabha

1. The maximum strength of the Rajya Sabha is fixed at 250, out of which, 238 are to be the representatives of the states and union territories (elected indirectly) and 12 are nominated by the president.
2. At present, the Rajya Sabha has **245** members. Of these, 229 members represent the states, 4 members represent the union territories and 12 members are nominated by the president.
3. The Fourth Schedule of the Constitution deals with the allocation of seats in the Rajya Sabha to the states and union territories.
4. The representatives of states in the Rajya Sabha are elected by the elected members of state legislative assemblies. The seats are allotted to the states in the Rajya Sabha on the basis of population.

NOTE – Population as ascertained on the basis of 2001 census as per 87th Amendment Act, 2003.

Composition of Lok Sabha

1. The maximum strength of the Lok Sabha is fixed at 552. Out of this, 530 members are to be the representatives of the states, 20 members are to be the representatives of the union territories and 2 members may be nominated by the president from the Anglo-Indian community.
2. At present, the Lok Sabha has 545 members.
3. The representatives of states in the Lok Sabha are directly elected by the people from their respective constituencies.
4. The voting age was reduced from 21 to 18 years by the 61st Constitutional Amendment Act, 1988.

Duration of the two Houses of Parliament

1. The Rajya Sabha is a permanent body and not subject to dissolution. However, one-third of its members retire every second year. The retiring members are eligible for re-election and re-nomination any number of times.

2. Unlike the Rajya Sabha, the Lok Sabha is not a continuing chamber. Its normal term is five years from the date of its first meeting after the general elections, after which it automatically dissolves.

Qualification, disqualifications etc. to be an MP

1. Eligibility

- (a) Citizen of India.
- (b) Minimum age – 30 years in Rajya Sabha and 25 years in Lok Sabha.
- (c) He must possess other qualifications prescribed by Parliament. (Hence, the Representation of People Act, 1951).

2. Criteria for disqualifying an MP:

- (a) If he holds any office of profit under the Union or state government
 - (b) If he is of unsound mind and stands so declared by a court.
 - (c) If he is an undischarged insolvent.
 - (d) if he is not a citizen of India or has voluntarily acquired the citizenship of a foreign state or is under any acknowledgement of allegiance to a foreign state; and
 - (e) If he is so disqualified under any law made by Parliament (RPA, 1951).
3. The Constitution also lays down that a person shall be disqualified from being a member of Parliament if he is so disqualified on the ground of defection under the provisions of the Tenth Schedule.
 4. **Double Membership** - A person cannot be a member of both Houses of Parliament at the same time.
 5. A House can declare the seat of a member vacant if he is absent from all its meetings for a period of sixty days without its permission.

Speaker of the Lok Sabha

1. The Speaker is elected by the Lok Sabha from amongst its members (as soon as may be, after its first sitting). The date of election of the Speaker is fixed by the President.
2. The Speaker offers his resignation to the Deputy Speaker and he can be removed by a resolution passed by a majority of members of Lok Sabha, however, only after giving him a 14-day notice.
3. He presides over a joint sitting of the two Houses of Parliament. Such a sitting is summoned by the President to settle a deadlock between the two Houses on a bill.
4. He decides whether a bill is a money bill or not and his decision on this question is final.
5. He can't vote in the first instance, though can vote in the event of a tie. When his removal motion is under consideration, he can take part and speak in the proceedings and can vote as well but not in the case of a tie. He can't preside in

that case. However, his motion can be passed by an absolute majority only and can be considered only if it has the support of at least 50 members.

6. G.V Mavalankar was the first Speaker of Lok Sabha.
7. The longest serving Speaker of Lok Sabha so far has been Balram Jakhar.
8. **NOTE** – There's also a post known as *Speaker Pro Tem*, appointed by the President himself. He is usually the oldest member of the last Lok Sabha and he presides over the first session of the incoming Lok Sabha. President administers him the oath.

Deputy Speaker of the Lok Sabha

1. Like the Speaker, the Deputy Speaker is also elected by the Lok Sabha itself from amongst its members.
2. The date of election of the Deputy Speaker is fixed by the Speaker. The removal process is the same as that of the speaker and he offers his resignation to the Speaker of the Lok Sabha.
3. Madabhushi Ananthasayanam Ayyangar was the first Deputy Speaker of Lok Sabha.
4. He presides over the joint sitting in case of absence of the Speaker.

Sessions of Parliament

A 'session' of Parliament is the period spanning between the first sitting of a House and its prorogation (or dissolution in the case of the Lok Sabha). The time period between the prorogation of a House and its reassembly in a new session is called 'Recess'. There are usually three sessions. The budget session is the longest and winter is the shortest.

1. The Budget Session (February to May);
2. The Monsoon Session (July to September); and
3. The Winter Session (November to December).

Important parliamentary terms, points, motions, bills, questions and Committees

1. The maximum gap between two sessions of Parliament cannot be more than six months.
2. The President summons and prorogues the two houses of parliament.
3. **Quorum** is the minimum number of members required to be present in the House before the transaction of any business. It is one-tenth of the total number of members in each House including the presiding officer. It means that there must be at least 55 members present in the Lok Sabha and 25 in the Rajya Sabha.
4. Every minister and the attorney general of India have the right to speak and take part in the proceedings of either House, any joint sitting of both the Houses and any committee of Parliament of which he is a member, without being entitled to vote.

5. **A lame-duck session** refers to the last session of the existing Lok Sabha after a new Lok Sabha has been elected.
6. **Question Hour** is the first hour of every parliamentary sitting.
7. A **starred question** (distinguished by an asterisk) requires an oral answer and hence supplementary questions can follow.
8. An **unstarred question**, on the other hand, requires a written answer and hence, supplementary questions cannot follow.
9. A **short notice question** is one that is asked by giving a notice of fewer than ten days. It is answered orally.
10. **The zero hour** starts immediately after the question hour and lasts until the agenda for the day (that is, regular business of the House) is taken up. In other words, the time gap between the question hour and the agenda is known as zero hours. It is an Indian innovation in the field of parliamentary procedures and has been in existence since 1962.
11. **Adjournment Motion** It is introduced in the Parliament to draw the attention of the House to a definite matter of urgent public importance and needs the support of 50 members to be admitted. Rajya Sabha isn't permitted to make use of this device and the discussion should last for not less than two hours and thirty minutes.
12. **No-Confidence Motion** Article 75 of the Constitution says that the council of ministers shall be collectively responsible to the Lok Sabha. It means that the ministry stays in the office so long as it enjoys the confidence of the majority of the members of the Lok Sabha. In other words, the Lok Sabha can remove the ministry from office by passing a no-confidence motion. The motion needs the support of 50 members to be admitted.
13. **A bill** is a proposal for legislation and it becomes an act or law when duly enacted. It could be classified as a private member bill or a public bill. A public bill is the one introduced by any minister and a private bill is the one which is otherwise.
14. Bills can be ordinary, money or financial and constitutional amendment bills. Money bills are the ones which are concerned with taxation, money matters which are specifically mentioned in article 110. Financial bill is also concerned with such matters though with slight differences and are mentioned in articles 117(1) and 117(3). Constitutional amendment bills, which are concerned with the amendment of the provisions of the Constitution.
15. The Rajya Sabha cannot reject or amend a money bill. It can only make the recommendations. It must return the bill to the Lok Sabha within 14 days, either with or without recommendations. The decision of the speaker is final in deciding a bill is a money bill or not. Also, every such bill is deemed to be a public bill.
16. The provision of joint sitting is applicable to ordinary bills or financial bills only and not to money bills or Constitutional amendment bills. In the case of a money bill, the Lok Sabha has overriding powers, while a Constitutional amendment bill must be passed by each House separately.
17. The term 'budget' has nowhere been used in the Constitution. It is the popular name for the 'annual financial statement' that has been dealt with in Article 112 of the Constitution.

18. The Railway Budget was separated from the General Budget in 1921 on the recommendations of the Acworth Committee. From the year 2017, the railway budget and the main financial budget were again merged and in 2017 the budget was presented on the 1st February 2017.
19. **Consolidated Fund of India** - It is a fund to which all receipts are credited and all payments are debited. In other words, (a) all revenues received by the Government of India; (b) all loans raised by the Government by the issue of treasury bills, loans or ways and means of advances; and (c) all money received by the government in repayment of loans forms the Consolidated Fund of India. Mentioned in article 266.
20. **Public Account of India** - All other public money (other than those which are credited to the Consolidated Fund of India) received by or on behalf of the Government of India shall be credited to the Public Account of India.
21. **Contingency Fund of India** - The Constitution authorised the Parliament to establish a 'Contingency Fund of India', into which amounts determined by law are paid from time to time. Accordingly, the Parliament enacted the contingency fund of India Act in 1950. This fund is placed at the disposal of the president, and he can make advances out of it to meet unforeseen expenditure pending its authorisation by the Parliament.
22. **Public Accounts Committee** - It consists of 22 members (15 from the Lok Sabha and 7 from the Rajya Sabha). Term of members – 1 year. A minister cannot be elected as a member of the committee. The chairman of the committee is appointed by the Speaker from amongst its members. Until 1966–67, the chairman of the committee belonged to the ruling party. However, since 1967 a convention has developed whereby the chairman of the committee is selected invariably from the Opposition. The function of the committee is to examine the annual audit reports of the Comptroller and auditor general of India (CAG), which are laid before the Parliament by the president.
23. **Estimates Committee** – The largest committee of the Parliament. The present number of members is 30. All the thirty members are from Lok Sabha only. The term of office is one year. A minister cannot be elected as a member of the committee. The chairman of the committee is appointed by the Speaker from amongst its members and he is invariably from the ruling party.
24. **Committee on Public Undertakings** – Present number of members is 22 (15 from the Lok Sabha and 7 from the Rajya Sabha). The term of office of the members is one year. A minister cannot be elected as a member of the committee. The chairman of the committee is appointed by the Speaker from amongst its members who are drawn from the Lok Sabha only.

Important Days and Dates (National and International)

Important Dates and Days of January

- **January 4:** World Braille Day
- **January 9:** NRI Day (Pravasi Bhartiya Diwas)
- **January 10:** World Hindi Day

- **January 12:** National Youth Day
- **January 15:** Army day
- **January 25:** National Voters day, National Tourism Day
- **January 30:** Martyrs' Day
- **January (last Sunday):** World Leprosy Eradication Day

Important Dates and Days of February

- **February 2:** World Wetlands Day
- **February 4:** World Cancer Day
- **February 6:** International Day of Zero Tolerance to Female Genital Mutilation
- **February 5:** Safer Internet Day (second day of the second week of February)
- **February 10:** National De-worming Day
- **February 13:** World Radio Day, National Women's Day (Birth Date of Sarojini Naidu)
- **February 27:** World NGO Day
- **February 28:** National Science Day

Important Dates and Days of March

- **March 3:** World Wildlife Day
- **March 8:** International Women's Day
- **March 14:** International Day of Action for Rivers
- **March 15:** World Consumer Rights Day
- **March 20:** International Day of Happiness
- **March 21:** World Forestry Day; World Down Syndrome Day; World Poetry Day
- **March 22:** World Day for Water
- **March 23:** World Meteorological Day
- **March 24:** World TB Day
- **March 27:** World Theatre Day
- **Second Wednesday of March:** No Smoking Day
- **Second Thursday of March:** World Kidney Day

Important Dates and Days of April

- **April 7:** World Health Day
- **April 10:** World Homeopathy Day
- **April 11:** National Safe Motherhood Day
- **April 17:** World Haemophilia Day
- **April 21:** Civil Services Day
- **April 22:** Earth Day
- **April 24:** National Panchayati Day
- **April 25:** World Malaria Day
- **April 30:** Ayushman Bharat Diwas

Important Dates and Days of May

- **May 1:** Workers' Day (International Labour Day),
- **May (1st Tuesday):** World Asthma Day
- **May (2nd Sunday):** Mother's Day
- **May 8:** World Red Cross Day
- **May 11:** National Technology Day
- **May 17:** World Telecommunication Day; World Hypertension Day
- **May 21:** National Anti-Terrorism Day
- **May 22:** International Day for Biological Diversity
- **May 31:** Anti-tobacco Day

Important Dates and Days of June

- **June 3:** World Bicycle Day
- **June 5:** World Environment Day
- **June (3rd Sunday):** Father's Day
- **June 7:** World Food Safety Day
- **June 8:** World Ocean Day, World Brain Tumour Day
- **June 12:** Anti-Child Labor Day
- **June 20:** World Refugee Day
- **June 21:** International day of yoga
- **June 23:** United Nations Public Service Day, International Olympic Day
- **June 26:** International Day against Drug Abuse and Illicit Trafficking

Important Dates and Days of July

- **July 1:** Doctor's Day
- **July 11:** World Population Day
- **July 17:** World Day for International Justice
- **July 18:** International Nelson Mandela Day
- **July 28:** World Hepatitis Day
- **July 29:** Global tiger Day

Important Dates and Days of August

- **August (1st Sunday):** International Friendship Day
- **August 6:** Hiroshima Day
- **August 9:** Quit India Day, Nagasaki Day, Intl. Day of the World's Indigenous Peoples
- **August 12:** International Youth Day
- **August 29:** National Sports Day

Important Dates and Days of September

- **September 5:** Teachers' Day

- **September 8:** International Literacy Day
- **September 14:** Hindi Diwas
- **September 15:** Engineers' Day; International Day of Democracy
- **September 16:** World Ozone Day
- **September 21:** Alzheimer's Day
- **September 23:** International Day of Sign Languages
- **September 27:** World Tourism Day
- **September 29:** World Heart Day

Important Dates and Days of October

- **October 1:** International Day for the Elderly
- **October 4:** World Animal Welfare Day
- **October 10:** World Mental Health Day
- **October 11:** International Girl Child Day
- **October 2nd Thursday:** World Sight Day
- **October 13:** UN International Day for Natural Disaster Reduction
- **October 15:** World Students Day
- **October 16:** World Food Day
- **October 24:** UN Day
- **October 31:** National Unity Day

Important Dates and Days of November

- **November 5:** World Tsunami day
- **November 7:** National Cancer Awareness Day
- **November 9:** Legal Services Day
- **November 14:** Children's Day; Diabetes Day; Rasagola Day (Recently declared by West Bengal govt)
- **November 17:** National Epilepsy Day

Important Dates and Days of December

- **December 1:** World AIDS Day
- **December 2:** National Pollution Control Day
- **December 10:** Human Rights' Day
- **December 14:** World Energy Conservation Day
- **December 18:** Minorities Rights Day (India)
- **December 22:** National Mathematics Day
- **December 23:** Kisan Divas (Farmer's Day) (India)
- **December 24:** National Consumers Day
- **December 25:** Good Governance Day

International Organizations & Headquarters

1. World Bank

Founded in	1945
Headquarters	Washington D.C. (U.S.A.)
India and World Bank	India was one of the 17 countries, prepared the agenda for the Bretton Woods Conference (June 1944), it is a founding member of WB
Remarks	The World Bank Group works in every major area of development. It provides a wide array of financial products and technical assistance, and help countries share and apply innovative knowledge and solutions to the challenges they face.

2. International Monetary Fund (IMF)

Founded in	1944
Headquarters	Washington D.C. (U.S.A.)
Members	The International Monetary Fund (IMF) is an organization of 189 countries.
India and IMF	India joined the IMF on December 27, 1945, as one of the IMF's original members.
Remarks	The IMF's primary purpose is to ensure the stability of the international monetary system—the system of exchange rates and international payments that enables countries (and their citizens) to transact with each other. The Fund's mandate was updated in 2012 to include all macroeconomic and financial sector issues that bear on global stability solutions to the challenges they face.

3. World Trade Organization (WTO)

Founded in	1 January 1995
Headquarters	Geneva, Switzerland
Members	The WTO has 164 members and 22 observer governments. Liberia became the 163rd member on 14 July 2016, and Afghanistan became the 164th member on 29 July 2016.
India and WTO	India has been a WTO member since 1 January 1995 and a member of GATT since 8 July 1948.

Remarks	The WTO provides a forum for negotiating agreements aimed at reducing obstacles to international trade and ensuring a level playing field for all, thus contributing to economic growth and development. their interpretation and application. The current body of trade agreements comprising the WTO consists of 16 different multilateral agreements (to which all WTO members are parties) and two different plurilateral agreements (to which only some WTO members are parties).
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4. Bank for International Settlements (BIS)

Founded in	May 17, 1930
Headquarters	Basel, Switzerland.
Members	It is an Organization of 60 Central Banks of different countries RBI is among its members
Remarks	The mission of the BIS is to serve central banks in their pursuit of monetary and financial stability, to foster international cooperation in those areas and to act as a bank for central banks.

5. World Economic Forum (WEF)

Founded in	1971
Headquarters	Geneva, Switzerland.
Members	The World Economic Forum provides a platform for the world's 1,000 leading companies to shape a better future. As a membership organization, the Forum engages businesses in projects and initiatives – online and offline – to address industry, regional and systemic issues.
Remarks	The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation. The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

6. The Asian Development Bank

Founded in	19 December 1966
Headquarters	Mandaluyong, Metro Manila, Philippines
Members	From 31 members at its establishment in 1966, ADB has grown to encompass 67 members—of which 48 are from within Asia and the Pacific and 19 outside.
India and ADB	India is a founding member of the ADB and is now the fourth largest shareholder.
Remarks	<p>The Asian Development Bank aims for an Asia and Pacific free from poverty. Its mission is to help developing member countries reduce poverty and improve the quality of life of their people.</p> <p>As a multilateral development finance institution, ADB provides:</p> <ul style="list-style-type: none">• loans• technical assistance• grants

7. New Development Bank

Founded in	During the sixth BRICS Summit in Fortaleza (2014), the leaders of BRICS nations signed the Agreement establishing the New Development Bank (NDB).
Headquarters	Shanghai, China
Members	<p>Bank's Articles of Agreement specify that all members of the United Nations could be members of the bank, however, the share of the BRICS nations can never be less than 55% of voting power.</p> <p>At present BRICS nations are the members of NDB</p>
India and NDB	As a member of BRICS, India are one of the founding members of NDB, India has 20% shareholding and 20% of voting rights in NDB.
Remarks	The Bank will provide technical and financial assistance for projects to be supported by the NDB and engage in information, cultural and personnel

	exchanges with the purpose of contributing to the achievement of environmental and social sustainability.
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8. The Asian Infrastructure Investment Bank (AIIB)

Founded in	<ul style="list-style-type: none"> 16 January 2016 (Open for business) 25 December 2015 (Entry into force Articles of Agreement)
Headquarters	Beijing, China
Members	The bank currently has 56-member states while another 24 are prospective members for a total of 80 approved members.
India and AIIB	<p>Fund Shares of countries-</p> <p>China- 30.34 %</p> <p>India- 8.52 %</p> <p>Russia- 6.66 %</p> <p>Voting shares of countries-</p> <p>China- 26.06 %</p> <p>India- 7.5 %</p> <p>Russia- 5.92 %</p>
Remarks	AIIB offers sovereign and non-sovereign financing for sound and sustainable projects in energy and power, transportation and telecommunications, rural infrastructure and agriculture development, water supply, and sanitation, environmental protection, and urban development and logistics.

9. European Union

Founded in	1 November 1993
Headquarters	Brussels, Belgium
Members	28 European countries
Remarks	Treaty of Maastricht established the European Union in 1992. Recently United

	Kingdom has initiated a process for withdrawing from EU.
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10. Association of South East Asian Nations (ASEAN)

Founded in	1967
Headquarters	Jakarta, Indonesia
Members	Indonesia, Malaysia, the Philippines, Singapore, and Thailand (Founding members), Brunei, Cambodia, Laos, Myanmar, and Vietnam.
Remarks	ASEAN promotes Pan-Asianism and intergovernmental cooperation and facilitates economic, political, military, educational and cultural integration amongst its members and Asian states.
Head	Chairman- Rodrigo Duterte Secretary-General- Le Luong Minh

11. SAARC

Founded in	1985
HQ	Kathmandu(Nepal)
Member	Afghanistan, Bangladesh, Bhutan, India , Nepal, the Maldives, Pakistan and Sri Lanka
Remark	The organization promotes the development of economic and regional integration. It launched the South Asian Free Trade Area in 2006.

12. Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)

Founded in	1997
HQ	Dhaka, Bangladesh
India and BIMSTEC	Bangladesh, India, Myanmar, Sri Lanka, Thailand, Bhutan and Nepal
Remark	The BIMSTEC states are among the countries dependent on the Bay of Bengal

13. Shanghai Cooperation Organisation (SCO)

Founded in	15 June 2001
Headquarter	Beijing, China
Member	China, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan, India , and Pakistan

14. North Atlantic Treaty Organization (NATO)

Founded in	4 th April 1949
Headquarters	Brussels, Belgium
Members	NATO is an alliance that consists of 29 independent member countries across North America and Europe.
Remarks	NATO constitutes a system of collective defense whereby its member states agree to mutual defense in response to an attack by any external party. Three NATO members (the United States, France, and the United Kingdom) are permanent members of the United Nations Security Council with the power to veto and are officially nuclear-weapon states.

15. Nuclear Supplier Group(NSG)

Founded in	1974
India and NSG	India is not a member of NSG
Important facts about NSG	<ul style="list-style-type: none">• It is a group of nuclear supplier countries that seek to prevent nuclear proliferation by controlling the export of materials, equipment, and technology that can be used to manufacture nuclear weapons.• It has also been referred to as the London Group, or the London Suppliers Group.

16. International Court of Justice(ICJ)

Founded in	1945
Headquarter	Hague, Netherland
India and ICJ	India is a member of ICJ
The important fact about ICJ	The Court has a twofold role: to settle, in accordance with international law, legal disputes submitted to it by States (Contentious cases) and to give advisory opinions (Advisory proceedings) on legal questions referred to it by duly authorized United Nations organs and specialized agencies.

17. The Collective Security Treaty Organization (CSTO)

Founded in	15 May 1992 (as Collective Security Treaty) 7 Oct 2002 (as Collective Security Treaty Organization)
Headquarters	Moscow, Russia
Members	6 members and 2 observers

18. International Renewable Energy Agency (IRENA)

Founded in	2009
Headquarter	Abu Dhabi, United Arab Emirates
India and IRENA	India is a member of IRENA
Important facts about IRENA	<ul style="list-style-type: none">Supports countries in their transition to a sustainable energy future and serves as the principal platform for international cooperation, a center of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy.

19. Amnesty International

Founded in	1961
Headquarter	London
Important facts about Amnesty International	<ul style="list-style-type: none">Focused on human rights.The objective of the organization is "to conduct research and generate action to prevent and end abuses of human rights and to demand justice for those whose rights have been violated"
India and Amnesty	HQ of Amnesty International in India is in Bangalore

20. Missile Technology Control Regime (MTCR)

Established in	1987
India and MTCR	<ul style="list-style-type: none">India became the 35th member on 27 June 2016.
Important Facts about MTCR	<ul style="list-style-type: none">The objective to curb the spread of unmanned delivery systems for nuclear weapons, specifically delivery systems that could carry a

	<p>payload of 500 kg for a distance of 300 km.</p> <ul style="list-style-type: none"> It includes non-proliferation of unmanned aerial vehicles(UAVs) for all weapons of mass destruction
Member Countries	35 members

21. International Atomic Energy Agency (IAEA)

Founded in	1957
Headquarters	Vienna, Austria
Head	Yukiya Amano
India and IAEA	India is a member of IAEA
Important facts about IAEA	<ul style="list-style-type: none"> Was Widely known as the world's "Atoms for Peace" organization within the United Nations family, the IAEA is the international center for cooperation in the nuclear field.

22. International Solar Alliance (ISA)

Founded in	2015
Headquarter	Gurugram
India and ISA	India is a founding member of ISA
Important facts about ISA	<ul style="list-style-type: none"> Alliance of more than 121 countries, most of them being sunshine countries, which come either completely or partly between the Tropic of Cancer and the Tropic of Capricorn. Launched by India at the India Africa Summit, and a meeting of member countries ahead of the 2015 United Nations Climate Change Conference in Paris in November 2015
Member Countries	121 members

23. OPCW (Organisation for the Prohibition of Chemical Weapons)

Established in	1997
Headquarters	The Hague, Netherlands
India and OPCW	India is a permanent member
Important facts about OPCW	<ul style="list-style-type: none"> Preventing chemical weapons used in warfare, thereby

	strengthening international security.
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List of Important Sports Championships

Here is the list of Cups and Trophies of various sports held at the international and national level. Sports-related general knowledge is important in various competitive exams. In various competitive exams, cups and trophies related to various are asked.

Sports Championships (National Level)

Championships	Related Sports
Beighton Cup	Hockey
Ezra Cup	Polo
Deodhar Trophy	Cricket
B. C Roy Trophy	Football
Duleep Trophy	First Class Cricket
Durand Cup	Football
Syed Mushtaq Ali Trophy	Cricket
Guru Nanak Dev Gold Cup	Hockey
Z. R. Irani Cup	Cricket
Maharaja Ranjit Singh Gold Cup	Hockey
Murugappa Gold Cup	Hockey
Nehru Trophy	Boat Race
Nizam Gold Cup	Horse Racing
Rangaswami Cup	Hockey
Ranji Trophy	Cricket
Rovers Cup	Football
Santosh Trophy	Football
Sheesh Mahal Trophy	Cricket
Subroto Mukherjee Cup	Football
Vittal Trophy	Football
Vijay Hazare Trophy	Cricket
Vizy Trophy	Cricket
Yadavindra Cup	Hockey

Sports Championships (International Level)

Cups And Trophies	Sports
American Cup	Yacht Racing
Asia Cup	Cricket
The Ashes	Cricket (England and Australia)

Colombo Cup	Football (India, Pakistan, Sri Lanka and Myanmar)
Corbillon Cup	Table Tennis (Women)
Davis Cup	Tennis (Men)
Lord Derby Cup	Rugby
Billie Jean King Cup	Tennis (Women)
Holkar Trophy	Bridge
Jules Rimet Trophy	World Football (Soccer)
Merdeka Cup	Football (Asian Cup)
Ryder Cup	Golf (Men)
Solheim Cup	Golf (Women)
Sudirman Cup	Badminton
Sultan Azlan Shah Cup	Field Hockey (Men)
Swaythling Cup	World Table Tennis (Men)
Thomas Cup	Badminton (Men)
Tunku Abdul Rahman Cup	Asian Badminton
U. Thant Cup	Lawn Tennis
Uber Cup	Badminton (Women)
Yonex Cup	Badminton
Walker Cup	Golf
Wightman Cup	Tennis (Women)
William Jones Cup	Basketball
Wimbledon Trophy	Tennis
FIFA World Cup	Football
ICC World Cup	Cricket
Australian Open	Lawn Tennis
Wimbledon	Lawn Tennis
US Open	Lawn Tennis
French Open	Lawn Tennis
Tour de France	Cycle Race

List of Important Awards/Honours and their respective Fields

There is a list of important awards/honours and their respective fields.

