

CAT 2018 Slot - 1 Question Paper & Solution



SLOT-1 VARC

Direction (Q1-5): The passage below is accompanied by a set of questions. Choose the best answer to each question.

"Everybody pretty much agrees that the relationship between elephants and people has dramatically changed," [says psychologist Gay] Bradshaw. "Where for centuries humans and elephants lived in relatively peaceful coexistence, there is now hostility and violence. Now, I use the term 'violence' because of the intentionality associated with it, both in the aggression of humans and, at times, the recently observed behavior of elephants." . . .

Typically, elephant researchers have cited, as a cause of aggression, the high levels of testosterone in newly matured male elephants or the competition for land and resources between elephants and humans. But. . . Bradshaw and several colleagues argue that today's elephant populations are suffering from a form of chronic stress, a kind of species-wide trauma. Decades of poaching and culling and habitat loss, they claim, have so disrupted the intricate web of familial and societal relations by which young elephants have traditionally been raised in the wild, and by which established elephant herds are governed, that what we are now witnessing is nothing less than a precipitous collapse of elephant culture.. . .

Elephants, when left to their own devices, are profoundly social creatures Young elephants are raised within an extended, multitiered network of doting female caregivers that includes the birth mother, grandmothers, aunts and friends. These relations are maintained over a life span as long as 70 years. Studies of established herds have shown that young elephants stay within 15 feet of their mothers for nearly all of their first eight years of life, after which young females are socialized into the matriarchal network, while young males go off for a time into an all-male social group before coming back into the fold as mature adults.. . .

This fabric of elephant society, Bradshaw and her colleagues [demonstrate], ha[s] effectively been frayed by years of habitat loss and poaching, along with systematic culling by government agencies to control elephant numbers and translocations of herds to different habitats. As a result of such social upheaval, calves are now being born to and raised by ever younger and inexperienced mothers. Young orphaned elephants, meanwhile, that have witnessed the death of a parent at the hands of poachers are coming of age in the absence of the support system that defines traditional elephant life. "The loss of elephant elders," [says] Bradshaw "and the traumatic experience of witnessing the massacres of their family, impairs normal brain and behavior development in young elephants."

What Bradshaw and her colleagues describe would seem to be an extreme form of anthropocentric conjecture if the evidence that they've compiled from various elephant researchers. . . weren't so compelling. The elephants of decimated herds, especially orphans who've watched the death of their parents and elders from poaching and culling, exhibit behavior typically associated with post-traumatic stress disorder and other trauma-related disorders in humans: abnormal startle response, unpredictable asocial behavior, inattentive mothering and hyper aggression.. . .

[According to Bradshaw], "Elephants are suffering and behaving in the same ways that we recognize in ourselves as a result of violence Except perhaps for a few specific

features, brain organization and early development of elephants and humans are extremely similar.”

1. The passage makes all of the following claims EXCEPT:

- A. elephant mothers are evolving newer ways of rearing their calves to adapt to emerging threats.
- B. the elephant response to deeply disturbing experiences is similar to that of humans.
- C. human actions such as poaching and culling have created stressful conditions for elephant communities.
- D. elephants establish extended and enduring familial relationships as do humans.

Answer: A

Solution:

Refer to the second last paragraph: ‘The elephants of decimated herds, especially orphans who’ve watched the death of their parents and elders from poaching and culling, exhibit behavior typically associated with post-traumatic stress disorder and other trauma-related disorders in humans: abnormal startle response, unpredictable asocial behavior, inattentive mothering and hyper aggression.. . .’ Options B and C can be verified from this extract.

Option D can be verified from the following lines of the third paragraph: ‘young elephants are raised within an extended, multi-tiered network of doting female caregivers that includes the birth mother, grandmothers, aunts and friends. These relations are maintained over a life span as long as 70 years’.

Option A cannot be verified from this paragraph. Nowhere has it been stated that elephant mothers are evolving newer ways of rearing their calves.

Hence, the correct answer is option A.

2. Which of the following statements best expresses the overall argument of this passage?

- A. Recent elephant behaviour could be understood as a form of species-wide trauma-related response.
- B. Elephants, like the humans they are in conflict with, are profoundly social creatures.
- C. The relationship between elephants and humans has changed from one of coexistence to one of hostility.
- D. The brain organisation and early development of elephants and humans are extremely similar.

Answer: A

Solution:

In short, the question is asking for the central idea of this passage.

The main idea of the passage is the changed elephant behavior and species-wide trauma which they have endured due to various human activities. Option A states this and is the correct answer.

Options B and D are a part of the overall argument but they are not the key ideas.

Option C is also not the main argument of the passage. The passage is not focused on the relationship between elephants and humans. The passage is more focused on shedding some light on the aggressive behavior of elephants and of exploring the causes behind the same.

Hence, the correct answer is option A.

3. Which of the following measures is Bradshaw most likely to support to address the problem of elephant aggression?

- A. Funding of more studies to better understand the impact of testosterone on male elephant aggression.
- B. The development of treatment programmes for elephants drawing on insights gained from treating post-traumatic stress disorder in humans.
- C. Studying the impact of isolating elephant calves on their early brain development, behaviour and aggression.
- D. Increased funding for research into the similarity of humans and other animals drawing on insights gained from human-elephant similarities.

Answer: B

Solution:

Refer to the relevant extract: 'The elephants of decimated herds, especially orphans who've watched the death of their parents and elders from poaching and culling, exhibit behavior typically associated with post-traumatic stress disorder and other trauma-related disorders in humans: abnormal startle response, unpredictable asocial behavior, inattentive mothering and hyper aggression. . . .' Since the behavior depicted by elephants is similar to the behavior depicted by humans, therefore, any treatment that works for humans should be recommended for elephants as well. Option B states this and is the correct answer.

Option A can be eliminated because it doesn't state how "studying the impact of testosterone" would help in addressing the problem of elephant aggression.

Options C and D don't address the problem of elephant aggression, which is the main idea of the passage.

Hence, the correct answer is option B.

4. In paragraph 4, the phrase, 'The fabric of elephant society. . . has(s) effectively been frayed by. . . .' is:

- A. an accurate description of the condition of elephant herds today.
- B. a metaphor for the effect of human activity on elephant communities.
- C. an exaggeration aimed at bolstering Bradshaw's claims.
- D. an ode to the fragility of elephant society today.

Answer: B

Solution:

'The fabric' in 'The fabric has been frayed' is a metaphorical depiction of the 'effect of human activity on elephant societies of today'.

A metaphor is a figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable.

Option B states this and is the correct answer.

Hence, the correct answer is option B.

5. In the first paragraph, Bradshaw uses the term 'violence' to describe the recent change in the human-elephant relationship because, according to him:

- A. there is a purposefulness in human and elephant aggression towards each other.
- B. elephant herds and their habitat have been systematically destroyed by humans.
- C. human-elephant interactions have changed their character over time.
- D. both humans and elephants have killed members of each other's species.

Answer: A

Solution:

Refer to the relevant extract: 'Now, I use the term 'violence' because of the intentionality associated with it, both in the aggression of humans and, at times, the recently observed behavior of elephants.' The author uses the word "intentionality" to mean that there is a reason behind the mutual aggression between the two species. Option A covers this essence by mentioning the word "purposefulness".

Option B is an extreme choice not borne out by the passage. 'Systematic Destruction' is far-fetched.

Option C doesn't delve into 'reasons' behind the violent human-elephant relationships.

Option D is incorrect because 'violence' is not to be equated with 'killing' members of each other's species.

Hence, the correct answer is option A.

Direction (Q6-10): The passage below is accompanied by a set of questions. Choose the best answer to each question.

The only thing worse than being lied to is not knowing you're being lied to. It's true that plastic pollution is a huge problem, of planetary proportions. And it's true we could all be doing more to reduce our plastic footprint. The lie is that blame for the plastic problem is wasteful consumers and that changing our individual habits will fix it.

Recycling plastic is to saving the Earth what hammering a nail is to halting a falling skyscraper. You struggle to find a place to do it and feel pleased when you succeed. But your effort is wholly inadequate and distracts from the real problem of why the building is collapsing in the first place. The real problem is that single-use plastic—the very idea of producing plastic items like grocery bags, which we use for an average of 12 minutes but can persist in the environment for half a millennium—is an incredibly reckless abuse of technology. Encouraging individuals to recycle more will never solve the problem of a massive production of single-use plastic that should have been avoided in the first place.

As an ecologist and evolutionary biologist, I have had a disturbing window into the accumulating literature on the hazards of plastic pollution. Scientists have long recognized that plastics biodegrade slowly, if at all, and pose multiple threats to wildlife through entanglement and consumption. More recent reports highlight dangers posed by absorption of toxic chemicals in the water and by plastic odors that mimic some species' natural food. Plastics also accumulate up the food chain, and studies now show that we are likely ingesting it ourselves in seafood. . . .

Beginning in the 1950s, big beverage companies like Coca-Cola and Anheuser-Busch, along with Phillip Morris and others, formed a non-profit called Keep America Beautiful. Its mission is/was to educate and encourage environmental stewardship in the public. At face value, these efforts seem benevolent, but they obscure the real problem, which is the role that corporate polluters play in the plastic problem. This clever misdirection has led journalist and author Heather Rogers to describe Keep America Beautiful as the first corporate greenwashing front, as it has helped shift the public focus to consumer recycling behavior and actively thwarted legislation that would increase extended producer responsibility for waste management. . . .

The greatest success of Keep America Beautiful has been to shift the onus of environmental responsibility onto the public while simultaneously becoming a trusted name in the environmental movement. . . .

So what can we do to make responsible use of plastic a reality? First: reject the lie. Litterbugs are not responsible for the global ecological disaster of plastic. Humans can only function to the best of their abilities, given time, mental bandwidth and systemic constraints. Our huge problem with plastic is the result of a permissive legal framework that has allowed the uncontrolled rise of plastic pollution, despite clear evidence of the harm it causes to local communities and the world's oceans. Recycling is also too hard in most parts of the U.S. and lacks the proper incentives to make it work well.

6. In the second paragraph, the phrase 'what hammering a nail is to halting a falling skyscraper' means:

- A. relying on emerging technologies to mitigate the ill-effects of plastic pollution.
- B. encouraging the responsible production of plastics by firms.
- C. focusing on consumer behaviour to tackle the problem of plastics pollution.
- D. focusing on single-use plastic bags to reduce the plastics footprint.

Answer: C

Solution:

Refer to the relevant extract: 'The lie is that blame for the plastic problem is wasteful consumers and that changing our individual habits will fix it.' and the first sentence of the second paragraph which states, 'Recycling plastic is to saving the Earth what hammering a nail is to halting a falling skyscraper'. These extracts clearly imply that changing consumer behavior towards plastic won't solve the problem of plastic pollution. Thus, option C is the correct answer.

Options A, B and D can be eliminated.

Hence, the correct answer is option C.

7. In the first paragraph, the author uses "lie" to refer to the:

- A. blame assigned to consumers for indiscriminate use of plastics.
- B. understatement of the enormity of the plastics pollution problem.
- C. understatement of the effects of recycling plastics.
- D. fact that people do not know they have been lied to.

Answer: A

Solution:

Refer to the relevant extract: 'The lie is that blame for the plastic problem is wasteful consumers and that changing our individual habits will fix it'. The 'lie' refers to 'blame assigned to consumers for indiscriminate use of plastics'. Thus, option A is the correct answer.

Options B, C and D are thus eliminated.

Hence, the correct answer is option A.

8. The author lists all of the following as negative effects of the use of plastics EXCEPT the:

- A. slow pace of degradation or non-degradation of plastics in the environment.
- B. air pollution caused during the process of recycling plastics.
- C. adverse impacts on the digestive systems of animals exposed to plastic.
- D. poisonous chemicals released into the water and food we consume.

Answer: B

Solution:

Options A, C and D are mentioned in the third paragraph.

Option B, which states, 'Air Pollution' caused during the process of recycling plastics has not been stated in the passage.

Hence, the correct answer is option B.

9. Which of the following interventions would the author most strongly support?

A. Completely banning all single-use plastic bags.

B. Having all consumers change their plastic consumption habits.

C. Recycling all plastic debris in the seabed.

D. Passing regulations targeted at producers that generate plastic products.

Answer: D

Solution:

Refer to the relevant extracts: 'This clever misdirection has led journalist and author Heather Rogers to describe Keep America Beautiful as the first corporate greenwashing front, as it has helped shift the public focus to consumer recycling behavior and actively thwarted legislation that would increase extended producer responsibility for waste management. . . .' and 'Our huge problem with plastic is the result of a permissive legal framework that has allowed the uncontrolled rise of plastic pollution, despite clear evidence of the harm it causes to local communities and the world's oceans.' This implies that legislations should be passed to target the producers and not the consumers. Thus, Option D is the correct answer.

Option A is correct in that the author would likely support single use plastic but that can only be done from the producer point of view and not that of the consumer. Eliminate option A.

Option B is not possible according to the passage.

Recycling does not work, according to the author. Eliminate option C.

Hence, the correct answer is option D.

10. It can be inferred that the author considers the Keep America Beautiful organisation:

A. an innovative example of a collaborative corporate social responsibility initiative.

B. a sham as it diverted attention away from the role of corporates in plastics pollution.

C. an important step in sensitising producers to the need to tackle plastics pollution.

D. a "greenwash" because it was a benevolent attempt to improve public recycling habits.

Answer: B

Solution:

Refer to the relevant extract: 'This clever misdirection has led journalist and author Heather Rogers to describe Keep America Beautiful as the first corporate greenwashing front, as it has helped shift the public focus to consumer recycling behavior and actively thwarted legislation....' Thus, from this extract we can infer that the author believes that the Keep America Beautiful diverted people's attention away from the role of the corporates in plastic pollution. Thus, option B is the correct answer.

Option A contradicts the author's view.

Option C has not been mentioned in the passage.

Option D uses the term 'greenwash' incorrectly. The initiative was a greenwash because it helped '...shift the public focus to consumer recycling behavior and actively thwarted legislation....'

Hence, the correct answer is option B.

Direction (Q11-15): The passage below is accompanied by a set of questions. Choose the best answer to each question.

Economists have spent most of the 20th century ignoring psychology, positive or otherwise. But today there is a great deal of emphasis on how happiness can shape global economies, or — on a smaller scale — successful business practice. This is driven, in part, by a trend in "measuring" positive emotions, mostly so they can be optimized. Neuroscientists, for example, claim to be able to locate specific emotions, such as happiness or disappointment, in particular areas of the brain. Wearable technologies, such as Spire, offer data-driven advice on how to reduce stress.

We are no longer just dealing with "happiness" in a philosophical or romantic sense — it has become something that can be monitored and measured, including by our behavior, use of social media and bodily indicators such as pulse rate and facial expressions.

There is nothing automatically sinister about this trend. But it is disquieting that the businesses and experts driving the quantification of happiness claim to have our best interests at heart, often concealing their own agendas in the process. In the workplace, happy workers are viewed as a "win-win." Work becomes more pleasant, and employees, more productive. But this is now being pursued through the use of performance-evaluating wearable technology, such as Humanyze or Virgin Pulse, both of which monitor physical signs of stress and activity toward the goal of increasing productivity.

Cities such as Dubai, which has pledged to become the "happiest city in the world," dream up ever-more elaborate and intrusive ways of collecting data on well-being — to the point where there is now talk of using CCTV cameras to monitor facial expressions in public spaces. New ways of detecting emotions are hitting the market all the time: One company, Beyond Verbal, aims to calculate moods conveyed in a phone conversation, potentially without the knowledge of at least one of the participants. And Facebook [has] demonstrated. . . that it could influence our emotions through tweaking our news feeds — opening the door to ever-more targeted manipulation in advertising and influence.

As the science grows more sophisticated and technologies become more intimate with our thoughts and bodies, a clear trend is emerging. Where happiness indicators were once used as a basis to reform society, challenging the obsession with money that G.D.P. measurement entrenches, they are increasingly used as a basis to transform or discipline individuals.

Happiness becomes a personal project, that each of us must now work on, like going to the gym. Since the 1970s, depression has come to be viewed as a cognitive or neurological defect in the individual, and never a consequence of circumstances. All of this simply escalates the sense of responsibility each of us feels for our own feelings, and with it, the sense of failure when things go badly. A society that deliberately removed certain sources of misery, such as precarious and exploitative employment, may well be a happier one. But we won't get there by making this single, often fleeting emotion, the overarching goal.

11. In the author's opinion, the shift in thinking in the 1970s:

A. introduced greater stress into people's lives as they were expected to be responsible for their own happiness.

- B. was a welcome change from the earlier view that depression could be cured by changing circumstances.
- C. put people in touch with their own feelings rather than depending on psychologists.
- D. reflected the emergence of neuroscience as the authority on human emotions.

Answer: A

Solution:

Refer to the relevant extract: 'Since the 1970s, depression has come to be viewed as a cognitive or neurological defect in the individual, and never a consequence of circumstances. All of this simply escalates the sense of responsibility each of us feels for our own feelings, and with it, the sense of failure when things go badly.' Thus, option A is the correct answer as it makes the point that before the 1970s, people thought that depression was a result of their circumstances but post 1970s, people became more responsible towards their feelings as they now believed that Depression was a neurological defect.

Option B is incorrect as nothing related to curing depression has been mentioned in the passage.

Option C refers to 'psychologists' which are nowhere mentioned in these lines.

Option D is completely baseless and cannot be determined from the passage.

Hence, the correct answer is option A.

12. The author's view would be undermined by which of the following research findings?

A. There is a definitive move towards the adoption of wearable technology that taps into emotions.

B. A proliferation of gyms that are collecting data on customer well-being.

C. Individuals worldwide are utilising technologies to monitor and increase their well-being.

D. Stakeholders globally are moving away from collecting data on the well-being of individuals.

Answer: D

Solution:

The author's views can be found in the following lines: 'Cities such as Dubai, which has pledged to become the "happiest city in the world," dream up ever-more elaborate and intrusive ways of collecting data on well-being — to the point where there is now talk of using CCTV cameras to monitor facial expressions in public spaces'. Option D negates this fact that stakeholders are moving towards collecting more data on the well-being of individuals. Therefore, it undermines the author's argument.

The above extract eliminates options A, B and C.

Hence, the correct answer is option D.

13. According to the author, Dubai:

A. develops sophisticated technologies to monitor its inhabitants' states of mind.

B. incentivises companies that prioritise worker welfare.

C. collaborates with Facebook to selectively influence its inhabitants' moods.

D. is on its way to becoming one of the world's happiest cities.

Answer: A

Solution:

Refer to the relevant extract, 'Cities such as Dubai, which has pledged to become the "happiest city in the world," dream up ever-more elaborate and intrusive ways of

collecting data on well-being — to the point where there is now talk of using CCTV cameras to monitor facial expressions in public spaces...' Clearly, Option A is the correct choice.

Options B and C are not mentioned in the passage.

Option D makes a false claim. Dubai is not yet on its way to becoming the happiest city. Rather it wants to be one.

Hence, the correct answer is option A.

14. According to the author, wearable technologies and social media are contributing most to:

- A. happiness as a "personal project".
- B. disciplining individuals to be happy.
- C. depression as a thing of the past.
- D. making individuals aware of stress in their lives.

Answer: B

Solution:

From the first paragraph which states that 'wearable devices are helping us to reduce stress', it can be easily inferred that what the author means is that these devices are disciplining individuals to be happy. Thus, option B is the correct answer.

Option A cannot be determined from the passage.

Option C is distorting the idea in the passage.

Option D doesn't cover the whole point made by the author.

Hence, the correct answer is option B.

15. From the passage we can infer that the author would like economists to:

- A. correlate measurements of happiness with economic indicators.
- B. measure the effectiveness of Facebook and social media advertising.
- C. incorporate psychological findings into their research cautiously.
- D. work closely with neuroscientists to understand human behaviour.

Answer: C

Solution:

Refer to the relevant extract, 'Economists have spent most of the 20th century ignoring psychology, positive or otherwise.' Clearly, the author wants economists to 'incorporate psychological findings into their research cautiously.' Thus, option C is the correct answer.

Options A, B and D have not been mentioned in the passage with regard to economists. They can thus be eliminated.

Hence, the correct answer is option C.

Direction (Q16-19): The passage below is accompanied by a set of questions. Choose the best answer to each question.

When researchers at Emory University in Atlanta trained mice to fear the smell of almonds (by pairing it with electric shocks), they found, to their consternation, that both the children and grandchildren of these mice were spontaneously afraid of the same smell. That is not supposed to happen. Generations of schoolchildren have been taught that the inheritance of acquire characteristics is impossible. A mouse should not be born with something its parents have learned during their lifetimes, any more than a mouse that loses its tail in an accident should give birth to tailless mice. . . .

Modern evolutionary biology dates back to a synthesis that emerged around the 1940s-60s, which married Charles Darwin's mechanism of natural selection with

Gregor Mendel's discoveries of how genes are inherited. The traditional, and still dominant, view is that adaptations – from the human brain to the peacock's tail – are fully and satisfactorily explained by natural selection (and subsequent inheritance). Yet [new evidence] from genomics, epigenetics and developmental biology [indicates] that evolution is more complex than we once assumed. . . .

In his book *On Human Nature* (1978), the evolutionary biologist Edward O Wilson claimed that human culture is held on a genetic leash. The metaphor [needs revision] Imagine a dog-walker (the genes) struggling to retain control of a brawny mastiff (human culture). The pair's trajectory (the pathway of evolution) reflects the outcome of the struggle. Now imagine the same dog-walker struggling with multiple dogs, on leashes of varied lengths, with each dog tugging in different directions. All these tugs represent the influence of developmental factors, including epigenetics, antibodies and hormones passed on by parents, as well as the ecological legacies and culture they bequeath. . . .

The received wisdom is that parental experiences can't affect the characters of their offspring. Except they do. The way that genes are expressed to produce an organism's phenotype – the actual characteristics it ends up with – is affected by chemicals that attach to them. Everything from diet to air pollution to parental behaviour can influence the addition or removal of these chemical marks, which switches genes on or off. Usually these so-called 'epigenetic' attachments are removed during the production of sperm and eggs cells, but it turns out that some escape the resetting process and are passed on to the next generation, along with the genes. This is known as 'epigenetic inheritance', and more and more studies are confirming that it really happens. Let's return to the almond-fearing mice. The inheritance of an epigenetic mark transmitted in the sperm is what led the mice's offspring to acquire an inherited fear. . . .

Epigenetics is only part of the story. Through culture and society, [humans and other animals] inherit knowledge and skills acquired by [their] parents. . . . All this complexity points to an evolutionary process in which genomes (over hundreds to thousands of generations), epigenetic modifications and inherited cultural factors (over several, perhaps tens or hundreds of generations), and parental effects (over single-generation timespans) collectively inform how organisms adapt. These extra-genetic kinds of inheritance give organisms the flexibility to make rapid adjustments to environmental challenges, dragging genetic change in their wake – much like a rowdy pack of dogs.

16. The Emory University experiment with mice points to the inheritance of:

- A. psychological markers.
- B. acquired characteristics.
- C. personality traits.
- D. acquired parental fears.

Answer: B

Solution:

Refer to the relevant extract, 'a mouse should not be born with something that its parents have learned during their lifetime'. 'Learned during lifetime' implies 'acquired traits'. Thus, option B is the correct answer.

Option A is out of the scope of the passage.

Option C doesn't mention 'acquired' with the personality traits. It can be eliminated.

Option D is a narrow answer choice as it talks only about 'fear'.

Hence, the correct answer is option B.

17. Which of the following best describes the author's argument?

- A. Darwin's and Mendel's theories together best explain evolution.
- B. Mendel's theory of inheritance is unfairly underestimated in explaining evolution.
- C. Wilson's theory of evolution is scientifically superior to either Darwin's or Mendel's.
- D. Darwin's theory of natural selection cannot fully explain evolution.

Answer: A

Solution:

Refer to the following extract, '...which married Charles Darwin's mechanism of natural selection with Gregor Mendel's discoveries of how genes are inherited. The traditional, and still dominant, view is that adaptations – from the human brain to the peacock's tail – are fully and satisfactorily explained by natural selection (and subsequent inheritance). Yet [new evidence] from genomics, epigenetics and developmental biology [indicates] that evolution is more complex than we once assumed. .' Going by this extract, option A becomes the correct answer.

Options B and Option D are not mentioned in the passage.

Option C cannot be determined or inferred from the passage.

Hence, the correct answer is option A.

18. Which of the following, if found to be true, would negate the main message of the passage?

- A. A study affirming the influence of socio-cultural markers on evolutionary processes.
- B. A study highlighting the criticality of epigenetic inheritance to evolution.
- C. A study indicating the primacy of ecological impact on human adaptation.
- D. A study affirming the sole influence of natural selection and inheritance on evolution.

Answer: D

Solution:

The central idea of the passage is that evolution can be understood as a function of natural selection and inheritance. Any option that weakens this idea will be the correct answer. Going by this logic, option D is the correct answer.

Options A and B will strengthen the main message while option C has not been mentioned in the passage.

Hence, the correct answer is option D.

19. The passage uses the metaphor of a dog walker to argue that evolutionary adaptation is most comprehensively understood as being determined by:

- A. extra genetic, genetic, epigenetic and genomic legacies.
- B. socio-cultural, genetic, epigenetic, and genomic legacies
- C. ecological, hormonal, extra genetic and genetic legacies.
- D. genetic, epigenetic, developmental factors, and ecological legacies.

Answer: D

Solution:

Refer to the following extract: 'All these tugs represent the influence of developmental factors, including epigenetics, antibodies and hormones passed on by parents, as well as the ecological legacies and culture they bequeath.' Going by this, we can see that only option D has these terms and no other extraneous terms.

Option A has a new term, extra-genetic.

Option B has a new term, socio-cultural.
Option C has genetic legacies instead of ecological legacies.
Hence, the correct answer is option D.

Direction (Q20-24): The passage given below is followed by a set of five questions. Choose the best answer to each question.

[The] Indian government [has] announced an international competition to design a National War Memorial in New Delhi, to honour all of the Indian soldiers who served in the various wars and counter-insurgency campaigns from 1947 onwards. The terms of the competition also specified that the new structure would be built adjacent to the India Gate – a memorial to the Indian soldiers who died in the First World War. Between the old imperialist memorial and the proposed nationalist one, India's contribution to the Second World War is airbrushed out of existence.

The Indian government's conception of the war memorial was not merely absent-minded.

Rather, it accurately reflected the fact that both academic history and popular memory have yet to come to terms with India's Second World War, which continues to be seen as little more than mood music in the drama of India's advance towards independence and partition in 1947

Further, the political trajectory of the postwar subcontinent has militated against popular remembrance of the war. With partition and the onset of the India-Pakistan rivalry, both of the new nations needed fresh stories for self-legitimation rather than focusing on shared wartime experiences.

However, the Second World War played a crucial role in both the independence and partition of India. The Indian army recruited, trained and deployed some 2.5 million men, almost 90,000 of which were killed and many more injured. Even at the time, it was recognised as the largest volunteer force in the war. . . .

India's material and financial contribution to the war was equally significant. India emerged as a major military-industrial and logistical base for Allied operations in south-east Asia and the Middle East. This led the United States to take considerable interest in the country's future, and ensured that this was no longer the preserve of the British government.

Other wartime developments pointed in the direction of India's independence. In a stunning reversal of its long-standing financial relationship with Britain, India finished the war as one of the largest creditors to the imperial power.

Such extraordinary mobilization for war was achieved at great human cost, with the Bengal famine the most extreme manifestation of widespread wartime deprivation. The costs on India's home front must be counted in millions of lives.

Indians signed up to serve on the war and home fronts for a variety of reasons [M]any were convinced that their contribution would open the doors to India's freedom The political and social churn triggered by the war was evident in the massive waves of popular protest and unrest that washed over rural and urban India in the aftermath of the conflict. This turmoil was crucial in persuading the Attlee government to rid itself of the incubus of ruling India. . . .

Seventy years on, it is time that India engaged with the complex legacies of the Second World War. Bringing the war into the ambit of the new national memorial would be a fitting – if not overdue – recognition that this was India's War.

20. In the first paragraph, the author laments the fact that:

- A. there is no recognition of the Indian soldiers who served in the Second World War.
- B. the new war memorial will be built right next to India Gate.
- C. India lost thousands of human lives during the Second World War.
- D. funds will be wasted on another war memorial when we already have the India Gate memorial.

Answer: A

Solution:

Refer to the following extract: 'Between the old imperialist memorial and the proposed nationalist one, India's contribution to the Second World War is airbrushed out of existence.' Clearly, the phrase 'airbrushed out of existence' means 'to go completely unnoticed'. Thus, A is the correct answer.

Options B, C and D can be eliminated from the information given in the above extract. Hence, the correct answer is option A.

21. The phrase 'mood music' is used in the second paragraph to indicate that the Second World War is viewed as:

- A. setting the stage for the emergence of the India-Pakistan rivalry in the subcontinent.
- B. a tragic period in terms of loss of lives and national wealth.
- C. a backdrop to the subsequent independence and partition of the region.
- D. a part of the narrative on the ill-effects of colonial rule on India.

Answer: C

Solution:

Refer to the following extract: 'Rather, it accurately reflected the fact that both academic history and popular memory have yet to come to terms with India's Second World War, which continues to be seen as little more than mood music in the drama of India's advance towards independence and partition in 1947". Mood-Music therefore refers to the light music being played in the background without having any significant impact on the overall scenario of events. So, mood music here refers to "a backdrop to the subsequent independence and partition of the region.' Thus, option C is the correct answer.

Options A, B and D do not conform to the above extract with regard to mood music and can thus be eliminated.

Hence, the correct answer is option C.

22. The author lists all of the following as outcomes of the Second World War EXCEPT:

- A. independence of the subcontinent and its partition into two countries.
- B. US recognition of India's strategic location and role in the War.
- C. large-scale deaths in Bengal as a result of deprivation and famine.
- D. the large financial debt India owed to Britain after the War.

Answer: D

Solution:

Option A can be verified from the very first paragraph.

Option B can be verified from the fourth paragraph.

Option C can be verified from the eighth paragraph.

Option D is stating the exact opposite of what is given in the passage. The passage states that it was Britain that owed huge sums of money to India and not the other way round.

Hence, the correct answer is option D.

23. The author claims that omitting mention of Indians who served in the Second World War from the new National War Memorial is:

- A. a reflection of the academic and popular view of India's role in the War.
- B. appropriate as their names can always be included in the India Gate memorial.
- C. a reflection of misplaced priorities of the post-independence Indian governments.
- D. is something which can be rectified in future by constructing a separate memorial.

Answer: A

Solution:

Refer to the following extract: 'Rather, it accurately reflected the fact that both academic history and popular memory have yet to come to terms with India's Second World War'. Thus, option A is the correct answer.

Options B and D are not stated in the passage.

Option C talks only about 'governments' and fails to make a mention of other parties that were involved.

Hence, the correct answer is option A.

24. The author suggests that a major reason why India has not so far acknowledged its role in the Second World War is that it:

- A. blames the War for leading to the momentous partition of the country.
- B. wants to forget the human and financial toll of the War on the country.
- C. has been focused on building an independent, non-colonial political identity.
- D. views the War as a predominantly Allied effort, with India playing only a supporting role.

Answer: C

Solution:

Refer to the following extract: 'With partition and the onset of the India-Pakistan rivalry, both of the new nations needed fresh stories for self-legitimization rather than focusing on shared wartime experiences.' 'Self-legitimization' here means building a legitimate and independent identity. Thus, option C is the correct answer.

Options A, B and D fail to highlight this point and can therefore be eliminated.

Hence, the correct answer is option C.

25. **Direction:** The four sentences (labelled 1,2,3,4) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper sequence of order of the sentences and key in this sequence of four numbers as your answer.

1) Impartiality and objectivity are fiendishly difficult concepts that can cause all sorts of injustices even if transparently implemented.