Awards	Respective fields
Bharat Ratna	Any field of Human Endeavour
Padma Vibhushan	Exceptional and distinguished service
Padma Bhushan	Distinguished service of a high order
Padma Shri	Distinguished service
Rajiv Gandhi Khel Ratna award	Highest Sports honour in India
Dhyan Chand Award	Sports and games

Dronacharya Award	Outstanding Coaches in Sports and Games
Jnanpith Award	Literature
Saraswati Samman	Poetry
Moorti Devi Award	Literature
Vyas Samman	Hindi literature
Sahitya Akademi Award	Literature (24 Indian languages)
Dadasaheb Phalke Award	Outstanding contribution to the growth and development of Indian cinema
Shanti Swarup Bhatnagar Prize	Science and technology
Nobel prize	Literature, Medicine, Chemistry, Physics, Peace, Economic Sciences
Oscar Award (also known as Academy Award)	Cinematic/Best in Film
Arjuna Award	Sports and games
Right livelihood Award (Alternative Nobel Prize)	Practical and exemplary solutions to the most urgent challenges facing the world today; Given in fields like environmental protection, human rights, sustainable development, health, education, and peace
UNESCO Prize for Human Rights Education	Human rights awareness
World Food prize (Nobel Prize in agriculture)	Agriculture and food
Stirling Prize	Excellence in Architecture
R.D Birla Award	Physics
Pritzker Architecture Prize	Architecture
Grammy Award	Outstanding achievements in the music industry
Abel Prize	Outstanding scientific work in the field of mathematics
Lal Bahadur Shastri National Award	Excellence in public administration, Academics and Management
Green Star Award	Excellence in preventing, preparing for and responding to environmental emergencies
Manthan Award	Outstanding contributions in digital content creation
Sangeet Natak Akademi Award	Award for performing arts in India

List of academies & research institutes in India (state-wise)

S.NO.	NAME	LOCATION/CITY	STATE	IMPORTANT FACTS
1	Damodaram Sanjivayya National Law University	Visakhapatnam	Andhra Pradesh	-
2	Dr. Y. S. R. Horticultural University	Tadepalligudem	Andhra Pradesh	-
3	Indian Maritime University	Visakhapatnam	Andhra Pradesh	-
4	Dravidian University	Kuppam	Andhra Pradesh	-
5	Gandhi Institute of Technology and management	Visakhapatnam	Andhra Pradesh	-
6	Acharya N. G. Ranga Agricultural University	Guntur	Andhra Pradesh	-
7	North-Eastern Regional Institute of Science and Technology	Nirjuli	Arunachal Pradesh	-
8	North-East Frontier Technical university	Alang	Arunachal Pradesh	-
9	Himalayan University	Itanagar	Arunachal Pradesh	-
10	Central Institute of Himalayan Cultural Studies	Tenga Valley	Arunachal Pradesh	-
11	Srimanta Sankaradeva University of Health Sciences	Guwahati	Assam	-
12	Kumar Bhaskar Varma Sanskrit and Ancient Studies University	Nalbari	Assam	-
13	Chanakya National Law University	Patna	Bihar	-

14	National Institute of Pharmaceutical and Research	Hajipur	Bihar	-
15	Women's Institute of technology	Darbhanga	Bihar	-
16	Rajendra Agricultural University	Pusa	Bihar	-
17	Nava Nalanda Mahavira	Nalanda	Bihar	1st and oldest University in the world
18	National Centre for Antarctic and Ocean Research	Vasco	Goa	-
19	Charotar University of Science and Technology	Changa	Gujarat	-
20	Bhaskarcharya Institute for Space Applications and Geo-informatics	Gandhinagar	Gujarat	-
21	Central Salt and Marine Chemicals Research Institute	Bhavnagar	Gujarat	-
22	Institute of Indian Diamond	Surat	Gujarat	-
23	Institute for Plasma Research	Gandhinagar	Gujarat	-
24	Institute of Rural management	Anand	Gujarat	-
25	Institute of Infrastructure Technology Research and Management	Ahmedabad	Gujarat	-
26	Rail University	Vadodara	Gujarat	
27	Pandit Deendayal Petroleum University	Gandhinagar	Gujarat	Proposed
28	Mudra Institute of Communications	Ahmedabad	Gujarat	-
29	Indian National Defence University	Gurgaon	Haryana	-
30	National Brain Research Centre	Manesar	Haryana	-
31	National Dairy research institute	Karnal	Haryana	-

32	World University of Design	Sonipat	Haryana	India's first design University
33	National University of Food Technology Entrepreneurship and Management	Sonipat	Haryana	-
34	Maharana Pratap Horticultural University	Anjanthali	Haryana	-
35	Institute of Civil Aviation	Hisar	Haryana	-
36	National Institute of Sports	Patiala	Haryana	-
37	Chaudhary Sarwan Kumar Krishi Vishvavidyalaya	Palampur	Himachal Pradesh	-
38	Himalayan Forest Research Centre	Shimla	Himachal Pradesh	-
39	Central Budd Educational Institute	Leh	J & K	-
40	Indian Institute of Astrophysics	Bangalore	Karnataka	-
41	National Institute of Design R&D campus	Bangalore	Karnataka	-
42	Indian Institute of Science	Bangalore	Karnataka	1st deemed University in India
43	National Yunani Institute	Bangalore	Karnataka	-
44	University of Fisheries and Ocean Studies	Kochi	Kerala	-
45	Indian Institute of Space Science and Technology	Thiruvananthapuram	Kerala	-
46	Traum Academy for German and French Languages	Ernakulam	Kerala	-
47	Lakshmibai National Institute of Physical Education	Gwalior	Madhya Pradesh	-
48	Indian Institute of Forest management	Bhopal	Madhya Pradesh	-

49	National Justice Academy	Bhopal	Madhya Pradesh	-
50	Maulana Azad National Institute of Technology	Bhopal	Madhya Pradesh	-
51	Indian Institute of Tourism and Travel Management	Gwalior	Madhya Pradesh	-
52	Indira Gandhi National Tribal University	Amarkantak	Madhya Pradesh	-
53	Sarvepalli Radhakrishnan University	Bhopal	Madhya Pradesh	-
54	National Power Training Institute	Nagpur	Maharashtra	-
55	National Institute of Bank management	Pune	Maharashtra	-
56	National Natural Medical Institute	Pune	Maharashtra	-
57	National Civil Defence College	Nagpur	Maharashtra	-
58	Bhabha Atomic Research Institute	Trombay, Mumbai	Maharashtra	-
59	Deccan College of Post-Graduate and research institute	Pune	Maharashtra	-
60	Defence Institute of Advanced technology	Pune	Maharashtra	-
61	Indian Institute of Tropical Meteorology	Pune	Maharashtra	-
62	Chinmaya Vishwa Vidyapeeth	Mumbai	Maharashtra	-
63	Tata Institute of Fundamental Research	Mumbai	Maharashtra	-
64	Homi Bhabha National Institute	Mumbai	Maharashtra	-
65	Indian Institute of GeoMagnetism	Mumbai	Maharashtra	-
66	Tata Institute of Social Sciences	Mumbai	Maharashtra	-
67	North-Eastern Hill University	Shillong	Meghalaya	-

68	Academy of Integrated Christian Studies	Aizawl	Mizoram	-
69	National Rehabilitation Training and Research Institute	Cuttack	Orissa	-
70	Rajiv Gandhi National University of Law	Patiala	Punjab	-
71	National Agri-Food Biotechnology Institute	Mohali	Punjab	-
72	Shaheed Bhagat Singh State Technical campus	Firozpur	Punjab	-
73	Maharana Pratap University of Agriculture and Technology	Udaipur	Rajasthan	-
74	Haridev Joshi University of Journalism and Mass Communication	Jaipur	Rajasthan	-
75	National Institute of Ayurveda	Jaipur	Rajasthan	-
76	Central Arid Zone Research Institute	Jodhpur	Rajasthan	-
77	Central Sheep and Wool Research Institute	Tonk	Rajasthan	-
78	Eastern Institute for Integrated learning in Management	South Sikkim district	Sikkim	-
79	Central Institute of Brackish Water Aquaculture	Chennai	Tamil Nadu	-
80	National Siddha Institute	Chennai	Tamil Nadu	-
81	Rajiv Gandhi National Youth Development Institute	Perambur	Tamil Nadu	-

82	Institute of Forest Genetic Tree Breeding	Coimbatore	Tamil Nadu	-
83	Indian Institute of Crop Processing Technology	Thanjavur	Tamil Nadu	-
84	Gandhigram Rural Institute	Dindigul	Tamil Nadu	-
85	Central Electro Chemical Research Institute	Karaikudi	Tamil Nadu	-
86	Academy of Marine Education (AMET)	Chennai	Tamil Nadu	-
87	Rajiv Gandhi National Aviation University	Rae Bareilly	Uttar Pradesh	-
88	Rajiv Gandhi Institute of Petroleum Technology	Rae Bareilly	Uttar Pradesh	-
89	Aligarh Muslim University	Aligarh	Uttar Pradesh	-
90	Banaras Hindu University	Varanasi	Uttar Pradesh	Largest Residential University in the World
91	Dr. Ram Manohar Lohiya National Law University	Lucknow	Uttar Pradesh	-
92	Central Institute of High Tibetan Studies	Varanasi	Uttar Pradesh	-
93	National Research Laboratory for Conservation of Cultural Heritage	Lucknow	Uttar Pradesh	-
94	Bhatkhande Music Institute	Lucknow	Uttar Pradesh	-
95	Indian Institute of Pulses Research	Kanpur	Uttar Pradesh	-
96	National Botanical Research Institute	Lucknow	Uttar Pradesh	-
97	Central Drug Research Institute	Lucknow	Uttar Pradesh	-
98	Footwear Designing and	Noida	Uttar Pradesh	-

	Development Institute			
99	Govind Ballabh Pant Social Science Institute	Allahabad	Uttar Pradesh	-
100	National Institute for the Empowerment of Persons with Intellectual Disabilities	Secunderabad	Uttar Pradesh	-
101	National Homeopathic Institute	Kolkata	West Bengal	-
102	Indian Statistical institute	Kolkata	West Bengal	-
103	Indian Anthropology Survey	Kolkata	West Bengal	-
104	India Jute Industry Research Association	Kolkata	West Bengal	-
105	National Orthopedic Disabled Institute	Kolkata	West Bengal	-
106	National University of Juridical Sciences	Kolkata	West Bengal	-
107	Guru Ghasidas University	Bilaspur	Chhattisgarh	-
108	Hidayatullah National Law University	Raipur	Chhattisgarh	-
109	Indira Kala Sangeet Vishwavidyalaya	Khairagarh	Chhattisgarh	-
110	Indira Krishi Vishwavidyalaya	Raipur	Chhattisgarh	-
111	Forest Research Institute	Dehradun	Uttarakhand	-
112	Indira Gandhi National Forest Academy	Dehradun	Uttarakhand	-
113	Aryabhatta Research Institute of Observational Sciences	Nainital	Uttarakhand	-
114	National Hydrology Institute	Roorkee	Uttarakhand	-

115	University of Patanjali	Haridwar	Uttarakhand	-
116	G. B. Pant Agricultural University	Pantnagar	Uttarakhand	First Agricultural University of India
117	National Institute of Foundry and Forge technology	Ranchi	Jharkhand	-
118	Birsa Agricultural University	Ranchi	Jharkhand	-
119	Central Institute of Tool Design	Hyderabad	Telangana	-
120	Nalsar University of Law	Hyderabad	Telangana	-
121	Satavahana University	Karimnagar	Telangana	-
122	Institute of Chartered Financial Analysts of India	Hyderabad	Telangana	
123	National Geophysical Research Institute	Hyderabad	Telangana	-
124	Central Research Institute for Dryland Agriculture	Hyderabad	Telangana	-
125	Centre for Cellular and Molecular Biology	Hyderabad	Telangana	-
126	Sardar Vallabhbhai Patel National Police Academy	Hyderabad	Telangana	-
127	Centre for DNA Fingerprinting and Diagnostics	Hyderabad	Telangana	-
128	Central Institute of English and Foreign Languages	Hyderabad	Telangana	-
129	Indira Gandhi Open University (IGNOU)	-	New Delhi	Largest Open University in the world by students Enrolment
130	Jamia Millia Islamia	-	New Delhi	

131	Indian Institute of Ecology and Environment	-	New Delhi	-
132	National Museum Institute of the History of Art, Conservation and Museology	-	New Delhi	-
133	Institute of National Museum History for Art Conservation and Science Museum	-	New Delhi	-
134	Lalit Kala Akademi	-	New Delhi	-
135	National School of Drama	-	New Delhi	-
136	Sangeet Natak Akademi	-	New Delhi	-
137	Indian Standard Bureau	-	New Delhi	-
138	National Ayurvedic Institute	-	New Delhi	-
139	Lok Nayak Jai Prakash Narain National Crime and Justice Institute	-	New Delhi	-
140	Pt. Deendayal Upadhyaya Institute For The Physically Handicapped	-	New Delhi	-
141	All India Institute of Ayurveda	-	New Delhi	-
142	Indian Institute of Foreign Trade	-	New Delhi	-
143	Indian Statistical Institute	-	New Delhi	-
144	Central Electro Chemical Research Institute	-	New Delhi	-

Famous Books & Authors

1. Panchtantra – Vishnu Sharma

2. Paradise Lost – John Milton
3. The Golden Gate – Vikram Seth
4. Humayunama – Gulbadan Begum
5. The Dark Room – R.K. Narayan
6. The Merchant of Venice – William Shakespeare
7. Romeo and Juliet – William Shakespeare
8. The Judgement – Kuldeep Nair
9. The Origin of Species – Charles Dickens
10. Malgudi Days – R.K. Narayan
11. Discovery of India – J. L. Nehru
12. My Experiment with Truth – M.K. Gandhi
13. The Songs of India – Sarojini Naidu
14. Mein Kampf – Adolf Hitler
15. Ramayana – Maharishi Balmiki
16. Mahabharata – Maharishi Vedavyasa
17. Hindu View of Life – S. Radhakrishnan
18. The Second World War – Winston Churchill
19. Mother India – Katherine Mayo
20. Anandamath – Bankim Chandra Chatterjee
21. Arthashastra – Kautilya
22. My Music My Life – Pt. Bhim Sen Joshi
23. Train to Pakistan – Khushwant Singh
24. A Suitable Boy – Vikram Seth
25. Gora – Rabindra Nath Tagore
26. Godan – Munshi Premchand

27. Poetics – Aristotle
28. The Post Office – R.N. Tagore
29. Harshacharitra – Banabhatta
30. Bachelor of Arts – RK Narayan
31. Gita Govinda – Jayadeva
32. Death of City – Amrita Pritam
33. The Idea of Justice – Amartya Sen
34. Ratnavali – Harsha Vardhan
35. Mudra Rakshash – Vishakha Dutt
36. Coolie – Mulkraj Anand
37. One Life is Not Enough – Natwar Singh
38. Five Points Someone – Chetan Bhagat
39. One Indian Girl – Chetan Bhagat
40. Geetanjali – Rabindra Nath Tagore
41. Ain-i-Akbari – Abul Fazal
42. Akbar-Nama – Abul Fazal
42. Getting India Back on Track – Ratan Tata
43. Indian Philosophy – Dr. S. Radhakrishnan
44. Key to Health – Mahatma Gandhi
45. Ramcharit Manas – Tulsidas
46. Divine Comedy – Dante
47. Abhigyan Sakuntalam – Kalidas
48. Wings of Fire – A.P.J. Abdul Kalam
49. Cricket My Style – Sachin Tendulkar
50. Speed Post – Shobhaa De

51. A House for Mr Biswas – V. S. Naipaul
52. Business Speed of Thought – Bill Gates
53. Unhappy India – Lala Lajpat Rai
54. Hamlet – William Shakespeare
55. Prison Diary – Jai Prakash Narayan
56. The Test of My Life – Yuvraj Singh
57. My Truth – Indira Gandhi
58. Essays on the Gita – Aurobindo Ghosh
59. The Tunnel Time – R.K. Narayan
60. Guide – R.K. Narayan
61. Collective Choice and Social Welfare – Amartya Sen
62. People's President : Dr A.P.J Abdul Kalam – S.M Khan
63. The Secret Diary of Kasturba – Nilima Dalmia Adhar
64. Think with Me – Subrata Rai (Sahara)
65. Indira Gandhi : A Life in Nature – Jairam Ramesh
66. Exam Warriors – Narendra Modi
67. Shape the Future – Stephen Hawking
68. Beyond the Lines – Kuldeep Nayar
69. The Accidental Prime Minister– Sanjaya Baru
70. The Mystery of Utmost Happiness – Arundhati Roy
71. The Paradox Prime Minister – Shashi Tharoor
72. The Great Indian Novel – Shashi Tharoor
73. My Unforgettable Memories – Mamta Banerjee
74. Shakuntala – Kalidas
75. India Divided – Dr. Rajendra Prasad

76. The Satanic Verses – Salman Rushdie
77. The Golden House – Salman Rusdie
78. Waiting for a Visa – B. R. Ambedkar
79. Listening, Learning and Leading – Venkaiah Naidu
80. Moving On, Moving Forward – A Year in Office – Venkaiah Naidu
81. My Life, My Mission – Baba Ramdev
82. Why I am Hindu – Shashi Tharoor
83. The Rule Breakers – Preeti Shenoy
84. The English Teacher – RK Narayan
85. Narendra Modi : A Political Biography – Andy Marino
86. A Century Is Not Enough – Sourav Ganguly
87. An Autobiography – Jawaharlal Nehru
88. The Indian Struggle – Subhash Chandra Bose
89. My Country My Life – L. K. Advani
90. Unbreakable – Mary Kom
91. Ignited Minds : Unleashing the Power Within India – APJ Abdul Kalam
92. A Horse Walks Into a Bar – David Grossman
93. The Namesake – Jhumpa Lahiri
94. We Are Displaced – Malala Yousafzai
95. Baburnama – Babur
96. Broken Wing – Sarojini Naidu
97. Chitra – Rabindranath Tagore
98. The Life Divine – Sri aurobindo
99. Gita Rahasya – Bal Gangadhar Tilak
100. Golden Threshold – Sarojini Naidu

101. Natya Shastra – Bharat Muni
102. Tuzuk-e-jahangiri – Jahangir
103. Satyarth Prakash – Swami Dayanand Saraswati
104. Shahnama – Firdausi
105. Sunny Days – Sunil Gavaskar
106. Uttar Ramcharit – Bhavbhuti
107. Vinay Patrika – Tulsidas
108. Wake up India – Annie Besant
109. Yama – Mahadevi Verma
110. Wealth of Nations – Adam Smith
111. The race of my life – Milkha Singh
112. ACE against odds – Sania Mirza
113. Atmakatha – Rajendra Prasad
114. A Shot at History – Abhinav Bindra
115. One Life is Not Enough – K. Natwar Singh

Famous Indian Tourist Places

Place	Location	Built by
Red Fort	Delhi	Shah Jahan
Taj Mahal	Agra, Uttar Pradesh	Shah Jahan
Jaisalmer Fort	Jaisalmer, Rajasthan	Rawal Jaisal

Ruins of Hampi	Karnataka	Vijayanagar Empire
Umaid Bhavan Palace	Jodhpur, Rajasthan	Umaid Singh
Jama Masjid	Delhi	Shah Jahan
Akshardham Temple	Delhi	
Ajanta and Ellora Caves	Aurangabad, Maharashtra	Rashtrakuta Empire
Golden Temple	Amritsar, Punjab	
Charminar	Hyderabad, Andhra Pradesh	Muhammad Quli Qutub Shah
Amber Fort	Jaipur, Rajasthan	Raja Man Singh I
Mahabodhi Temple	Bodh Gaya, Bihar	
Meenakshi Amman Temple	Madurai, Tamilnadu	
Khajuraho Temples	Chattarpur, Madhya Pradesh	Chandela Rajputs
Elephanta Caves	Mumbai, Maharashtra	
Tirupati Balaji Temple	Chittoor, Andhra Pradesh	
City Palace	Jaipur, Rajasthan	Sawai Jai Singh

Sun Temple	Konark, Orrisa	Narasimhadeva I
Rani Ki Vav	Patan, Gujarat	Solanki Dynasty
Gwalior Fort	Gwalior, Madhya Pradesh	Man Singh Tomar
Bhimbetka Rock Shelters	Raisen, Madhya Pradesh	
Jagannath Temple	Puri, Orissa	Ananta Varman Chodaganga Deva
Lingaraja Temple	Bhubaneswar, Orissa	Jajati Keshari
Udayagiri Caves	Bhopal, Madhya Pradesh	Gupta Empire
Jallianwala Bagh	Amritsar, Punjab	
Lake Palace	Udaipur, Rajasthan	Maharana Jagat Singh II
Bada Imambara	Lucknow, Uttar Pradesh	Nawab Asaf-ud-Daula
Fatehpur Sikri	Agra, Uttar Pradesh	Akbar
Humayun's Tomb	Delhi	Hamida Banu Begum
The Great Stupa	Sanchi, Madhya Pradesh	Ashoka
Jantar Mantar	Jaipur, Rajasthan	Sawai Jai Singh II
Mahabalipuram Temple	Tamilnadu	Narasimhavarman I
Agra Fort	Agra, Uttar Pradesh	Shah Jahan
Nalanda University	Bihar	Kumaragupta I
Junagarh Fort	Bikaner, Rajasthan	Raja Rai Singh
Belur Math	Belur, West Bengal	Swami Vijnanananda
Akbar's Tomb	Agra, Uttar Pradesh	Started by Akbar himself and was finished by his son Jahangir
Gateway of India	Mumbai, Maharashtra	Britishers
Mehrangarh Fort	Jodhpur, Rajasthan	Rao Jodha

Munnar Hills	Idukki, Kerala	
Tughlaqabad Fort	Delhi	Ghiyas-ud-din Tughlaq
Shalimar Bagh	Jammu and Kashmir	Jahangir
Lotus Temple	Delhi	Designed by Iranian architect Fariborz Sahba
Qutub Minar	Delhi	Qutub-ud-Din Aibak
Silent Valley National Park	Palakkad, Kerala	
Gir National Park	Junagarh, Gujarat	
Dharamshala	Kangra, Himachal Pradesh	Dharamshala is the seat of the Dalai Lama and also the headquarters of the Tibetan Government in exile.
Jim Corbett National Park	Nainital, Uttarakhand	
Nainital Lake	Nainital, Uttarakhand	
Kodaikanal Lake	Kodaikanal, Tamilnadu	Sir Vere Henry Levinge
Loktak Lake	Moirang, Manipur	
Ranthambore National Park	Sawai Madhopur, Rajasthan	
Sariska Tiger Reserve	Alwar, Rajasthan	
Makkah Masjid	Hyderabad, Andhra Pradesh	Muhammad Qutb Shah
Sundarbans National Park	West Bengal	
Chota Imambara	Lucknow, Uttar Pradesh	Mohammed Ali Shah
The Great Living Chola Temples	Thanjavur, Tamil Nadu	Chola Empire
Hawa Mahal	Jaipur, Rajasthan	Sawai Pratap Singh
India Gate	Delhi	Britishers
Kumbhalgarh Fort	Rajasthan	King Kumbha
Lakshmi Vilas Palace	Vadodara, Gujarat	Maharaja Sayajirao Gaekwad

Mysore Palace	Mysore, Karnataka	Wodeyar dynasty
Chhatrapati Shivaji Terminus	Mumbai, Maharashtra	
Gol Gumbaz	Bijapur, Karnataka	Mohammed Adil Shah
Golkonda Fort	Hyderabad, Andhra Pradesh	Kakatiya dynasty
Champaner Pavagadh Archaeological Park	Gujarat	
Kashi Vishwanath Temple	Varanasi, Uttar Pradesh	Maharani Ahilyabai Holkar
Amarnath Temple	Jammu and Kashmir	
Kedarnath Temple	Uttarakhand	
Triveni Sangam	Prayagraj, Uttar Pradesh	
Naimisharanya Chakra Tirth	Sitapur, Uttar Pradesh	
Valley of Flowers National Park	Chamoli, Uttarakhand	

General Mental Ability

Basics of Number Series

A number series is nothing but a sequence of numbers arranged in some logical way. This topic basically consists of a set of numbers connected by a specific pattern and you need to identify the pattern and answer the missing number or you may be asked to identify the number that doesn't fit the pattern.

Numbers can have interesting patterns.

Here we list the most common patterns and how they are made:-

1. Arithmetic (Difference/Sum based): An arithmetic series is obtained by adding or subtracting the same value each time. These types of series will have a fixed difference between the two consecutive terms.

Example: 1, 4, 7, 10, 13, 16, 19, 22, 25, ...

This sequence has a difference of 3 between each number. The pattern is continued by **adding 3** to the last number each time. Hence, the next term will be $25+3 = 28$

The value-added each time is called the “**common difference**”.

2. Geometric (Multiplication/Division based): The pattern will be identified by multiplying or dividing the term by some number to obtain the next term.

Example: 1, 3, 9, 27, 81, 243, ...

If you closely observe the next term can be obtained by multiplying by 3.

$3 = 1 \times 3$, $9 = 3 \times 3$, $81 = 27 \times 3$, similarly $243 = 81 \times 3$. Hence next term will be $243 \times 3 = 729$.

The value multiplied or divided each time is called “**common ratio**”.

3. Exponential Series: These series as the name suggest will be of form a^n . These could be perfect squares or perfect cubes etc.

Example: 4, 16, 64, 256, 1024...

If you closely observe the numbers are increasing at a very fast rate. This is the basic characteristic to identify if a series can be done by exponents. In this case we can see $16 = 2^4$, $64 = 2^6$, $256 = 2^8$, $1024 = 2^{10}$. Clearly, the next term will be $2^{12} = 4096$

4. Alternating Series: Every alternate term forms a part of the series. Here you need to look for the pattern among the alternate numbers.

Example: 3, 9, 5, 15, 11, 33, 29, ?

Now for the given series the pattern that follows is -

$$3 \times 3 = 9$$

$$9 - 4 = 5$$

$$5 \times 3 = 15$$

$$15 - 4 = 11$$

$$11 \times 3 = 33$$

$$33 - 4 = 29$$

So, the next term is - $29 \times 3 = 87$

An easy way to identify such series is that the numbers might not increase consistently. They usually increase and decrease continuously.

5. Special Number Series -

(a) Prime Numbers: Prime numbers are special numbers who are divisible only by 1 and itself, which means it is not possible to factorize the prime numbers.

(b) Fibonacci Series: Fibonacci series are special series where the current value is determined by adding previous two values.

Consider the series 1, 1, 2, 3, 5, 8, 13, ...

$13 = 8+5$, $8 = 5+3$, $5 = 3+2$. Hence next term = $13+8 = 21$

6. Mixed Series -

These series basically involve different arithmetic operations together. This series may be applicable when you cannot spot any common difference or ratio or the alternate arrangement in the series.

Example - 5, 12, 27, 58, 121, ?

Now if you closely look, no particular pattern in the difference can be spotted. The series that follows is -

$$5 \times 2 + 2 = 12$$

$$12 \times 2 + 3 = 27$$

$$27 \times 2 + 4 = 58$$

$$58 \times 2 + 5 = 121$$

So, the next term should be - $121 \times 2 + 6 = 248$

The patterns provided here are the most common type of patterns on which the series may be based. However, a lot many more patterns may be possible by varying the parameters provided above.

Points to remember

1. Identifying patterns solely depends on how quickly you can categorize the series. This needs practice and after a while solving series questions becomes instinctive. Try to identify how the series grows, this should help you categorize your series.
2. If you fail to categorize a series into some category consider finding the special series in them. We have mentioned Prime and Fibonacci numbers. There can be other types of number like Armstrong numbers etc.
3. Do not give much time to series, If you are not able to establish relations between terms in a minute, it's better to leave the question as a new kind of series can consume a lot of time that can be used elsewhere.

Percentage

The percentage is an important part of Quantitative Aptitude. Whether it is DI, Profit & Loss, SI-CI, or Allegation, etc. all these chapters with the help of percentage can be solved easily. You can go through the basics of percentage and previous year asked questions.

A percentage is a number or ratio expressed as a **fraction of 100**. It is proportion per hundred.

1. When we say 35 per cent in mathematical notation we write 35%.
2. When we want to express this in mathematical form, 35% means 35 per 100 or (35/100).

Important: 50% of 20 can be written 20% of 50 as well.

You can also represent % into decimal, 50% = 0.5

Conversion of fraction into %.

to convert a fraction into %, we multiply it by 100.

$$\frac{1}{4} = (\frac{1}{4}) \times 100 \% = 25 \%$$

$$\frac{1}{3} = (\frac{1}{3}) \times 100 \% = 33\frac{1}{3} \%$$

$$\frac{1}{14} = (\frac{1}{14}) \times 100 \% = (\frac{100}{14})\% = 7\frac{1}{7} \%$$

Note: Never forget to express % notation in the percentage.

We suggest you that you must learn both tables given below.

Fraction	Percentage	Fraction	Percentage	Fraction	Percentage
1	100%	1/7	14(2/7) %	1/13	7 (9/13)
1/2	50%	1/8	12(1/2) %	1/14	7 (1/7)
1/3	33(1/3) %	1/9	11(1/9) %	1/15	6 (2/3)
1/4	25%	1/10	10 %	1/16	6 (1/4)
1/5	20%	1/11	9 (1/11) %		
1/6	16(2/3) %	1/12	8 (1/3) %		

Conversion of % into a fraction.

To convert % into fraction, we divide it by 100. So, we can express in this way:

$$100\% = (100/100) = 1 \quad 1\% = (1/100) \quad 2\% = (2/100) = (1/50)$$

$$50\% = 50/100 = \frac{1}{2}$$

$$20\% = 20/100 = \frac{1}{5}$$

$$10\% = 10/100 = \frac{1}{10}$$

$$16\frac{2}{3}\% = (50/3)\% = 50/(3 \times 100) = 50/300 = \frac{1}{6}$$

Percentage	Fraction	Percentage	Fraction	Percentage	Fraction
10%	1/10	16 (2/3)%	1/6	15%	3/20
20%	1/5	66 (2/3) %	2/3	7(1/2)%	3/40

40%	2/5	6(1/4)%	1/16	22(1/2)%
60%	3/5	18(3/4) %	3/16	69(3/13) %
80%	4/5			

In following examples we will try to avoid calculation using above table.

(i) 99% of 840

we can say 10% = 84, So 1% = 8.4

99% of 840 = 840 - 8.4 = 831.6

(ii) 25% of 320 = $(\frac{1}{4}) \times 320$
= 80

(iii) 76% of 400?

76% = 50% + 25% + 1%

= 200 + 100 + 4

= 304

(iv) 102% of 720?

1% = 7.2 so 2% = 14.4

102% = 100% + 2% = 720 + 14.4 = 734.4

(v) 18% of 300?

18% = 20% - 2% = $(\frac{1}{5}) \times 300 - 6$

= 60 - 6 = 54

or 1% = 3 so 18% = 18 × 3 = 54

(vi) 12% of 540?

1% = 5.4

12% = 10% + 2%

= 54 + 10.8

= 64.8

$$(i) 7\frac{1}{7} \% \text{ of } 343 = \frac{1}{14} \times 343 = \frac{49}{2}$$

$$(ii) 12\frac{1}{2} \% \text{ of } 10\% \text{ of } 400 = \frac{1}{8} \times \frac{1}{10} \times 400 = 5$$

$$(iii) 69\frac{3}{13} \% \text{ of } 7\frac{9}{13} \% \text{ of } 169 = \frac{9}{13} \times \frac{1}{13} \times 169 = 9$$

$$(iv) 9\frac{1}{11} \% \text{ of } 1331 = \frac{1}{11} \times 1331 = 121$$

$$(v) 18\frac{3}{4} \% \text{ of } 11\frac{1}{9} \% \text{ of } 144 = \frac{3}{16} \times \frac{1}{9} \times 144 = 3$$

Example1: Out of his total income, Mr Sharma spends 20% on house rent and 70% of the rest on household expenses. If he saves Rs 1,800 what is his total income (in rupees)?

Solution: Let Income of Mr Sharma is 100

then he spends 20% on the house, so the remaining amount is 80.

now he spends 70% of 80 on household expenses, so the remaining amount left with him is 30% of 80

30% of 80 = 1800

24 = 1800

$1 = 1800/24$
 $1 = 75$
 $100 = 7500$
hence total income is 7500 Rs.
Or, Let total income is P
 $(100\% - 20\%) \times (100\% - 70\%) \times P = 1800$
 $80\% \times 30\% \times P = 1800$
 $((80 \times 30) / (100 \times 100)) \times P = 1800$
 $P = 7500$

Example2: An army lost 10% its men in war, 10% of the remaining due to diseases died and 10% of the rest were disabled. Thus, the strength was reduced to 729000 active men. Find the original strength.

Solution: Let the army has 100 men.
10% loss in war, so remained are 90 men
then, 10% of 90 died due to diseases, remained $90 - 9 = 81$
then again, 10% of 81 again disabled
So, remained men = 90% of 81
 $90\% \text{ of } 81 = 729000$
 $(90 \times 81) / 100 = 729000$
 $1 = 10000$
 $100 = 1000000$
hence total men are 1000000.

Example3: In a village three people contested for the post of village Sarpanch. Due to their own interest, all the voters voted and no one vote was invalid. The losing candidate got 30% votes. What could be the minimum absolute margin of votes by which the winning candidate led by the nearest rival, if each candidate got an integral per cent of votes?

Solution: As given, no vote was invalid i.e. 100% votes were polled and all candidate got votes in an integer value. There were 3 candidates, one losing candidate got 30%, so the remaining two candidates got 70% vote of the total.

Candidate 1 + candidate 2 = 70%

An important point which is given in the question is the minimum absolute margin and integral value.

Case 1: Suppose candidate 1 got 40%, then-candidate 2 had got 30%. But this is not the minimum absolute margin.

Case 2: Both got 35% votes, If both got equal votes then there will be no winning candidate.

Case 3: One candidate must have got 34% and another one has got 36%.

Hence the absolute margin is 2%.