2) It encourages us into bubbles of people we know and like, while blinding us to different perspectives, but the deeper problem of 'transparency' lies in the words '...and much more'.

3) Twitter's website says that 'tweets you are likely to care about most will show up first in your timeline...based on accounts you interact with most, tweets you engage with, and much more.'

4) We are only told some of the basic principles, and we can't see the algorithm itself, making it hard for citizens to analyse the system sensibly or fairly or be convinced of its impartiality and objectivity.

Answer:1324

Solution:

Sentence 1 introduces the topic on which this entire paragraph is based, i.e., 'impartiality and objectivity'.

3 is an example of 1 and can be placed directly after 3.

The practice in 3 is further elaborated in 2 which starts with It - meaning Twitter.

4 sums up the entire argument for us by stating that it is hard for people to analyse the system sensibly or fairly or be convinced of its impartiality and objectivity.

Hence, the correct sequence is 1324.

26. **Direction:** Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1) Translators are like bumblebees.

2) Though long since scientifically disproved, this factoid is still routinely trotted out.

3) Similar pronouncements about the impossibility of translation have dogged practitioners since Leonardo Bruni's *De interpretatione recta*, published in 1424

4) Bees, unaware of these deliberations, have continued to flit from flower to flower, and translators continue to translate.

5) In 1934, the French entomologist August Magnan pronounced the flight of the bumblebee to be aerodynamically impossible.

Answer: 2

Solution:

Sentence 1 is a very good opening sentence as it introduces the topic of discussion; similarities between translators and bumblebees.

5 elaborates on the flight of bumblebees and can be placed directly after 1.

Sentence 3, which talks about similar statements about translators, should be placed directly after 5.

Sentence 4, sums up the whole argument and can be placed at the end.

Sentence 2 is the odd one out. The information that this factoid is being routinely trotted out despite being disapproved doesn't fit in this paragraph logically.

Hence, the correct answer is sentence 2.

27. **Direction:** The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.

1) The woodland's canopy receives most of the sunlight that falls on the trees.

2) Swifts do not confine themselves to woodlands, but hunt wherever there are insects in the air.

3) With their streamlined bodies, swifts are agile flyers, ideally adapted to twisting and turning through the air as they chase flying insects – the creatures that form their staple diet.

4) Hundreds of thousands of insects fly in the sunshine up above the canopy, some falling prey to swifts and swallows.

Answer: 1432

Solution:

Sentences 1 and 4 form a pair. 'The Canopy' in 4 refers to the woodland's canopy in 1.

3-2 form a pair. 3 elaborates on the swifts and swallows and 2 provides additional information about swifts.

2 states, 'Swifts do not confine themselves to woodlands...' Therefore, the 3-2 pair will come after the 1-4 which has introduced woodlands.

Hence, the correct answer is 1432.

28. **Direction:** The passage given below is followed by four summaries. Choose the option that best captures the author's position.

Production and legitimation of scientific knowledge can be approached from a number of perspectives. To study knowledge production from the sociology of professions perspective would mean a focus on the institutionalization of a body of knowledge. The professions- approach informed earlier research on managerial occupation, business schools and management knowledge. It however tends to reify institutional power structures in its understanding of the links between knowledge and authority. Knowledge production is restricted in the perspective to the selected members of the professional community, most notably to the university faculties and professional colleges. Power is understood as a negative mechanism, which prevents the non-professional actors from offering their ideas and information as legitimate knowledge.

A. Professions-approach aims at the institutionalization of knowledge but restricts knowledge production as a function of a select few.

B. The study of knowledge production can be done through many perspectives.

C. Professions-approach focuses on the creation of institutions of higher education and disciplines to promote knowledge production

D. The professions-approach has been one of the most relied upon perspective in the study of management knowledge production.

Answer: A

Solution:

Option B sums up only the first part of the paragraph.

Option D with 'most relied upon perspective' is incorrect. Nowhere has it been stated that it is one of the most reliable perspectives.

Between options A and C, A is a better choice because it mentions the limitation of professions-approach as well, thereby covering the whole essence of the paragraph. Hence, the correct answer is option A.

29. **Direction:** The passage given below is followed by four summaries. Choose the option that best captures the author's position.

Artificial embryo twinning is a relatively low-tech way to make clones. As the name suggests, this technique mimics the natural process that creates identical twins. In nature, twins form very early in development when the embryo splits in two. Twinning happens in the first days after egg and sperm join, while the embryo is made of just a small number of unspecialized cells. Each half of the embryo continues dividing on its own, ultimately developing into separate, complete individuals. Since they developed from the same fertilized egg, the resulting individuals are genetically identical.

A. Artificial embryo twinning is low-tech and mimetic of the natural development of genetically identical twins from the embryo after fertilization.

B. Artificial embryo twinning is low-tech unlike the natural development of identical twins from the embryo after fertilization.

C. Artificial embryo twinning is just like the natural development of twins, where during fertilization twins are formed.

D. Artificial embryo twinning is low-tech and is close to the natural development of twins where the embryo splits into two identical twins.

Answer: A

Solution:

Option A captures the key ideas of the paragraph accurately. Artificial embryo twinning is low-tech and mimics the natural development of genetically identical twins from the embryo after fertilization.

Option B describes the process of Artificial embryo twinning and then states it is not artificial embryo twinning.

Option C, too, distorts the facts stated in the passage. Twins are not formed during fertilization. Option D mentions that the embryo splits into two identical twins which is incorrect.

Hence, the correct answer is option A.

30. **Direction:** The passage given below is followed by four summaries. Choose the option that best captures the author's position.

The conceptualization of landscape as a geometric object first occurred in Europe and is historically related to the European conceptualization of the organism, particularly the human body, as a geometric object with parts having a rational, three-dimensional organization and integration. The European idea of landscape appeared before the science of landscape emerged, and it is no coincidence that Renaissance artists such as Leonardo da Vinci, who studied the structure of the human body, also facilitated an understanding of the structure of landscape.

Landscape, which had been a subordinate background to religious or historical narratives, became an independent genre or subject of art by the end of the sixteenth century or the beginning of the seventeenth century.

A. Landscape became a major subject of art at the turn of the sixteenth century.

B. The three-dimensional understanding of the organism in Europe led to a similar approach towards the understanding of landscape.

C. The study of landscape as an independent genre was aided by the Renaissance artists.

D. The Renaissance artists were responsible for the study of landscape as a subject of art.

Answer: C

Solution:

Option A goes out of context because the paragraph states that landscape became an independent genre of art or form, while the option says it became a major subject of art.

Option B distorts the facts; it mentions that 'the three-dimensional understanding of the organism in Europe led to...landscape', while the passage says that the two are related.

Option C best captures the author's position, which in the passage is clearly visible as 'Renaissance artists also facilitated an understanding of the structure of landscape'.

Option D is incorrect because it distorts the fact by saying the Renaissance artists were responsible, while the passage says that they only facilitated it.

Hence, the correct answer is option C.

31. **Direction:** The four sentences (labelled 1,2,3,4) given in this question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a number. Decide on the proper sequence of order of the sentences and key in this sequence of four numbers as your answer:

1) But now we have another group: the unwitting enablers.

2) Democracy and high levels of inequality of the kind that have come to characterize the United States are simply incompatible.

3) Believing these people are working for a better world, they are, actually, at most, chipping away at the margins, making slight course corrections, ensuring the system goes on as it is, uninterrupted.

4) Very rich people will always use money to maintain their political and economic power.

Answer: 2413

Solution:

Sentence 2 opens the discussion by introducing the topic of inequality and 4 gives reasons for this inequality. Therefore, 2-4 form a pair.

1 introduces a new category of people - the unwitting enablers and 3 describes their actions. Thus, 1-3 form a pair.

Hence, the correct answer is 2413.

32. **Direction:** Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out.

1) In many cases time inconsistency is what prevents our going from intention to action.

2) For people to continuously postpone getting their children immunized, they would need to be constantly fooled by themselves.

3) In the specific case of immunization, however, it is hard to believe that time inconsistency by itself would be sufficient to make people permanently postpone the decision if they were fully cognizant of its benefits.

4) In most cases, even a small cost of immunization was large enough to discourage most people.

5) Not only do they have to think that they prefer to spend time going to the camp next month rather than today, they also have to believe that they will indeed go next month.

Answer: 4

Solution:

All the sentences talk about time-inconsistency, citing the example of immunization, except sentence 4 which talks about the cost of immunization.

Hence, the correct answer is sentence 4.

33. **Direction:** Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out.

1) Displacement in Bengal is thus not very significant in view of its magnitude.

2) A factor of displacement in Bengal is the shifting course of the Ganges leading to erosion of river banks.

3) The nature of displacement in Bengal makes it an interesting case study.

4) Since displacement due to erosion is well spread over a long period of time, it remains invisible.

5) Rapid displacement would have helped sensitize the public to its human costs.

Answer: 5

Solution:

Sentences 1-4 talk about displacement in Bengal due to the shifting course of the Ganges. Sentences 1-4 describe this shifting as a case study.

Sentence 5 dwells deeper into it as a hypothetical situation - rapid displacement - bringing into consideration its human costs and is the odd sentence out.

Hence, the correct answer is sentence 5.

34. **Direction:** The four sentences (labelled 1, 2, 3, and 4) given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence of four numbers as your answer.

- 1) The eventual diagnosis was skin cancer and after treatment all seemed well.
- 2) The viola player didn't know what it was; nor did her GP.
- 3) Then a routine scan showed it had come back and spread to her lungs.
- 4) It started with a lump on Cathy Perkins' index finger.

Answer:4213

Solution:

4 makes the mention of the protagonist's name and sheds some light on the onset of the disease.

2 describes her reaction to the same.

1 takes the story ahead by talking about the early diagnosis.

3 sits comfortably in the end. It mentions the latter diagnosis - a routine scan showed it had come back and spread to her lungs.

Hence, the correct answer is 4213.

SLOT-1 QA

1. A trader sells 10 litres of a mixture of paints A and B, where the amount of B in the mixture does not exceed that of A. The cost of paint A per litre is Rs. 8 more than that of paint B. If the trader sells the entire mixture for Rs. 264 and makes a profit of 10%, then the highest possible cost of paint B, in Rs. per litre, is

- A. 20
- B. 16
- C. 22
- D. 26

Answer: A

Solution:

Let the price of paint B be Rs. b per litre.
 So, the price of paint A will be Rs. $(b + 8)$ per litre.
 Also, let the amount of A be M litres.
 So, that of B will be $(10 - M)$ litres.
 According to the question,

$$\begin{aligned} 10 - M &\leq M \\ 10 &\leq 2M \\ 5 &\leq M \end{aligned}$$

Now, we can form the following table:

| Paint | Volume in litres | Cost Per litre | Total |
|-------|------------------|----------------|------------|
| A | M | $8 + b$ | $8M + bM$ |
| B | $10 - M$ | b | $10b - Mb$ |
| Total | 10 | ----- | $8M + 10b$ |

According to the question, there is 10% profit.

$$\text{So, } (8M + 10b) \times 1.1 = 264$$

$$8M + 10b = 240$$

$$4M + 5b = 120$$

Here, we need to find the possible value/s of M and b , where M cannot be less than 5.

So, we can get the following table:

| | | | | | | |
|---|----|------|------|------|------|----|
| M | 5 | 6 | 7 | 8 | 9 | 10 |
| b | 20 | 19.2 | 18.4 | 17.6 | 16.8 | 16 |

Assuming M to be an integer, the maximum value of b occurs when M is 5.

So, the correct answer is 20.

Hence, option (A) is the correct answer.

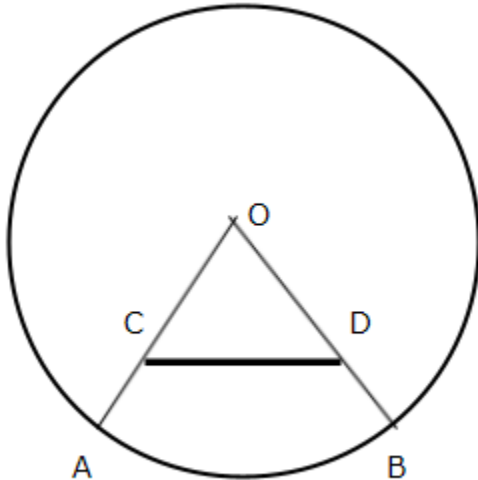
2. In a circle with centre O and radius 1 cm, an arc AB makes an angle of 60 degrees at O . Let R be the region bounded by the radii OA , OB , and the arc AB . If C and D are two points on OA and OB , respectively such that $OC = OD$ and the area of triangle OCD is half that of R , then the length of OC , in cm, is

- A. $\left(\frac{\pi}{6}\right)^{\frac{1}{2}}$
- B. $\left(\frac{\pi}{4}\right)^{\frac{1}{2}}$
- C. $\left(\frac{\pi}{3\sqrt{3}}\right)^{\frac{1}{2}}$

D. $\left(\frac{\pi}{4\sqrt{3}}\right)^{\frac{1}{2}}$

Answer: C

Solution:



OA = OB = 1cm = Radius of the circle

The area of the region R, bounded by OA, OB, and arc AB is

$$\frac{60}{360} \times \pi \times (1)^2 \text{ sq. cm} = \frac{\pi}{6} \text{ sq. cm}$$

Area of $\triangle OCD$ = Half of the region OAB = $\frac{1}{2} \times \frac{\pi}{6} = \frac{\pi}{12}$ sq. cm

$\triangle OCD$ is an equilateral triangle, since $\angle COD = 60^\circ$ and $OC = OD$

$$\begin{aligned} \text{Area of } \triangle OCD &= \frac{\sqrt{3}}{4} \times (\text{side})^2 = OC^2 \times \frac{\sqrt{3}}{4} = \frac{\pi}{12} \\ OC^2 &= \frac{\pi}{3\sqrt{3}} \\ OC &= \left(\frac{\pi}{3\sqrt{3}}\right)^{\frac{1}{2}} \end{aligned}$$

Hence, option (C) is the correct answer.

3. If $f(x + 2) = f(x) + f(x + 1)$ for all positive integers x, and $f(11) = 91$, $f(15) = 617$, then $f(10)$ equals.

Answer: 54

Solution:

We get, $f(12) = f(10) + f(11) = f(10) + 91$

Also, $f(13) = f(12) + f(11) = f(10) + 91 + 91 = f(10) + 2 \times 91$

Similarly, $f(14) = f(13) + f(12) = 2f(10) + 3 \times 91$

And $f(15) = f(14) + f(13) = 3 \times f(10) + 5 \times 91$

$$617 = 3 \times f(10) + 5 \times 91$$

$$617 = 3 \times f(10) + 455$$

$$162 = 3 \times f(10)$$

$$54 = f(10)$$

Hence, 54 is the correct answer.

4. The distance from A to B is 60 km. Partha and Narayan start from A at the same time and move towards B. Partha takes four hours more than Narayan to reach B. Moreover, Partha reaches the midpoint of A and B two hours before Narayan reaches B. The speed of Partha, in km/h, is ____.

- A. 3
- B. 4
- C. 6
- D. 5

Answer:

Solution:

Let the midpoint be C.

Also, let the speeds of Partha and Narayan be X and Y, respectively.

According to the question, we can write the following:

$$\frac{60}{X} = \frac{60}{Y} + 4 \dots\dots\dots(1)$$

$$\frac{30}{X} = \frac{60}{Y} - 2 \dots\dots\dots(2)$$

(1) - (2) gives us the following:

$$\begin{aligned} \frac{60}{X} - \frac{30}{X} &= 6 \\ \frac{30}{X} &= 6 \\ X &= 5 \end{aligned}$$

Hence, option (D) is the correct answer.

So, the correct answer is option D.

5. A CAT aspirant appears for a certain number of tests. His average score increases by 1 if the first 10 tests are not considered and decreases by 1 if the last 10 tests are not considered. If his average scores for the first 10 and the last 10 tests are 20 and 30, respectively, then the total number of tests taken by him is ____.