Example4: The difference between $4/5$ of a number and 45% of the number is 56. What is 65% of the number?

Solution: Let number is P.
we can say $4/5 = 80\%$
so, $(80\% - 45\%) \text{ of } P = 56$
 $35\% \text{ of } P = 56$
 $P = (56/35\%)$
 $65\% \text{ of } P = 56/35 \times 65 = 104$

Example5: Deeksha's science test consists of 85 questions from three sections- i.e. A, B and C. 10 questions from section A, 30 questions from section B and 45 questions from section C. Although, she answered 70% of section A, 50% of section B and 60% of section C correctly. She did not pass the test because she got less than 60% of the total marks. How many more questions she would

have to answer correctly to earn 60% of the marks which is the passing grade?

Solution: If she has done 60% of total questions she would have passed,

So, no. of question to be done to pass = 60% of 85 = $(3/5) \times 85 = 51$

But she done 70% of A = 70% of 10 = 7

50% of B = 50% of 30 = 15

60% of C = $(3/5)$ of 45 = 27

So, total questions she attempted = $(7+15+27) = 49$

If she has attempted $(51-49) = 2$ more questions she would have passed.

Example6: In an election between 2 candidates, 75% of the voters cast their votes, out of which 2% votes were declared invalid. A candidate got 18522 votes which were 75% of the valid votes. What was the total number of voters enrolled in the election?

Solution: Let the total number of voters enrolled are P.

Number of votes casted = 75% of P = $(75/100) P = 0.75 P$

Important: Those votes which were declared invalid are 2% of cast voted not 2% of total votes.

So, valid votes are = $(100\%-2\%)$ of $0.75P = 98\%$ of $0.75P$

Given Candidates got 75% of valid votes = 18522

$(75\%) \times 98\% \times 0.75 P = 18522$

$(3/4) \times (98/10) \times (3/4) P = 18522$

$P = 42 \times 800$

$P = 33600$ votes.

Example7: An ore contains 20% of an alloy that has 85% iron. Other than this, in the remaining 80% of the ore, there is no iron. What is the quantity of ore (in kg) needed to obtain 60 kg of pure iron?

Solution: Let the quantity of ore is P kg

$P \times 20\% \times 85\% = 60\text{kg}$

$P \times (1/5) \times (17/20) = 60$

$P = (60 \times 5 \times 20)/17$

$P = 6000/17$ Kg

Example8: 5% of one number (X) is 25% more than another number (Y). If the difference between the numbers is 96 then find the value of X?

Solution : Given: 5% of X = Y + 25% of Y

$0.05 X = 1.25 Y$

$X = 25 Y$

$X - Y = 96$

$25Y - Y = 96$

$24Y = 96$

$Y = 4$ so, $X = 100$

How to Solve Age Related Questions? Tips & Tricks

In the miscellaneous section of Quantitative Aptitude, "Ages" is one of the important topics.

To make the chapter easy for you all, we are providing you with all some Basic Concept and Tricks on Age-Related Questions which will surely make the chapter easy for you all.

Have a look at the following questions:-

Question. 1: The age of the father 3 years ago was 7 times the age of his son. At present, the father's age is five times that of his son. What are the present ages of the father and the son?

Solution: Let the present age of son = x yrs

Then, the present age of father = $5x$ yr

3 years ago,

$$7(x - 3) = 5x - 3$$

$$\text{Or, } 7x - 21 = 5x - 3$$

$$\text{Or, } 2x = 18$$

$$x = 9 \text{ yrs}$$

Therefore, the son's age = 9 years

Father's age = 45 years

Question. 2: At present, the age of the father is five times the age of his son. Three years hence, the father's age would be four times that of his son. Find the present ages of the father and the son.

Solution: Let the present age of son = x yrs

Then, the present age of father = $5x$ yrs

3 yrs hence,

$$4(x+3) = 5x+3$$

$$\text{Or, } 4x + 12 = 5x + 3$$

$$x = 9 \text{ yrs.}$$

Therefore, son's age = 9 yrs and father's age = 45 yrs

Question. 3: Three years earlier, the father was 7 times as old as his son. Three years hence, the father's age would be four times of his son. What are the present ages of the father and the son?

Solution: Let the present age of son = x yrs and the present age of father = y yrs

3 yrs earlier, $7(x - 3) = y - 3$

$$7x - y = 18 \dots\dots\dots(i)$$

3 yrs hence, $4(x+3) = y + 3$

$$4x + 12 = y + 3$$

$$4x - y = -9 \dots\dots\dots(ii)$$

Solving (1) & (2) we get, $x = 9$ yrs & $y = 45$ yrs

Question. 4: The sum of the ages of a mother and her daughter is 50 yrs. Also 5 yrs ago, the mother's age was 7 times the age of the daughter. What are the present ages of the mother and the daughter?

Solution: Let the age of the daughter be x yrs.

Then, the age of the mother is $(50 - x)$ yrs

$$5 \text{ yrs ago, } 7(x - 5) = 50 - x - 5$$

$$\text{Or, } 8x = 50 - 5 + 35 = 80$$

$$x = 10$$

Therefore, the daughter's age = 10 yrs and mother's age = 40 yrs

Question. 5: The sum of the ages of a son and father is 56 yrs. After 4 yrs, the age of the father will be three times that of the son. What is the age of the son?

Solution: Let the age of the son be x yrs.

Then, the age of the father is $(56 - x)$ yrs.

$$\text{After 4 yrs, } 3(x+4) = 56 - x + 4$$

$$\text{Or, } 4x = 56 + 4 - 12 = 48$$

$$x = 12 \text{ yrs}$$

Thus, the son's age = 12 yrs

Note: Just try to make two equations and then solve them to get your answer.

Question 6: A man's age is $133\frac{1}{3}\%$ of what it was 8 years ago, but 80% of what it will be after 8 years. What is his present age?

Solution: Let the present age be X years.

$$\text{Then } 133\frac{1}{3}\% \text{ of } (X-8) = X \text{ and } 80\%(X+8) = X$$

So, $133\frac{1}{3}\%$ of $(X-8) = 80\%(X+8)$

$$4(X-8)/3 = 4(X+8)/5$$

$$5(X-8) = 3(X+8)$$

$$2X = 64$$

$$X = 32$$

Shortcut: You don't need to solve both equations. Solve any equation you will get the answer.

$$133\frac{1}{3}\% \text{ of } (X-8) = X$$

$$4(X-8)/3 = X$$

$$4X-32 = 3X$$

$$X = 32 \text{ years.}$$

Question 7: The present age of Romila is one-fourth that of her father. After 6 years the father's age will be twice the age of Kapil. If Kapil celebrated his fifth birthday 8 years ago. What is Romila's present age?

Solution: Let the present age of Romila is X , then Father's age = $4X$

6 years hence,

$$\text{father's age} = 4X+6$$

$$2 (\text{Age of Kapil}) = 4X+6$$

$$\text{Age of Kapil} = 2X+3$$

$$\text{Present age of Kapil} = 2X+3-6 = 2X-3$$

Kapil celebrated his 5th birthday 8 years ago

So, Present age of Kapil is $5+8 = 13$ years

$$2X-3 = 13$$

$$2X = 16$$

$$X = 8 \text{ years.}$$

Shortcut approach: Kapil celebrated his 5th birthday 8 years ago.

The present age of Kapil = 13

After 6 years, father's age will be twice of the Kapil.

$$2 \times (13+6) = 4X+6$$

$$X = 8 \text{ years}$$

Tips and Tricks for Profit, Loss and Discount

Profit, Loss and Discount are yet another crucial topics of an Arithmetic section of Quantitative Aptitude. You may also find the application of this topic in certain Data Interpretation questions as well. To help you all prepare for this topic better, we will discuss this topic today. Before going to detail on this topic, we recommend you to go through the following topics -Percentage and Ratio

Let us now discuss this topic. Consider the information below -

Raunak was travelling to Jaipur from New Delhi by train. At the platform, he purchased the novel "Half Girlfriend". The printed price of the novel was 250. He negotiated with the vendor and asked for a discount of 30%. The vendor didn't agree with 30% and finally deal ended at 20% discount. He studied the novel in train and after reaching Jaipur, Raunak sold it to Manish at the MRP of the novel. After studying the novel Manish sold it to Navneet after giving some discount Rs.150.

Now, let us have a look at some common questions or terms that often confuse students.

1. What is the MRP of the novel?

MRP: Marked Retail Price is the price which is printed on an object. So MRP of the novel is 250.

2. What is the discount?

Discount is calculated on MRP, Raunak and vendor both agreed at 20% discount.

So, Discount = 20% of MRP = 20% of 250

$$= (20 \times 250) / 100 = 50$$

3. What is the Selling Price of the novel for Vendor?

Selling Price (SP) is the price at which an object is sold.

$$SP = MRP - \text{discount}$$

$$SP = 250 - 50 = \text{Rs.}200$$

4. What is the Cost Price of the novel for Raunak?

Cost Price is the price at which an object is purchased.

Raunak purchased this novel at Rs.200.

5. What is the Selling Price of the novel for Raunak?

Raunak sold it at the MRP, so the SP for Raunak is 250.

6. What is the Cost Price of the novel for Manish?

Manish purchased it at the MRP. So, CP for Manish is Rs.250.

7. What is the profit for Raunak?

Raunak purchased it at Rs.200 and sold it at Rs. 250

$$\text{So, Profit} = SP - CP = 250 - 200 = \text{Rs.}50$$

8. What is the SP for Manish?

He sold it to Navneet at Rs. 150. So, SP for Manish is Rs.150

9. How much discount Manish give to Navneet?

$$\text{Discount} = CP \text{ of Manish} - SP \text{ of Manish}$$

$$= 250 - 150 = 100$$

10. What is the discount% given to Navneet by Manish?

$$\text{discount\%} = (\text{Discount} / CP \text{ for Manish}) \times 100$$

$$= (100 / 250) \times 100$$

$$= 40\%$$

11. What is the Loss for Manish?

$$\text{Loss} = CP \text{ for Manish} - SP \text{ for Manish}$$

$$\text{Loss} = 250 - 150 = 100 \text{ Rs.}$$

Now, we will discuss concepts by solving the questions based on this topic.

Example 1:

If a man purchases 12 toys for Rs.10 and sells 10 toys for Rs.12. How much profit or loss does he make?

Approach:

You can see that the man purchases a number of toys at less price than selling less number of toys at more price. So, definitely, we can say that he makes the profit. In the exam the options which have the loss, you can easily eliminate those options.

Solution: CP of 12 toys = Rs.10

SP of 10 toys = Rs. 12

So, SP of 12 toys = $(12/10) \times 12 = 14.4$

Profit% = $((SP-CP)/CP) \times 100 = (4.4/10) = \%$

Tricks for this type of questions:

Purchases: 12 toys for Rs.10

Sells: 10 toys for Rs.12

For profit% or loss% Cross multiply

profit% or loss% = $((12 \times 12 - 10 \times 10)/(10 \times 10)) \times 100$
= 44%

Example 2:

If a man purchases 12 toys for Rs.10 and sells 10 toys for Rs.8. How much profit or loss does he make?

Solution:

There will be a loss using the same approach.

profit% or Loss% = $((12 \times 8 - 10 \times 10)/(10 \times 10)) \times 100$

= -4% (Don't be confused with a negative sign, it represents loss)

So the loss is 4%.

SP = $[(100 \pm \text{profit or loss})/100] \times \text{CP}$

Example 3:

A person sells an article for ₹890 at a loss of 11%. What will be the price of the article when sold at a profit of 10%?

Solution:

$SP_1 = 890$, loss 11%

We know that loss% = $[(CP-SP)/CP] \times 100$

$11CP = (CP-890) \times 100$

$11CP = 100CP - 890 \times 100$

$89CP = 890 \times 100$

$CP = 1000$

If he had sold it at 10% profit,

then new SP = $CP + 10\%CP$

New SP = $1000 + 100 = 1100$

Approach: Loss is 11% and it is calculated on CP, So we can say loss = 11% CP

$$\text{New SP} = [(100 \pm \text{new profit or loss \%})/100] \times \text{CP} \dots (1)$$

$$\text{Old SP} = [(100 \pm \text{old profit or loss \%})/100] \times \text{CP} \dots (2)$$

$$\text{CP} = \text{Old SP} / [(100 \pm \text{old profit or loss \%})/100] \dots (3)$$

Now, putting eqn 3 in eqn 1.

$$\text{New SP} = \text{Old SP} [(100 \pm \text{new profit or loss \%}) / (100 \pm \text{old profit or loss \%})]$$

Important: Put + sign for-profit and – sign for negative.

$$\text{New SP} = 890 [(100+10)/(100-11)] = 1100$$

Example 4:

A shopkeeper sold an item for Rs.6080 after giving 20% discount on the labelled price and made 18% profit on the cost price. What would have been the percentage profit if he had not given the discount?

Solution:

$$\text{SP} = \text{MP} (100 - \text{discount})\%$$

$$6080 = \text{MP}(80\%)$$

$$\text{MP} = 7600$$

$$\text{Also, SP} = \text{CP} [(100 + \text{profit \%})/100]$$

$$\text{SP} = \text{CP}(118/100)$$

$$\text{CP} = (6080 \times 100)/118$$

$$\text{CP} = 5125.54$$

He sold it at MP. So New SP = MP

$$\text{profit \%} = [(\text{MP} - \text{CP})/\text{CP}] \times 100$$

$$= [(7600 - 5125.24)/5125.24] \times 100$$

$$= 47.5\%$$

Another approach:

$$\text{Reqd. profit \%} = [(\text{Discount} \pm \text{Profit or loss}) / (100 - \text{discount \%})] \times 100$$

$$\text{Reqd. profit \%} = [(20 + 18) / (100 - 20)] \times 100$$

$$\text{Reqd. profit \%} = 380/8 = 47.5\%$$

Example 5: A shopkeeper sells an object at a profit of 25% after giving a discount of 20%. Find the ratio of Cost price, selling price and Marked price.

Solution: Let Cost price of the object is Rs.100.

$$\text{SP} = (125/100) \times 100 = 125$$

$$\text{SP} = [(100 - \text{discount \%})/100] \text{MP}$$

$$\text{SP} = (80/100) \text{MP}$$

$$\text{MP} = (125 \times 100)/80$$

$$\text{MP} = 625/4$$

$$\text{ratio CP : SP : MP}$$

$$100 : 125 : (625/4)$$

$$4 : 5 : (25/4)$$

$$16 : 20 : 25$$

Another approach: Let MP is 100 Rs

$$\text{MP} = 100$$

$$\text{SP} = 80$$

$$\text{then, SP} = 125\% \text{ of CP}$$

$$\text{So, CP} = 64$$

ratio of CP:SP:MP = 64:80:100
= 16:20:25
Dishonest Shopkeeper Concept

Example 6:

A dishonest dealer professes to sell his goods at cost price, but he uses a weight of 900gm of weight for the kg. Find his gain percent.

Solution: Let the price of 1kg is Rs.100 then, the price for 900gm will be Rs.90
Hence, he sells 900gm instead of 1kg for Rs.100 but cost price of it is only Rs.90.
So he earns a profit of Rs.10 on Rs.90, **not on Rs.100**
So, profit% = $(10/90) \times 100$
= $11\frac{1}{9}\%$
You can also use formula:
gain% = $[\text{Error}/(\text{true value}-\text{error})] \times 100$
gain% = $[100/(1000-100)] \times 100$
= $100/9 = 11\frac{1}{9}\%$

Example7:

A dishonest dealer professes to sell his goods at cost price, but he earns the profit of 25%. Find the weight he has used instead of 800gm?

Solution:

Let the cost price of 800gm goods is Rs. 100
He sells well at cost price i.e. Rs.100 but earns 25% profit.
So, CP of goods he sold = $[SP/(100+\text{profit})] \times 100$
CP of goods = $(100/125) \times 100 = 80$
100Rs. costs for 800gm
80Rs. costs for $(800/100) \times 80 = 640$ gm.
He used 640gm instead of 800gm.

Example8:

A machine is sold for Rs.5060 at a gain of 10%. What would have been the gain or loss if it had been sold for Rs.4370?

Solution:

$SP = CP \times [(100+10)/100]$
 $SP = CP \times (11/10)$
 $CP = 4600$
New SP = 4370
Loss% = $(230/4600) \times 100 = 5\%$

Example9:

Ashish sold a pen at 5% loss and a book at 15% profit. In the whole business, he earned Rs.7. If he had sold a pen of 5%profit and a book at 10% profit then he has earned Rs.6 more. What is the cost price of a pen and a book?

Solution:

Let CP of a book is B and a pen is P. We know that profit or loss is calculated on CP.

So, In case 1: loss for pen = $5\%P$, profit for book = $15\%B$

In case 2: profit for book = $10\%B$, profit for pen = $5\%P$

Use sign (-) for loss and (+) for profit.

In case 2 he earned Rs. 13 (6 more than the previous one)

$$15\%B - 5\%P = 7 \dots (1)$$

$$10\%B + 5\%P = 13 \dots (2)$$

Adding eqn (1) and (2)

$$25\%B = 20$$

$$B = 20 \times (100/25)$$

$$B = 80 \text{Rs.}$$

Putting $B=80$ in Eqn(2)

$$5\%P = 13 - 8$$

$$5\%P = 5$$

$$P = \text{Rs. } 100$$

Tips and Tricks for Simple Interest

Simple and Compound Interest is an important segment of an Arithmetic section under Quantitative Aptitude.

In this article, we will discuss the concepts of Simple Interest and talk about how to solve and approach the questions based on this topic.

You can also read the basics of Simple Interest from the link given below-

Basics of Simple

$$\text{Simple Interest (SI)} = \frac{P \times R \times T}{100}$$

Amount: Amount is total sum of Principal and simple Interest.

where P = principal,

R(%) = rate of interest per annum,()

T = time period (in years)

Interest

$$\text{So, } P = \frac{SI \times 100}{R \times T}; R = \frac{SI \times 100}{P \times T}; T = \frac{SI \times 100}{P \times R}$$

Example 1: What will be the rate of interest if the principal is Rs. 2500 and simple interest for 3 years is Rs 375?

Solution: Given, Principal = 2500, T= 3yrs, SI = 375

$$\text{So, } R = \frac{SI \times 100}{P \times T}$$

$$R = \frac{375 \times 100}{2500 \times 3} = 5\%$$

Without formula: Simple interest for 3 years is 375, Interest for 1 year is Rs. 125

$$\begin{aligned} \text{Now we can calculate rate of interest} &= \frac{\text{Interest for 1 year}}{\text{Principal}} \times 100 \\ &= \frac{125}{2500} \times 100 = 5\% \end{aligned}$$

Example 2: If the principal is 100 Rs. Difference of Simple Interest for 4yrs and 6yrs is Rs 8. Calculate the rate of simple interest.

Solution: In simple interest questions, interest always remains same for a year if the principal, rate of interest is constant for the same.

Let Interest for 4 yrs is I then interest for 6 yrs is (I+8)

interest for 2 yrs is Rs. 8

interest for 1 yr = 4

$$\text{rate of interest} = (4/100) \times 100 = 4\%$$

Example3: If the amount is (10/9) times of Principal and rate of interest and time both are numerically equal. Then, what is the rate of interest per annum?

Solution: Let Principal is P. Given, numerically R = T

Interest = Amount – principal

$$I = (10/9)P - P$$

$$I = P/9 \text{ (Interest is in the multiples of Principal)}$$

$$\text{Now, } I = [(P \times R \times T)/100]$$

$$P/9 = (P \times R \times T)/100$$

$$R^2 = 100/9 \text{ (using, } R=T)$$

$$R = (10/3)\%$$

We can also say the time period is (10/3)years.

Short approach: Whenever Interest is in multiple of Principal and Rate of Interest and Time period is equal.

$$\text{Then, } R = T = \sqrt{100 \times \text{multiple of } P}$$

$$R = T = \sqrt{100 \times (1/9)} = 10/3$$

Annual Instalments for Simple Interest:

Let's discuss a real example to understand instalment concepts:

A person deposit Rs.140 to bank every year up to 5 yrs . The bank gives him 5% rate of interest simple annually. And at the end of 5 yrs he get total amount of Rs.770

So, 140 is the instalment, time is 5 years rate of interest is 5% and the amount or debt is Rs.770

This Instalment is also known as annual payment. Debt is total amount, so don't confuse between these two terms.

Installment = where A = debt, r = rate of interest and t = time period

$$\text{Installment} = \frac{100A}{100t + rt \frac{(t-1)}{2}} \text{ where A = debt, r = rate of interest and t = time period}$$

Example4: What annual payment will discharge a debt of Rs.848 in 4yrs at 4% per annum simple interest?

Solution: Given, A = 848, r = 4% and t = 4yrs

$$\text{Using formula: Annual payment} = \frac{100 \times 848}{100 \times 4 + 4 \times 4 \frac{(4-1)}{2}}$$

$$\text{Annual payment} = \frac{100 \times 848}{400 + 24} = 200$$

In case if you forget formula then how to approach this question.

Let installment is X. There are 4 installments and rate of interest is also 4%

Debt (A) = four installments + (r%) × installments × (0+1+2+... (t-1))

So, 848 = 4X + (4%)(X)(0+1+2+3)

$$848 = 4X +$$

$$848 = 4X +$$

$$848 = 424X/100$$

$$X = 200$$

Some Important examples based on Simple Interest.

Example5: A sum amounts to Rs. 702 in 2 years and Rs. 783 in 3 years. Calculate the sum, rate of interest and the amount after 5 years?

Solution:

$$\text{Amount for 2 years}(A_2) = 702$$

$$\text{Amount for 3 years}(A_3) = 783$$

$$\text{Interest for 1 year}(I) = 783 - 702 = 81$$

$$\text{So Sum} = A_2 - 2I = 702 - 2 \times 81$$

$$= 702 - 162 = 540$$

$$\text{rate of interest} = (81/540) \times 100$$

$$= 15\%$$

$$\text{Amount after 5 years} = \text{Sum} + 5I$$

$$= 540 + 5 \times 81$$

$$= 945$$

Example6: A sum of money doubles itself in 3 yrs at simple interest. In how many yrs will it amount to 8 times itself?

Solution: Doubles in 3 yrs

3 times in $3 \times 2 = 6$ yrs

4 times in $3 \times 3 = 9$ yrs

8 times in $3 \times 7 = 21$ yrs

Example7: Atul and Vijay are friends. Atul borrowed a sum of Rs.400 at 5% per annum simple interest from Vijay. He returns the amount with interest after 2 yrs. Vijay returns to Atul 2% of the total amount returned. How much did Atul receive?

Solution: After 2 yrs, amount returned to Vijay = $400 + (400 \times 5 \times 2)/100 = \text{Rs } 440$

Amount returned to Atul = 2% of 440 = 8.8

Example8: Rs.4000 is divided into two parts such that if one part be invested at 3% and the other at 5%, the annual interest from both the investments is Rs. 144. Find each part.

Solution: Let the amount lent at 3% rate be Rs.X, then amount lent at 5% rate is $4000 - X$

So, 3% of X + 5% of $(4000 - X) = 144$

5% of 4000 – 2% of X = 144

$200 - 2\% \text{ of } X = 144$

2% of X = 56

$X = (56/2) \times 100$

$X = 2800$

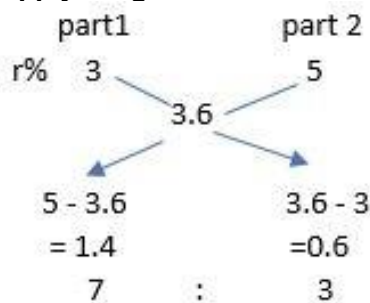
And $4000 - X = 1200$.

How to solve this Question by Alligation Method:

First we will calculate net rate of interest for Rs. 144 on 4000

So, net rate = $(144/4000) \times 100 = 3.6\%$

Apply allegation:



So part 1 : part2 = 7:3

part1 = $(7/10) \times 4000 = 2800$

part2 = $(3/10) \times 4000 = 1200$

Quantitative Notes on Compound Interest

Now, Let's discuss the basic difference between Simple Interest and Compound Interest.

Principal = 1000, rate of interest (r) = 10%, time = 3yrs

Simple Interest

SI for 1st yr = $(1000 \times 10 \times 1)/100 = 100$,

SI for 2nd yr = 100 (In SI it will be the same as 1st yr)

SI for 3rd yr = 100

Compound Interest:

CI for 1st yr = 100

CI for 2nd yr will not be same as 1st yr because principal for 2nd yr is the amount of 1st yr.

So, CI (2nd yr) = $(1100 \times 10 \times 1) / 100 = 110$

CI for 3rd yr will also not be the same as 1st yr and 2nd yr because principal for 3rd yr is the amount of 2nd yr.

principal (3rd yr) = Amount (2nd yr) = Principal(2nd yr) + Interest(2nd yr) = 1100 + 110 = 1210

CI (3rd yr) = $(1210 \times 10 \times 1) / 100 = 121$

Hence total CI for 3yrs = 100 + 110 + 121 = 331

Amount after 3 yrs = 1331

Interest is always calculated on the Principal. But in case of CI, Principal is get changed every year.

If we calculate it by net rate concept then the Principal will remain same.

Concept1: How to calculate net CI rate for 2 years?

Let rate is r% per annum for 2 years

Net CI rate for 2yrs can be calculated by = $2r + (r^2/100)$

If rate is 1%, net CI rate for 2yrs = $2 \times 1 + (1^2/100) = 2.01\%$

If rate is 3%, net CI rate for 2yrs = $2 \times 3 + (3^2/100) = 6.09\%$

If rate is 14%, net CI rate for 2yrs = $2 \times 14 + (14^2/100) = 29.96\%$

We suggest you to learn the table given below:

% Rate per annum	Net CI rate for 2 yrs	% Rate per annum	Net CI rate for 2 yrs
2%	4.04%	9%	18.81%
3%	6.09%	10%	21%
4%	8.16%	11%	23.21%
5%	10.25%	12%	25.44%
6%	12.36%	13%	27.69%
7%	14.49%	14%	29.96%
8%	16.64%	15%	32.25%

Concept2: How to calculate net CI rate for 3 years?

Let rate is r% per annum for 3 years

Net CI rate for 3yrs can be calculated = $3r + 3(r^2/100) + 1(r^3/10000)$

If rate is 3% p.a., net CI rate for 3 yrs

= $3 \times 3 + 3(9/100) + 1(27/10000)$

= $9 + .27 + .0027 = 9.2727$

If rate is 12% p.a., net CI rate for 3 yrs

= $3 \times 12 + 3(144/100) + 1(1728/10000)$

= $36 + 4.32 + .1728$

= 40.4928

Representation while calculating net rate %.

Let's calculate it for the rate 3% p.a.

write, $r/r^2/r^3 = 3/9/27$

then, $3r/3r^2/1r^3 = 9/27/27$

= 9.2727

We suggest you learn the table given below:

% Rate per annum	Net CI rate for 3 yrs	% Rate per annum	Net CI rate for 3 yrs
------------------	-----------------------	------------------	-----------------------

1%	3.31%	6%	19.1016%
2%	6.1208%	7%	22.5043%
3%	9.2727%	8%	25.9712%
4%	12.4864%	9%	29.5029%
5%	15.7625%	10%	33.10%

Concept3: If the r% p.a. is in fraction:

Example: if the rate is $16\frac{2}{3}\%$ and the principal is 216, then calculate CI for 2yrs and 3yrs.

Solution: We can write $16\frac{2}{3}\% = \frac{1}{6}$ (Discussed in percentage study notes)

For 2 years

$216 \times \frac{1}{6} = 36$, Now multiply 36 by 2 = 72

$36 \times \frac{1}{6} = 6$, multiply 6 by 1 = 6

Add both the above value = $72 + 6 = 78$

CI for 2yrs = 78

For 3 years

$216 \times \frac{1}{6} = 36$, Now multiply 36 by 3 = 108

$36 \times \frac{1}{6} = 6$, multiply 6 by 3 = 18

$6 \times \frac{1}{6} = 1$, multiply 1 by 1 = 1

Add all the above values = $(108 + 18 + 1) = 127$

CI for 3yrs = 127

Concept4: When r% is given p.a. and CI has to be calculated half-yearly or quarterly basis.

Yearly	factor	r% (per annum)	Time (n yrs)
Half yearly	6months = $\frac{6}{12} = \frac{1}{2}$	Factor \times r% = $\frac{r}{2}\%$	2n
Quarterly	3months = $\frac{3}{12} = \frac{1}{4}$	$\frac{1}{4} \times r\% = \frac{r}{4}\%$	4n
9 months	9months = $\frac{9}{12} = \frac{3}{4}$	$\frac{3}{4} \times r\% = \frac{3r}{4}\%$	$\frac{4n}{3}$
8 months	8months = $\frac{8}{12} = \frac{2}{3}$	$\frac{2}{3} \times r\% = \frac{2r}{3}\%$	$\frac{3n}{2}$

Example: If r% = 10% per annum. Find the CI on 5000 for 2 years if it is compounded half-yearly.

Solution: Rate is calculated half yearly so new r% = $\frac{10}{2}\% = 5\%$

Given time is 2 yrs, acc.to half yearly, it will be $2 \times 2 = 4$

Now we have to calculate CI for 4yrs @ 5%

We know $5\% = \frac{1}{20}$

So, $5000 \times \frac{1}{20} = 250$, multiply 250 by 4 = 1000

$250 \times \frac{1}{20} = 12.5$, multiply 12.5 by 6 = 75

$12.5 \times \frac{1}{20} = 0.625$, multiply 0.625 by 4 = 2.5

$0.625 \times \frac{1}{20} = .03125$ multiply .03125 by 1 = .03125

Add all the above values

$(1000 + 75 + 2.5 + 0.03125)$

= 1077.53125

Concept 5: When different rates are given for 2 years.

If a% is given for 1st year and b% is given for 2nd year.

Net rate of CI for 2 yrs = $(a + b + \frac{ab}{100})\%$ (discussed in percentage study notes)

Note: The net CI rate will be the same if b% is given for 1st year and a% is given for 2nd year.

Example: If principal is 1000 Rs and $r(1^{st} \text{ yr}) = 4\%$ and $r(2^{nd} \text{ yr}) = 6\%$. Calculate the CI after 2yrs.

Solution:

Net CI rate = $4 + 6 + \frac{4 \times 6}{100}$

= 10.24%

Now CI = $1000 \times 10.24\% = 102.4$ Rs

Concept6: When difference between CI and SI is given.