Answer: 60

Solution:

From the data given in the question above:

| Test category | Number | Average | Total |
|---------------|--------|---------|----------|
| First 10 | 10 | 20 | 200 |
| Middle | N | B | NB |
| Last 10 | 10 | 30 | 300 |
| Total | N + 20 | A | 500 + NB |

$$(N + 20)A = 500 + NB \dots\dots\dots(1)$$

If we exclude the first 10 tests, the average will increase to A + 1.

So, in that case, we will get the following equation:

$$(N + 10)(A + 1) = NB + 300 \dots\dots\dots(2)$$

$$NA + N + 10A + 10 = NB + 300 \dots\dots\dots(3)$$

Similarly, we will get

$$(N + 10)(A - 1) = NB + 200 \dots\dots\dots(4)$$

$$\text{or } NA - N + 10A - 10 = NB + 200 \dots\dots\dots(5)$$

(3) - (5) gives us

$$2N + 20 = 100$$

$N = 40$ or $N + 20 = 60$
Hence, 60 is the correct answer.

6. Two types of tea, A and B, are mixed and then sold at Rs. 40 per kg. The profit is 10% if A and B are mixed in the ratio 3:2, and 5% if this ratio is 2:3. The cost prices, per kg, of A and B are in the ratio _____.
A. 21:25
B. 19:24
C. 18:25
D. 17:25

Answer: B

Solution:

Let us assume that the cost prices (per kg) of A and B are $100a$ and $100b$, respectively.

In the first case, let us assume that we have taken 3kg of A and 2kg of B.

So, the total cost price = $300a + 200b = 100(3a + 2b)$ and profit = 10%

Profit = 10% of the cost price = 10% of $100(3a + 2b) = 10(3a + 2b)$

So, selling price = cost price + profit = $100(3a + 2b) + 10(3a + 2b)$
= $110(3a + 2b)$

According to the question,

$$110(3a + 2b) = 40 - (3 + 2) = 200 \text{ or } 11(3a + 2b) = 20 \dots\dots\dots(1)$$

Similarly, from the second case, we can get the following:

$$105(2a + 3b) = 40 \times 5 = 200 \text{ or } 21(2a + 3b) = 40 \dots\dots\dots(2)$$

From (1) and (2), we will get the following:

$$22(3a + 2b) = 21(2a + 3b)$$

$$66a + 44b = 42a + 63b$$

$$24a = 19b$$

$$a:b = 19:24$$

$$100a:100b = 19:24$$

Hence, option (B) is the correct answer.

7. A wholesaler bought walnuts and peanuts, the price of walnut per kg being thrice that of peanut per kg. He then sold 8 kg of peanuts at a profit of 10% and 16 kg of walnuts at a profit of 20% to a shopkeeper. However, the shopkeeper lost 5 kg of walnuts and 3 kg of peanuts in transit. He then mixed the remaining nuts and sold the mixture at Rs. 166 per kg, thus making an overall profit of 25%. At what price, in Rs. per kg, did the wholesaler buy the walnuts?

- A. 98
B. 86
C. 84
D. 96

Answer: D

Solution:

Let the cost price of peanuts and walnuts be Rs. x /kg and Rs. $3x$ /kg respectively.

The selling price of 8kg peanuts and 16kg of walnuts for the wholesaler =

$$\text{The cost of the same for the shopkeeper} = \text{Rs. } 8 \times x \times \frac{110}{100} + 16 \times 3x \times \frac{120}{100} = \text{Rs. } \frac{332x}{5}$$

The shopkeeper lost 5kg of walnuts and 3kg of peanuts.
Hence, the shopkeeper sold the remaining mixture, i.e., 16kg at Rs. 166 per kg.
Hence, the total selling price for the shopkeeper = Rs. 16×166
The shopkeeper's overall profit of 25%, so $\frac{332x}{5} \times \frac{125}{100} = 16 \times 166$ or $x = 32$
The cost price of walnuts for the wholesaler = Rs. $3 \times 32 = \text{Rs. } 96$
Hence, option (D) is the correct answer.

8. When they work alone, B needs 25% more time to finish a job than A does. They two finish the job in 13 days in the following manner: A works alone till half the job is done, then A and B work together for four days, and finally B works alone to complete the remaining 5% of the job. In how many days can B alone finish the entire job?

- A. 16
- B. 18
- C. 20
- D. 22

Answer: C

Solution:

Let A can finish the work in $4d$ days and B can finish the work in $5d$ days (as B takes 25% more days) LCM of $4d$ and $5d$ is $20d$.

Let the total work be $20dw$.

So, in 1 day, work done by A is $5w$ and B is $4w$, half the work = $10dw$

A alone finished the work in $\frac{10dw}{5w} = 2d$ days

A and B together can do $(4w+5w) = 9w$ work in 1 day

So, in 4 days, they will do $36w$ work.

Remaining work = 5% of total = 5% of $20dw = dw$

This work is done by B in $\frac{dw}{4w} = \frac{d}{4}$ days and $2d + 4 + \frac{d}{4} = 13$

Solving, we get, $d = 4$

So, B can finish the job in $5d = 20$ days

Hence, option (C) is the correct answer.

9. Given an equilateral triangle T_1 with side 24 cm, a second triangle T_2 is formed by joining the midpoints of the sides of T_1 . Then a third triangle T_3 is formed by joining the midpoints of the sides of T_2 . If this process of forming triangles is continued the sum of the areas, in sq. cm, of infinitely many such triangles T_1, T_2, T_3, \dots will be

- A. $248\sqrt{3}$
- B. $192\sqrt{3}$
- C. $188\sqrt{3}$
- D. $164\sqrt{3}$

Answer: B

Solution:

In any triangle, the triangle obtained by joining the mid points of the sides will have an area which is one-fourth of the original triangle.

Now, area of the equilateral triangle $T_1 = 24^2 \times \frac{\sqrt{3}}{4} = 144\sqrt{3} \text{ cm}^2$

So, the area of the equilateral triangle $T_2 = \frac{1}{4} \times 144\sqrt{3} = 36\sqrt{3} \text{ cm}^2$ and so on

So, the required sum will be $144\sqrt{3} + 36\sqrt{3} + 9\sqrt{3} + \dots$

This is a GP with first term = $144\sqrt{3}$ and the common ratio = $\frac{1}{4}$

So, the sum of the infinite GP = $\frac{144\sqrt{3}}{1 - \frac{1}{4}} = \frac{144\sqrt{3}}{\frac{3}{4}} = 192\sqrt{3}$

Hence, option (B) is the correct answer.

10. While multiplying three real numbers, Ashok took one of the numbers as 73 instead of 37. As a result, the product went up by 720. The minimum possible value of the sum of squares of the other two numbers is

Answer: 40

Solution:

Let the other two numbers be a and b.

So, actual product = 37ab and wrong product = 73ab

Increase = 73 ab - 37 ab = (73 - 37) ab = 36 ab = 720 and ab = 20

We need to find the minimum value of $a^2 + b^2 = P$ (let)

The minimum value of P will correspond to equal values of a and b.

So, $a = b = \sqrt{20}$ and $P = (\sqrt{20})^2 + (\sqrt{20})^2 = 20 + 20 = 40$

Hence, 40 is the correct answer.

11. If x is a positive quantity such that $2^x = 3^{\log_5 2}$, then x is equal to

A. $\log_5 9$

B. $1 + \log_5 \left(\frac{3}{5}\right)$

C. $1 + \log_3 \left(\frac{5}{3}\right)$

D. $\log_5 8$

Answer: B

Solution:

$$\begin{aligned} 2^x &= 3^{\log_5 2} \\ x \log_2 2 &= \log_5 2 \times \log_2 3 \\ x &= \log_5 3 = \log_5 \left(\frac{3}{5} \times 5\right) = \log_5 \left(\frac{3}{5}\right) + \log_5 5 = \log_5 \left(\frac{3}{5}\right) + 1. \end{aligned}$$

Hence, option (B) is the correct answer.

12. If $\log_{12} 81 = p$, then $3^{\left\{\frac{4-p}{4+p}\right\}}$ is equal to:

A. $\log_2 8$

B. $\log_6 8$

C. $\log_4 16$

D. $\log_6 16$

Answer: B

Solution:

Since, $p = \log_{12} 81 = \log_{12} 3^4 = \frac{4 \log_3 3}{\log_3 3 + \log_3 2^3}$ or $p = \frac{4}{1 + 2 \log_3 2}$

$4 - p = 4 - \frac{4}{1 + 2 \log_3 2} = \frac{4 + 8 \log_3 2 - 4}{1 + 2 \log_3 2}$, Let $a = \log_3 2$

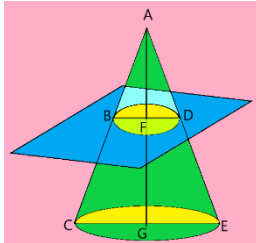
Similarly, $4 + p = \frac{8(1+a)}{1+2a}$
 So, $\frac{3(4-p)}{4+p} = \frac{3a}{1+a} = \frac{3 \log_3 2}{1 + \log_3 2} = \frac{3 \log_3 2}{\log_3 3 + \log_3 2} = \log_6 8$

Hence, option (B) is the correct answer.

13. A right circular cone, of height 12 ft, stands on its base which has a diameter of 8 ft. The tip of the cone is cut off with a plane which is parallel to the base and 9 ft from the base. With $n = 22/7$, the volume, in cubic ft, of the remaining part of the cone is:

Answer: 198

Solution:



$AG=12$, $CE=8$, $FG=9$ \square $AF=AG - FG = 12 - 9 = 3$

Base diameter = $CE = 8$

So, base radius = $CG=GE = \frac{1}{2} \times 8 = 4$

Let, the upper radius be $r = BF=FD$

In triangles AFD and triangle AGE, angle AFD = angle AGE = 90 degrees

Angle FAD and angle GAE are the same angle.

So, triangles DAF and triangle EAG are similar.

So, their corresponding sides will be proportional.

So, $\frac{AD}{AE} = \frac{FD}{GE} = \frac{AF}{AG}$

$$\frac{AD}{AE} = \frac{r}{4} = \frac{3}{12} = \frac{1}{4}$$

$r = 1$

So, the volume of the upper cone = $\frac{1}{3} \pi r^2 \times 3 = \pi$

And the volume of the total cone = $\frac{1}{3} \pi \times 4^2 \times 12 = 64\pi =$

So, the volume of the lower part of the cone = $64\pi - \pi = 63\pi = 63 \times \frac{22}{7} = 9 \times 22 = 198$ cc

Hence, 198 is the correct answer.

14. How many numbers with two or more digits can be formed with the digits 1, 2, 3, 4, 5, 6, 7, 8, and 9 so that in every such number, each digit is used at most once and the digits appear in the ascending order?

Answer: 502

Solution:

We can form a two digit number satisfying the given condition in ${}^9C_2=36$ ways.

Similarly, we can form a three digit number satisfying the given condition in ${}^9C_3=84$ ways

Similarly going on , we can get the total number of all possible cases as ${}^9C_2+{}^9C_3+{}^9C_4+{}^9C_5+{}^9C_6+{}^9C_7+{}^9C_8+{}^9C_9 = {}^9C_0 + {}^9C_1 + {}^9C_2+{}^9C_3+{}^9C_4+ {}^9C_5+{}^9C_6+{}^9C_7+ {}^9C_8+{}^9C_9 - ({}^9C_0 + {}^9C_1)=2^9 - (1+9)=2^9 - 10 = 512 - 10 =502$
Hence, 502 is the correct answer.

15. John borrowed Rs. 2,10,000 from a bank at an interest rate of 10% per annum, compounded annually. The loan was repaid in two equal instalments, the first after one year and the second after another year. The first installment was interest of one year plus part of the principal amount, while the second was the rest of the principal amount plus due interest thereon. Then each installment, in Rs., is:

Answer: 121000

Solution:

Let each of the two instalments be Rs. x.

After one year, the amount becomes = Rs. $2,10,000 \times \left(1 + \frac{10}{100}\right)$

= Rs. $2,10,000 \times 1.1 = \text{Rs. } 2,31,000$

After paying the first instalment, the remaining amount is = Rs. $(2,31,000 - x)$

The entire loan was repaid after two years, hence $(231000 - x) \left(1 + \frac{10}{100}\right) = x$

$$\begin{aligned} (231000 - x)1.1 &= x \\ 254100 - 1.1x &= x \\ 2.1x &= 254100 \\ x &= 1,21,000 \end{aligned}$$

Hence, 121000 is the correct answer.

16. If $u^2 + (u-2v-1)^2 = -4v(u+v)$, then what is the value of $u + 3v$?

- A. $\frac{1}{4}$
- B. $\frac{1}{2}$
- C. 0
- D. $-\frac{1}{4}$

Answer: D

Solution:

$$\begin{aligned} u^2 + (u - 2v - 1)^2 &= -4v(u + v) \\ 2u^2 + 4v^2 + 1 - 4uv - 2u + 4v &= -4uv - 4v^2 \\ 2u^2 + 8v^2 + 1 - 2u + 4v &= 0 \end{aligned}$$

$$2(u^2 - u) + 8\left(v^2 + \frac{v}{2}\right) + 1 = 0 \dots\dots\dots (1)$$

Now, $u^2 - u = u^2 - 2\left(\frac{1}{2}\right)u + \left(\frac{1}{2}\right)^2 - \frac{1}{4} = (u - \frac{1}{2})^2 - \frac{1}{4}$

And $v^2 + \frac{v}{2} = v^2 + 2v\left(\frac{1}{4}\right) + \left(\frac{1}{4}\right)^2 - \frac{1}{16} = \left(v + \frac{1}{4}\right)^2 - \frac{1}{16}$

Substituting these values, we will get, (1) or

$$\begin{aligned} 2\left(u - \frac{1}{2}\right)^2 - \frac{1}{2} + 8\left(v + \frac{1}{4}\right)^2 - \frac{1}{2} + 1 &= 0 \\ 2\left(u - \frac{1}{2}\right)^2 + 8\left(v + \frac{1}{4}\right)^2 &= 0 \end{aligned}$$

$U = \frac{1}{2}$ and $v = -\frac{1}{4}$

So, $u+3v = \frac{1}{2} - \frac{3}{4} = -\frac{1}{4}$

Hence, option (D) is the correct answer.

17. Point P lies between points A and B such that the length of BP is thrice that of AP. Car 1 starts from A and moves towards B. Simultaneously, car 2 starts from B and moves towards A. Car 2 reaches P one hour after car 1 reaches P. If the speed of car 2 is half that of car 1, then the time, in minutes, taken by car 1 in reaching P from A is:

Answer: 12

Solution:

A P B

AP = D (let)

So, BP = 3D

Let the speed of the second car be S.

So, the speed of the first car = 2S

We need to find the time taken by the first car to reach P from A, that is, to cover the distance D. Let the time be T.

So, we can form the following table:

| Name | Time | Speed | Distance |
|------|-------|-------|----------|
| A | T | 2S | 2ST |
| B | T + 1 | S | S(T + 1) |

So, $S(T + 1) = 3 \times 2ST$

$ST + S = 6ST$

$S = 5ST$

$T = \frac{1}{5} = 12$ minutes

Hence, 12 is the correct answer.

18. Let ABCD be a rectangle inscribed in a circle of radius 13 cm. Which one of the following pairs can represent, in cm, the possible length and breadth of ABCD?

A. 25,10

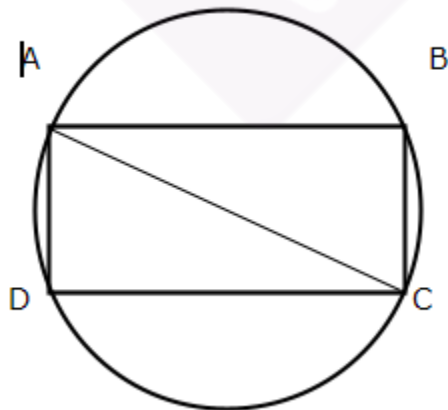
B. 24,12

C. 25,9

D. 24,10

Answer: D

Solution:



Since the rectangle is inscribed in the circle, hence the diagonal AC and BD become the diameter of the circle.

Let the length and breadth be L and B units respectively.

Hence, the diagonal of becomes $\sqrt{L^2 + B^2} = 26$, $L^2 + B^2 = 26^2$ or $L^2 + B^2 = 676$

And out of the given options, only option B, i.e., 24 and 10 satisfies the above equation, i.e., $24^2 + 10^2 = 576 + 100 = 676$

Hence, option (D) is the correct answer.

19. In an examination, the maximum possible score is N while the pass mark is 45% of N. A candidate obtains 36 marks but falls short of the pass mark by 68%. Which one of the following is correct?

- A. $N \leq 200$
- B. $243 \leq N \leq 252$
- C. $N \geq 253$
- D. $201 \leq N \leq 242$

Answer: D

Solution:

Pass mark = $0.45N$

So, obtained marks + 68% of pass marks = pass marks

So, $36 + 68\% \text{ of } 0.45N = 0.45N$

$36 = 32\% \text{ of } 0.45N$

$36 = 0.32 \times 0.45N$

$N = 250$

Hence, option (D) is the correct answer.

20. Let x, y, z be three positive real numbers in a geometric progression such that $x < y < z$. If 5x, 16y, and 12z are in an arithmetic progression then the common ratio of the geometric progression is

- A. $1/6$
- B. $3/6$
- C. $3/2$
- D. $5/2$

Answer: D

Solution:

Let, the common ratio be r.

So, $y = xr$ and $z = yr^2$

Since 5x, 16y, and 12z are in AP,

We can write $32y = 5x + 12z$

Putting the values of y and z, we will get,

$$32 \times r = 5x + 12xr^2$$

$$32r = 5 + 12r^2$$

$$12r^2 - 32r + 5 = 0$$

$$12r^2 - 30r - 2r + 5 = 0$$

$$6r(2r - 5) - (2r - 5) = 0$$

$$(2r - 5)(6r - 1) = 0$$

$$r = 5/2 \text{ or } 1/6$$

since $x < y < z$, r can not be less than one or $r = 5/2$

Hence, option (D) is the correct answer.

21. The number of integers x such that $0.25 < 2^x < 200$, and $2^x + 2$ is perfectly divisible by either 3 or 4, is

Answer: 5

Solution:

Since $0.25 < 2^x < 200$, we can say, $(-4) < x < 8$

Since $2^x + 2$ is perfectly divisible by either 3 or 4, $2^x + 2$ must be a natural number.

So, x can be 0, 1, ...7 only.

We can draw the chart as given below:

| x | 2^x | 2^x+2 | divisible by | | ACCEPTABLE? |
|---|-------|---------|--------------|-----|-------------|
| | | | 3 | 4 | |
| 0 | 1 | 3 | YES | NO | YES |
| 1 | 2 | 4 | NO | YES | YES |
| 2 | 4 | 6 | YES | NO | YES |
| 3 | 8 | 10 | NO | NO | NO |
| 4 | 16 | 18 | YES | NO | YES |
| 5 | 32 | 34 | NO | NO | NO |
| 6 | 64 | 66 | YES | NO | YES |
| 7 | 128 | 130 | NO | NO | NO |

So, we can see that there are 5 acceptable values of x .

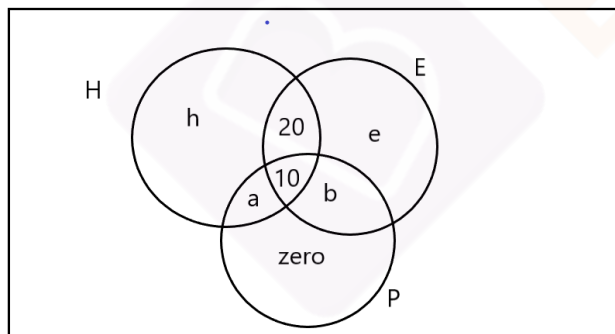
Hence, 5 is the correct answer.

22. Each of 74 students in a class study at least one of the three subjects H, E and P. Ten students study all three subjects, while twenty study H and E, but not P. Every student who studies P also studies H or E or both. If the number of students studying H equals that studying E, then the number of students studying H is

Answer: 52

Solution:

We can form the following diagram □



$$20+10+a+h=20+10+e+b \text{ [since the number of students for H and E are same]}$$

$$\text{So, } a+h=e+b=k \text{ (let)}$$

$$\text{Now, } 20+10+h+a+e+b+0=74$$

$$30+k+k=74$$

$$2k=44$$

$$k = 22$$

$$\text{so, H has } 20+10+h+a=30+k = 30+22=52$$

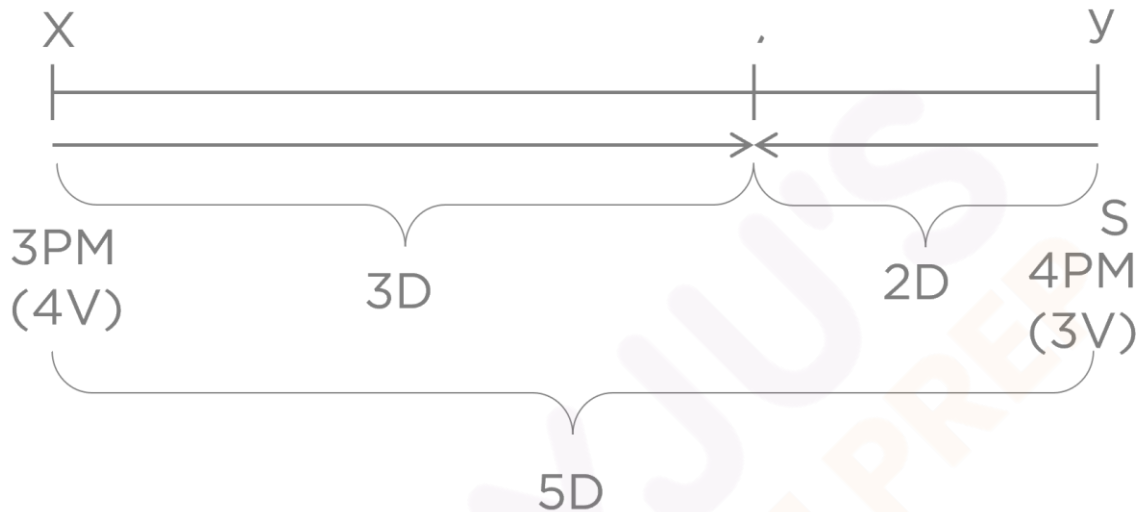
Hence, 52 is the correct answer.

23. Train T leaves station X for station Y at 3 pm. Train S, traveling at three quarters of the speed of T, leaves Y for X at 4 pm. The two trains pass each other at station Z, where the distance between X and Z is three-fifths of that between X and Y. How many hours does train T take for its journey from X to Y?

Answer: 15

Solution:

We can draw the following diagram:



We have assumed the total distance as 5D and speed of T as 4V to avoid fractions. Now, train T covers 3D distance in t time.

$$\text{So, } t = \frac{3D}{4V} \dots \dots \dots (1)$$

Similarly, train S covers 2D distance in (t - 1) time.

$$\text{So, } t - 1 = \frac{2D}{3V} \dots \dots \dots (2)$$

Dividing (1) by (2), we will get, $\frac{t}{t-1} = \frac{\left(\frac{3}{4}\right)}{\frac{2}{3}}$

$$\frac{t}{t-1} = \frac{9}{8}$$

$$8t = 9t - 9$$

$$9 = t$$

Now, train T takes $\frac{5D}{4V}$ time to cover the entire distance.

$$\text{From (1), we get, } \frac{D}{V} = \frac{4t}{3} = 12$$

$$\text{So, required time} = \frac{5}{4} \times 12 = 15 \text{ hours}$$

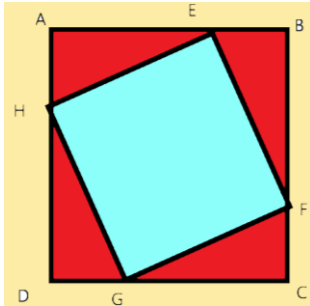
Hence, 15 is the correct answer.

24. Points E, F, G, H lie on the sides AB, BC, CD, and DA, respectively, of a square ABCD. If EFGH is also a square whose area is 62.5% of that of ABCD and CG is longer than EB, then the ratio of length of EB to that of CG is

A. 1 : 3

- B. 3 : 8
- C. 4 : 9
- D. 2 : 5

Answer: A
Solution:



Let, $EB = x$, $CG = y$, and $HE = EF = FG = GH = z$

Now, let, angle BEF be θ .

Since, in a square, all angles are right angles, in triangle EBF, angle EBF = 90 degrees

Since sum of all the angles of any triangle is always 180 degrees, we can say, angle BFE = $90 - \theta$

Since EFGH is a square, angle EFH is a right angle.

Since BFC is a straight line, angle BFC is 180 degrees.

So, angle BFE + angle EFH + angle GFC = 180 degrees

So, $90 - \theta + 90 + GFC = 180$ or $GFC = \theta$

In right angled triangle FCG, angle FGC = $90 - \theta$

So, between triangles EBF and FCG, $EF = FG = z$

Angles BEF = angle GFC = θ

And angle BFE = angle FGC = $90 - \theta$

So, using the angle-side-angle formula, the two triangles BEF and CFG are congruent.

So, $FC = EB = x$ and $BF = CG = y$

Similarly, we can prove that $EB = FC = GD = AH = x$ AND $BF = CG = HD = AE = y$

So, $AB = x + y = BC = CD = DA$

Now, area of the square ABCD = $(x + y)^2 = x^2 + 2xy + y^2$

Area of the square EFGH = $z^2 = x^2 + y^2$ [using Pythagoras' theorem in right angled triangle EBF]

According to the question,

$$x^2 + y^2 = 62.5\% \text{ of } (x^2 + 2xy + y^2)$$

$$x^2 + y^2 = \left(\frac{5}{8}\right) \times (x^2 + 2xy + y^2)$$

$$3x^2 + 3y^2 - 10xy = 0$$

$$(x - 3y)(3x - y) = 0$$

$$x = 3y \text{ or } x = y/3$$

It is given that $CG > EB$, or $y > x$.

As both x and y are positive numbers, $x = 3y$ is not acceptable.

So, $x = y/3$

Or $\frac{x}{y} = \frac{1}{3}$ or EB : CG = 1:3

25. Given that $x^{2018} y^{2017} = 1/2$ and $x^{2016} y^{2019} = 8$, the value of $x^2 + y^3$ is

- A. 37/4
- B. 31/4
- C. 35/4
- D. 33/4

Answer: D

Solution:

Given that $x^{2018} y^{2017} = 1/2$(1) and $x^{2016} y^{2019} = 8$(2)

(1)/(2) gives us $y = 4x$(3)

Since all values are given positive (1/2 and 4), so, we have ignored the negative values.

Substituting $y = 4x$ in (1), We will get, $x^{4035} = 2^{-4035}$ so $x = 1/2$

Substituting this value in (3), we will get, $y = 2$ and $x^2 + y^3 = 33/4$.

Hence, option (D) is the correct answer.

26. Raju and Lalitha originally had marbles in the ratio 4 : 9. Then Lalitha gave some of her marbles to Raju. As a result, the ratio of the number of marbles with Raju to that with Lalitha became 5 : 6. What fraction of her original number of marbles was given by Lalitha to Raju?

- A. 1/4
- B. 1/5
- C. 6/19
- D. 7/33

Answer: D

Solution:

Suppose that Lalitha had 4m marbles and Raju had 9m marbles. Lalitha gave 'x' marbles to Raju. According to the question, we can write the following:

$$\frac{4m + x}{9m - x} = \frac{5}{6}$$

$$24m + 6x = 45m - 5x$$

$$11x = 21m$$

$$x = \frac{21m}{11}$$

The required fraction = $\frac{21m}{9m} = \frac{7}{33}$

Hence, option (D) is the correct answer.

27. If $\log_2(5 + \log_3 a) = 3$ and $\log_5(4a + 12 + \log_2 b) = 3$, then a + b is equal to

- A. 32
- B. 59
- C. 67
- D. 40

Answer: B

Solution:

Given,

$\log_2(5 + \log_3 a) = 3$(1) and $\log_5(4a + 12 + \log_2 b) = 3$(2)

from (1), we get $5 + \log_3 a = 2^3 = 8$
 $\log_3 a = 3$ or $a = 3^3$ or $a = 27$(3)
From (2) we get, $4a + 12 + \log_2 b = 5^3 = 125$
 $4 \times 27 + 12 + \log_2 b = 125$
 $108 + 12 + \log_2 b = 125$
 $\log_2 b = 5$
 $b = 2^5 = 32$
so, $a + b = 32 + 27 = 59$

Hence, option (B) is the correct answer.

28. Humans and robots can both perform a job but at different efficiencies. Fifteen humans and five robots working together take thirty days to finish the job, whereas five humans and fifteen robots working together take sixty days to finish it. How many days will fifteen humans working together (without any robot) take to finish it?

- A. 40
- B. 32
- C. 36
- D. 45

Answer: B

Solution:

Let, in 1 day, while working alone,
1 man can do M units of work and 1 robot can do R units of work.

Let the total work be T units.

According to the first condition,
 $30(15H+5R)=T$ and $150(3H+R)=T$(1)

Also, $60(5H+15R)=T$ and $300(H+3R)=T$(2)

Comparing (1) and (2), we get,

$$150(3H+R)=300(H+3R)$$

$$3H+R=2(H+3R)$$

$$3H+R=2H+6R$$

$$H = 5R$$
.....(3)

Substituting this value in (1) we get,

$$T = 150(15R+R)=150 \times 16R$$
.....(4), 15 humans = $15H = 15 \times 5R$(5)

If D is the number of days taken by 15 humans to finish the total work, then $15 \times 5RD = 150 \times 16R$ and $D=32$

Hence, option (B) is the correct answer.

29. In a parallelogram ABCD of an area of 72 sq. cm, the sides CD and AD have lengths 9 cm and 16 cm, respectively. Let P be a point on CD such that AP is perpendicular to CD. Then the area, in sq. cm, of triangle APD is

- A. $18\sqrt{3}$
- B. $24\sqrt{3}$
- C. $32\sqrt{3}$
- D. $12\sqrt{3}$

Answer: C

Solution:



Since the area is 72 cm^2 , we can write $AP \times CD = 72$
 $9AP = 72$ and $AP = 8 \text{ cm}$

In right-angled triangle APD, using Pythagoras' Theorem, we get, $PD = 8\sqrt{3}$

So, the area of APD = $\frac{1}{2} \times PD \times AP = \frac{1}{2} \times 8\sqrt{3} \times 8 = 32\sqrt{3} \text{ cm}^2$

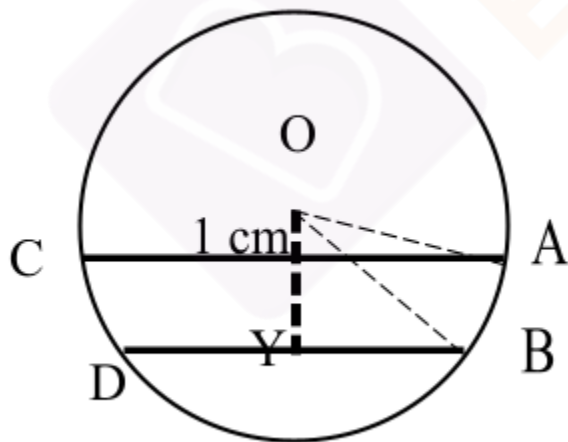
Hence, option (C) is the correct answer.

30. In a circle, two parallel chords on the same side of a diameter have lengths 4 cm and 6 cm. If the distance between these chords is 1 cm, then the radius of the circle, in cm, is

- A. $\sqrt{13}$
- B. $\sqrt{14}$
- C. $\sqrt{11}$
- D. $\sqrt{12}$

Answer: A

Solution:



The lengths of the chords CA and DB are 6cm and 4cm respectively and the distance between these two are 1 cm.