We know, net CI for 2yrs = $2r + (r^2/100)\%$,

net SI for 2 yrs = $2r\%$

So, difference = $(r^2/100)\%$

Example: If the difference between CI and SI is Rs.10 and the principal is Rs.1000. Calculate the rate % per annum.

Solution: difference = 10 Rs.

So difference% = $(10/1000) \times 100 = 1\%$

We know that, if rate of interest is 10%

then, net CI rate (2yrs) = 21%

net SI rate (2yrs) = 20%

difference = 1%

Definitely we can say r% per annum is 10%.

Example: Calculate the difference between CI and SI for 3 yrs if Principal = 8000 and r = 6% p.a.

Solution: Net rate CI(3yrs) = 19.1016%

Net rate SI (3yrs) = 18%

Difference = 1.1016%

So, difference = 1.1016% of 8000 = 88.128

Example: If difference between CI and SI is Rs.64 and r = 8% p.a.. Calculate the Principal and Amount?

Solution: If r = 8% p.a.

then, net rate CI (2yrs) – net rate SI (2yrs)

= 16.64% - 16% = 0.64%

Given, difference is Rs. 64

So, 0.64% = 64

100% = 10000

Hence, Principal is 10000 Rs.

Amount = principal \times (116.64%) = $10000 \times 116.64\% = \text{Rs.} 11664$

Concept7: Calculation of Instalment

For 2 yrs: If r% is given, convert it into fraction (a/b)

then, **Instalment** $\times \frac{b}{a+b} \times \frac{b+a+b}{a+b} = \text{Principal}$

Example: A man borrowed Rs.8,400 at 10% p.a. CI. He pays equal annual repayment of X rs and clear off his debts in 2 yrs. What is the value of X?

Solution: Given $r=10\% = (1/10)$

Instalment $\times \frac{10}{11} \times \frac{10+11}{11} = 8400$

$X \times \frac{10}{11} \times \frac{21}{11} = 8400$

$X = 4840 \text{ Rs.}$

For 3 yrs: If r% p.a. is given, convert it into fraction(a/b)

$$\text{Instalment} \times \frac{b}{a+b} \left[\frac{b^2 + (a+b)^2 + b(a+b)}{(a+b)^2} \right] = \text{Principal}$$

Example: A man borrowed Rs.1820 at 20% p.a. CI. He pays equal annual repayment of X rs and clear off his debts in 3 yrs. What is the value of X?

Solution: Given $r = 20\% = (1/5)$

$$\text{Instalment} \times \frac{5}{5+1} \left[\frac{5^2 + (1+5)^2 + 5(1+5)}{(1+5)^2} \right] = 1820$$

$$X \times \frac{5}{6} \times \frac{5^2 + 6^2 + 5 \times 6}{6^2} = 8400$$

$$X \times \frac{5}{6} \times \frac{91}{36} = 8400$$

$$X = 864$$

Formulas:

$$\text{Amount} = P \left(1 + \frac{r}{100} \right)^n$$

$$\text{Difference between CI and SI for 2 yrs} = P \times \left(\frac{r}{100} \right)^2$$

$$\text{Difference between CI and SI for 3 yrs} = P \times \left(\frac{r}{100} \right)^2 \times \left(\frac{300+r}{100} \right)$$

Where P = Principal, r = rate of interest and n = no. of yrs

Concepts of Ratio & Proportion

Example 1: If A : B = 2 : 5 and B : C = 7 : 3 then find A : B : C

Solution:

$$A : B = 2 : 5$$

$$B : C = 7 : 3$$

In this, the value of B has to be same so to equate the value of B, we can take LCM of both the values of B i.e. $(5 \times 7) = 35$

So multiply (A : B) by 7 and (B : C) by 5

$$\text{Hence, } A : B : C = 14 : 35 : 15$$

Example 2: If the ratio of A : B : C is given in reciprocals, then convert it.

Solution: Suppose, if A : B : C = $(1/2) : (1/3) : (1/5)$

take any number which is multiple of the product $(2 \times 3 \times 5) = 30$

Now multiply it in the numerator part

$$A : B : C = (30/2) : (30/3) : (30/5) = 15 : 10 : 6$$

Example 3: The sum of the ages of Akhil and Binay is 48 years. Akhil is 4 years older than Chetan. The ratio of the ages of Binay and Chetan is 4 : 7. What was the age of Akhil 5 years back?

Solution:

Given Age of Akhil + Binay = 48 and Akhil is 4 yrs older than Chetan

So, Binay + Chetan = 44

and Binay : Chetan = 4 : 7

Comparing B + C = 11

So, $11 = 44$

$1 = 4$

Binay = $4 \times 4 = 16$ yrs

Chetan = $7 \times 4 = 28$ yrs

Akhil = 32 yrs

Age of Akhil 5 yrs back = $32 - 5 = 27$ yrs

Example 4: The ratio of the ages of A and B is 6 : 5. The difference between the ages of C and A is more than 3 years. The age of D is a prime number between the ages of A and B. The ratio of the ages of B and C is 2 : 3. If the ages of all four are integers, what is the difference between the ages of C and D?

Solution: Given ratio of A : B = 6 : 5 and B : C = 2 : 3

So, A : B : C = 12 : 10 : 15

Now let's use conditions given i.e.

(i) All ages of A, B, C and D should be integers.

(ii) difference of age between A and C should be more than 3 yrs but from the above ratio difference is only 3 yrs.

So, we have to take A : B : C = 24 : 20 : 30

(iii) age of D lies between A and B and it should be prime number

Numbers between 24 and 20 are = 23, 22, 21 and 23 is the prime number. So, the age of D is 23

Difference of C and D = $30 - 23 = 7$ yrs

Example 5: Ten years ago, the ages of Adam and Parker were in the ratio 6 : 7. After six years, Adam's age would be 9.09% less than Parker's age. What would be age of Parker after 9 years?

Solution: In percentage topic we have learnt that $9.09\% = \frac{1}{11}$, if age of Parker after 6 yrs is X then age of Adam will be $X - (\frac{1}{11})X = (\frac{10}{11})X$ hence ratio of Adam and Parker = $(\frac{10}{11})X : X = 10 : 11$

adam : parker

10yrs ago 6 : 7

after 6yrs 10 : 11

Difference between both these are 16 yrs

So, $4 = 16$

$1 = 4$

hence, age of parker after 6 yrs = $11 \times 4 = 44$

age of parker after 9 yrs = $44 + 3 = 47$ yrs

Example 6: Five years ago, the ages of a father and son were in the ratio 7 : 2. After three years, their ages would be in the ratio 5 : 2. What was father's age 7 years back?

Solution: Father : Son

5yrs ago 7 : 2

3yrs after 5 : 2

The difference between the age of the father at 5yrs ago and 3 yrs after should be equal to the difference between age of son at 5yrs ago and 3 yrs. To achieve this condition, we manipulate the ratio.

Father : Son

5yrs ago 21 : 6

3yrs after 25 : 10

now, we can see that $25 - 21 = 4$ and $10 - 6 = 4$

difference between 3yrs after and 5 yrs ago = 8yrs

So, $4 = 8$ yrs

$1 = 2$ yrs

hence the age of father's 5 yrs ago is 42 yrs and 7yrs ago = 40 yrs.

Example 7: A stick is broken up into two parts. The ratio of the lengths of the bigger part and the smaller part is equal to the ratio of the lengths of the full stick and the bigger part. What is this ratio?

Solution: Let the length of bigger part of the rod is 1 m and the length of a smaller part of the rod is

x m, the total length of the rod is (1+x) m

Given, the ratio of bigger to smaller is equal to the ratio of the length of the full stick to a bigger part

So, $1/x = (1+x)/1$

$$x^2 + x = 1$$

$$x^2 + x - 1 = 0$$

using quadratics $x = (-1 \pm \sqrt{5})/2$

but $x = (-1 + \sqrt{5})/2$ is the answer because another will give the negative answer.

Example 8: The contents of two vessels containing wine and water in the ratio 2 : 3 and 5: 6 are mixed in the ratio 10: 7. What would be the ratio of wine and water in the final mixture?

Solution:

	Wine	:	Water
vessel 1	2	:	3
vessel 2	5	:	6

to make the total quantity same in both vessel we have to multiply the ratio of vessel 1 by (5+6= 11) and vessel 2 by (2+3 = 5)

Now, Vessel 1 22: 33

Vessel 2 25: 30

But, vessel 1 and vessel 2 are mixed in the ratio of 10: 7.

So, wine = $22 \times 10 + 25 \times 7 = 395$

water = $33 \times 10 + 30 \times 7 = 540$

It is given that two vessels containing wine and water in the ratio 2 : 3 and 5: 6 but both vessels have the same quantity of total mixture.

So, ratio of wine and water in final mixture = $395 : 540 = 79 : 108$

How to express data in a smarter way.

Wine: water

vessel 1 $(2 : 3) \times 11 \times 10$

vessel2 $(5 : 6) \times 5 \times 7$

vessel 1 $(2 : 3) \times 110 = (2 : 3) \times 22 = 44 : 66$

vessel2 $(5 : 6) \times 35 = (5 : 6) \times 7 = 35 : 42$

Hence, ratio will be $(44+35) : (66+42) = 79 : 108$

Example 9: A mixture contains wine and water in the ratio 3: 2 and another contains them in the ratio 4: 5. How many litres of the former must be mixed with 15 litres of the latter so that the resultant mixture contains equal quantities of wine and water?

Solution: In this, after mixing of both different mixture, the quantity of wine and water becomes equal.

Let X litre of mixture 1 is mixed with 15 litres of mixture 2, then

$$(3/5)X + (4/9)15 = (2/5)X + (5/9)15$$

$$X/5 = 15/9$$

$$X = 75/9 = 25/3$$

How to do it by using the ratio concept and above-discussed methodology?

Ultimately we have to equal the ratio of wine and water in the final mixture.

Wine: Water

Mix 1 3: 2

Mix 2 4: 5

We have to make the sum of the quantity of wine in mix 1 and mix 2 equal to the sum of the quantity of water in mix 1 and mix2.

But in the above question, it is already given so, we will mix it in the same quantity.

If we mix 5 litres of mixture1 and 9 litres of mixture2, then the ratio of quantity will be the same.

So, if it is 15 litres of mixture2, then mixture1 = $(15 \times 5)/9 = 25/3$ litres.

Example 10: A mixture contains wine and water in the ratio 3: 2 and another contains them in the ratio 7 : 3. In what ratio should the two be mixed to get a resultant mixture with wine and water in the ratio 17: 8?

Solution: Let these are mixed in a ratio of 1:X, we will not assume a: b because there will be two variables and will make the calculation harder.

Now, wine: water

mixture1 3 : 2

mixture2 7 : 3

First, we will solve it as done in 8.

So, $(3:2) \times (10) \times 1 = (3:2) \times 2$

$(7:3) \times (5) \times X = (7:3) \times X$

the ratio of wine and water in the final mixture is $(3 \times 5 + 7X) : (2 \times 5 + 3X)$

$(6 + 7X) / (4 + 3X) = 17/8$

solving it, $X = 4$

So, it will be mixed in the ratio of 1:4

Wrong Approach

Some of you will mark answer (1:2), why?

$3 : 2 \times 1 = 3 : 2$

$7 : 3 \times 2 = 14 : 6$

So, $(3+14) : (2+6) = 17 : 8$. this will not be applicable here because the quantity of mixtures 1 & 2 is not equal.

Allegation Approach: we will discuss it in detail in the next article.

In this approach, the allegation will be applied only on one object throughout the solution.

So, let's apply it on wine

in mixture1, % of wine is 60% in solution

In mixture2, % of wine is 70% in solution

In the final mixture, % of the wine is 68%

So, 60-----68-----70

60 8 68 2 70, you can see the difference of 68 and 60 is 8 and 70 and 68 is 2.

For calculating the ratio of mixing, the answer will be the reciprocal of the ratio of these differences.
ratio in which it is mixed = $2 : 8 = 1 : 4$

Mixture and Allegation Notes

Example1: Milk and water are mixed in a vessel in the ratio 7: 22 and in another vessel in the ratio 21: 37. In what ratio should the two be mixed to get milk and water in the ratio 25: 62 in the resultant mixture?

Solution: Milk: Water

Mixture1 7 : 22 29

Mixture2 21 : 37 58

Final Mix. 25: 62 87

Now, we try to always make the same quantity in all mixtures. We can see that 29, 58 and 87 are multiples of 29, if we take LCM to make quantity similar it will be 174.

Mixture 1 42: 132

Mixture 2 63: 111

Final Mix. 50: 124

The allegation can be applied to anyone substances of the solution. We can apply it on either Milk or water, but we will apply it on milk as its calculation seems easier.

Mixture 1	Final Mix.	Mixture2
42	50	63
Difference:	8	13

So the ratio will be reciprocal of difference i.e. 13:8.

In exams, you don't need to write everything. First, you must choose those data are which are less complicated. Then, apply allegation directly.

mix1 = $7+22 = 29$,

mix2 = $21+ 37 = 58$

fin.mix = $25+62 = 87$

Now apply allegation on milk after equating quantity of all mixtures.

42	50	63
	8	13

So, the answer is 13:8

Example 2: The ratio of land and water on our planet is 1 : 2. If this ratio 2 : 3 in the northern hemisphere, what is it in the southern hemisphere?

Solution: In this question, if you understand the language of the question then it is the easiest one. In a planet, there are two parts: Northern hemisphere and southern hemisphere.

Let the total area of the planet is 60. (Why we assume 60? Because ratios are given, $1+2 = 3$ and $2+3 = 5$, it should be multiple of this to make calculation easy.)

Ratio of land and water on planet = 1:2

So land on planet = $(1/3) \times 60 = 20$

Water on planet = $(2/3) \times 60 = 40$

Area of northern hemisphere = area of southern hemisphere = 30

Given, the ratio of land and water on north hemi. = 2 : 3

So, land on north.hemi = $(2/5) \times 30 = 12$

water on the north. Hemi = $(3/5) \times 30 = 18$

Remaining land and water of the planet will be on southern hemi.

land on south hemi = land on the planet – land on north hemi
 $= 20 - 12 = 8$

water on south hemi = water on the planet – water on north hemi
 $= 40 - 18 = 22$

Hence ratio is 8:22 i.e. 4:11

Example3: A vessel contains milk and water in the ratio 8 : 3 while another contains them in the ratio 5: 1. A 35-litre vessel is to fill with the two such that it contains milk and water in the ratio 4: 1. What quantity of the mixture should be picked from the first vessel?

Solution: Quantity of the final mixture is 35 litre and the ratio of milk and water is 4:1.

So, it means that milk = $(4/5) \times 35 = 28$ litres

water = $(1/5) \times 35 = 7$ litres

Now if we analyse the given data, we can see that if we take 8 litres of milk from mixture 1 and 20 litres of milk from mixture 2, then our resultant mixture will contain 28 litres of milk.

Similarly, water from mix.1 = 3 litres and from mix.2 = 4 litres, then resultant mix. Will have 7 litres of water.

You must realise that milk and water taken from the mixture 2 has the same ratio as it is in question 20: 4 i.e. 5:1

So, the quantity of mixture 1 taken is $8+3 = 11$

Example 4: The incomes of A, B, C are in the ratio 4: 5: 6, and their expenditures are in the ratio 8: 9: 10. If A saves $1/5^{\text{th}}$ of his income, in what ratio do they save?

Solution: This question seems to be tough but it is not. If you solve these questions practically, it will be very easy for you.

Last line of the question says A saves $1/5^{\text{th}}$ of his income it means if he has 5 Rs. he will save only 1 Rs.

So, the ratio of income and expenditure is 5:4

A	B	C
Income 4:	5:	6
Expen. 8:	9:	10

Now, try to make income and expenditure of A in ratio 5: 4, for this we have to multiply the income ratio by 5 and expenditure ratio by 2.

Income	20: 25: 30
Expen.	16: 18: 20
Savings	4 : 7: 10

Example 5: A mixture contains wine and water in the ratio 8: 5. What part of the mixture must be removed and replaced with water for the resultant mixture to have equal quantities of water and wine?

Solution: In this type, we try to make the quantity the same which is not replacing. As in this mixture is not getting replaced by wine, so we make wine ratio same.

Wine: Water

$$8 : 5 = 13$$

to make it equal in the water we have to add 3 units of water So

$$8 : 8 = 16$$

So, the part which is removed = $(16-13)/16 = 3/16$ part is removed and replaced with water.

Example 6: A mixture contains wine and water in the ratio 7: 12. What part of the mixture must be removed and replaced with wine for the resultant mixture to have wine and water in the ratio 5: 6?

Solution: Applying the same method as the previous one.

first, make 5: 6 near to 10:12

So, Initially Wine: water

$$7 : 12 = 19$$

To get the desired ratio 10:12, we have to add 3 litres of wine and $10 + 12 = 22$

Hence the mixture to be replaced is $(22-19)/22 = 3/22$

Example 7: A mixture contains wine and water in the ratio 8: 13. What part of the mixture must be removed and replaced with wine for the resultant mixture to have wine and water in the ratio 4: 5?

Solution: As in this mixture is replaced with wine, so we will try to keep the water the same.

wine: water

mixture1 8: 13

mixture2 4: 5

To make the water ratio the same, we will multiply mixture1 by 5 and mixture2 by 13.

So, mix1 40: 65

mix2 52: 65

Hence, the part of the mixture to be replaced is $(52-40)/(52+65) = 12/117$

Example 8: From a solution containing milk and water in the ratio 3: 4, 7 litres is drawn off and replaced by water. If the resultant mixture contains milk and water in the ratio 1: 2, then what was the volume of the original solution?

Solution: milk is not getting replaced so we will try to make the ratio of milk same.

Milk : water

Mixture1 3 : 4

Mixture2 1 : 2

multiplying mix2 by 3

mixture2 3 : 6

According to our method, mixture to be replaced = $(6-4)/(6+3) = 2/9$

and 2 parts of 9 is equal to 7 litres

i.e. $2 = 7$

and $9 = 7 \times 9/2 = 63/2 = 31.5$

Hence, volume of original solution is 31.5 litres.

Another approach

This approach is opposite to the previous one discussed above.

Method is applied on which is not changing.

In this case, milk is not replaced, so we will apply on it.

So, initial milk Conc. \times change in mixture = final milk conc.

$$\left(\frac{3}{7}\right) \times X = \left(\frac{1}{3}\right)$$

$$X = 7/9$$

We can say that initially there are total 9 parts and $(9-7)=2$ parts were removed.

2 parts = 7 litres

So, 9 parts = $63/2 = 31.5$ litres.

Example 9: From a 30-litre solution containing milk and water in the ratio 4: 5, 7.5 litres is drawn off and replaced by water. Then 9 litres is drawn off and replaced by water. Finally, 12 litres is drawn off and replaced by water. What is the volume of milk in the resultant mixture?

Solution: As the mixture is getting replaced by water so we will apply it for milk.

Final volume of milk = Final total volume \times (Conc. Of not changing substances) \times (quantity remained after drawn / net quantity after replaced) \times n times the process is going.....

You can see that in each replacing process, the same quantity removed and same quantity replaced. So, after replacing the quantity will remain the same as 30 litres.

$$\text{Final volume of milk} = 30 \times \left(\frac{4}{9}\right) \times \left(\frac{22.5}{30}\right) \times \left(\frac{21}{30}\right) \times \left(\frac{18}{30}\right)$$

$$= 30 \times \left(\frac{4}{9}\right) \times \left(\frac{3}{4}\right) \times \left(\frac{7}{10}\right) \times \left(\frac{3}{5}\right)$$

$$= 4.2 \text{ litres}$$

Example 10: From an 18-litre solution containing milk and water in the ratio 3: 4, 3 litres is drawn off and replaced by 5 litres of water. Then 4 litres is drawn off and replaced by 5 litres of water. Finally, 7 litres is drawn off and replaced by 2 litres of water. What is the volume of milk in the resultant mixture?

Solution: At the first replacing process:

Initial solution = 18 litres

solution after withdrawal = $18-3 = 15$ litres

Solution after replacing = $15+5 = 20$

At the second replacing process:

Initial solution = 20

Solution after withdrawal = $20-4 = 16$

Solution after replacing = $16+5 = 21$

At the third replacing process:

Initial solution = 21

Solution after withdrawal = $21-7 = 14$

Solution after replacing = $14+2 = 16$

$$\text{So, Volume of milk in resultant mixture} = 16 \times \left(\frac{3}{7}\right) \times \left(\frac{15}{20}\right) \times \left(\frac{16}{21}\right) \times \left(\frac{14}{16}\right) = 24/7 = 3.43$$

Example 11: A 10-litre vessel contains 25% milk and the rest is water. Some of it is thrown and replaced with water. Then this operation is done a second time. If the resultant mixture contains just 9% milk, what was the quantity of the mixture removed each time?

Solution: The volume which is replaced is always the same. So, the ratio of the solution after withdrawal to after replacing will be the same every time. Let's say it will be X

Initial conc. of milk $\times X \times X$ = final conc. of milk

$$\left(\frac{25}{100}\right) \times X^2 = 9/100$$

$$X^2 = 9/25$$

$$X = 3/5$$

$$X = (\text{vol. after withdrawal} / \text{vol. after replaced}) = 3/5$$

Vol. after replaced is 10

So, $5 = 10$
 $1 = 2$
and $3 = 6$
Volume after withdrawal = 6
withdrawal volume = $10 - 6 = 4$ litres

Time & Work

Time and Work is one of the topics asked under the miscellaneous questions in the **Quantitative Aptitude** Section. It may also be combined with data sufficiency or wages based questions. We received many requests from our readers about tips to approach the miscellaneous section of Quantitative Aptitude. So, today we are going to provide you with some study tips with examples that should help you understand one of the topics of miscellaneous category better.

Before we move on to the types of problems that you may face in this topic, understand the following formulae -

- If A can do a piece of work in x days, then A's 1-day work = $1/x$
- If A's one day work is $1/x$, A can finish the total work in x days.
- If A is x times as efficient as B then
The ratio of work done by A : B individually = $x : 1$
The ratio of time taken by A and B individually to finish the work = $1 : x$

Now let us have a look at the types of problems that you may encounter under this topic-

1. The first type of problem is the most basic one that may be asked - Calculation of time from work or vice - versa.

For instance -

A takes 8 days to finish a piece of work. B takes 10 days to finish the same work. How long will it take to finish the work when both of them are working together?

Now for such questions, A's 1-day work = $\frac{1}{8}$

B's 1-day work = $\frac{1}{10}$

Work done by both A and B together in one day = $\frac{1}{8} + \frac{1}{10} = \frac{9}{40}$

Hence, A and B together will finish the work in $\frac{40}{9}$ days.

Similarly, when n people are involved, you can follow the above approach. For instance, B and C together can complete the work in 8 days. A and B together can complete the same work in 12 days and A and C together can complete it in 16 days. In how many days can A, B, C can complete the same work?

For this type of question, find the 1-day work of A and B, B and C and A and C.

1-day work of B and C = $\frac{1}{8}$ ----- (a)

1-day work of A and B = $\frac{1}{12}$ ----- (b)

1-day work of A and C = $\frac{1}{16}$ ----- (c)

Adding (a), (b) and (c),

1-day work of B and C + 1-day work of A and B + 1-day work of A and C = $\frac{1}{8} + \frac{1}{12} + \frac{1}{16}$

$$2 * (1 \text{ day work of } A + B + C) = 13/48$$

$$1 \text{ day work of } A + B + C = (13/48) / 2 = 13/96$$

So, the number of days taken by A, B, C to finish the work = $96/13$.

2. Another type of problem that you may face is when you need to normalise the time unit.

A can do a piece of work in 9 days by working 7 hours each day. B can do it in 7 days, working 6 hours per day. How long will it take them to complete the work together if both of them work for 504 minutes per day?

In this type of question, since the time unit mentioned is not the same for both, so you need to find per hour work of A and B.

$$A's \text{ 1 hour work} = 1/9 * 7 = 1/63$$

$$B's \text{ 1 hour work} = 1/7 * 6 = 1/42$$

Now, A and B's one hour work = $(1/63 + 1/42) = 5/126$, i.e. they will finish the work in $126/5$ hours.

But as per question, they work 504 minutes per day i.e. $504/60$ hours per day. So, number of days = $(126/5) / (504/60) = 3$ days.

3. Another type of problem that you may face is efficiency based.

For instance -

X can do a piece of work in 12 days. Y is 80% more efficient than X. How many days will Y take to complete the same work alone.

Now as per question Y does the work 1.8 times more efficiently than X (80% more).

So, ratio of time taken by X : Y = 1.8 : 1 i.e. $12/Y = 1.8/1$

$$Y = 12/1.8 \text{ i.e. } 20/3 \text{ days}$$

4. Another case that you may face is when one person leaves the work midway.

For instance -

X can finish a piece of work in 18 days and Y can do the same work in 15 days. Y worked for 10 days and left the job. In how many days, X alone can finish the remaining work?

In this case, X's 1-day work = $1/18$, Y's 1-day work = $1/15$

$$\text{Work done by Y in 10 days} = 10 * 1/15 = 2/3$$

$$\text{Remaining work} = 1 - 2/3 = 1/3$$

$$X \text{ finishes } 1/18 \text{th work in 1 day, so he will finish } 1/3 \text{ work in } = (1/3) / (1/18) = 6 \text{ days}$$

5. You may also encounter problems based on wages.

For instance-

X and Y do a piece of work for Rs.600. X alone can do it in 6 days while Y alone can do it in 8 days. With the help of Z, they finish it in 3 days. Find the share of each.

Now, for this question, we'll find one day work of each and the share of wage will be divided in the ratio of their one day work.

$$Z's \text{ one day work} = 1/3 - (1/6 + 1/8) = 1/24$$

$$X : Y : Z = \frac{1}{6} : \frac{1}{8} : \frac{1}{24} = 4 : 3 : 1$$

$$\text{Share of X} = 600 * (\frac{4}{8}) = 300$$

$$\text{Share of Y} = 600 * (\frac{3}{8}) = 225$$

$$\text{Share of Z} = 600 - (300+225) = 75$$

6. Another set of problem that you may face are the ones involving more than 2 different types of people.

For instance-

2 women and 3 girls can do a piece of work in 10 days while 3 women and 2 girls can do the same work in 8 days. In how many days can 2 women and 1 girl do the work?

For such questions, let us assume that one woman's 1-day work = x and 1 girl's 1-day work = y
Now, $2x + 3y = \frac{1}{10}$ and $3x + 2y = \frac{1}{8}$

You now have two equations in two variables, solve the equations for the values of x and y and accordingly find the answer.

How to solve Time & Work (Shortcut Approach)

How to approach and express data while taking the exam?

If there are two people A and B. If A begins and both work alternate days. It means

1 st day	2 nd day	3 rd day	4 th day	5 th day	6 th day	7 th day	8 th day	9 th day	10 th day
A	B	A	B	A	B	A	B	A	B

Before going forward, we will discuss **some basics of Ratios to make calculation easy** for this topic and these basics will also help you in other topics like Partnership, time and distance, average, allegation etc.

Example 1: If A:B = 2:3 and B:C = 4:5 then A:B:C =?

A : B : C	A : B : C	A : B : C
2 : 3 : 4	8 : 12	8 : 12 : 15
3 X 4 : 5	12 : 15	

Shortest Approach:

A:B	2	:	3
B:C	4	:	5
A:B:C	8:12:15		

Example 2: If 4A=3B=5C then find A:B:C.

$$A : B : C$$

$$BxC : Ax C : Ax B$$

$$3x5 : 4x5 : 4x3$$

$$15 : 20 : 12$$

Example3: If $\frac{A}{4} = \frac{B}{5} = \frac{C}{3}$ then find A:B:C.

Let $\frac{A}{4} = \frac{B}{5} = \frac{C}{3} = K$

Then, $A=4K$, $B=5K$ and $C=3K$

$A : B : C$

$4K:5K:3K$ Here we can say that in this type of questions, we can directly find ratio, just by

$4:5:3$ writing down denominator.

Example4: If total salary of A and B is 4500Rs and ratio of their salary is 7:3. Find the salary of A and B individually.

Solution: A's part $\frac{7}{10}$ and B's part $\frac{3}{10}$

$A = \frac{7}{10} \times 4500$ $B = \frac{3}{10} \times 4500$

$A = 3150Rs.$ $B = 1350Rs$

Easy approach:

Ratio of Salary of A and B = 7:3. So salary of A+B = 10

We can say $10 = 4500Rs$

$1 = 450Rs$

$A = 450 \times 7 = 3150$

$B = 450 \times 3 = 1350$

TIME AND WORK EXAMPLES:

Example 5: A and B can do a work in 8 days and 12 days respectively.

	A	B
Time (T)	8 days	12 days
Efficiency (η)	12	8
η	3	2

total work = $T_A \times \eta_A = T_B \times \eta_B$

total work = $8 \times 3 = 12 \times 2$

total work = 24 units

(a). If both A and B work alternatively and A begins, then in how many days work will be completed?

According to the question, A begins and both A and B work alternately.

Days	1 st day	2 nd day	3 rd day	4 th day	5 th day	6 th day	7 th day	8 th day	9 th day	10 th / 2 day	Total Work
Person	A	B	A	B	A	B	A	B	A	B	
Work Unit	3	2	3	2	3	2	3	2	3	1	24

Hence work will be completed in 9 (1/2) days.

But this type of approach is not helpful in exams. We will go by basic but in a smarter way.

If we make a pair of A and B, we can say that both together will work 5 units but in 2 days.

2 days = 5 unit of work

2 days \times 4 = 5 units of work \times 4

8 Days = 20 units of work, i.e. we can say that up to 8th day 20 units of work will be done

But on the 9th day it's a chance of A and he will do his 3 units of work. So up to 9th day 23 units of work will be done. Now 1 unit of work will remain. On 10th day it's a chance of B.

As above B do 2 unit of work in a day. So, he will do 1 unit of work in (1/2) days.

So total time taken to complete the work is 9 (1/2) days.

(b). If A and B both work for 4 days then A leaves. In how many days total work will be completed.

$(\text{Eff}_{A+B} \times t_{A+B}) + (\text{Eff}_B \times t_B) = \text{total work}$

$(5 \times 4) + (2 \times t_B) = 24$

$20 + 2 \times t_B = 24$

$2 \times t_B = 4$

$t_B = 2 \text{ days}$, hence total time will be (4+2) days i.e. 6 days.

Important: the Same question can be framed in many ways.

Way 1: B works for 2 days and after that A joins B, then in how many days the work will be completed.

Solution: B works only for 2 days and then A joins B, i.e. both will work together after 2 days.

$(t_B \times \eta_B) + (t_{A+B} \times \eta_{A+B}) = \text{total work}$

$(2 \times 2) + (t_{A+B} \times 5) = 24$

$(t_{A+B} \times 5) = 20$

$t_{A+B} = 4 \text{ days}$ hence total time is (2+4) days i.e. 6 days

Way 2: A and B both work together and A takes leaves for 2 days, then in how many days the work will be completed.

Solution: When both A and B are working together and A takes leaves for two days it means B has to work alone for 2 days .

Let total time to complete the work is t days.

$$\text{So, } \eta_{A+B} \times (t-2) + \eta_B \times 2 \text{ days} = 24$$

$$5 \times (t-2) + 2 \times 2 = 24$$

$$t-2 = 4$$

t = 6 days Hence total time taken to complete the work is 6 days.

Don't confuse between t_{A+B} and T_{A+B} (as mentioned in article1). Both are different.

Example 6: X can do a work in 6 days, Y can do it in 8 days and Z can do it in 12 days.

(a). If X starts the work and X, Y, Z works in alternate days, then in how many days the work will be completed?

Solution: Here X will start work on the 1st day, then Y will work on 2nd day and z will work on the 3rd day.

	X : Y : Z
Time	6 : 8 : 12

Efficiency	12 × 8 : 6 × 12 : 8 × 6
------------	-------------------------

η	96 : 72 : 48
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η	4 : 3 : 2
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$$\text{total work} = \eta_X \times T_X = \eta_Y \times T_Y = \eta_Z \times T_Z$$

$$\text{total work} = 6 \times 4 = 8 \times 3 = 12 \times 2 = 24 \text{ units}$$

On 1st day, work done by X = 4 unit

On 2nd day, work done by Y = 3 unit

On 3rd day, work done by Z = 2 unit

Total work in 3 days done by X, Y and Z = 9 unit

Now again X will come then Y, then Z and so on till work is completed.

$$\text{In 3 days} = 9 \text{ units}$$

$$\times 2 \quad \times 2$$

$$\text{In 6 days} = 18 \text{ units}$$

$$\text{X will work on 7th day} = 4 \text{ units}$$

$$= 22 \text{ units}$$

Now we need (24-22) units = 2 units work more but Y can do 3 unit of work in one day. So 2 unit will be done in (2/3) day.

$$+(2/3) \text{ day} \quad + 2 \text{ unit}$$

$$\text{Total days} = 7 \frac{2}{3} \text{ days} \quad 24 \text{ units}$$

Hence total work will be done in $7 \frac{2}{3}$ days.

(b). If all started together and after completion of $(\frac{3}{4})^{\text{th}}$ work, Y left and remaining work is done by X and Z together. Then in how many days work will be completed?

Solution: Total work is 24 units then $(\frac{3}{4})^{\text{th}}$ work is 18 units.

One day work of $(X+Y+Z) = 9$ units so in 2 days 18 units of work will be done by $(X+Y+Z)$ together.

After this Y left, X+Z worked together and 6 units of work remained.

One day work of $X+Z = (4+2)$ units = 6 units. So in 3 days, total work will be completed.

How to solve the problems based on Men, Women and Children; Work and Wages

Man, Hours Efficiency Day Work Rupees Consumption etc. terms are used in these types of questions. We know that

No. of persons (M) \propto Work (W)

efficiency (η) \propto Work (W)

no. of days (D) \propto Work (W)

no. of hours (H) \propto Work (W)

So, No. of persons \times efficiency \times no. of days \times no. of hours per day = work

$$M_1 \times \eta_1 \times D_1 \times H_1 = W_1 \quad M_2 \times \eta_2 \times D_2 \times H_2 = W_2$$

$$\frac{M_1 \times \eta_1 \times D_1 \times H_1}{W_1} = \text{constant} \quad \frac{M_2 \times \eta_2 \times D_2 \times H_2}{W_2} = \text{constant}$$

From eqn (1) and (2)

$$\frac{M_1 \times \eta_1 \times D_1 \times H_1}{W_1} = \frac{M_2 \times \eta_2 \times D_2 \times H_2}{W_2}$$

$$\frac{M_1 \times \eta_1 \times D_1 \times H_1}{W_1/R_1/C_1} = \frac{M_2 \times \eta_2 \times D_2 \times H_2}{W_2/R_2/C_2}$$

where R = rupees or salary and C = consumption.

Important: When persons are the same their efficiency will be equal. If persons are different their efficiency will be different.

Example 1: 12 persons can complete a work in 5 days, then how many persons are required to complete the same work in 3 days?

Solution: Here $M_1 = 12$ and $D_1 = 5$, $D_2 = 3$ days we have to find M_2

$$M_1 \times D_1 = M_2 \times D_2$$

$$12 \times 5 = M_2 \times 3$$

$$60 = M_2 \times 3$$

$$M_2 = 20$$

Example 2: 18 persons can make 12 chairs in 6 days working 8 hours per day. In many days 12 persons can make 24 chairs working 6 hours per day?

Solution: Here $M_1 = 18$, $D_1 = 6$, $H_1 = 8$ $W_1 = 12$ and $M_2 = 12$, $H_2 = 6$, $W_2 = 24$ are given we have to find D_2

$$\frac{M_1 \times \eta_1 \times D_1 \times H_1}{W_1} = \frac{M_2 \times \eta_2 \times D_2 \times H_2}{W_2}$$

$$18 \times 6 \times 8 = 12 \times D_2 \times 6$$

$$\begin{array}{ccc} 12 & & 24 \\ & D_2 = & 24 \text{ days} \end{array}$$

Example 3: The expenditure on fuel is Rs.600 burning 6 stoves for 12 days for 4 hours per day. How many stoves are required to burn 6 days for 8 hours making expenditure of Rs.900?

Solution: Here R = Rupees

$$\frac{M_1 \times \eta_1 \times D_1 \times H_1}{R_1} = \frac{M_2 \times \eta_2 \times D_2 \times H_2}{R_2}$$

Here M = no. of stoves

$$\frac{6 \times 12 \times 4}{600} = \frac{M_2 \times 6 \times 8}{900}$$

$M_2 = 9$ Hence, 9 stoves are required.

Example 4: If Q persons can do Q units of work in Q days working Q hours per day then in how many days P persons can do P units of work, working P hours per day.

Solution: $\frac{M_1 \times D_1 \times H_1}{W_1} = \frac{M_2 \times D_2 \times H_2}{W_2}$

$$\frac{Q \times Q \times Q}{Q} = \frac{P \times D_2 \times P}{P}$$

$$D_2 = \frac{Q^2}{P} \text{ days}$$

Example 5: If 5 women can do a work in 6 days working 9 hours per day. How many men are required to complete four times of work in 4 days working 6 hours per day? If 3 women can do the work in 6 hours that work can be done by 4 men in 3 hours.

Solution: In this type, we can see that the efficiencies of men and women are different. So first we will calculate efficiency, check the last line of question.

work was done by 3 women in 6 hours = work done by 4 men in 3 hours

$$3\omega \times 6 = 4m \times 3$$

$$3\omega = 2m \text{ or if } \omega = 2 \text{ then } m = 3$$

$$\frac{\omega}{m} = \frac{2}{3}$$

$$\frac{\omega}{m} = \frac{2}{3}$$

where ω = eff. of women and m = effi. of men

using $\frac{M_1 \times D_1 \times H_1}{W_1} = \frac{M_2 \times D_2 \times H_2}{W_2}$

$$\frac{5\omega \times 6 \times 9}{1} = \frac{Xm \times 4 \times 6}{4}$$

$$\frac{5 \times 2 \times 6 \times 9}{1} = \frac{X \times 3 \times 4 \times 6}{4} \quad (\omega = 2 \text{ and } m = 3)$$

$$X = 30 \text{ men}$$

Example 6: 4 women and 12 children together take 4 days to complete a piece of work. How many days will 4 children alone take to complete the piece of work if 2 women alone can complete the piece of work in 16 days?

Solution: Let time take by 4 children to complete the work is X days.

work done by 4 women and 12 children in 4 days = work done by 2 women in 16 days = work done by 4 children in X days

$$(4\omega + 12C) \times 4 = (2\omega) \times 16 = (4C) \times X$$

By using

$$(4\omega + 12C) \times 4 = (2\omega) \times 16$$

$$16\omega + 48C = 32\omega$$

$$48C = 16\omega$$

$$3C = \omega$$

hence $\omega = 3$ and $C = 1$

By using

$$(2\omega) \times 16 = (4C) \times X \quad \text{or} \quad (4\omega + 12C) \times 4 = (4C) \times X$$

$$2 \times 3 \times 16 = 4 \times 1 \times X \quad \text{or} \quad (4 \times 3 + 12 \times 1) \times 4 = (4 \times 1) \times X$$

$$X = 24 \text{ days} \quad \text{or} \quad (24) \times 4 = 4 \times X$$

$$X = 24 \text{ days.}$$

Important: There are so many shortcuts for this type of question, if the language of questions changes, students will be confused so we suggest you to go by this method. All approaches discussed above are the advanced part of Time and Work article 1 and 2.

Example 7: 4 men can complete a piece of work in 2 days. 4 women can complete the same piece of work in 4 days whereas 5 children can complete the same piece of work in 4 days. If 2 men, 4 women and 10 children work together, in how many days can the work be completed?

(SBI Rural Business officers)

Solution: Let time taken by $(2m + 4\omega + 10C)$ is X days.

$$4m \times 2 = 4\omega \times 4 = 5C \times 4 = (2m + 4\omega + 10C) \times X \dots\dots\dots(1)$$

Firstly, we will calculate the efficiency of men, women and children.

$$8m = 16\omega = 20C$$

$$2m = 4\omega = 5C$$

$m : \omega : C$ (to know the basics of ratio, check time and work article 2)

$$20 : 10 : 8$$

$$10 : 5 : 4$$

Now, putting in eqn (1)

$$4 \times 10 \times 2 = 4 \times 5 \times 4 = 5 \times 4 \times 4 = (2 \times 10 + 4 \times 5 + 10 \times 4) \times X$$

$$80 = (80) X$$

$$X = 1 \text{ day.}$$

Example 8: 8 men and 4 women together can complete a piece of work in 6 days. Work done by a man in one day is double the work done by a woman in one day. If 8 men and 4 women started working and after 2 days, 4 men left and 4 new women joined. In how many more days will the work be completed? (IBPS PO)

Solution: Given, work of man in 1 day = $2 \times$ work of a woman in 1 day

$$m \times 1 \times 1 = 2 \times \omega \times 1$$

$$m = 2\omega \quad \text{So, } m = 2 \text{ and } \omega = 1$$

Now, let total time take to complete the work is p days.

$$(8m + 4\omega) \times 6 = (8m + 4\omega) \times 2 + (4m + 8\omega) \times (p - 2)$$

$$(16 + 4) \times 6 = (16 + 4) \times 2 + (8 + 8) \times (p - 2)$$

$$120 = 40 + 16(p - 2)$$

$$80 = 16(p - 2)$$

$$5 = p - 2$$

$$p = 7$$

hence total time is 7 days but in question time taken by changed persons after 2 days is asked so answer will be 5 days.

Exam approach: As $(8m + 4\omega)$ has worked for 2 days after that $4m$ left and 4ω joined, remaining work of 4 days of $(8m + 4\omega)$ will be done by $(4m + 8\omega)$ in X days.

$$\text{so, } (8m + 4\omega) \times 4 = (4m + 8\omega) \times X$$

$$(16 + 4) \times 4 = (8 + 8)X$$

$$80 = 16X$$

$$X = 5 \text{ days}$$

Example 9: If 5 women or 3 men or 12 children can complete a work in 6 days. In how many days 2 men, 3 women and 5 children can complete the same work.?

Solution: In this question, we can see that here 'OR' is used instead of 'AND'.

So, we can write directly $5W = 3M = 12C$

$$W : M : C$$

$$12 \times 3 : 5 \times 12 : 5 \times 3$$

$$12 : 20 : 5$$

$$5W \times 6 = 3M \times 6 = 12C \times 6 = (2M + 3W + 5C) \times X \text{ days}$$

$$5 \times 12 \times 6 = 3 \times 20 \times 6 = 12 \times 5 \times 6 = (2 \times 20 + 3 \times 12 + 5 \times 5) \times X$$

$$360 = (40 + 36 + 25)X$$

$$X = 360/101 \text{ days.}$$

Example 10: A contractor wants to complete a project in 120 days and he employed 80 men. After 90 days $\frac{1}{2}$ work is completed, then how many more persons he must hire to complete work on time?

Solution: Here given work has to be completed in 120 days and 80 men were employed earlier.

According to contractor,

In 120 days = 1 total work completed

In 90 days = $\frac{3}{4}$ of work has to be completed but

we can see that it didn't happen. In 90 days only $\frac{1}{2}$ work is completed and the remaining $\frac{1}{2}$ work has to be completed in the remaining 30 days.

Let more person hire are P.

$$\frac{90 \times 80}{\frac{1}{2}} = \frac{30 \times (P+80)}{\frac{1}{2}}$$

$$240 = P+80$$

$$P = 160 \text{ persons}$$

Example 11: P and Q undertake to do a piece of work in 6000Rs. P can do this in 8 days alone and B alone can do it in 12 days. With the help of R, they complete the work in 4 days. Find the part of P, Q and R individually?

Solution:

Efficiency	Days	total work
$24/8 = 3$	P.....8	
$24/12 = 2$	Q.....12	24
$24/4 = 6$	P+Q+R.....4	(LCM of 8,12 and 4)
$6 - (3+2) = 1$	R	

there are two methods :

(1) efficiency method

The share of P = $\frac{\eta_P}{\eta_{(P+Q+R)}} \times \text{total Rs.}$

$$= \frac{3}{6} \times 6000$$

$$= 3000 \text{ Rs.}$$

The share of Q = $\frac{2}{6} \times 6000$

$$= 2000 \text{ Rs.}$$

The share of R = $\frac{1}{6} \times 6000$

$$= 1000 \text{ Rs.}$$

(2) Work Method

The share of P = $\frac{\text{work done by P}}{\text{work done by P+Q+R}}$ × total Rs

$$= \frac{3 \times 4}{24} \times 6000$$

$$= 3000 \text{ Rs.}$$

The share of Q = $\frac{2 \times 4}{24} \times 6000$

$$= 2000 \text{ Rs}$$

Share of R = $\frac{1 \times 4}{24} \times 6000$

$$= 1000 \text{ Rs}$$

Data Interpretation

Data Interpretation is a major part of Quantitative Aptitude section for any exam. Now, first and foremost, What does Data Interpretation exactly mean?

Interpretation is the process of making sense of numerical **data** that has been collected, analysed, and presented. Interpreting data is an important critical thinking skill that helps you comprehend textbooks, graphs and tables

Majority of the questions asked in the Data Interpretation Section are based on the following topics of the Arithmetic Section -

1. Ratios
2. Averages
3. Percentages

If the basics of these topics are clear, attempting DI in the exams becomes comparatively easy.

Now, let us go through the types of DI graphs/charts that you may encounter in the exams -

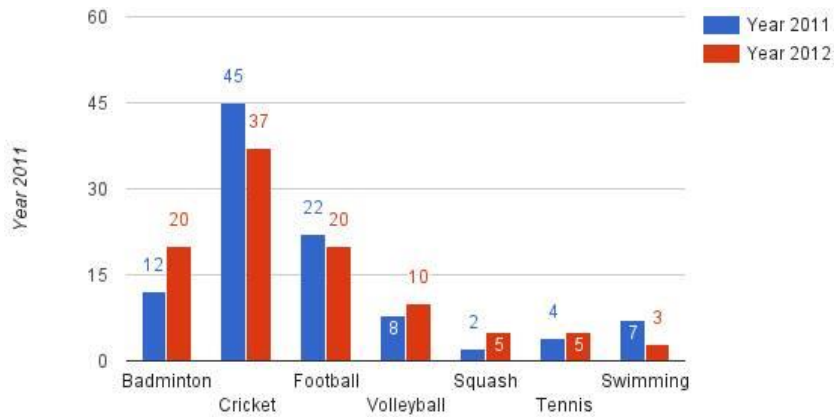
1. Pie Charts
2. Line Charts
3. Bar Graphs
4. Tabular Charts
5. Mixed Graphs

We shall now have a look at the types of questions that are asked under these Data Interpretation Graphs -

Consider the following data presented in the bar graph -

Percentage of Students who like different sports in two different years is provided in the following graph. Total number of Students is 1000 for both the years.

Year 2011 and Year 2012



Now the following types of questions may be asked from this data -

1. Sum or Difference based -

These are the most basic questions that may be asked in a DI set. For instance,

What was the sum of the total number of students who like Badminton and Cricket in both the years?

Now for such questions, first find the number of students who like the two sports in the two years -

$$2011 - \text{Badminton} = (12/100) * 1000 = 120$$

$$\text{Cricket} = (45/100) * 1000 = 450$$

$$\text{Total} = 570$$

$$2012 - \text{Badminton} = (20/100) * 1000 = 200$$

$$\text{Cricket} = (37/100) * 1000 = 370$$

$$\text{Total} = 570$$

$$\text{Sum} = 570 + 570 = 1140$$

2. Averages based Questions -

Average based questions are very commonly asked in the Data Interpretation sets. For instance,

What is the average number of students who like badminton, cricket and football in 2011?

$$\text{Total students who like badminton, cricket and football in 2011} = (12 + 45 + 22) = 79\% \text{ of } 1000$$

$$\text{Required average} = 790/3$$

3. Ratio based question -

Another arithmetic operation based question that may be asked is Ratio based.

Now, these questions may be asked directly or in combination with the above. For instance,

What is the ratio of the students who like football and tennis in 2011 and those who like volleyball and squash in 2012?

Students who like football and tennis in 2011 = $(22 + 4) = 26\%$ of 1000

Students who like volleyball and squash in 2012 = $(10 + 5) = 15\%$ of 1000

Remember for such questions, you do not need to do the entire calculation, because such numbers will eventually cancel out while calculating the ratios.

Required ratio = $(26\% \text{ of } 1000) : (15\% \text{ of } 1000) = 26 : 15$

4. Percentage based question -

These are yet other arithmetic problems that are usually asked in DI questions.

These problems again may be asked individually or in combination with the sum or difference based problems. For instance,

The students who like badminton and squash in 2011 is what per cent of the students who like football and swimming in 2011?

Students who like badminton and squash in 2011 = $(12 + 2) = 14\%$ of 1000

Students who like football and swimming in 2011 = $(22+7) = 29\%$ of 1000

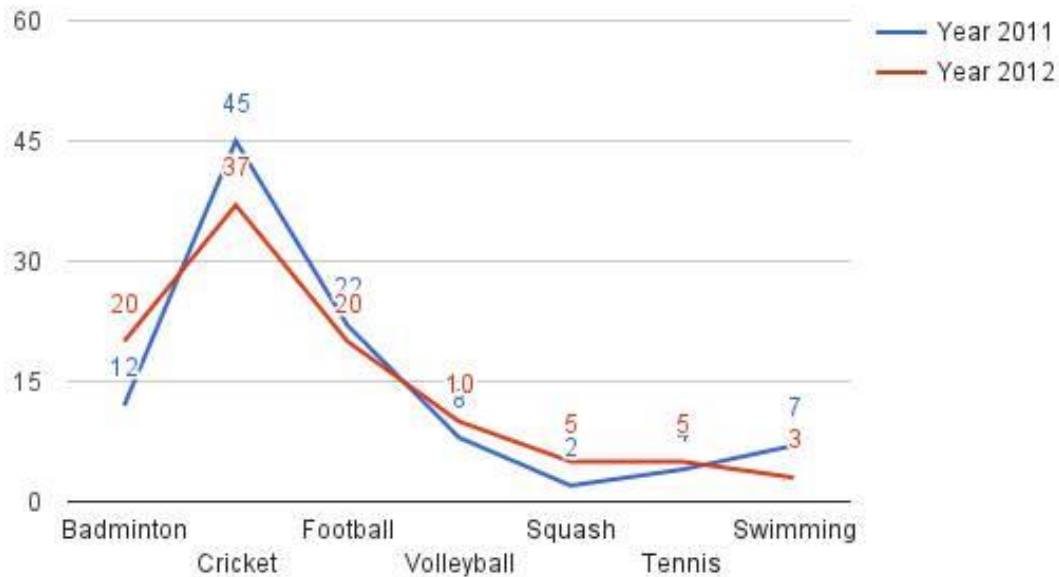
Here again, do not calculate the entire value.

Required % = $(14\% \text{ of } 1000) / (29\% \text{ of } 1000) * 100 = 1400/29\%$

Same data may be presented in the form of other graphs as well, however, the approach to attempt the questions would remain the same. You may find numbers in place of percentages or vice - versa, so do read the question carefully before proceeding.

Line Graph -

Year 2011 and Year 2012

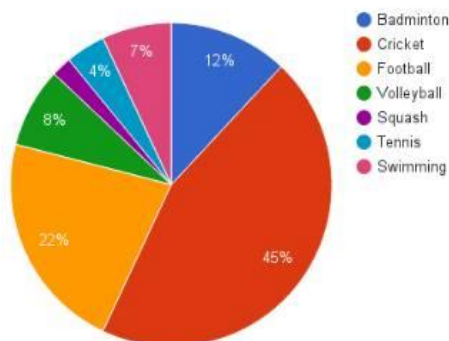


Tabular Chart -

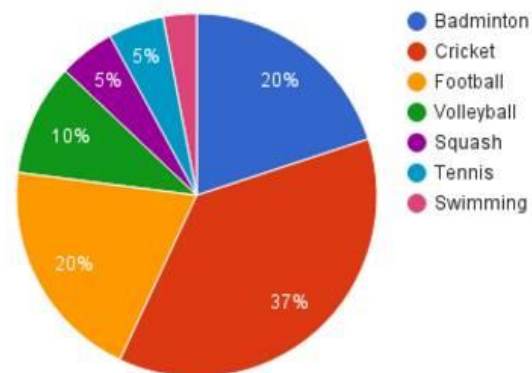
Sport	Year 2011	Year 2012
Badminton	12	20
Cricket	45	37
Football	22	20
Volleyball	8	10
Squash	2	5
Tennis	4	5
Swimming	7	3

Pie Chart -

Year 2011



Year 2012



One more variety of question that may be asked in pie charts is the angle based. For instance, What is the central angle corresponding to football and volleyball together for 2012?
 Angle = $(20 + 10)\% \times 360 = (30/100) \times 360 = 108$

Basics of Permutation & Combination

Permutation & Combination has direct application probability which is most widely asked in almost every banking exam. So basics of P&C must be very clear for solving those questions. So let us start with the basics.

Factorial

Before going deep into Permutation & Combination, let us figure out a term known as 'factorial'. The product of the numbers starting from 1 up to a number 'n' is known as factorial of number 'n'.

It means $n! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \dots \times (n-2) \times (n-1) \times n$

$$1! = 1$$

$$2! = 1 \times 2 = 2$$

$$3! = 1 \times 2 \times 3 = 6$$

$$4! = 1 \times 2 \times 3 \times 4 = 24$$

$$5! = 1 \times 2 \times 3 \times 4 \times 5 = 120$$

Key points related to Factorial:

$0!$ & $1!$ are equal to 1.

We can't find factorial of a negative number.

Application of factorial:

Factorial has most common application in **arrangement**. Let us understand how factorial helps in arranging things.

Suppose we have 5 persons and we want to arrange them on 5 vacant places. Then we will start with the first place. We can choose 1 person out of 5 for the first place. We can do that in 5 ways.

Now only 4 seats are vacant and 4 persons are left. We will choose 1 person out of 4 for the second place now. We can do that in 4 ways.

In the same manner, for the third place, 3 ways, for the fourth place, 2 ways and for the last vacant place only 1 way of selection is possible. As we know that we have to do all of these activities, so we will **multiply all these ways** to get the final answer for getting the different ways of arrangement.

So total ways = $5 \times 4 \times 3 \times 2 \times 1$ **which is $5!$**
= 120

Or we can say that whenever we have to arrange 'n' things at 'n' places then total arrangements that can be made will always be equal to $n!$

Q.1) In how many ways can the letters of the word PATNA be rearranged?

Solution: PATNA has total 5 words. So we will arrange 5 letters at 5 places in $5! = 120$ ways.

But in this question, A is coming twice. Whenever any letter is more than once in the word, then we have to divide by the number of repetition of the word. So we have to divide the total 120 ways by $2! = 2$.

So total different words that can be made will be $120/2 = 60$.

Direct answer: $5!/2! = 60$

Q.2) How many different words can be made using letters of PATNA starting with P?

Solution: PATNA has total 5 words. According to the question, P is fixed at first place, so we will arrange remaining 4 letters at 4 places in $4! = 24$ ways. But in this question, A is coming twice, so we have to divide the total 24 ways by $2! = 2$. So total different words starting from P will be $24/2 = 12$.

Direct answer: $4!/2! = 4 \times 3 = 12$

- **Whenever we have to choose certain things from a group and no arrangement is done. In that case combination comes into picture. So let us see concept of combination.**

Combination

In combination, we select the things at random & check out the different possible ways of selection. So this is a one step process. Combination is also known as collection. The formula used for combination is nC_r

$${}^nC_r = n! / [r! \times (n-r)!]$$

$${}^nC_r = [n \times (n-1) \times (n-2) \times (n-3) \times \dots \times (n-r+1) \times (n-r) \times \dots \times 1] / [1 \times 2 \times 3 \times \dots \times r] \times [(n-r) \times \dots \times 3 \times 2 \times 1]$$

$${}^nC_r = [n \times (n-1) \times (n-2) \times (n-3) \dots \times (n-r+1)] / [1 \times 2 \times 3 \dots \times r]$$

For example: ${}^{12}C_2 = 12! / [2! \times (12-2)!] = 12! / (2! \times 10!) = [12 \times 11] / [1 \times 2] = 66$

$${}^5C_2 = [5 \times 4] / [1 \times 2] = 10$$

$${}^nC_r = {}^nC_{(n-r)}$$

For example: ${}^5C_3 = [5 \times 4 \times 3] / [1 \times 2 \times 3] = [5 \times 4] / [1 \times 2] = {}^5C_2 = 10$

$${}^{10}C_7 = {}^{10}C_3 = [10 \times 9 \times 8] / [1 \times 2 \times 3] = 120$$

Q.3) In a class there are 4 boys and 5 girls. In how many different ways a class monitor can be chosen?

Solution: As we can clearly see that we have to choose a student from total 9. So we will use combination concept here which will give us the answer as ${}^9C_1 = 9/1 = 9$

Q.4) In a class there are 4 boys and 5 girls. In how many different ways a boy and a girl can be selected for group leaders of two groups?

Solutions: We have to choose a boy from 4 boys and a girl from 5 girls for two groups.

So total ways of selection = ${}^4C_1 \times {}^5C_1 = 4 \times 5 = 20$

Q.5) In how many different ways a cricket team can be selected from total 16 players?

Solution: We need to select 11 players from total 16 players.

So the answer will be ${}^{16}C_{11} = 16! / 5! \times (16-5)! = 16! / 5! \times 11! = (16 \times 15 \times 14 \times 13 \times 12) / (1 \times 2 \times 3 \times 4 \times 5) = 4368$

Q.6) An urn contains 5 red and 3 blue balls. In how many different ways, 2 red and 1 blue balls can be drawn?

Solution: The urn contains 5 red and we want 2 red balls. So ways of selecting red balls = ${}^5C_2 = 10$

Similarly ways of selecting 1 blue ball from 3 blue balls = ${}^3C_1 = 3$

So total ways to select 2 red and 1 blue ball will be = $10 \times 3 = 30$

Q.7) In how many different ways a team of 11 can be selected from 15 players if 2 particular players are never selected?

Solution: It is given that 2 particular players are never selected. So we will do selection from rest of the players which means we will select 11 players out of 13 players.

So total ways of selection = ${}^{(15-2)}C_{11} = {}^{13}C_{11} = {}^{13}C_2 = (13 \times 12) / (1 \times 2) = 78$

Q.8) In how many different ways a team of 11 can be selected from 15 players if 2 particular players are always selected?

Solution: It is given that we have to select two particular players always which means that we have choice of selection only for remaining 9 players and the possible options are only 13.

So total ways of selection = ${}^{(15-2)}C_{(11-2)} = {}^{13}C_9 = {}^{13}C_4 = (13 \times 12 \times 11 \times 10) / (1 \times 2 \times 3 \times 4) = 715$

- Whenever we have to choose certain things from a group and arrangement of those chosen things is to be done. In that case permutation comes into picture. So let us see concept of permutation.

Permutation

In permutation, we select the things and then arrange them to check out different possible ways of arrangement. So basically permutation is a two-step process.

The formula used for permutation is ${}^nP_r = n! / (n-r)!$

Suppose we have 5 persons and we have to arrange them on 3 vacant places. Then first of all, we will choose 3 persons from 5. We can do that in 5C_3 different ways. After choosing 3 persons, we will have to arrange them on the 3 vacant places, for that we will use factorial concept. The total ways to arrange 3 persons on 3 places are $3!$

So total ways to arrange 3 persons from total 5 on 3 vacant places will be:

$${}^5C_3 \times 3! = {}^5C_2 \times 3! = 5! / (2! \times 3!) \times 3! = 5! / 2! = 60 \text{ ways.}$$

Q.9) A wicket-keeper and a bowler are to be chosen out of a team having 11 players. In how many different ways we can do this?

Solution: First of all, we will select 2 players from total 11 players. The ways of selection are ${}^{11}C_2 = (11 \times 10) / (1 \times 2) = 55$. After doing selection, we can arrange 2 players on 2 different positions in $2! = 2$ ways. So total ways of selecting a wicket-keeper and a bowler = ${}^{11}C_2 \times 2! = 55 \times 2 = 110$

Direct answer: ${}^{11}P_2 = 110$

Q.10) In how many ways can the letters of the word EQUATION be arranged so that all the vowels come together?

Solution: In word 'EQUATION', we have 5 vowels (E,U,A,I,O) and 3 consonants (Q,T,N). According to question, all five vowels should come together so we will assume these 5 vowels to take one place and other 3 consonants will be arranged on 3 places, so total 4 places.

So ways to arrange these on 4 places will be $4! = 24$

One important thing is that we can arrange the vowels order as well and we can do that in $5! = 120$ ways.

So total ways = $24 \times 120 = 2880$

Direct answer: $4! \times 5! = 24 \times 120 = 2880$

Q.11) There are 7 candidates for 4 different posts. In how many ways we can fill the posts?