OA = OB are the two radii of the circle. let OA = OB = R units

The perpendicular drop from the centre O bisects the chords. Hence, ΔOXA and ΔOYB are two right-angled triangles in which XA = 3cm and YB = 2cm and also OX + 1 = OY

Let OX = x cm, hence OY = x + 1 cm

$$OX^2 + XA^2 = OY^2 + YB^2 = OA^2 = OB^2 = R^2$$

$$x^2 + 9 = (x + 1)^2 + 4$$

$$x^2 + 9 = x^2 + 2x + 1 + 4$$

$$2x = 4$$

$$x = 2$$

Hence the radius = $\sqrt{2^2 + 3^2}$ cm = $\sqrt{13}$ cm

Hence, option (A) is the correct answer.

31. A tank is fitted with pipes, some filling it and the rest draining it. All filling pipes fill at the same rate, and all draining pipes drain at the same rate. The empty tank gets completely filled in 6 hours when 6 filling and 5 draining pipes are on, but this time becomes 60 hours when 5 filling and 6 draining pipes are on. In how many hours will the empty tank get completely filled when one draining and two filling pipes are on?

Answer: 10

Solution:

Let, in 1 hour, each filling pipe can fill F units and each draining pipe can drain D units.

$$\text{So, the capacity of the tank} = 6(6F - 5D) = 60(5F - 6D) \dots\dots\dots(1)$$

$$6F - 5D = 10(5F - 6D)$$

$$6F - 5D = 50F - 60D$$

$$55D = 44F$$

$$5D = 4F = 20K \text{ (let) [where K is a non-zero constant]}$$

$$D=4K, F = 5K$$

So, if we assume that when one draining and two filling pipes are on, they will take H hours to completely fill the tank, then,

$$H(2F - D) = \text{total capacity of the tank} \dots\dots\dots(2)$$

$$\text{From (1) and (2), we will get, } H(2F - D) = 60(5F - 6D) \dots\dots\dots(3)$$

Putting the values of F and D into this equation, we will get,

$$H(10K - 4K) = 60(25K - 24K)$$

$$H(6K) = 60K$$

$$H = 10$$

Hence, 10 is the correct answer.

32. If among 200 students, 105 like pizza and 134 like burger, then the number of students who like only burger can possibly be

A. 26

B. 23

C. 96

D. 93

Answer: D

Solution:

Let, B students like both pizza and burger and N students like none of pizza and burger.

$$\text{So, those who like only burger} = 134 - B$$

And those who like only pizza = $105 - B$

So, $134 - B + 105 = 200 - N$, where both B and N are whole numbers

$$B = 39 + N$$

So, B can be 39 or more.

So, 134 can be 95 or less.

But, on the other hand, even if all pizza eaters also eat burgers, then also at least 29 people must be there who only like burgers.

So, the required value should be in the interval $[29, 95]$

Hence, option (D) is the correct answer.

33. Let $f(x) = \min\{2x^2, 52 - 5x\}$, where x is any positive real number. Then the maximum possible value of $f(x)$ is

Answer: 32

Solution:

If $2x^2 < 52 - 5x$ then $2x^2 + 5x - 52 < 0$ so, $(-6.5) < x < 4$

so, $x = -6, -5, -4, -3, -2, -1, 0, 1, 2, 3$

but, since $x > 0$, we will get, $x = 1$ or 2 or 3 only

so, $f(x)$ can be at max $2(3)^2 = 18$

and if $2x^2 > 52 - 5x$ then $2x^2 + 5x - 52 > 0$ so, $x < (-6.5)$ and $4 < x$

So, the max value of $f(x)$ can be $52 - 5(4) = 32$

Hence, 32 is the correct answer.

34. In an apartment complex, the number of people aged 51 years and above is 30 and there are at most 39 people whose ages are below 51 years. The average age of all the people in the apartment complex is 38 years. What is the largest possible average age, in years, of the people whose ages are below 51 years?

A. 25

B. 26

C. 27

D. 28

Answer: D

Solution:

From the given data, we can form the following table:

| Case | Number | Average | Total |
|---------|------------|--------------|----------------|
| Higher | 30 | 51 and above | 1530 and above |
| Lower | 39 or less | Below 51 | Below 1949 |
| Overall | 69 or less | 38 | 2622 or less |

For the "lower" case, if we need the largest possible average, we need the lowest possible average in the "higher" case.

For the "higher" case, the lowest possible average = 51

So, for the "higher" case, the lowest possible sum = 1530

So, for the "lower" case, the sum will be $2622 - 1530 = 1092$

So, average = $1092/39 = 28$

Hence, option (D) is the correct answer.

SLOT-1 DILR

1.

Direction: 1600 satellites were sent up by a country for several purposes. The purposes are classified as broadcasting (B), communication (C), surveillance (S), and others (O). A satellite can serve multiple purposes. However, a satellite serving either B, or C, or S does not serve O.

The following facts are known about the satellites:

(i) The numbers of satellites serving B, C, and S (though maybe not exclusively) are in the ratio 2:1:1.

(ii) The number of satellites serving all three of B, C, and S is 100.

(iii) The number of satellites exclusively serving C is the same as the number of satellites exclusively serving S. This number is 30% of the number of satellites exclusively serving B.

(iv) The number of satellites serving O is the same as the number of satellites serving both C and S but not B.

What best can be said about the number of satellites serving C?

- A. Cannot be more than 800
- B. Must be at least 100
- C. Must be between 450 and 725
- D. Must be between 400 and 800

Answer: C

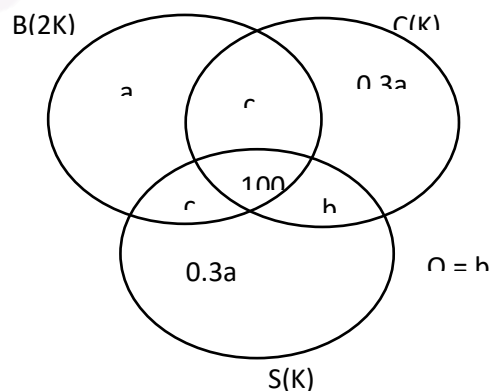
Solution:

Step 1: It is given that the satellites serving either B, C or S do not serve O. From given point (i), let the number of satellites serving B, C, and S be $2K$, K , and K , respectively. Further, let the number of satellites exclusively serving B be a .

Step 2: From given point (iii), the number of satellites exclusively serving C and exclusively serving S will each be $0.3a$.

Step 3: From given point (iv), the number of satellites serving O is the same as the number of satellites serving only C and S. Let that number be b .

Step 4: Since the number of satellites serving C is the same as the number of satellites serving S, we can say that (number of satellites serving only B and C) + $0.3a$ + 100 + b = (number of satellites serving only B and S) + $0.3a$ + 100 + b . Further, let the number of satellites serving only B and C = the number of satellites serving only B and S = c



Step 5: It is given that there are a total of 1600 satellites.

$$\Rightarrow a + c + 0.3a + c + 100 + b + 0.3a + b = 1600$$

$$\Rightarrow 1.6a + 2b + 2c = 1500 \text{ ----- (a)}$$

$$\text{Also } K = 0.3a + c + b + 100$$

$$\text{Satellites serving B} = 2K = a + 2c + 100$$

$$\Rightarrow 2(0.3a + c + b + 100) = a + 2c + 100$$

$$\Rightarrow 0.4a = 2b + 100$$

$$a = 5b + 250 \text{ -----(b)}$$

Substituting (b) in (a), we will get

$$1.6(5b + 250) + 2b + 2c = 1500$$

$$10b + 2c = 1100$$

$$c = 550 - 5b \text{ ----- (c)}$$

Step 1: The number of satellites serving C = $c + 0.3a + 100 + b$

Substituting the derived values of c and a,

$$\Rightarrow (550 - 5b) + 0.3(5b + 250) + 100 + b = 725 - 2.5b$$

Step 2: This number will be maximum when b is minimum. Minimum value of b is 0, therefore, the maximum number of satellites serving C will be 725.

Step 3: From (c), $c = 550 - 5b$. Since the number of satellites cannot be negative, the maximum value of b is 110.

Step 4: When $b = 110$, the number of satellites serving C will be $725 - 2.5 \times 110 = 450$. This will be the minimum number of satellites serving C.

The number of satellites serving C must be between 450 and 725.

The correct option is C.

2. What is the minimum possible number of satellites serving B exclusively?

- A. 100
- B. 200
- C. 250
- D. 500

Answer: C

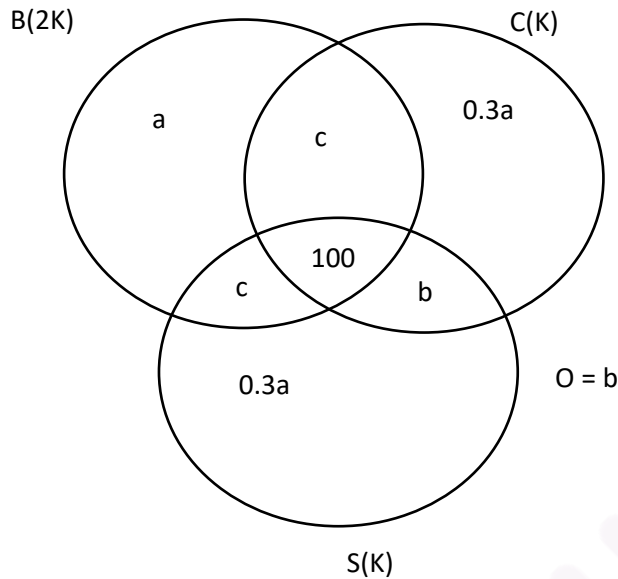
Solution:

Step 1: It is given that the satellites serving either B, C or S do not serve O. From given point (i), let the number of satellites serving B, C and S be $2K, K, K$ respectively. Further, let the number of satellites exclusively serving B be a.

Step 2: From given point (iii), the number of satellites exclusively serving C and exclusively serving S will each be $0.3a$.

Step 3: From given point (iv), the number of satellites serving O is the same as the number of satellites serving only C and S. Let that number be b.

Step 4: Since the number of satellites serving C is the same as the number of satellites serving S, we can say that (number of satellites serving only B and C) + $0.3a + 100 + b =$ (number of satellites serving only B and S) + $0.3a + 100 + b$. Further, let the number of satellites serving only B and C = the number of satellites serving only B and S = c



Step 5: It is given that there are a total of 1600 satellites.

$$\Rightarrow a + c + 0.3a + c + 100 + b + 0.3a + b = 1600$$

$$\Rightarrow 1.6a + 2b + 2c = 1500 \text{ ----- (a)}$$

Also $K = 0.3a + c + b + 100$

Satellites serving B = $2K = a + 2c + 100$

$$\Rightarrow 2(0.3a + c + b + 100) = a + 2c + 100$$

$$\Rightarrow 0.4a = 2b + 100$$

$$a = 5b + 250 \text{ -----(b)}$$

Substituting (b) in (a), we will get

$$1.6(5b + 250) + 2b + 2c = 1500$$

$$10b + 2c = 1100$$

$$c = 550 - 5b \text{ ----- (c)}$$

From (b), the number of satellites serving B exclusively is $a = 5b + 250$

This is minimum when b is minimum.

Minimum value of $b = 0$.

The minimum number of satellites serving B exclusively = $5 \times 0 + 250 = 250$.

The correct option is C.

3. If at least 100 of the 1600 satellites were serving O, what can be said about the number of satellites serving S?

- A. Exactly 475
- B. At most 475
- C. At least 475
- D. No conclusion is possible based on the given information

Answer: B

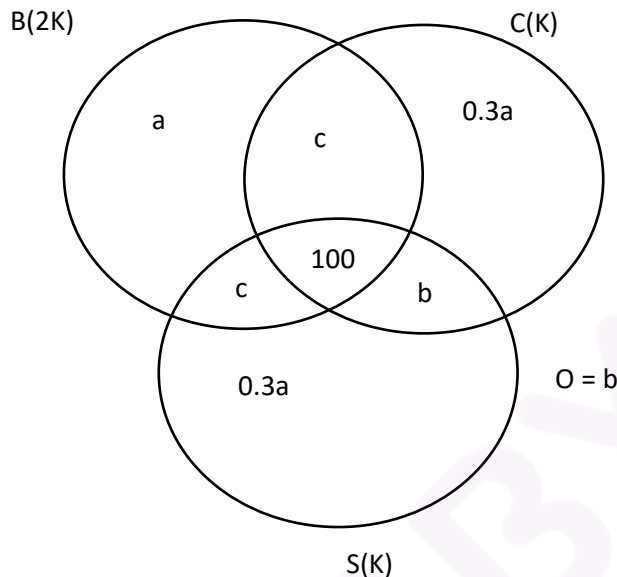
Solution:

Step 1: It is given that the satellites serving either B, C or S do not serve O. From given point (i), let the number of satellites serving B, C and S be 2K, K, K respectively. Further, let the number of satellites exclusively serving B be a.

Step 2: From given point (iii), the number of satellites exclusively serving C and exclusively serving S will each be $0.3a$.

Step 3: From given point (iv), the number of satellites serving O is the same as the number of satellites serving only C and S. Let that number be b .

Step 4: Since the number of satellites serving C is the same as the number of satellites serving S, we can say that (number of satellites serving only B and C) + $0.3a + 100 + b =$ (number of satellites serving only B and S) + $0.3a + 100 + b$. Further, let the number of satellites serving only B and C = the number of satellites serving only B and S = c



Step 5: We are given that there are a total of 1600 satellites.

$$\Rightarrow a + c + 0.3a + c + 100 + b + 0.3a + b = 1600$$

$$\Rightarrow 1.6a + 2b + 2c = 1500 \text{ ----- (a)}$$

$$\text{Also } K = 0.3a + c + b + 100$$

$$\text{Satellites serving B} = 2K = a + 2c + 100$$

$$\Rightarrow 2(0.3a + c + b + 100) = a + 2c + 100$$

$$\Rightarrow 0.4a = 2b + 100$$

$$a = 5b + 250 \text{ ----- (b)}$$

Substituting (b) in (a), we will get

$$1.6(5b + 250) + 2b + 2c = 1500$$

$$10b + 2c = 1100$$

$$c = 550 - 5b \text{ ----- (c)}$$

Step 1: Given that at least 100 satellites serve O; we can say in this case that $b \geq 100$. Number of satellites serving $s = 0.3a + c + 100 + b$. Substituting values of a and c from (b) and (c), respectively, we get $s \Rightarrow 725 - 2.5b$.

Step 2: This is minimum when b is maximum, i.e., 110 (from c). Minimum number of satellites serving = $725 - (2.5 \times 110) = 450$.

Step 3: This is maximum when b is minimum, i.e., 100 in this case. Maximum number of satellites serving = $725 - (2.5 \times 100) = 475$

Therefore, the number of satellites serving S is at most 475.

The correct option is B.

4. If the number of satellites serving at least two among B, C, and S is 1200, which of the following **MUST** be FALSE?

- A. All 1600 satellites serve B or C or S.
- B. The number of satellites serving B is more than 1000.
- C. The number of satellites serving C cannot be uniquely determined.
- D. The number of satellites serving B exclusively is exactly 250.

Answer: C

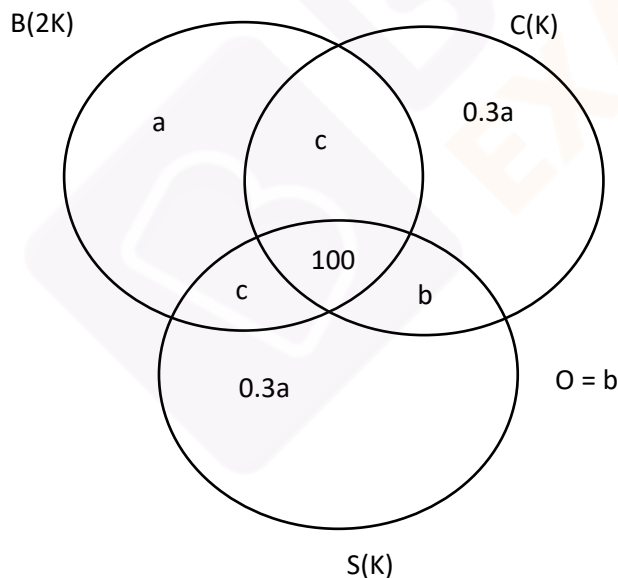
Solution:

Step 1: It is given that the satellites serving either B, C, or S do not serve O. From the given point (i), let the number of satellites serving B, C, and S be $2K$, K , and K , respectively. Further, let the number of satellites exclusively serving B be a .

Step 2: From given point (iii), the number of satellites exclusively serving C and exclusively serving S will each be $0.3a$.

Step 3: From given point (iv), the number of satellites serving O is the same as the number of satellites serving only C and S. Let that number be b .

Step 4: Since the number of satellites serving C is the same as the number of satellites serving S, we can say that (number of satellites serving only B and C) + $0.3a + 100 + b =$ (number of satellites serving only B and S) + $0.3a + 100 + b$. Further, let the number of satellites serving only B and C = the number of satellites serving only B and S = c



Step 5: We are given that there are a total of 1600 satellites.

$$\Rightarrow a + c + 0.3a + c + 100 + b + 0.3a + b = 1600$$

$$\Rightarrow 1.6a + 2b + 2c = 1500 \text{ ----- (a)}$$

$$\text{Also } K = 0.3a + c + b + 100$$

$$\text{Satellites serving B} = 2K = a + 2c + 100$$

$$\Rightarrow 2(0.3a + c + b + 100) = a + 2c + 100$$

$$\begin{aligned} \Rightarrow 0.4a &= 2b + 100 \\ a &= 5b + 250 \text{ -----(b)} \\ \text{Substituting (b) in (a), we will get} \\ 1.6(5b + 250) + 2b + 2c &= 1500 \\ 10b + 2c &= 1100 \\ c &= 550 - 5b \text{ ----- (c)} \end{aligned}$$

Step 1: The number of satellites serving at least two of B, C, or S = Number of satellites serving exactly two of B, C, or S + Number of satellites serving all the three
 $= c + c + b + 100$
 $= 2(550 - 5y) + b + 100$
 $= 1200 - 9y.$

Step 2 - Given that this is equal to 1200
 $1200 - 9y = 1200$
 $\Rightarrow b = 0$

If $b = 0$, $a = 5y + 250 = 250$ and $c = 550 - 5y = 550$

Step 3 - No. of satellites serving C = $k = c + 0.3x + 100 + b$
 $= 550 + 0.3(250) + 100 + b$
 $= 725$

No. of satellites serving B = $2k = 2 \times 725 = 1450.$

"The number of satellites serving C cannot be uniquely determined" must be FALSE.

The correct option is C.

5.

Direction: Twenty four people are part of three committees which are to look at research, teaching, and administration respectively. No two committees have any members in common. No two committees are of the same size. Each committee has three types of people: bureaucrats, educationalists, and politicians, with at least one from each of the three types in each committee. The following facts are also known about the committees:

(i) The numbers of bureaucrats in the research and teaching committees are equal, while the number of bureaucrats in the research committee is 75% of the number of bureaucrats in the administration committee.

(ii) The number of educationalists in the teaching committee is less than the number of educationalists in the research committee. The number of educationalists in the research committee is the average of the numbers of educationalists in the other two committees.

(iii) 60% of the politicians are in the administration committee, and 20% are in the teaching committee.

Based on the given information, which of the following statements MUST be FALSE?

A. The size of the research committee is less than the size of the administration committee

B. In the teaching committee the number of educationalists is equal to the number of politicians

C. The size of the research committee is less than the size of the teaching committee

D. In the administration committee the number of bureaucrats is equal to the number of educationalists

Answer: C

Solution:

Step 1: From the given points we get the following table:

| | Reserach | Teaching | Administration |
|-----------------|----------------|----------|----------------|
| Bureaucrats | 3x | 3x | 4x |
| Educationalists | m (where, m>n) | n | o |
| Politicians | y | y | 3y |

Total = 24

Step 2: Since bureaucrats are in the ratio 3:3:4, the only value which suits this ratio along with the total of 24 is 3, 3, 4. So, x = 1

Step 3: From given point (ii), we can say that in educationalist $n < m < o$ and $m = (o + n)/2$

Step 4: Since politicians are in ratio 1:1:3, the only value which suits this ratio taking other factors into consideration is 1, 1, 3.

Step 5: After obtaining the values of politicians and bureaucrats, the possible values of m, n, o are 3, 2, 4 and 3, 1, 5.

Case 1:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 2 | 4 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 6 | 11 | 24 |

Case 2:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 1 | 5 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 5 | 12 | 24 |

“Size of the research committee is less than the size of the teaching committee” must be false.

The correct option is C.

6. What is the number of bureaucrats in the administration committee?

Answer: 4

Solution:

Step 1: From the given points, we get the following table:

| | Reserach | Teaching | Administration |
|-----------------|----------------|----------|----------------|
| Bureaucrats | 3x | 3x | 4x |
| Educationalists | m (where, m>n) | n | o |
| Politicians | y | y | 3y |

Total = 24

Step 2: Since bureaucrats are in the ratio 3:3:4, the only value which suits this ratio along with the total of 24 is 3, 3, 4. So, x = 1.

Step 3: From the given point (ii), we can say that in educationalist $n < m < o$ and $m = (o + n)/2$

Step 4: Since politicians are in ratio 1:1:3, the only value which suits this ratio taking other factors into consideration is 1, 1, 3.

Step 5: After obtaining the values of politicians and bureaucrats, the possible values of m, n, o are 3, 2, 4 and 3, 1, 5.

Case 1:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 2 | 4 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 6 | 11 | 24 |

Case 2:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 1 | 5 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 5 | 12 | 24 |

In both the obtained cases, there are 4 bureaucrats in the administration committee.

The correct answer is 4.

7. What is the number of educationalists in the research committee?

Answer: 3

Solution:

Step 1: From the given points, we get the following table:

| | Reserach | Teaching | Administration |
|-----------------|----------------|----------|----------------|
| Bureaucrats | 3x | 3x | 4x |
| Educationalists | m (where, m>n) | n | o |
| Politicians | y | y | 3y |

Total = 24

Step 2: Since bureaucrats are in the ratio 3:3:4, the only value which suits this ratio along with the total of 24 is 3, 3, 4. So, x = 1.

Step 3: From the given point (ii), we can say that among educationalists $n < m < o$ and $m = (o + n)/2$.

Step 4: Since politicians are in ratio 1:1:3, the only value which suits this ratio taking other factors into consideration is 1, 1, 3.

Step 5: After obtaining the values of politicians and bureaucrats, the possible values of m, n, o are 3, 2, 4 and 3, 1, 5.

Case 1:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 2 | 4 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 6 | 11 | 24 |

Case 2:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 1 | 5 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 5 | 12 | 24 |

In both the obtained cases, there are 3 educationalists in the research committee.

The correct answer is 3.

8. Which of the following CANNOT be determined uniquely based on the given information?

- A. The size of the teaching committee
- B. The size of the research committee
- C. The total number of educationalists in the three committees
- D. The total number of bureaucrats in the three committees

Answer: A

Solution:

Step 1: From the given points, we get the following table:

| | Reserach | Teaching | Administration |
|-----------------|----------------|----------|----------------|
| Bureaucrats | 3x | 3x | 4x |
| Educationalists | m (where, m>n) | n | o |
| Politicians | y | y | 3y |

Total = 24

Step 2: - Since bureaucrats are in the ratio 3:3:4, the only value which suits this ratio along with the total of 24 is 3, 3, 4. So, x = 1.

Step 3: From the given point (ii), we can say that in educationalists $n < m < o$ and $m = (o + n)/2$

Step 4: Since politicians are in the ratio 1:1:3, the only value which suits this ratio taking other factors into consideration is 1, 1, 3.

Step 5: After obtaining the values of politicians and bureaucrats, the possible values of m, n, o are 3, 2, 4 and 3, 1, 5.

Case 1:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 2 | 4 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 6 | 11 | 24 |

Case 2:

| | Reserach | Teaching | Administration | |
|-----------------|----------|----------|----------------|----|
| Bureaucrats | 3 | 3 | 4 | 10 |
| Educationalists | 3 | 1 | 5 | 9 |
| Politicians | 1 | 1 | 3 | 5 |
| | 7 | 5 | 12 | 24 |

We cannot uniquely determine the size of the teaching committee.

The correct option is A.

9.

Direction: A company administers a written test comprising of three sections of 20 marks each – Data Interpretation (DI), Written English (WE) and General Awareness (GA) for recruitment. A composite score for a candidate (out of 80) is calculated by doubling her marks in DI and adding it to the sum of her marks in the other two sections. Candidates who score less than 70% marks in two or more sections are disqualified. From among the rest, the four with the highest composite scores are recruited. If four or less candidates qualify, all who qualify are recruited.

Ten candidates appeared for the written test. Their marks in the test are given in the table below. Some marks in the table are missing, but the following facts are known:

- (i) No two candidates had the same composite score.
- (ii) Ajay was the unique highest scorer in WE.
- (iii) Among the four recruited, Geeta had the lowest composite score.
- (iv) Indu was recruited.
- (v) Danish, Harini, and Indu had scored the same marks in GA.
- (vi) Indu and Jatin both scored 100% in exactly one section and Jatin's composite score was 10 more than Indu's.

| Candidate | Marks out of 20 | | |
|-----------|-----------------|----|----|
| | DI | WE | GA |
| Ajay | 8 | | 16 |
| Bala | | 9 | 11 |
| Chetan | 19 | 4 | 12 |
| Danish | 8 | 15 | |
| Ester | 12 | 18 | 16 |
| Falak | 15 | 7 | 10 |
| Geeta | 14 | | 6 |
| Harini | 5 | | |
| Indu | | 8 | |
| Jatin | | 16 | 14 |

Which of the following statements MUST be true?

- 1) Jatin's composite score was more than that of Danish.
 - 2) Indu scored less than Chetna in DI.
 - 3) Jatin scored more than Indu in GA
- A. Both 1 and 2
B. Both 2 and 3
C. Only 1
D. Only 2

Answer: A

Solution:

Step 1: From (vi), Jatin scored 20 in DI. Hence, the composite score of Jatin = $(20 \times 2) + 16 + 14 = 70$

| DI | WE | GA |
|----|----|----|
| 20 | 16 | 14 |

Step 2: From (vi), the composite score of Indu = $70 - 10 = 60$.

Step 3: Indu scored 100% in exactly one subject. Hence, if Indu scores 20 in DI, Indu's score in GA = $60 - 20 - 8 = 12$. Indu will not qualify. Hence, Indu did not score 12 in GA.

Therefore, Indu's score in GA = 20.

Therefore, her score in DI = $(60 - 20 - 8) / 2 = 32 / 2 = 16$

Step 4: From (v) Danish, Harini and Indu scored 20 in GA.

Step 5: Composite score of Danish = $2(8) + 15 + 20 = 51$

Step 6: From (ii), the composite score of Ajay = $2(8) + 20 + 16 = 52$

Step 7: We know that Geeta had the lowest score among four recruited students. The top three recruited people are Indu, Ester, and Ajay and among them Ajay had the lowest composite score of 52. Since Geeta got recruited, therefore, she must have scored more than Ajay whose score is 52.

Step 8: If Geeta scored 20 in WE, then her composite score would become 54 which is not possible as it is the same as Chetna. Therefore, Geeta scored 19 in WE and her composite score = 53.

| Candidate | DI | WE | GA | Total |
|-----------|----|----|----|-------|
| Ajay | 8 | 20 | 16 | 52 |
| Bala | | 9 | 11 | |
| Chetna | 19 | 4 | 12 | 54 |
| Danish | 8 | 15 | 20 | 51 |
| Ester | 12 | 18 | 16 | 58 |
| Falak | 15 | 7 | 10 | 47 |
| Geeta | 14 | 19 | 6 | 53 |
| Harini | 5 | | 20 | |
| Indu | 16 | 8 | 20 | 60 |
| Jatin | 20 | 16 | 14 | 70 |

From the derived table, we can see that Jatin's composite score was more than Danish's score and Indu scored less than Chetna in DI. Therefore, both statements 1 and 2 are correct.

The correct option is A.

10. Which of the following statements MUST be FALSE?

- A. Harini's composite score was less than that of Falak.
- B. Bala scored the same as Jatin in DI.
- C. Bala's composite score was less than that of Ester.
- D. Chetna scored more than Bala in DI.

Answer: B

Solution:

Step 1: From (vi), Jatin scored 20 in DI. Hence, the composite score of Jatin = $(20 \times 2) + 16 + 14 = 70$

| DI | WE | GA |
|----|----|----|
| 20 | 16 | 14 |

Step 2: From (vi), the composite score of Indu = $70 - 10 = 60$.

Step 3: Indu scored 100% in exactly one subject. Hence, if Indu scores 20 in DI, Indu's score in GA = $60 - 40 - 8 = 12$. Indu will not qualify. Hence, Indu did not score 12 in GA.

Therefore, Indu's score in GA = 20.

Therefore, her score in DI = $(60 - 20 - 8) / 2 = 32 / 2 = 16$

Step 4: From (v), Danish, Harini, and Indu scored 20 in GA.

Step 5: Composite score of Danish = $2(8) + 15 + 20 = 51$

Step 6: From (ii), the composite score of Ajay = $2(8) + 20 + 16 = 52$

Step 7: We know that Geeta had the lowest score among the four recruited students. The top three recruited people are Indu, Ester, and Ajay and among them Ajay had

a lowest composite score of 52. Since Geeta got recruited, therefore, she must have scored more than Ajay whose score is 52.

Step 8: If Geeta scored 20 in WE, then her composite score would become 54 which is not possible as it is the same as Chetna. Therefore, Geeta scored 19 in WE and composite score = 53.

| Candidate | DI | WE | GA | Total |
|-----------|----|----|----|-------|
| Ajay | 8 | 20 | 16 | 52 |
| Bala | | 9 | 11 | |
| Chetna | 19 | 4 | 12 | 54 |
| Danish | 8 | 15 | 20 | 51 |
| Ester | 12 | 18 | 16 | 58 |
| Falak | 15 | 7 | 10 | 47 |
| Geeta | 14 | 19 | 6 | 53 |
| Harini | 5 | | 20 | |
| Indu | 16 | 8 | 20 | 60 |
| Jatin | 20 | 16 | 14 | 70 |

From the derived table, we can say that if Bala scores 20 (same as Jatin) in DI then his score would be $2(20) + 9 + 11 = 60$, which is the same as that of Indu which is not possible.

Hence, Bala scoring the same as Jatin in DI must be false.

The correct option is B.

11. If all the candidates except Ajay and Danish had different marks in DI, and Bala's composite score was less than Chetna's composite score, then what is the maximum marks that Bala could have scored in DI?

Answer: 13

Solution:

Step 1: From (vi), Jatin scored 20 in DI. Hence, the composite score of Jatin = $(20 \times 2) + 16 + 14 = 70$

| DI | WE | GA |
|----|----|----|
| 20 | 16 | 14 |

Step 2: From (vi), the composite score of Indu = $70 - 10 = 60$.

Step 3: Indu scored 100% in exactly one subject. Hence, if Indu scores 20 in DI, Indu's score in GA = $60 - 20 - 8 = 12$. Indu will not qualify. Hence, Indu did not score 12 in GA.

Therefore, Indu's score in GA = 20.

Therefore, her score in DI = $(60 - 20 - 8) / 2 = 32 / 2 = 16$

Step 4: From (v), Danish, Harini, and Indu scored 20 in GA.

Step 5: Composite score of Danish = $2(8) + 15 + 20 = 51$

Step 6: From (ii), the composite score of Ajay = $2(8) + 20 + 16 = 52$

Step 7: We know that Geeta had the lowest score among four recruited students. The top three recruited people are Indu, Ester and Ajay and among them Ajay had a lowest composite score of 52. Since Geeta got recruited, therefore, she must have scored more than Ajay whose score is 52.