Solution: First of all, we will select 4 candidates out of total 7 candidates. The ways of selection are, ${}^7C_4 = {}^7C_3 = (7 \times 6 \times 5) / (1 \times 2 \times 3) = 35$

After doing selection, we can arrange 4 candidates for 4 different posts in $4!$ ways = 24 ways.

So total possible number of ways to fill the posts = $35 \times 24 = 840$

Direct answer: ${}^7P_4 = (7 \times 6 \times 5 \times 4) = 840$

Q.12) Twenty students are participating in a race. In how many ways can the first three prizes be won?

Solution: First of all, we will select 3 candidates from total 20 candidates. The ways of selection are, ${}^{20}C_3 = (20 \times 19 \times 18) / (1 \times 2 \times 3) = 1140$

After doing selection, we can arrange 3 candidates on 3 positions in $3! = 6$ ways.

So total possible number of ways in which the first three prizes can be won = $1140 \times 6 = 6840$.

Direct answer: ${}^{20}P_3 = (20 \times 19 \times 18) = 6840$ ways

Key points related to Permutation & Combination:

- Whenever we want to **arrange n things at n places**, we have total $n!$ ways of arrangement.
- Whenever we have to **select r things out of n**, we have total nC_r ways of selection.
- Whenever we have to **select r things from n and then arrange those r things at r places**, we have total nP_r ways.
- ${}^nC_r = n! / [r! \times (n-r)!]$
- ${}^nC_r = {}^nC_{(n-r)}$
- ${}^nP_r = n! / (n-r)!$

Basics of Probability

A word which can also be used in the place of 'Probability' is 'Chance'. We all are well aware of the word 'chance'. We use it in our daily life. Whatever we do, whatever we observe, there is always a chance that this is going to happen or not. When we want to find out the value of this chance in a quantitative form, at that point of time we use 'Probability' at the place of 'Chance'.

Some basic terms related to probability:

Experiment: Whatever we do, is called experiment.

Outcome: Whatever is the result of the experiment is known as the outcome.

Favourable Outcome: The outcome in which we are interested is known as a favorable outcome.

Total possible outcomes: All possibilities related to the result of the experiment.

If one is aware with all the basic terms of probability, then the probability of any event/experiment can be found out by dividing the favourable outcome by total possible outcomes.

For example: Suppose we have a pack of cards and we want to pick a king of red then there will be less chance that we will pick out the same one. But let us find this quantitatively.

In this example: Experiment – Picking out one card from a pack of 52 cards.

Favourable outcome – Card picked out is red king (King of Heart or Diamond) (Only 2)

Total possible outcomes – Card picked out is any one of the total 52 cards.

Probability = (Favourable outcome / Total possible outcomes)

Combination concept

Combination is also known as collection. Whenever we deal with probability questions, we use only **Combination** concept of 'Permutation and Combination'. The reason is that in probability, we only have to collect or pick the things. We don't arrange them after picking out. So once a student knows the basics of Combination can deal with probability questions in easy way.

The formula used for combination is nC_r

$${}^nC_r = n! / [r! \times (n-r)!]$$

$${}^nC_r = [n \times (n-1) \times (n-2) \times \dots \times (n-r+1) \times (n-r) \times \dots \times 1] / [1 \times 2 \times 3 \times \dots \times r] \times [(n-r) \times \dots \times 3 \times 2 \times 1]$$

$${}^nC_r = [n \times (n-1) \times (n-2) \times \dots \times (n-r+1)] / [1 \times 2 \times 3 \times \dots \times r]$$

For example: ${}^{12}C_2 = 12! / [2! \times (12-2)!] = 12! / (2! \times 10!) = [12 \times 11] / [1 \times 2] = 66$

$${}^5C_2 = [5 \times 4] / [1 \times 2] = 10$$

$${}^nC_r = {}^nC_{(n-r)}$$

For example: ${}^5C_3 = [5 \times 4 \times 3] / [1 \times 2 \times 3] = [5 \times 4] / [1 \times 2] = {}^5C_2 = 10$

$${}^{10}C_7 = {}^{10}C_3 = [10 \times 9 \times 8] / [1 \times 2 \times 3] = 120$$

Various types of probability questions

Let us see how we can solve the probability questions, by taking the example of previous years questions asked in banking exams.

- **When the probability of two or more events is given: In this case, We use multiplication when both the events are going to happen (i.e. when the relation between the events is defined or described using 'and'). We use addition when only one of the events will happen (i.e. when the relation between the events is defined or described using 'or').**

Two people A and B go for an interview, the probability of A clearing the interview is $1/2$ and probability of B clearing the interview is $1/4$.

Q-1) What is the probability that both A and B will clear the interview?

Solution: We will multiply the probability of happening of both the events.

$$(1/2) \times (1/4) = 1/8$$

Q-2) What is the probability that either one of them will clear the interview?

Solution: We will add the probability of happening of both the events.

$$(1/2) + (1/4) = 3/4$$

Q-3) What is the probability that only A will clear the interview?

Solution: We will multiply the probability of happening of event A and non-happening of event B.

$$(1/2) \times [1 - (1/4)] = (1/2) \times (3/4) = 3/8$$

Note: Probability of non-happening of an event is always found out by subtracting probability of happening of that event from 1. The reason is that an event may or may not take place. So probability of happening of the event and non-happening of the event always add up to 1.

Probability of non-happening of an event = 1 – (Happening of an event)

Q-4) What is the probability that only B will clear the interview?

Solution: We will multiply the probability of non-happening of event A and happening of event B.

$$[1 - (1/2)] \times (1/4) = (1/2) \times (1/4) = 1/8$$

- **When we have to choose or pick out things from a bag/group: In this case, we use the concept of combination because we are choosing (selecting) things.**

A bag contains 6 red shirts, 6 green shirts and 8 blue shirts.

Q-5) Two shirts are drawn randomly. What is the probability that both are green?

Solution: Favourable outcome – 2 Green shirts (out of 6)

Total possible outcomes – 2 shirts (out of 20)

$$\text{Probability} = {}^6C_2 / {}^{20}C_2 = [(6 \times 5) / (1 \times 2)] / [(20 \times 19) / (1 \times 2)] = (6 \times 5) / (20 \times 19) = 3/38$$

Q-6) Three shirts are drawn randomly. What is the probability that two are blue and one is red?

Solution: Favourable outcome – 2 blue (out of total 8) **and** 1 red shirt (out of total 6)

Total possible outcomes – 3 (out of 20)

Probability = $({}^8C_2 \times {}^6C_1) / {}^{20}C_3 = (28 \times 6) / 1140 = 14 / 95$

Because we have 'AND' in favourable outcome, so we used multiplication.

Q-7) Two shirts are drawn randomly. What is the probability that both are either red or blue?

Solution: Favourable outcome – 2 red (out of total 6) or 2 blue (out of total 8)

Total possible outcomes – 2 (out of 20)

Probability = $({}^6C_2 + {}^8C_2) / {}^{20}C_2 = (15 + 28) / 190 = 43 / 190$

Because we have 'OR' in favourable outcome, so we used addition.

Q-8) Out of 5 girls and 3 boys, 4 children are to be randomly selected for a quiz contest. What is the probability that all the selected children are girls?

Solution: Favourable outcome – 4 (out of 5)

Total possible outcomes – 4 (out of 8)

Probability = ${}^5C_4 / {}^8C_4 = {}^5C_1 / {}^8C_4 = 5 / 70 = 1 / 14$

- **When dice are thrown:** Concept of combination is not needed in these questions. We normally check the favourable and total possible outcomes by the basic idea of a dice. The total possible outcomes are decided on the basis of no of throws or no of dices used. If two throws are made (or two dices are thrown) then the total possible outcomes can be found out by $6 \times 6 = 36$ (because these are the total possible combinations which can be seen).

Q-9) A die is thrown twice. What is the probability of getting a sum 7 from both the throws?

Solution: Favourable outcome – 6 [(1,6), (2,5), (3,4), (4,3), (5,2), (6,1)]

Total possible outcomes – $6 \times 6 = 36$

Probability = $6 / 36 = 1 / 6$

Q-10) A die is thrown thrice. What is the probability of getting a sum 5?

Solution: Favourable outcomes – 6 [(1,1,3), (1,3,1), (3,1,1), (1,2,2), (2,1,2), (2,2,1)]

Total possible outcomes – $6 \times 6 \times 6 = 216$

Probability = $6 / 216 = 1 / 36$

- **When cards are chosen from a pack of cards:** Here we use the concept of combination because we are choosing (selecting) cards from a whole pack of cards. The total possible outcomes are 52 if only one pack of cards is used.

Q-11) Two cards are picked simultaneously from a pack of cards. What is the probability that both the cards will be queen?

Solution: Favourable outcomes – 2 (out of 4)

Total possible outcomes – 2 (out of 52)

Probability = ${}^4C_2 / {}^{52}C_2 = [(4 \times 3) / (1 \times 2)] / [(52 \times 51) / (1 \times 2)] = (4 \times 3) / (52 \times 51) = 1 / 221$

Q-12) Two cards are picked out one by one from a pack of cards with replacement. What is the probability that both the cards will be queen?

Solution: First pick out –

Favourable outcomes – 1 (out of 4)

Total possible outcomes – 1 (out of 52)

Probability = ${}^4C_1 / {}^{52}C_1 = 4 / 52 = 1 / 13$

Second pick out –

Favourable outcome – 1 (out of 4)

Total possible outcomes – 1 (out of 52)

Probability = ${}^4C_1 / {}^{52}C_1 = 4 / 52 = 1 / 13$

Because both events are happening, so final probability = $(1 / 13) \times (1 / 13) = 1 / 169$

Q-13) Two cards are picked out one by one from a pack of cards without replacement. What is the probability that both the cards will be queen?

Solution: First pick out –

Favourable outcomes – 1 (out of 4)

Total possible outcomes – 1 (out of 52)

Probability = ${}^4C_1 / {}^{52}C_1 = 4 / 52 = 1 / 13$

Second pick out –

Favourable outcome – 1 (out of 3)

Total possible outcomes – 1 (out of 51)

Probability = ${}^3C_1/{}^{51}C_1 = 3/51 = 1/17$

Because both events are happening, so final probability = $(1/13) \times (1/17) = 1/221$

- **When team/group/committee is made with some constraints:** In these questions, we have to find out the probability of different possibilities and we add those probabilities because only one combination of team/group/committee will be formed at a time.

A committee of 3 members is to be made out of 3 men and 2 women.

Q-14) What is the probability that the committee has at least one woman?

Solution: Favourable outcomes – [1(out of 2 women) and 2(out of 3 men)]

Or [2(out of 2 women) and 1(out of 3 men)]

Total possible outcomes – 3 (out of 5)

Probability = $[({}^2C_1 \times {}^3C_2) + ({}^2C_2 \times {}^3C_1)] / {}^5C_3 = [(2 \times 3) + (1 \times 3)] / 10 = (6+3)/10 = 9/10$

Q-15) What is the probability that the committee has at most one woman?

Solution: Favourable outcomes – [0(out of 2 women) and 3(out of 3 men)]

Or [1(out of 2 women) and 2(out of 3 men)]

Total possible outcomes – 3 (out of 5)

Probability = $[({}^2C_0 \times {}^3C_3) + ({}^2C_1 \times {}^3C_2)] / {}^5C_3 = (1+6)/10 = 7/10$

Tips & Tricks to Solve Quadratic Equations

The quadratic equation is an important topic that is asked in the exams under the Quantitative Aptitude Section. In SBI Clerk Prelims Exam, the questions of Quadratic equations were asked. There are high chances that these question will be asked in upcoming State Exams. Usually, 5 questions are asked from this topic. If prepared well, you can easily score 5 marks in this topic with the help of some short tricks.

How to Solve Quadratic Equations?

First and foremost, Relation between X and Y is established only when the relationship is defined for all solutions.

1. Linear Equations: In linear equations, both X and Y have only one value. So relation can be established easily.

$$4X+3Y=18, 7x+5Y= 12$$

$$(4X+3Y= 18) \times 5, (7X+5Y=12) \times 3$$

$$20X+15Y=90 \dots\dots(i)$$

$$21X+15Y=36 \dots\dots(ii)$$

subtracting equation (i) from equation (2)

we get, $X = -54, Y = 78$

Hence, $Y > X$

2.Squares: In this, solutions have both negative and positive value.

$$X^2=1600 \text{ and } Y^2=3600$$

$$X = \pm 40 \text{ and } Y = \pm 60$$

+60 is greater than both -40 and +40, but -60 is less than both -40 and +40. So, the answer will be Cannot be determined.

TRICK: Whenever both equations are given in the square form, our ANSWER will be 'Can't be determined.'

3. Squares and Square root case.

$$X^2=1600 \text{ and } Y = \sqrt{3600}$$

We know that square root always gives a positive value. So, Y will have **ONLY +60 NOT -60**.

$$X = \pm 40 \text{ and } Y = +60$$

+60 is greater than both +40 and -40. Hence $Y > X$.

4. Cubes Case.

$$\text{If } X^3=1331, Y^3=729$$

then, $X=11$ and $Y = 9$

X is greater than Y , so relation is $X > Y$.

If $X^3 = -1331$ and $Y^3 = 729$

then, $X = -11$ and $Y = 9$

X is greater than Y , so relation is $X < Y$.

Note: Can you see something common in above example? Common thing is that when $X^3 > Y^3$, relationship is $X > Y$ and when $X^3 < Y^3$, relation is $X < Y$.

TRICK: When both equations are in cube form. If $X^3 > Y^3$, then $X > Y$ and $X^3 < Y^3$, then $X < Y$.

5. Square and cube cases.

If $X^2 = 16$ and $Y^3 = 64$

then $X = +4, -4$ and $Y = 4$

So, $Y = 4$ is equal to $X = 4$ and $Y = 4$ is greater than $X = -4$.

So, $Y \geq X$

If $X^2 = 25$ and $Y^3 = 64$

then $X = +5, -5$ and $Y = 4$

So, $Y = 4$ is greater than $X = -5$ and less than $X = +5$, So relation Can't be Determined.

Table Method to solve Quadratic Equations Easily

1. Write down the table (given below) before exam starts, in your rough sheet, to use during the exam, Analyse the (+, -) signs in the problem, and refer to the table of signs.
2. Write down the new (solution) signs, and see if a solution is obtained instantly. If not, then go to step 3.
3. Obtain the two possible values for X & Y , from both the equations,
4. Rank the values and get the solution,

STEP 1

Firstly, when you enter the exam hall, you need to write down the following **master table** in your rough sheet instantly (only the signs):-

Let us consider that the equations are $AX^2+BX+C = 0$ and $AY^2+BY+C = 0$

Type of Equation	$AX^2+BX+C = 0$ or $AY^2+BY+C = 0$		Roots in X or Y equation	
	Sign of BX or BY	Sign of C	Sign of bigger root	Sign of smaller root
P	+	+	-	-
Q	-	+	+	+
R	+	-	-	+
S	-	-	+	-

Now we will discuss the cases as mentioned below in the table.

CASE	ROOTS OF X / Y	ROOTS OF X/Y	CONCLUSION
I	+,+ (Q)	+,+ (Q)	Easy
II	+,+ (Q)	+,- (R or S)	Will discuss
III	+,+ (Q)	-,- (P)	Left>Right
IV	+,- (R or S)	-,- (P)	Will discuss
V	+,- (R or S)	+,- (R or S)	Cannot be defined
VI	-,- (P)	-,- (P)	Easy

CASE I: When the result of both equations are Q-type having both roots (+).

(i) If $X^2-5X+6 = 0$

both roots will be positive i.e. +3 and +2

$Y^2-17Y+66 = 0$

both roots will be positive i.e. +11 and +6

We can see that both roots of X are less than both roots of Y. So, $X < Y$.

(ii) If $X^2-17X+42$

both roots will be positive i.e. +14 and +3.

$$Y^2 - 17Y + 66 = 0$$

both roots will be positive i.e. +11 and +6.

Here, +14 > +11

but +14 < +6

also +3 < +11

and +3 < +6

As we can see in the comparison above, there are TWO relations between X and Y which are both > and <. So **relation cannot be defined**.

Note 1: When both equations have BX (-) and C(+), You have to go in detail.

CASE II: When the result of one equation is Q type and another is either R type or S type.

(i) Q type: $Y^2 - 49Y + 444$, Roots are 37, 12

R type: $X^2 + 14X - 1887$, Roots are -51, 37

Now let us compare the values in this table below -

X	RELATION	Y
-51	<	37
-51	<	12
37	=	37
37	>	12

When we compared the values of X and Y in the table above, we found that there are THREE relations between X and Y i.e. =, > and <. So, a relation **cannot be defined**.

(ii) Q type: $X^2 - 5X + 6 = 0$, Roots are 3, 2

R type: $Y^2 - Y - 6 = 0$, Roots are 3, -2

Now let us compare the values in this table below -

X	RELATION	Y
3	=	3
3	>	-2
2	<	3
2	>	-2

When we compared the values of X and Y in the table above, we found that there are TWO relations between X and Y i.e. >, =. **So relation CANNOT BE DEFINED.**

CASE III: When one equation is P-type having both roots (-) another Q type having both roots (+).

(i) P type: $X^2 + 5X + 6 = 0$, Roots are -3, -2

Q type: $Y^2 - 7Y + 12 = 0$, Roots are 4, 3

Comparing the values in the below table -

X	RELATION	Y
-3	<	3
-3	<	2
-2	<	3
-2	<	2

On comparing, we saw that So roots of Y equation are greater than roots of X.

Note: In this case, roots of the equation Q type will always be greater than P-type.

CASE IV: When the result of one equation is P-type having both roots negative and another is either R type or S type having one root (-) and another one (+)

(i) P type: $X^2 + 5X + 6$, Roots are -3, -2

R type: $X^2 - X - 6$, roots are 3, -2

Comparing the values in the below table -

X	RELATION	Y
-3	<	3
-3	<	-2
-2	<	3
-2	=	-2

On comparison of X and Y values, There are THREE relations between X and Y i.e. =, > and <. So relation **cannot be defined**.

(ii) P type: X^2+5X+6 , Roots are -3, -2

R type: X^2-X-6 , Roots are 3, -2

Now let us compare the values in this table below -

X	RELATION	Y
-3	<	3
-3	<	-2
-2	<	3
-2	=	-2

When we compared the values of X and Y in the table above, we found that there are TWO relations between X and Y i.e. <, =. **So, the relation is $X \leq Y$.**

Case V: When the result of both equations are either R type or S type or one equation is R type and another is S type having one root (-) and another root (+).

(i) If $X^2+X-6 = 0$

Roots are -3 and +2.

$Y^2+5Y-66 = 0$

Roots are -11 and +6.

Comparing the values in the below table -

X	RELATION	Y
-3	>	-11
-3	<	+6
+2	>	-11
+2	<	+6

On comparison of X and Y values, there are two relations between X and Y i.e. both > and <. So, the relation **cannot be defined**.

(ii) If $X^2+11X-42$

Roots are -14 and +3

$Y^2+5Y-66 = 0$

Roots are -11 and +6

Comparing the values in the below table -

X	RELATION	Y
-14	<	-11
-14	<	+6
+3	>	-11
+3	<	+6

When we compared the values of X and Y in the table above, we saw that there are two relations between X and Y i.e. both > and <. So, the relation **cannot be defined**.

(iii) If $X^2-X-6 = 0$

Roots are +3 and -2

$Y^2-5Y-66 = 0$

Roots are +11 and -6.

Let us compare the values of X and Y in below table -

X	RELATION	Y
+3	<	+11
+3	>	-6
-2	<	+11
-2	>	-6

As the table shows, there are two relations between X and Y i.e. both > and <. So, relation **cannot be defined**.

(iv) If $X^2-11X-42$

Roots are +14 and -3

$$Y^2-5Y-66 = 0$$

Roots are +11 and -6

We are comparing these roots of X and Y in the table below -

X	RELATION	Y
+14	>	+11
+14	>	-6
-3	<	+11
-3	>	-6

On comparing, there are two relation between X and Y i.e. both > and <. So relation **cannot be defined**.

Note 4: In this case, the answer will always be **CANNOT BE DEFINED**.

CONCLUSION: Whenever in a question, the sign of C is negative (-) in both X and Y equation, then answer will always be **CANNOT BE DEFINED**.

Case VI: When the result of both equations are P-type having both roots (-).

(i) If $X^2+5X+6 = 0$

Both roots will be negative i.e. -3 and -2

$$Y^2+17Y+66 = 0$$

Both roots will be negative i.e. -11 and -6

We can see that both roots of X are greater than both roots of Y. So, **X > Y**.

(ii) If $X^2+17X+42$

both roots will be negative i.e. -14 and -3.

$$Y^2+17Y+66 = 0$$

both roots will be negative i.e. -11 and -6.

On comparing these values of X and Y in the table below -

X	RELATION	Y
-14	<	-11
-14	<	-6
-3	>	-11
-3	>	-6

We found that there are two relations between X and Y i.e. both > and <. So relation **cannot be defined**.

Note 6: When both equations have BX (-) and C(+), You have to go in detail.

Other Examples:

$$2l^4-36l^2+162 = 0 \text{ and } 3m^4-75m^2+432 = 0$$

Solution: Basically this is not a quadratic equation because the maximum power of variable is 4.

But if you suppose l^2 is X and m^2 is Y, then equations will be $2X^2-36X+162=0$ and $3Y^2-75Y+432=0$

Now the converted equations are Q type having all roots positive.

$X = l^2 =$ positive roots, hence **l** will have 2 negative roots and 2 positive roots.

$Y = m^2 =$ positive roots, hence **m** will also have 2 negative roots and 2 positive roots.

So the relation between **l** and **m** cannot be defined.

Basics of Simplification

Simplification generally means to find an answer for the complex calculation that may involve numbers on division, multiplication, square roots, cube roots, plus and minus.

Simplification questions are asked in the exam to check the ability of an aspirant to deal with numbers which can be in one of the following two types.

- Sometimes, a calculation is given and one of the numbers is missing from the calculation. To find out the missing number, we have to approximate the given numbers or do the basic operations.

- Sometimes all the numbers are given with some operations between them & we have to simplify the calculation.

Rules related to Simplification

Rule-(I) Replace 'of' by 'Multiplication' & '/' by 'Division'.

Explanation: Whenever we find 'of' in a simplification problem, we can replace that by 'multiplication(*)'. Similarly '/' can be replaced by '÷'.

Example: Find $\frac{1}{4}$ of 20

Solution: $(\frac{1}{4}) \times 20 = 20 \div 4 = 5$

Rule-(II) Always keep in mind the "BODMAS" rule. These operations have priorities in the same order as mentioned.

Explanation: Whenever we have more than one operation in the given calculation, we have to do the operations according to the priority specified by 'BODMAS'

- B-Bracket
- O-Of (means multiplication)
- D-Division
- M-Multiplication
- A-Addition
- S-Subtraction

Example: Simplify: $(2+3)*30$

Solution: In this question, we have two things-Bracket & Multiplication. According to the BODMAS rule, we have to solve bracket first and not multiplication. So now coming to bracket, we have only one operation-Addition, so we will do addition.

$$(2+3)*30 = 5*30$$

Now we have only one operation to do – Multiplication

$$5*30 = 150$$

Example: Simplify: $(2+5)$ of 80

Solution: In this question, we have three things – bracket, addition & of. Replacing 'of' by 'multiplication'.

$$(2+5) \text{ of } 80 = (2+5)*80$$

Now we have three things – bracket, addition & Multiplication. According to the BODMAS rule, we have to solve bracket first and not multiplication. So now coming to bracket, we have only one operation-Addition, we will do addition.

$$(2+5)*80 = 7*80$$

Now we will do multiplication.

$$7*80 = 560$$

Rule-(III) Multiplication & Division have the same priority(Do that operation first which is on left)

Explanation: Though division has more priority than multiplication according to 'BODMAS' but we can perform any of the two operations first if multiplication is on left.

Example: $8*30/15$

$$8*30 \div 15$$

Solution: In this question, we have two things – Multiplication & Division. Multiplication is on left So we can perform that first.

Doing Multiplication first:

$$240 \div 15$$

$$16$$

Doing division first:

$$8*2$$

$$16$$

Rule-(IV) Addition & Subtraction have the same priority.

Explanation: Though addition has more priority than division according to 'BODMAS' but we can perform any of the two operations first.

Example: 30+40-15

Solution: In this question, we have two things – Addition & Subtraction. So we can perform any operation first as they have same priority.

Doing Addition first:

$$\begin{array}{r} 70 - 15 \\ 55 \end{array}$$

Doing Subtraction first:

$$\begin{array}{r} 30 + 25 \\ 55 \end{array}$$

Rule-(V) Don't hesitate in rounding the numbers to nearest integers.

Explanation: Most of the times the numbers are given in such a way that you can round them quickly and get the answer (Rounding should be done or not, It can be realised by looking at the given options).

Example: (324.5*15)/(5.01*24.98)

Solution: $(325*15)/(5*25)$

$$= 13*3$$

$$= 39$$

Now let us see some of the previous year questions asked from 'Simplification' & try to apply the rules learnt so far.

Q. 1) $(17 - 13)^4 - 17^4 - 13^4 - [-52(17)^3 - 68(13^3)] = (?) * 221$

Using formula: $(a - b)^4 = a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4$

$$\Rightarrow (a - b)^4 - a^4 + 4a^3b + 4ab^3 - b^4 = +6a^2b^2$$

$$(17 - 13)^4 - 17^4 - 13^4 - [-52(17)^3 - 68(13^3)] = (?) * 221$$

Here, $a = 17$ and $b = 13$

$$\Rightarrow (?) = (6(17)^2(13)^2)/221$$

$$\Rightarrow (?) = (6 \times 289 \times 169)/221$$

$$\Rightarrow (?) = 1326$$

Q.2) Simplify: $127.001 * 7.998 + 6.05 * 4.001$

1. 1000
2. 1020
3. 1040
4. 1080
5. None of these

Solution: Using the rounding concept

$$127 * 8 + 6 * 4$$

Using the BODMAS rule

$$1016 + 24$$

$$1040 \text{ (Option 3)}$$

Q.3) What will come at place of ?: $9876 \div 24.96 + 215.005 - ? = 309.99$

1. 270
2. 280
3. 290
4. 300
5. 310

Solution: Using the rounding concept

$$9875 \div 25 + 215 - ? = 310$$

Using the BODMAS rule

$$395 + 215 - ? = 310$$

$$610 - ? = 310$$

$$? = 300 \text{ (Option 4)}$$

Q.4) What will come at place of a: $(128 \div 16 \times a - 7*2)/(7^2 - 8*6 + a^2) = 1$

1. 1
2. 5

3. 9
4. 13
5. 17

Solution: Using the BODMAS rule

$$(8a - 14)/(49 - 48 + a^2) = 1$$

$$(8a - 14)/(1 + a^2) = 1$$

$$8a - 14 = 1 + a^2$$

$$a^2 - 8a + 15 = 0$$

$$a = 3 \text{ or } 5 \text{ (Option 2)}$$

Q.5) What will come at place of ? : $85.147 + 34.192 \times 6.2 + ? = 802.293$

1. 400
2. 450
3. 550
4. 600
5. 500

Solution: Using the rounding concept

$$85 + 35 \times 6 + ? = 803$$

Using the BODMAS rule

$$85 + 210 + ? = 803$$

$$295 + ? = 803$$

$$? = 508 \text{ [approx. = 500] (Option 5)}$$

Q.6) What will come at place of ? : $(3/8 \text{ of } 168) \times 15 \div 5 + ? = 549 \div 9 + 235$

1. 189
2. 107
3. 174
4. 296
5. None of these

Solution: Using the BODMAS rule

$$(3 \times 168 \div 8) \times 15 \div 5 + ? = 549 \div 9 + 235$$

$$(504 \div 8) \times 3 + ? = 61 + 235$$

$$63 \times 3 + ? = 296$$

$$189 + ? = 296$$

$$? = 107 \text{ (Option 2)}$$

Key points to remember while solving Simplification Question

- Replace 'of' by 'Multiplication'
- Replace '/' by 'Division'
- Always do the operations in priority according to 'BODMAS'
- Division & Multiplication have the same priority (Start from left)
- Addition & Subtraction have the same priority
- Rounding can be done to simplify problems
- When the given options are very close then rounding doesn't help much
- Always look at the options before doing simplification that can help in the elimination of options.

How to Solve Mensuration Questions?

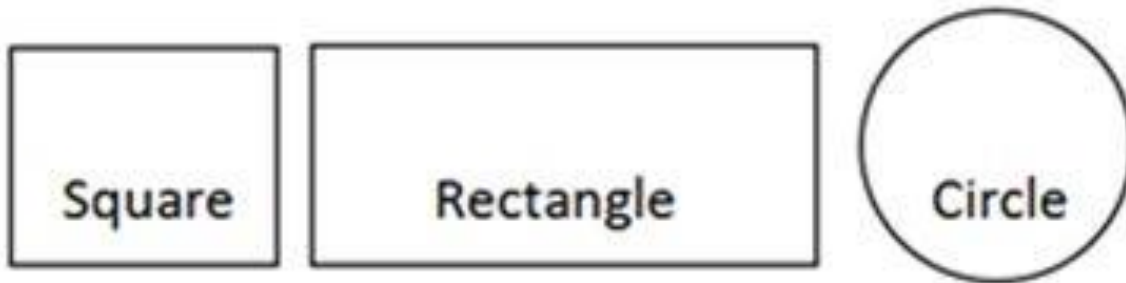
To make the chapter easy for you all, we are providing you with all some **Important Short Tricks to Mensuration Questions** which will surely make the chapter easy for you all.

About Mensuration:-

Mensuration questions are an important part of the **Quant section** in the CSAT exam. Mensuration question asked in the CSAT exam related to **Perimeter and Area**.

About Perimeter & Area:-

To put simply, Area measures the area of shape i.e. the space that shape takes up. Perimeter is the measurement of the boundary of the figure.



1. Square:- A square four-sided polygon characterized by right angles and sides of **equal length**.

$$\text{Area} = \text{side}^2,$$

$$\text{Perimeter} = 4\text{side}$$

2. Rectangle:- A four-sided flat shape with straight sides where all interior angles are right angles (90°). Also, the opposite sides are parallel and of equal length.

$$\text{Area} = \text{Length} \times \text{Breadth},$$

$$\text{Perimeter} = 2(L+B)$$

3. Circle:- Circle is the locus of points equidistant from a given point, the centre of the circle. The common distance from the centre of the circle to its points is called the radius

$$\text{Area} = \pi(\text{radius})^2,$$

$$\text{Perimeter} = 2\pi\text{radius}$$

Let's look at some questions asked:-

Que 1. The length of the rectangular plot is 20 m more than its breadth. If the cost of fencing the plot @ Rs. 26.50 per meter is Rs. 5300, what is the length of the plot?

Sol. Cost = Rate \times Perimeter

$$\Rightarrow \text{Perimeter} = 5300/26.50 = 200$$

$$\Rightarrow 2(L + B) = 200$$

$$\Rightarrow 2(L + L - 20) = 200$$

$$\Rightarrow L - 10 = 50$$

$$\Rightarrow L = 60 \text{ m}$$

Que 2. If the length is to be increased by 10% and breadth of a rectangle plot to be decreased by 12%, then find % change in area?

Sol:- In such questions, use formula: Increment in area = $[L\% + B\% + \{(L\% \cdot B\%) / 100\}]$
Increment in area = $10 - 12$ (because breadth is decreased) $\{+ 10 + (-12) \cdot (-120/100)\} = -3.2\%$

Que 3. The length of rectangular plot is increased by 60%. By what percentage should the width be decreased to maintain the same area?

Sol:- In such questions, use the formula:

Required % decrease in breadth = $[\% \text{change in } L \{100 / (100 + \% \text{change in } L)\}]$

Required % decrease in breadth = $60 (100/160) = 37.5\%$

Que 4. If the radius of the circle is increased by 5% find the percentage change in its area.
In such questions, use formula:

Sol:-

Change in area = $(2x + x^2/100) \%$

Change in area = $2 \times 5 + 5^2/100 = 10 + \frac{1}{4} = 10.25\%$ increment.

Note: In such questions, the negative sign implies decrements while positive sign shows increment.

Que 5. The circumference of a circle is 100 cm. Find the side of the square inscribed in the circle.

Sol. Always use this formula, Side of a square inscribed in a circle of radius **$r = \text{Root } 2$**

Circumference = 100 $\Rightarrow 2\pi r = 100$

$r = 50/\pi$

Side of square = **$\text{Root } 2 (50/\pi)$**

Note: Similar formula:

1) Area of the largest triangle inscribed in a semi-circle of radius **$r = r^2$**

2) Area of the largest circle that can be drawn in a square of side **$x = \pi(x/2)^2$**

Que 6. The length and breadth of the floor of the room are 20 by 10 feet respect. Square tiles of 2 feet are to be laid. Black tiles are laid in the first row on all sides, white tiles on $1/3^{\text{rd}}$ of remaining sides and blue tiles on the rest. How many blue tiles are required?

Sol:- Side of a tile = 2 feet \Rightarrow Area of 1 tile = $2^2 = 4$ sq ft. ----- (1)



Length left after lying black tile on 4 sides = $20 - 4$

⇒ Area left after black tiles = $(20 - 4) \times (10 - 4) = 96$ sq. ft.

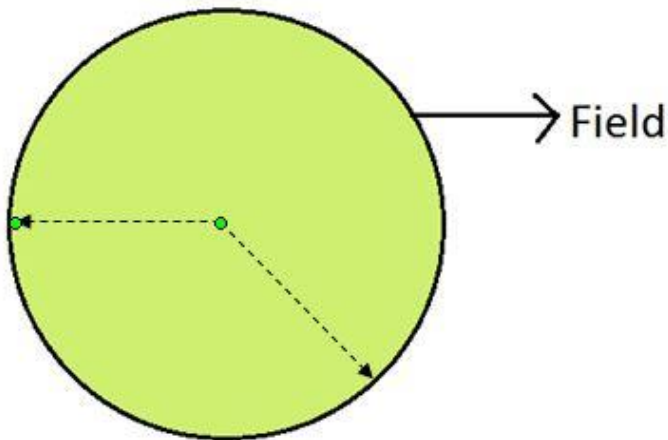
Area left after white tiles = $\frac{2}{3} \times 96 = 64$ sq. ft.

⇒ Area for blue tiles = 64 sq. ft.

Number of blue tiles = $64/4 = 16$ (using 1)

Que 7. A cow is tethered in the middle of the field with a 14 ft long rope. If the cow grazes 100 sq. ft. per day, then the approximate time is taken to graze the whole field?

Sol: Here, the rope of cow is like radius



$$\text{Area} = \pi (14)^2$$

$$\text{No. of days} = (\text{Area of field}) / \text{Rate of cow} = \pi (14)^2 / 100 = 6 \text{ days (approx)}$$

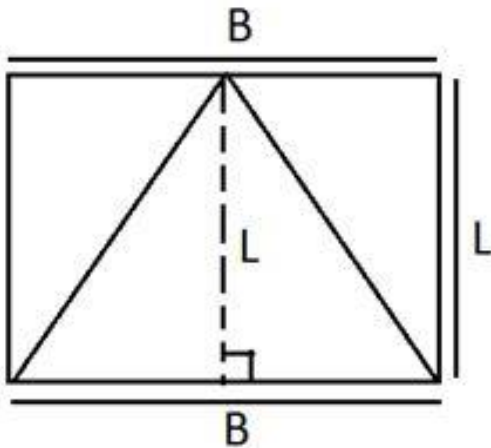
Que 8. A circle and a rectangle have the same perimeter. Sides of the rectangle are 18 by 26 cm. What is the area of the circle?

Sol:- $2\pi r = 2(18 + 26) \Rightarrow r = 14$ cm

$$\text{Area} = \pi r^2 = 616 \text{ cm}^2$$

Que 9. What will be the ratio between the area of a rectangle and the area of a triangle with one of the sides of the rectangle as a base and a vertex on the opposite side of the rectangle?

Sol:-



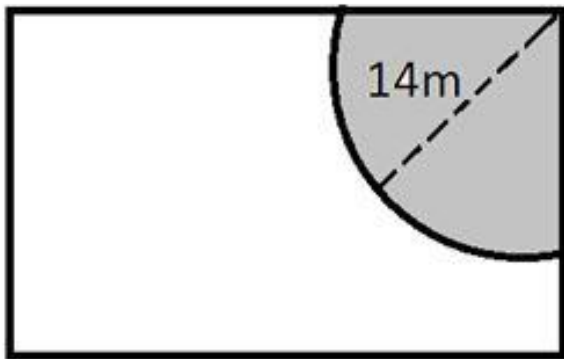
Area of triangle = $\frac{1}{2} \times L \times B$

Area of rectangle = $L \times B$

Area of a rectangle: area of a triangle = $L \times B$: $\frac{1}{2} \times L \times B = 2:1$

Que 10. In a rectangular plot, a cow is tied down at a corner with a rope of 14m long. Find the area that cow can graze?

Sol. The area that cow can graze can be illustrated as the shaded area:



Here, the shaded area is a quarter of a circle with radius 14m,

Area of grazed field = $\frac{1}{4} \times \pi (14)^2 = 154 \text{ m}^2$

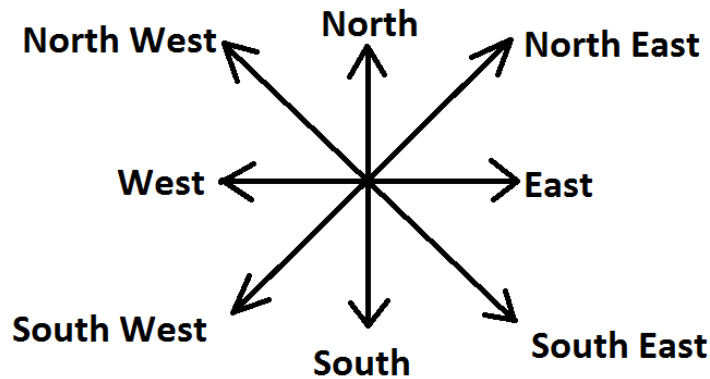
Logical Reasoning

Direction Sense Test

As the name of the topic clearly explains that we deal with finding distance or direction in the questions of this topic. But for dealing with the questions from this topic, we must have a very clear idea about two things.

- Basic Directions
- Pythagoras theorem

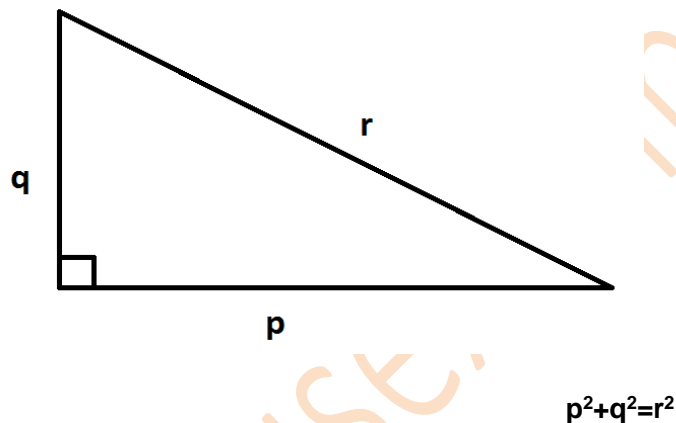
1. Basic Directions: We have 8 basic directions which should be crystal clear to us for attempting distance and direction questions.



One key point that should be kept in mind is that If not mentioned we always assume that the person is facing north.

2. Pythagoras theorem: According to this theorem, "The square of Hypotenuse is always equal to the sum of the squares of the other two sides of the right angle triangle".

Suppose we have a triangle having base p , height q and hypotenuse r . Then according to this theorem:



Now you have the basics required to attempt Distance & Direction questions. So let us try to look at a few questions on the same so that you will get to know the proper approach to solve these questions.

Some other basics:

1. B is to the east of A.



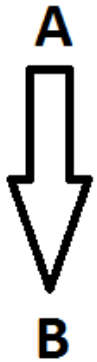
2. B is to the west of A.



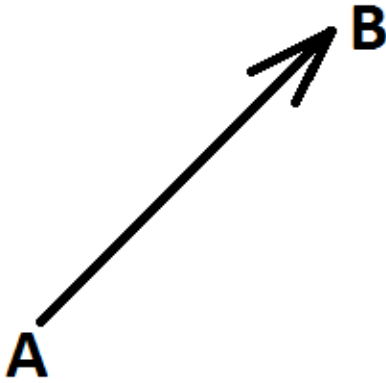
3. B is to the north of A.



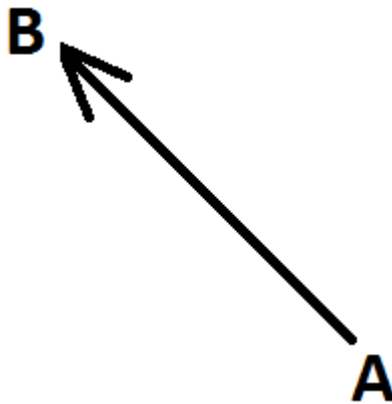
4. B is to the south of A.



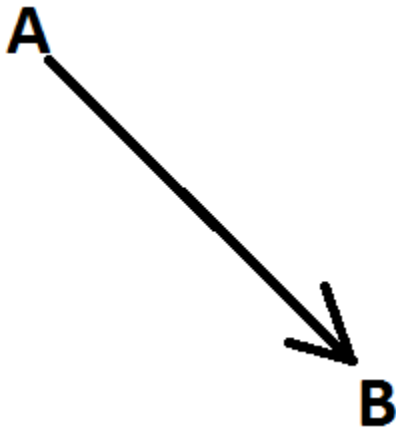
5. B is to the North East of A.



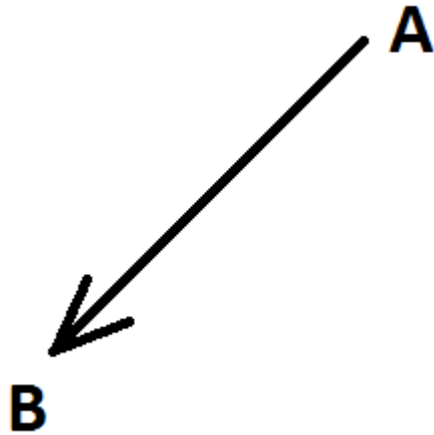
6. B is to the North West of A.



7. B is to the South East of A.



8. B is to the South West of A.



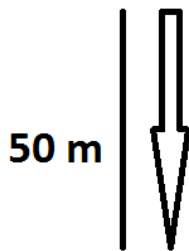
Direction: Ashok started walking towards the South. After walking 50 meters he took a right turn and walked 30 meters. He then took a right turn and walked 100 meters. He then took a left turn and walked 30 meters and stopped. How far and in which direction was he from the starting point?

Solution:

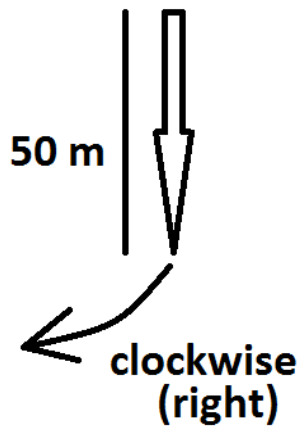
Ashok started walking towards the south.



After walking 50 meters...

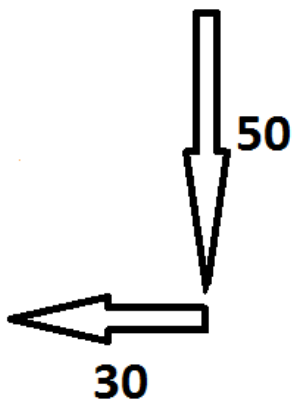


..he took a right turn...

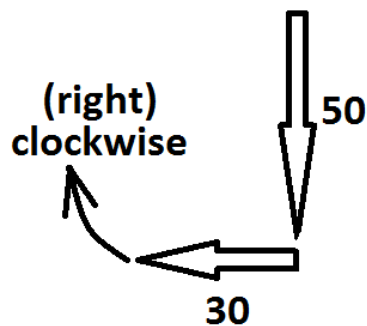


Some people have doubt in deciding left or right in direction questions; they can replace **right by clockwise** and **left by anticlockwise**. So now moving right (clockwise) from the tip of the arrow.

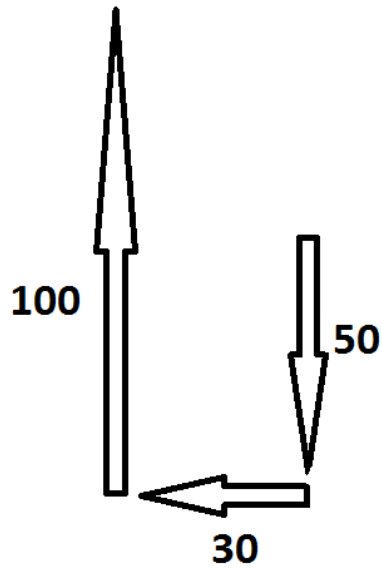
...and walked 30 meters.



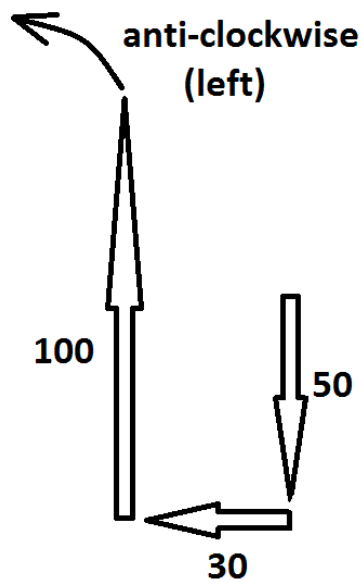
He took a right turn...



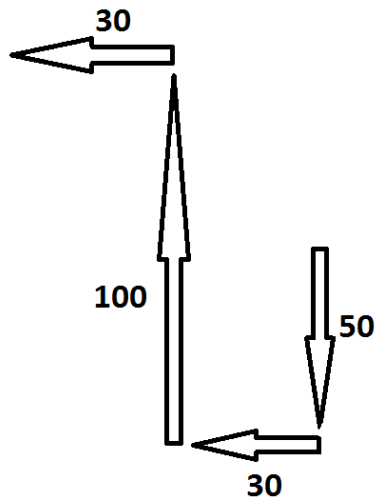
...and walked 100 meters.



He took a left turn...



...and walked 30 meters.



Now for finding how far he has moved, we will check two things:

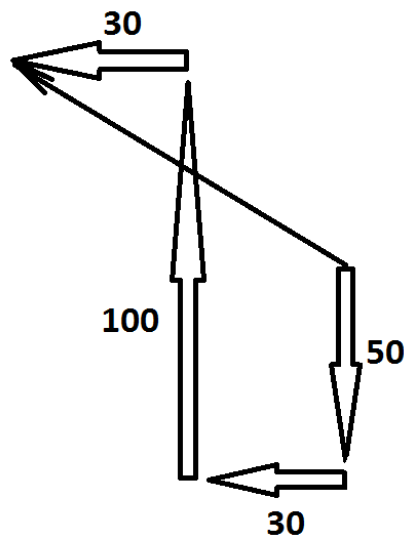
- Horizontal displacement
- Vertical displacement

$$\text{Horizontal displacement} = 30 + 30 = 60\text{m}$$

$$\text{Vertical displacement} = 100 - 50 = 50\text{m}$$

$$\text{Final displacement} = \sqrt{(60^2 + 50^2)} = \sqrt{(3600 + 2500)} = \sqrt{6100} = 10\sqrt{61} \text{ m}$$

Now for finding the direction with reference to the initial position, we will draw a line joining two points which will give us the direction.



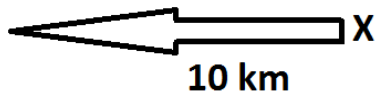
We can clearly see that the direction in which Ashok moved is northwest.

So the final answer for this question will be "Ashok moved $10\sqrt{61}$ meters in northwest direction".

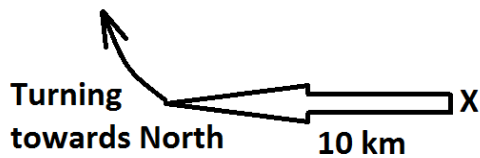
Directions: Jay starts his van from point X and covers a distance of 10 km towards west, then he turns north and covers a distance of 7 km. Again, he takes a right turn and covers 25 km. Now he covers 6 km, after taking a left turn. At last, he takes a left turn and covers 15 km and stops at point Z.

Solution:

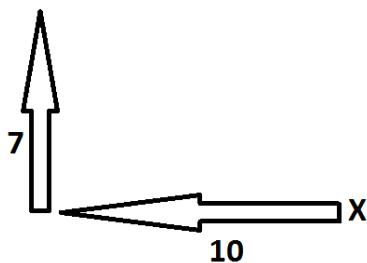
Jay starts his van from point X and covers a distance of 10 km towards west



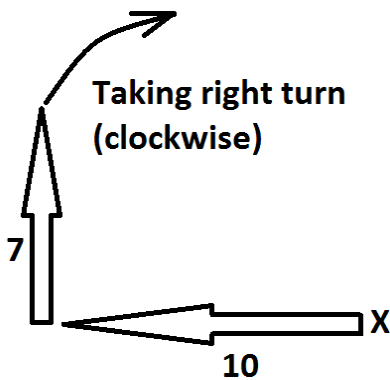
then he turns north



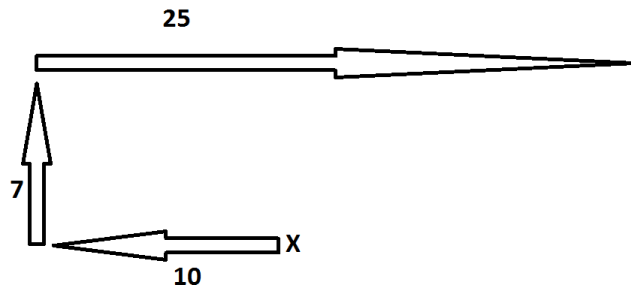
and covers a distance of 7 km



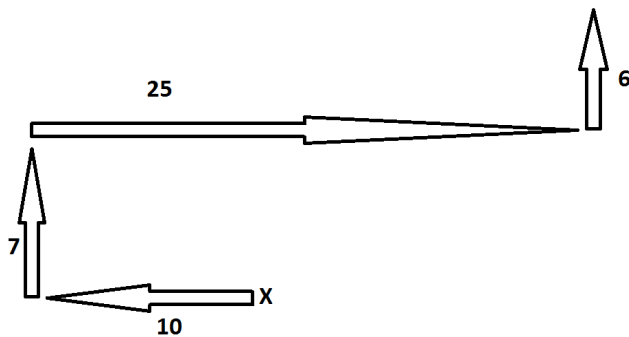
Again, he takes a right turn



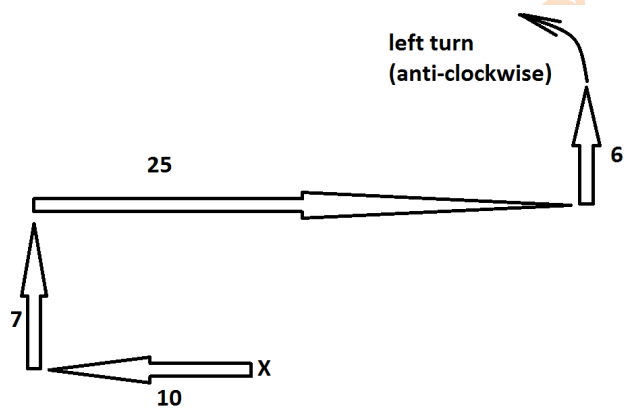
...and covers 25 km



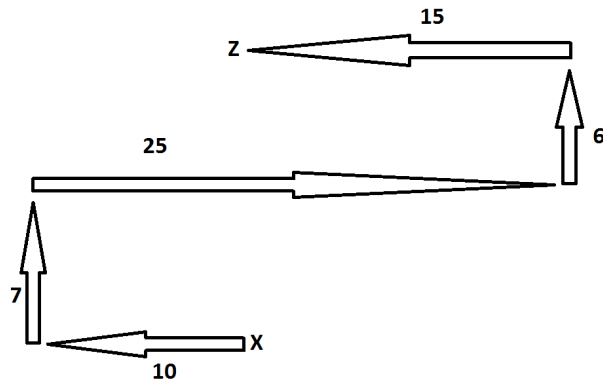
Now he covers 6 km, after taking a left turn.



At last, he takes a left turn...



...and covers 15 km and stops at point Z.



Q. Towards which direction was the van running before stopping at point Z?

1. North
2. East
3. West
4. South
5. None of these

Solution: We can clearly see that van was running towards the west before stopping at point Z.

So the correct answer is C.

Q. How far is Jay from point X?

1. 23 km
2. 25 km
3. 17 km
4. 50 km
5. None of these

Soution:

Horizontal movement = $10 - 25 + 15 = 0$ kms

Vertical movement = $7 + 6 = 13$ km

So final movement = $\sqrt{0^2 + 13^2} = \sqrt{169} = 13$ km

Direction of movement is North.

Question - Point B is $40\sqrt{2}$ m to the East of point A. Point C is 50m in the direction, which is 225° anticlockwise north of point B. Point D is 30m to the North-East of point C. Rahul started from point A, after crossing point B reaches to point E in the east of point A. He took a right turn and after walking some distance he reaches to point D. find the total distance travelled by him?

Solution - Let us first draw some lines and take points, F and G such that Line CF is perpendicular to BE and also line DG is the extension of line CD, which meets at G when BE line is extended in east direction of point E.

The required length is AB + BE + ED, we know the length of AB that is 40m. We are required to find BE and ED.

For BE and ED:-

In triangle BCG, Angle C is 90 degree, angle B and G are of 45 degrees, and the total length of line CG must be 50m (symmetry).

$$BG^2 = BC^2 + CG^2 \text{ (PT theorem)}$$

$$BG^2 = 50^2 + 50^2 = 2 \times 50^2$$

$$BG = 50\sqrt{2}$$

$$\text{Length of DG} = CG - CD = 50 - 30 = 20\text{m.}$$

In triangle DEG

$$DE/DG = \sin 45$$

$$DE/20 = 1/\sqrt{2}, DE = 20/\sqrt{2} = 10\sqrt{2}$$

$$EG/DG = \cos 45$$

$$EG/20 = 1/\sqrt{2}, EG = 20/\sqrt{2} = 10\sqrt{2}$$

$$\text{The length BE} = BG - EG = 50\sqrt{2} - 10\sqrt{2} = 40\sqrt{2}$$

$$\text{Total Distance covered by him} = AB + BE + ED = 40\sqrt{2} + 40\sqrt{2} + 10\sqrt{2} = 90\sqrt{2}$$

Shadow Based Concepts of Direction Sense

In Morning (During Sunrise)

The sun rises in East direction. At the time of the sunrise/ morning, if a man is standing, the shadow of a man always falls on West.

In Evening (During Sunset)

The sun rises in the West direction. At the time of the sunset/ evening, if a man is standing, the shadow of a man always falls on East.

At 12'o clock

There is no shadow at this time. At this time, the sun is exactly above our head, so no shadow is formed at 12'o clock.

Question: One morning, Sonu and Akhil were standing to face each other. Sonu's shadow fell towards his right. Which direction was Akhil facing?

Solution - In the morning the sun is in the East so the shadow will form in the West. Thus, Sonu's right is west i.e Sonu is facing south. Hence, Akhil is facing north.

Key points related to Distance & Direction

- Always remember the basic directions.
- Pythagoras theorem is valid only for a right-angle triangle.
- The direction of the right turn is always in the clockwise direction.
- The direction of the left turn is always in an anti-clockwise direction.
- The direction of the North is to the upwards side.
- The Direction of East is to the right.
- The direction of the West is to left.
- Always approach the question step by step.
- In the End, join the initial and final point to get to know the distance and relative direction.
- If in any of the questions, the relative direction is given. i.e. P is to the north of Q, then you can use the basic directions to get the location of P and Q.

Basics of Coding-Decoding

Let's see various types of questions from coding-decoding one by one.

Type I: Sometimes the alphabets are replaced by some other alphabets in a given word and thus a coded word is obtained. The alphabets replacement occurs according to some pattern. We have to observe that pattern and implement the same in the question asked.

Q-1. In a certain coding language, 'WISDOM' is written as 'OMFQKU' then how will 'WATER' be written in that language?

Solution:

After proper observation, we can see that:

W-2=U

I+2=K

S-2=Q

D+2=F

O-2=M

M+2=O

And now the coded alphabets are written in reverse order. i.e. OMFQKU

The same pattern will be used for finding the code for WATER

W-2=U

A+2=C

T-2=R

E+2=G

R-2=P

And now the coded alphabets are written in reverse order. i.e. PGRCU. So this is the coded word for WATER.

Type II: Sometimes the alphabets in the word are directly replaced by some numbers or symbols. Generally more than one example of such conversion is given which helps us in identifying the coded number/symbol sequence for the asked question.

Q-2. If 'APPLE' is coded as 14489 and 'BANANA' is coded as 315151 THEN how will 'PALE' be coded?

1. 1489
2. 1589
3. 5189
4. 4189
5. None of these

Solution:

In the given question, code for APPLE and BANANA are given which enables us to get the code for each of the alphabet for word 'PALE'.

Note: We can find code for any word consisting alphabets A,P,L,N,B,E.

A-1

P-4

L-8

E-9

B-3

N-5

Then 'PALE' will be coded as

P-4

A-1

L-8

E-9

So the answer is '4189'

Type III: Sometimes the coding is not at alphabetical level while it is given directly for the words.i.e. one word is replaced by some other word. So we have to be careful while giving the answer because we have to write the coded word as the answer for the one which is logically the answer.

Q-3. If 'RED' is called 'WHITE', 'WHITE' is called 'BLUE', 'BLUE' is called 'GREEN' and 'GREEN' is called 'BLACK', then what will be the colour of blood?

1. RED
2. WHITE
3. GREEN
4. BLUE
5. BLACK

Solution:

In this example, logically the color of blood should be RED but we have to write the coded word for the word RED which is WHITE. So WHITE is the answer for this question.

Type IV: (In trend) In some of the questions, three or four complete messages are given in the coded language and the code for a particular word is asked. To analyse such codes, any two messages bearing one or more common words are picked up so that we can extract the coded words for the actual words. Proceeding similarly by picking up all possible combinations of two, the entire message can be analysed and all the words can be decoded.

Directions: In a certain coded language:

1. 'money is not everything' is written as 'ma pa na ra',
2. 'everything is important' is written as 'na ma ta',
3. 'something is not right' is written as 'pa na ga sa'

Solution:

From first two statements, we can infer that 'everything is' is written as 'ma na'

From first and third statements, we can infer that 'is not' is written as 'pa na'

From these two conclusions, we can infer that

'is' is written as 'na'

'everything' is written as 'ma'

'not' is written as 'pa'

Now we can look at first statement and infer that

'money' is written as 'ra'

Now we can look at second statement and infer that

'important' is written as 'ta'

'Something right' is written as 'ga sa'

Q-4. What is the code for 'important' in the given coded language?

1. na
2. ma
3. ta
4. ra
5. None of these

Solution:

The answer for this question will be 'ta'.

Q-5. What is the code for 'not' in the given coded language?

1. na
2. sa
3. ga
4. pa
5. None of these

Solution:

The answer for this question will be 'pa'.

Q-6. What may be the possible code for 'something is everything'?

1. ga na sa
2. ga pa sa
3. ga ma pa
4. sa ma na
5. None of these

Solution:

'is' is written as 'na'

'everything' is written as 'ma'

'something' is written as either 'ga' or 'sa'

So code for 'something is everything' can be either 'na ma ga' or 'na ma sa'.

So option 4 is correct answer.

Type V: Sometimes the code for various digits is given in a tabular form followed by some rules. The questions consist of a series of the digits (from the table) and the rules specify the modification in the digits while writing the code for the series given. We have to check all the rules while writing the code for the given series of digits.

Directions: In these questions a group of digits is given followed by four combinations of letters and symbols numbered (1), (2), (3) and (4).

Digits are to be coded as per the scheme and conditions given below. You have to find out which of the four combinations correctly represents the group of digits. Serial number of that combination is your answer. If none of the combinations is correct, your answer is (5) i.e., 'None of these'.

Digit	: 5 1 2 8 6 3 9 0 4 7
Letter/Symbol Codes :	H \$ T A U % # F R @

Rules:

- (i) If first digit is odd and the last digit is even their codes are to be interchanged.
- (ii) If the first as well as the last digit is even both are to be coded as *
- (iii) If the first digit is even and the last digit is odd both are to be coded as the code for last digit.

Q-7. what will be the code for '471536'?

1. *@\$H%*
2. R@\$H%U
3. U@\$H%U
4. R@\$H%R
5. None of these

Solution: The first as well as last digit in '471536' is even so condition (ii) follows which specifies that we will have to * as a code for both 4 and 6 while the code for other digits will be as per the given table.

4	7	1	5	3	6
↓	↓	↓	↓	↓	↓
*	@	S	H	%	*

So option 1 is correct answer.

Q-8. what will be the code for '697845'?

1. U#@ARU
2. U#@ARH
3. H#@ARH
4. R#@ARU
5. None of these

6	9	7	8	4	5
↓	↓	↓	↓	↓	↓
H	#	@	A	R	H

Solution: The first digit in '697845' is even while the last digit is odd so condition (iii) follows which specifies that we will have to code both 6 and 5 as per the code of 5 using table while the code for other digits will be as per the given table.

So option 3 is correct answer.

Q-9. what will be the code for '590247'?

1. @#FTRH
2. H#FTR@
3. H#FTRH
4. @#FTR@
5. None of these

Solution: The first as well last digit in '590247' is odd so no condition follows which means that the code for all the digits will be as per the given table.

5	9	0	2	4	7
↓	↓	↓	↓	↓	↓
H	#	F	T	R	@

So, option 2 is the correct answer.

How to solve Blood Relation Questions easily?

Family or Blood Relationship means persons connected by relations like – father-mother, son daughter, brother-sister, grandfather-grandmother, uncle-aunty, nephew-niece, brother-in-law sister-in-law etc. The list can go on and on adding members from father's side and mother's side etc.

Questions in Test of Reasoning on Family /Blood Relationship are about the relationship of a particular person with another person of the family, based on the chain of relationships between other members of that family

Family/Blood Relation Tests are an exercise to test the candidate's ability to comprehend and come to the crux of an issue from complex, lengthy and unclear data.

Example 1: 'Ram' is the father of 'Kusha' but 'Kusha' is not his son. 'Mala' is the daughter of 'Kusha'. 'Shalaka' is the spouse of 'Ram'. 'Gopal' is the brother of 'Kusha'. 'Hari' is the son of 'Gopal'. 'Meena' is the spouse of 'Gopal'. 'Ganpat' is the father of 'Meena'. Who is the granddaughter of 'Ram'?

- (1) Hari
- (2) Mala
- (3) Meena
- (4) Shalaka

Solution:

'Mala' is the daughter of 'Kusha' and 'Ram' is the father of 'Kusha'. So, 'Mala' is the granddaughter of 'Ram'. Hence, the answer is (2) Mala.

Some Common Terms

Meaning of some terms often used in questions on the family relationship are given below:

- a) **Parent** – Mother or father
- b) **Child** – Son or daughter (even if an adult)
- c) **Sibling** – Brother or sister (Including half brother and half sister - one parent in common)
- d) **Spouse** – Husband or wife

Basic Relationships:-

Aunt, Uncle, Niece, and Nephew

- *Most English speakers use “uncle” for any of four relationships: father’s brother, mother’s brother, father’s sister’s husband, or mother’s sister’s husband.*
- **Again, “aunt”** in English could mean father’s sister, mother’s sister, father’s brother’s wife, or mother’s brother’s wife.
- Brother’s or sister’s son is called nephew. Brother’s or sister’s daughter is called niece.
- Children of aunt or uncle are called cousins.

Relationships Involving the Term ‘-in-law’

General

- Any relationship term ending with -in-law indicates that the relationship is by marriage and not by blood. In other words, -in-law will be a blood relative of the spouse.
- In-law relationship terms are always written with hyphens. And the plural is formed on the part before the “-in-law”;

For example, “brothers-in-law” and not “brother-in-law”. The only exception is the general term “in-laws”, which is always plural.

Father-in-law, Mother-in-law, Son-in-law and Daughter-in-law

- Father-in-law is the father of spouse; mother-in-law is the mother of spouse. If parents get divorced and remarry, their new spouses are called stepparents, not mother-in-law and father-in-law.
- The husband of daughter is son-in-law; the wife of son is daughter-in-law. If spouse has children from a previous marriage, those are called stepchildren, not sons-in-law or daughters-in-law. The person is their stepfather or stepmother, not their father-in-law or mother-in-law.

Brother-in-law and Sister-in-law

- **Brother-in-law” and “Sister-in-law”** each have two or three meanings as follows:

- a) Sister-in-law could be

- i) The sister of spouse, or
 - ii) The wife of brother, or
 - iii) The wife of spouse's brother.
- b) Similarly, Brother-in-law could be
- i) The brother of spouse, or
 - ii) The husband of sister, or
 - iii) The husband of spouse's sister.

Relationships Involving the Terms 'Grand' and 'Great'

- The relationships of the second generation are prefixed with the word Grand.
- Similarly, for a person, the first generation above him would be that of his/her parents (Father/ Mother). The next/second generation above him/her would be the parents of the parents who would be called Grand Parents/ Grand Father/ Grand Mother of that person. The next/ third generation parents would be called Great Grand Parents/ Great Grand Father/ Great Grand Mother of that person.
- **This also applies to the collateral relationships.**

For example Son of nephew of a person is called Grand Nephew; Brother of Grand Father is called Grand Uncle and so on.

- The fourth generation relationships are called Great Great Grand. For example, Son of Great Grand Son is Great Great Grand Son.

There are two ways Martha could have a stepsister:

a) If Martha's mother marries second time, and her new husband (Martha's new stepfather) already has a daughter from a previous marriage, that daughter is Martha's stepsister because one of her parents is married to one of Martha's parents.

b) If Martha's father marries second time, and his new wife already has a daughter, that daughter is again Martha's stepsister.

Summary of Some Common Relationships

- Summary of some common Relationships is given below in tabular forms:

Details of Relationship	Relation
Mother's or Father's son	Brother
Mother's or Father's daughter	Sister
Mother's or Father's father	Grandfather
Mother's or Father's mother	Grandmother
Son's wife	Daughter-in-law
Daughter's husband	Son-in-law

Husband's or Wife's sister	Sister-in-law
Husband's or Wife's brother	Brother-in-law
Brother's or Sister's son	Nephew
Brother's or Sister's daughter	Niece
Uncle or Aunt's daughter or son	Cousin
Brother's wife	Sister-in-law
Sister's husband	Brother-in-law
Grandson's or Granddaughter's son	Great Grandson
Grandson's or Granddaughter's daughter	Great Granddaughter

Data Sufficiency

So let's have a look at the approach you should follow while solving these questions -

- The first and foremost thing to do is go through the complete question properly first. You'll be able to make out what data is required to arrive at the answer to the question and then proceed to the statements that have been provided.
- Try to recall if you have approached the similar question in past and go ahead and follow the same approach while taking the exam.
- Remember, **you don't have to solve the question completely.**
- All you need to do is figure out if the data that has been provided to you is sufficient to answer the question. This saves the time that is spent on calculations or the complete solution.
- **Analyse each statement separately first.**
- If both the statements aren't providing sufficient information to answer the question, then take the details provided in both the statements and check if the information together is sufficient to answer the question.
- Comprehend the language of the question properly.
- Don't make assumptions here. Stick entirely to the information that is provided in the statements.
- **Do not mark the answer after testing just one statement.** For instance, even if you conclude that the data in statement 1 is sufficient to answer the question, do not forget to check for the other statement.
- Use the process of elimination of options to narrow down the possible answers. For instance, if data in statement 1 is sufficient to answer the question, you only need to check for the second statement. Combining the information of the two statements and checking if it would be sufficient to answer the question won't be required here.
- To make sure that you don't spend too much time on these problems, practice these types of questions thoroughly.

Now to have a clear picture of the above tips, let us consider the following example -

Consider the question given below and the statements numbered I and II that are provided and answer accordingly.

1. The data in Statement I alone are sufficient to answer the question, while the data in Statement II alone are not sufficient to answer the question.
2. The data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question.
3. The data in Statement I alone or in Statement II alone are sufficient to answer the question.

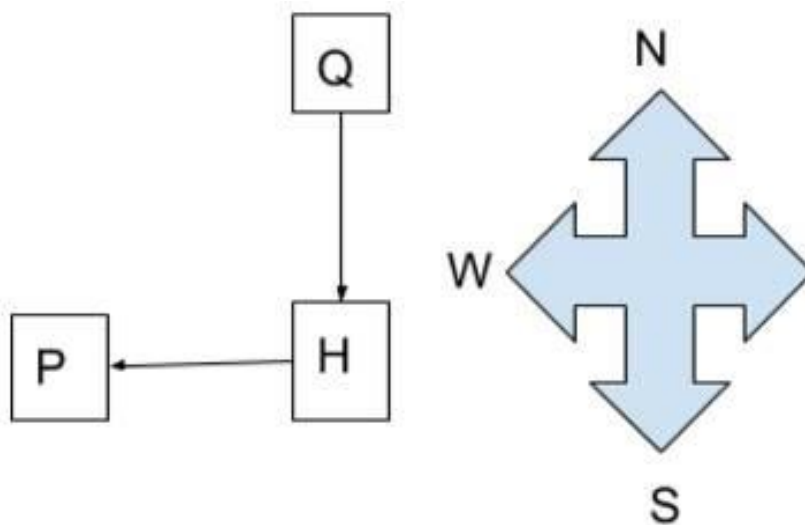
4. The data in both the statements I and II are not sufficient to answer the question.
5. The data in both the statements I and II together are necessary to answer the question.

Question - Tower 'P' is in which direction with respect to the tower 'Q'?

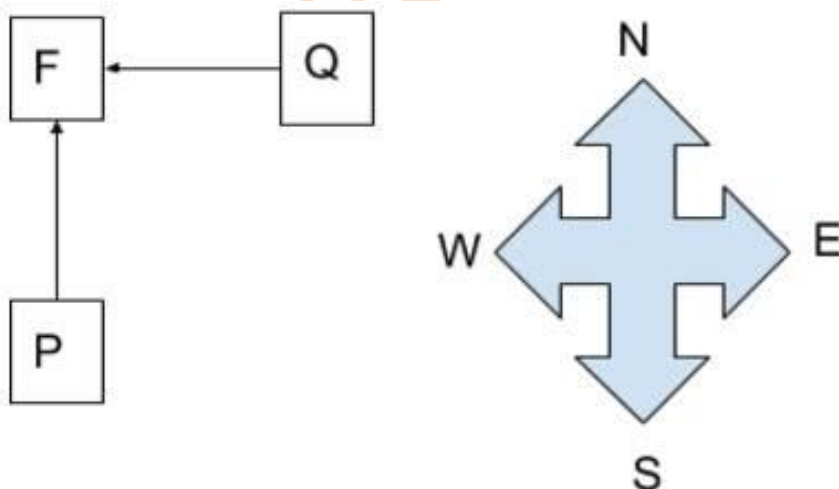
Statement I. P is to the west of H, which is to the South of Q.

Statement II. F is to the west of Q and to the North of P.

Now let us first go through the first statement,



We can clearly see that P is in the South - West direction with respect to Q i.e. the data in Statement I is sufficient to answer the question. But we can't conclude our answer here. We need to check the second statement as well. As per the information of the second statement, we can again figure out the position of P with respect to Q.



Hence the answer to this question will be,

(C) The data in Statement I alone or in Statement II alone are sufficient to answer the question.

Key Takeaways from Data Sufficiency Problems

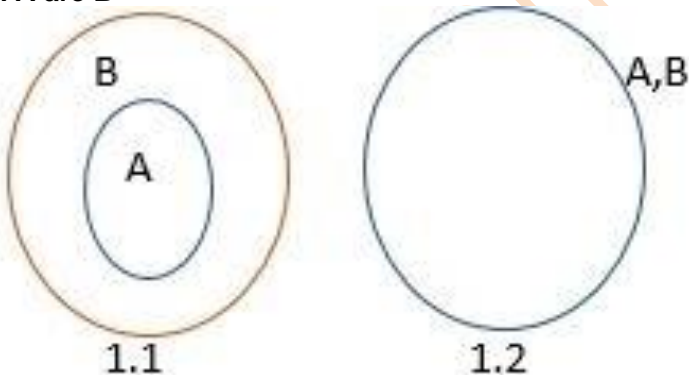
- Understand what is given in the question, reading the statements properly will provide you with some clues and strategy which you should write down as soon as it strikes you.
- Organize the strategies identified on the basis of data points given in the main statement.
- The questions may be based on various topics, For instance, blood relation, or ranking or direction based problems. Remember, it's just the topics you already know, presented in a different form.
- You may be more than 2 statements in the question. Don't let the size of the question scare you, the approach to solving the question still remains the same. So practice well.

How to solve Syllogisms?

Today we will discuss the Syllogism (based on the new pattern). First, we will understand the basics of syllogism, How the Venn Diagram can be drawn for both Definite and Possibility cases? Make sure to go through the article thoroughly -

	Affirmative (+)	Negative (-)
Universal	All A are B	No A are B
Particular	Some A are B	Some A are not B

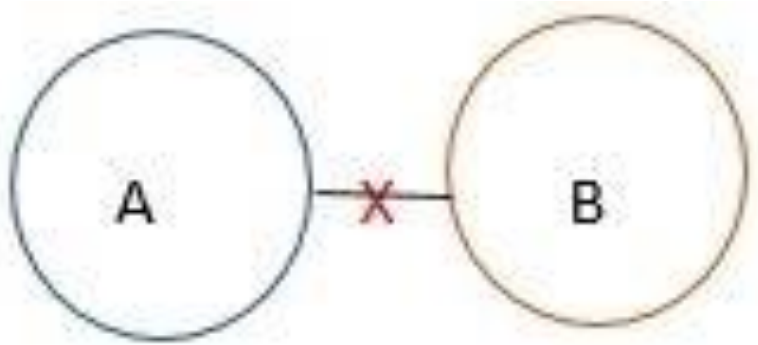
Case I: Universal Affirmative All A are B



Basic Diagram

Set A is a subset of B
Can't infer that "Some B are not A" (from diagram 1.2).
It is different from "All B are A".

Case II: Universal negative No A are B



Basic Diagram

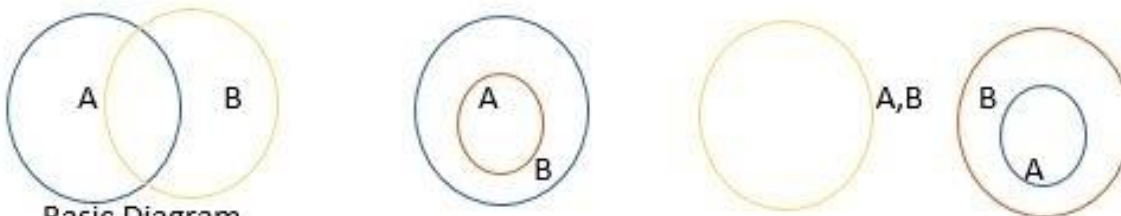
Two sets, A and B do not overlap each other in this case.

It is same as "No B are A".

It can be also written as "All A are not B" and "All B are not A".

Case III: Particular Affirmative

Some A are B



Basic Diagram

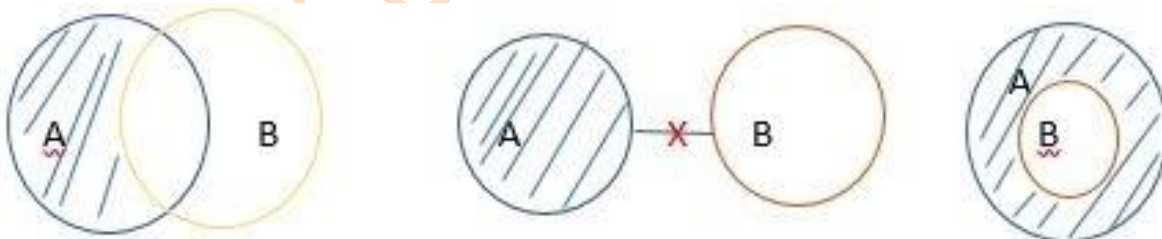
There is at least one element that is both in set A and B.

Can't infer that "Some A are not B".

It is the same as "Some B are A".

Case IV: Particular Negative

Some A are not B



There is at least one element (**Shaded portion**) in set A that is not a part of set B.

Can't infer that "Some A are B".

It is different from "Some B are not A".

In this type there are two types of conclusions, one is the definite conclusion and another one is the possible conclusion. In case of, definite conclusion you must draw basic diagram (i.e. Minimum overlapping) and for possible conclusion, you have to check all possible cases.

Now, let's understand this from examples:

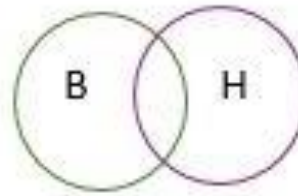
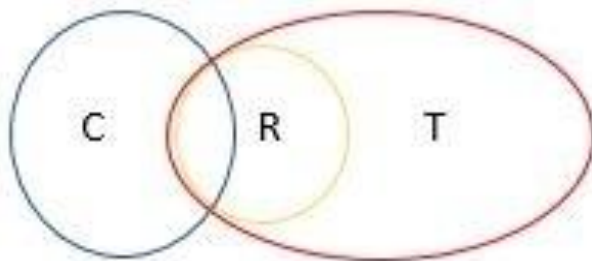
Statements:

- (1) Some Cakes are Roses (2) All Roses are Trucks
(3) No Trucks are Bricks (4) At least some Bricks are Hotels

Conclusions:

- (1) Some Trucks are Cakes
- (2) Some Bricks are Roses
- (3) All Cakes are Trucks
- (4) Some Hotels are Cakes

Solution: First, you should draw basic diagrams.



Now, we can see that

Conclusion1 is true. As Cakes and Trucks are intersecting each other.

Conclusion2: There is no relation mentioned between Bricks and Roses. So, we can't comment about it.

Conclusion3: Intersection of Trucks and Cakes is due to Roses. We can't comment about all Cakes.

Conclusion4: There is no relation mentioned between Hotels and Cars. So, we can't comment about it.

Hence, Conclusion 1 follows.

Possibility Cases

In the case of Possibility cases, we have to infer all possible cases which can be possible. In exams, you don't need to draw diagram for each and every possible case. In this, the basic and definite condition

should not be changed.

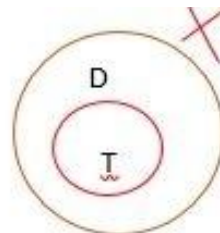
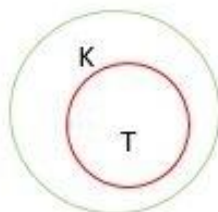
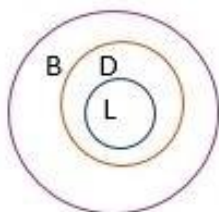
Statements:

- (1) All Locks are Doors
- (2) All Doors are Bags
- (3) Some Tickets are not Doors
- (4) All Tickets are Keys.

Conclusions:

- (1) Some Locks are not Tickets
- (2) Some Tickets are not Bags
- (3) All Locks being Tickets is a possibility.
- (4) All Keys being Doors is a possibility.

Solution:



this diagram is not valid, ensuring at least one Ticket will not be Door

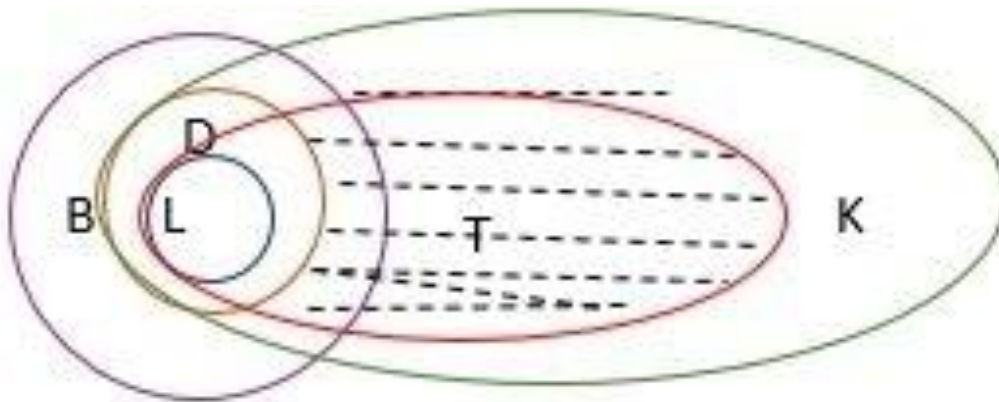
In Statement 3 Some Tickets are not Doors, it is Case IV (Particular Negative).

Conclusion1: We can't comment about this because there are more than one possible case and it is a basic statement.

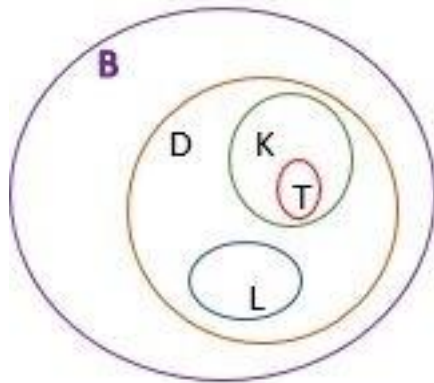
Conclusion2: There is no mention of relation about this also. We can not comment about it too.

Conclusion 3: It is a possible conclusion, we can see that in the below diagram it has not violated the basic condition that "Some Tickets are not Doors (Dotted line portion of Tickets are not Doors)" and followed all statements given. So, it is true.

But if it has not been a possibility conclusion, this conclusion does not follow will be our answer



In Conclusion 4, From the below possible diagram, we can see that "All Ticket are Keys" also all Tickets are Doors. So it is violating the basic condition that "Some Tickets are not Doors".



Hence, only conclusion 3 follows.

Seating Arrangement Questions

Seating Arrangement forms a major chunk of questions from **Reasoning Ability section**. You will always find questions based on the seating arrangement in Preliminary Examination of various State Exams. Today, we are going to provide you with some important tips for the seating arrangement questions. As you all are well aware, at least 2 sets are asked from seating arrangement or puzzle-based questions in most of the banking exams. This topic is really important since the question is asked normally in the set of 5 questions and once you get the correct arrangement, you can easily score 5 marks from this part.

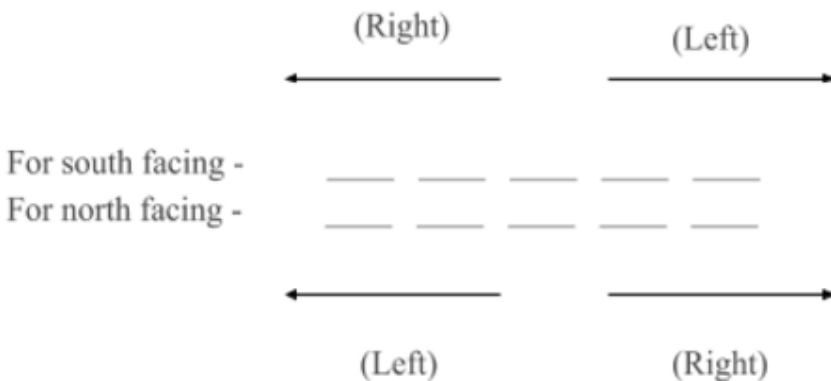
These questions may be asked in the following forms -

- Linear Arrangement
- Circular Arrangement (inward, outward or both side facing)
- Square/Rectangular Arrangement (inward, outward or both side facing)
- Combination of the above three with puzzles.

Now, let us go through the above arrangements in depth.

1. Linear Arrangement -

This type of question may be asked in a single row or double row arrangement. You need to take special care of the directions of the people here. Suppose 5 people are sitting in a single row.



2. Circular Arrangement –

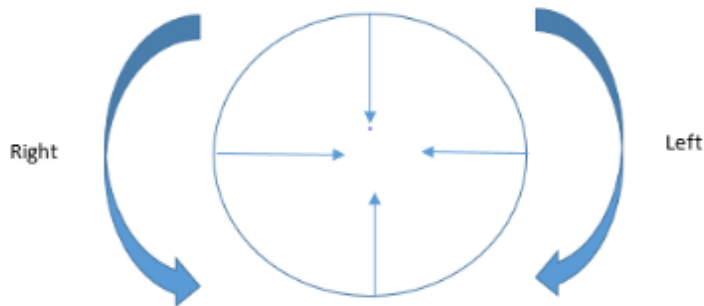
This type of question may be asked in following forms –

- (a) All the people are facing towards the center
- (b) All the people are facing outside the center
- (c) Some people are facing inside while some are facing outside the center.

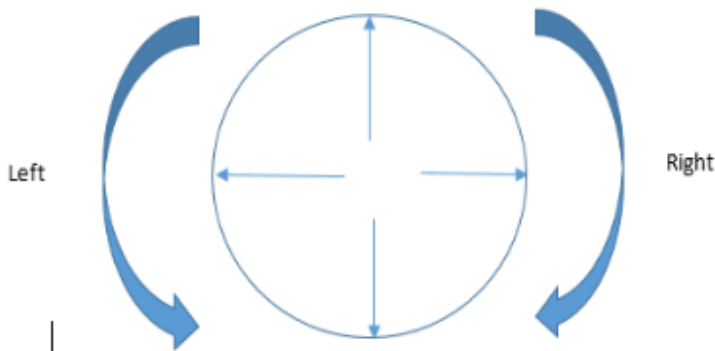


As mentioned above, you need to take special care of the directions in such problems.

For people facing inside the center –



For people facing outside the center –



You can accordingly look for the directions of the people when some are facing inside the circle while some are facing outside the circle.

3. Square/ Rectangular Arrangement -

In this type of arrangement as well, following arrangements are possible -

- (a) All the people are facing towards the center
 - (b) All the people are facing outside the center
 - (c) Some people are facing inside while some are facing outside the center.
- The directions for this arrangement are taken in the same manner as that of a circular arrangement.

4. Combination of Linear, Circular and Square Arrangements with puzzles -

Many of you face difficulties in solving such problems. To have a better understanding of the approach that should be followed for solving puzzles you can go through the link below -

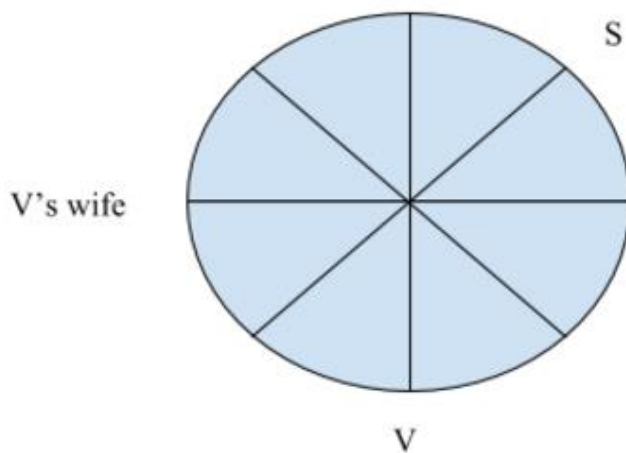
[How to solve Puzzles](#)

To have a clear picture of the above points, let us consider a basic circular arrangement as given below -

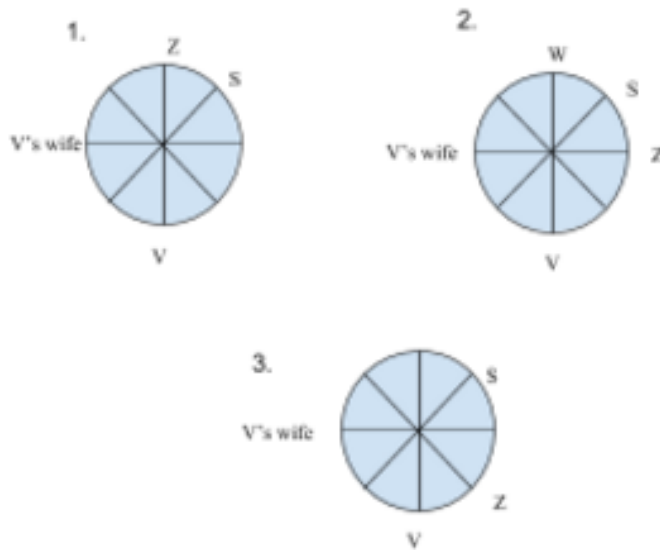
Eight friends Q, R, S, T, V, W, Y and Z are sitting around a circular table facing the center, not necessarily in the same order. There are 3 males and 5 females in the group. No two males are immediate neighbours of each other.

1. V sits second to the right of his wife.
2. S sits third to the right of V.
3. W sits second to the right of her husband Z.
4. Z is not an immediate neighbour of V's wife.
5. T is a male and Y is not an immediate neighbour of V.
6. R sits second to the right of Q.

Now, the first 2 conditions give one possible arrangement -

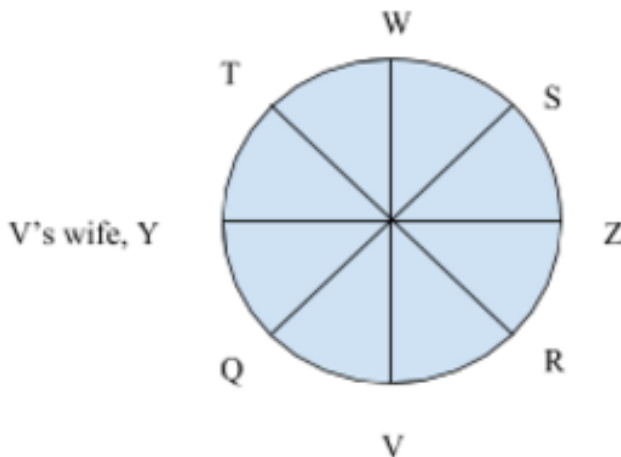


As per 3rd and 4th condition, following arrangements are possible -



Although we will get 3 probable positions of Z, but 1st and 3rd arrangements are not possible since we can't place W in these cases, also, V and Z can't be placed together since both are male and this violates the constraint of the question. So, we proceed with 2nd arrangement.

Now, as per 5th condition, T being a male can't be placed adjacent to V and hence only one place is left for T to be placed. Also, Y is not an immediate neighbour of V, so Y will be placed at V's wife's place. Q and R can be placed as per the 6th condition.



Keep following things in mind while solving seating arrangement or puzzle-based questions-

- Do not be intimidated by the size or the language of the question.
- Read the entire question carefully. Every detail required to form the Seating Arrangement is mentioned in the question, you just need to observe properly and implement all the facts logically.

- Remember, even when combined with puzzles, the approach of the question will still remain the same as that of the normal seating arrangement.
- Consider all the possible scenarios which may be formed as per the given question. A lot of the possibilities will cancel out as you move forward with the question.
- Practice. That is the only way you can expect to ace this topic.

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