Step 8: If Geeta scored 20 in WE, then her composite score would become 54 which is not possible as it is the same as Chetna). Therefore, Geeta scored 19 in WE and her composite score = 53.

| Candidate | DI | WE | GA | Total |
|-----------|----|----|----|-------|
| Ajay | 8 | 20 | 16 | 52 |
| Bala | | 9 | 11 | |
| Chetna | 19 | 4 | 12 | 54 |
| Danish | 8 | 15 | 20 | 51 |
| Ester | 12 | 18 | 16 | 58 |
| Falak | 15 | 7 | 10 | 47 |
| Geeta | 14 | 19 | 6 | 53 |
| Harini | 5 | | 20 | |
| Indu | 16 | 8 | 20 | 60 |
| Jatin | 20 | 16 | 14 | 70 |

The sum of Bala’s score without DI is 20. Therefore, Bala could score a maximum of 16 marks in DI and his composite score will be 52, but 16,15 and 14 have already been scored by other candidates in DI. Hence, Bala could have scored a maximum of 13 in DI.

The correct answer is 13.

12. If all the candidates scored different marks in WE, then what is the maximum marks that Harini could have scored in WE?

Answer:

Solution: 14

Solution:

Step 1: From (vi), Jatin scored 20 in DI. Hence, the composite score of Jatin = $(20 \times 2) + 16 + 14 = 70$

| DI | WE | GA |
|----|----|----|
| 20 | 16 | 14 |

Step 2: From (vi), the composite score of Indu = $70 - 10 = 60$.

Step 3: Indu scored 100% in exactly one subject. Hence, if Indu scores 20 in DI, Indu's score in GA = $60 - 20 - 8 = 12$. Indu will not qualify. Hence, Indu did not score 12 in GA.

Therefore, Indu’s score in GA = 20.

Therefore, her score in DI = $(60 - 20 - 8) / 2 = 32 / 2 = 16$

Step 4: From (v), Danish, Harini, and Indu scored 20 in GA.

Step 5: Composite score of Danish = $2(8) + 15 + 20 = 51$

Step 6: From (ii), the composite score of Ajay = $2(8) + 20 + 16 = 52$

Step 7: We know that Geeta had the lowest score among the four recruited students. The top three recruited people are Indu, Ester and Ajay and among them Ajay had a lowest composite score of 52. Since Geeta got recruited, therefore, she must have scored more than Ajay whose score is 52.

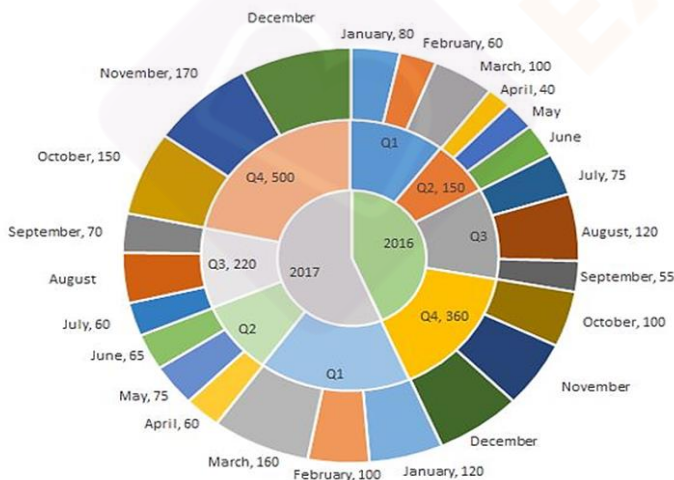
Step 8: If Geeta scored 20 in WE, then her composite score would become 54 which is not possible as it is the same as Chetna). Therefore, Geeta scored 19 in WE and composite score = 53.

| Candidate | DI | WE | GA | Total |
|-----------|----|----|----|-------|
| Ajay | 8 | 20 | 16 | 52 |
| Bala | | 9 | 11 | |
| Chetna | 19 | 4 | 12 | 54 |
| Danish | 8 | 15 | 20 | 51 |
| Ester | 12 | 18 | 16 | 58 |
| Falak | 15 | 7 | 10 | 47 |
| Geeta | 14 | 19 | 6 | 53 |
| Harini | 5 | | 20 | |
| Indu | 16 | 8 | 20 | 60 |
| Jatin | 20 | 16 | 14 | 70 |

If all the candidates scored different marks in WE, then the maximum marks left for Harini is 17 in WE but that would make her composite score 47 which is the same as Falak. Hence, Harini scored the next maximum mark in WE which is 14.

The correct answer is 14.
13.

Direction: The multi-layered pie-chart below shows the sales of LED television sets for a big retail electronics outlet during 2016 and 2017. The outer layer shows the monthly sales during this period, with each label showing the month followed by the sales figure of that month. For some months, the sales figures are not given in the chart. The middle-layer shows quarter-wise aggregate sales figures (in some cases, aggregate quarter-wise sales numbers are not given next to the quarter). The innermost layer shows annual sales. It is known that the sales figures during the three months of the second quarter (April, May, June) of 2016 form an arithmetic progression, as do the three monthly sales figures in the fourth quarter (October, November, December) of that year.



What is the percentage increase in sales in December 2017 as compared to the sales in December 2016?

- A. 22.22
- B. 28.57

- C. 38.46
- D. 50.00

Answer: B
 Solution:

It is given that the sales figures during the three months of the second quarter (April, May, June) of 2016 form an arithmetic progression. So, $40 + (40 + a) + (40 + 2a) = 150$

Hence, $a = 10$.

Sales: April 2016 = 40, May 2016 = 50, June 2016 = 60

The same case holds for October, November, and December of 2016. $100 + (100 + b) + (100 + 2b) = 360$

Or $b = 20$

Sales: October 2016 = 100, November 2016 = 120, December 2016 = 140
 August 2017 = 220 - 130 = 90.

Similarly, sales for December 2017 = 500 - 320 = 180

We can obtain the following table:

| 2016 | | | 2017 | | |
|---------|-----------|--------------|---------|-----------|--------------|
| Quarter | Month | Sales Figure | Quarter | Month | Sales Figure |
| Q1(240) | January | 80 | Q1(240) | January | 120 |
| | February | 60 | | February | 100 |
| | March | 100 | | March | 160 |
| Q2(150) | April | 40 | Q2(150) | April | 60 |
| | May | 50 | | May | 75 |
| | June | 60 | | June | 65 |
| Q3(250) | July | 75 | Q3(250) | July | 60 |
| | August | 120 | | August | 90 |
| | September | 55 | | September | 70 |
| Q4(360) | October | 100 | Q4(360) | October | 150 |
| | November | 120 | | November | 170 |
| | December | 140 | | December | 180 |

Sales in December 2017 = 180

Sales in December 2016 = 140

Required percentage increase = $(180/140) \times 100 = 128.57\%$

The correct option is B.

14. In which quarter of 2017, was the percentage increase in sales from the same quarter of 2016 the highest?

- A. Q1
- B. Q2
- C. Q3
- D. Q4

Answer: A
 Solution:

It is given that the sales figures during the three months of the second quarter (April, May, June) of 2016 form an arithmetic progression. So $40 + (40 + a) + (40 + 2a) = 150$

Hence, $a = 10$.

Sales: April 2016 = 40, May 2016 = 50, June 2016 = 60

The same case holds for October, November, and December of 2016. $100 + (100 + b) + (100 + 2b) = 360$

Or $b = 20$

Sales: October 2016 = 100, November 2016 = 120, December 2016 = 140

August 2017 = 220 - 130 = 90.

Similarly, sales of December 2017 = 500 - 320 = 180

We can obtain the following table:

| 2016 | | | 2017 | | |
|---------|-----------|--------------|---------|-----------|--------------|
| Quarter | Month | Sales Figure | Quarter | Month | Sales Figure |
| Q1(240) | January | 80 | Q1(240) | January | 120 |
| | February | 60 | | February | 100 |
| | March | 100 | | March | 160 |
| Q2(150) | April | 40 | Q2(150) | April | 60 |
| | May | 50 | | May | 75 |
| | June | 60 | | June | 65 |
| Q3(250) | July | 75 | Q3(250) | July | 60 |
| | August | 120 | | August | 90 |
| | September | 55 | | September | 70 |
| Q4(360) | October | 100 | Q4(360) | October | 150 |
| | November | 120 | | November | 170 |
| | December | 140 | | December | 180 |

The following table shows the percentage increase in sales in 2017 for the same quarter of 2016.

| | 2017 | 2016 | Percentage increase |
|----|------|------|-------------------------|
| Q1 | 380 | 240 | $(140/240)*100 = 58.33$ |
| Q2 | 200 | 150 | $(50/150)*100 = 33.33$ |
| Q3 | 220 | 250 | $(-30/250)*100 = -12$ |
| Q4 | 500 | 360 | $(140/360)*100 = 38.88$ |

Hence, we can say that in Q1 the percentage increase in sales was the highest.

The correct option is A.

15. During which quarter was the percentage decrease in sales from the previous quarter's sales the highest?

- A. Q2 of 2016
- B. Q1 of 2017
- C. Q2 of 2017
- D. Q4 of 2017

Answer: C

Solution:

It is given that the sales figures during the three months of the second quarter (April, May, June) of 2016 form an arithmetic progression. So $40 + (40 + a) + (40 + 2a) = 150$

Hence, $a = 10$.

Sales: April 2016 = 40, May 2016 = 50, June 2016 = 60

The same case holds for October, November, and December of 2016. $100 + (100 + b) + (100 + 2b) = 360$

Or $b = 20$

Sales: October 2016 = 100, November 2016 = 120, December 2016 = 140
August 2017 = 220 - 130 = 90.

Similarly, sales of December 2017 = 500 - 320 = 180

We can obtain the following table:

| 2016 | | | 2017 | | |
|---------|-----------|--------------|---------|-----------|--------------|
| Quarter | Month | Sales Figure | Quarter | Month | Sales Figure |
| Q1(240) | January | 80 | Q1(240) | January | 120 |
| | February | 60 | | February | 100 |
| | March | 100 | | March | 160 |
| Q2(150) | April | 40 | Q2(150) | April | 60 |
| | May | 50 | | May | 75 |
| | June | 60 | | June | 65 |
| Q3(250) | July | 75 | Q3(250) | July | 60 |
| | August | 120 | | August | 90 |
| | September | 55 | | September | 70 |
| Q4(360) | October | 100 | Q4(360) | October | 150 |
| | November | 120 | | November | 170 |
| | December | 140 | | December | 180 |

Solving the question by calculating the options, we get:

→Q2 of 2016

$=((150-240)/240) \times 100 = -37.5\%$ increase or 37.5% decrease

→Q1 of 2017

$=((380-360)/360) \times 100 = 5.55\%$ increase.

→Q2 of 2017

$=((200-380)/380) \times 100 = -47.36$ or 47.36% decrease

→Q4 of 2017

There is an increase from 220 to 500.

So, sales of Q2 of 2017, had the highest percentage decrease compared with Q1 of 2017.

The correct option is C .

16. During which month was the percentage increase in sales from the previous month's sales the highest?

- A. March of 2016
- B. October of 2016
- C. March of 2017
- D. October of 2017

Answer: D

Solution:

It is given that the sales figures during the three months of the second quarter (April, May, June) of 2016 form an arithmetic progression. So $40 + (40 + a) + (40 + 2a) = 150$

Hence, $a = 10$.

Sales: April 2016 = 40, May 2016 = 50, June 2016 = 60

The same case holds for October, November, and December of 2016. $100 + (100 + b) + (100 + 2b) = 360$

Or $b = 20$

Sales: October 2016 = 100, November 2016 = 120, December 2016 = 140

August 2017 = 220 - 130 = 90.

Similarly, sales of December 2017 = 500 - 320 = 180

We can obtain the following table:

| 2016 | | | 2017 | | |
|---------|-----------|--------------|---------|-----------|--------------|
| Quarter | Month | Sales Figure | Quarter | Month | Sales Figure |
| Q1(240) | January | 80 | Q1(240) | January | 120 |
| | February | 60 | | February | 100 |
| | March | 100 | | March | 160 |
| Q2(150) | April | 40 | Q2(150) | April | 60 |
| | May | 50 | | May | 75 |
| | June | 60 | | June | 65 |
| Q3(250) | July | 75 | Q3(250) | July | 60 |
| | August | 120 | | August | 90 |
| | September | 55 | | September | 70 |
| Q4(360) | October | 100 | Q4(360) | October | 150 |
| | November | 120 | | November | 170 |
| | December | 140 | | December | 180 |

Solving the question by calculating the options, we get:

→ March 2016

$$= \frac{(100-60)}{60} \times 100 = 66.67\% \text{ increase}$$

→ October 2016

$$= \frac{(100-55)}{55} \times 100 = 81.81\% \text{ increase.}$$

→ March 2017

$$= \frac{(160-100)}{100} \times 100 = 60\% \text{ increase}$$

→ October 2017

$$= \frac{(150-70)}{70} \times 100 = 114.2\% \text{ increase}$$

So, sales of October 2017 compared with September 2017, had the highest percentage increase of 114.2%.

The correct option is D.

17.

Direction: You are given an $n \times n$ square matrix to be filled with numerals so that no two adjacent cells have the same numeral. Two cells are called adjacent if they touch each other horizontally, vertically or diagonally. So a cell in one of the four corners has three cells adjacent to it, and a cell in the first or last row or column which is not in the corner has five cells adjacent to it. Any other cell has eight cells adjacent to it.

What is the minimum number of different numerals needed to fill a 2×2 square matrix?

Answer: 4

Solution:

Given that $n \times n$ square matrix to be filled with numerals so that no two adjacent cells have the same numeral.

Also, two cells are called adjacent if they touch each other horizontally, vertically, or diagonally.

The following cases can be obtained.

| | | |
|----|----|--|
| A1 | A2 | |
| | | |
| | | |

| | | |
|----|--|--|
| A1 | | |
| A2 | | |
| | | |

| | | |
|----|----|--|
| A1 | | |
| | A2 | |
| | | |

The diagram for a 2×2 matrix to have minimum number of numerals is as shown.

| | |
|---|---|
| 1 | 2 |
| 3 | 4 |

So, we require 4 elements to have all different numerals.

The correct answer is 4.

18. What is the minimum number of different numerals needed to fill a 3×3 and 5×5 square matrix?

- A. 2 and 4
- B. 4 and 6
- C. 4 and 4
- D. 2 and 6

Answer: C

Solution:

Given that $n \times n$ square matrix to be filled with numerals so that no two adjacent cells have the same numeral.

Also, two cells are called adjacent if they touch each other horizontally, vertically, or diagonally.

As per the given definition, in the following matrix, the following are the cases of adjacent cells.

| | | |
|----|----|--|
| A1 | A2 | |
| | | |
| | | |

| | | |
|----|--|--|
| A1 | | |
| A2 | | |
| | | |

| | | |
|----|----|--|
| A1 | | |
| | A2 | |
| | | |

The diagram for a 3 by 3 matrix to have a minimum number of numerals is as shown.

| | | |
|---|---|---|
| 1 | 2 | 1 |
| 3 | 4 | 3 |
| 1 | 2 | 1 |

The following diagram for a 5 by 5 matrix to have a minimum number of numerals is as shown.

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 1 | 2 | 1 |
| 4 | 3 | 4 | 3 | 4 |
| 1 | 2 | 1 | 2 | 1 |
| 4 | 3 | 4 | 3 | 4 |
| 1 | 2 | 1 | 2 | 1 |

So, we require 4 elements to have all different numerals in both 3×3 and 5×5 matrix.

The correct option is C.

19. Suppose you are allowed to make one mistake, that is, one pair of adjacent cells can have the same numeral. What is the minimum number of different numerals required to fill a 3×3 matrix?

- A. 9
- B. 16
- C. 25
- D. 4

Answer: D

Solution:

Given that the $n \times n$ square matrix is to be filled with numerals so that no two adjacent cells have the same numeral.

Also, two cells are called adjacent if they touch each other horizontally, vertically, or diagonally.

As per the given definition, in the following matrix, the following are the cases of adjacent cells.

| | | |
|----|----|--|
| A1 | A2 | |
| | | |
| | | |

| | | |
|----|--|--|
| A1 | | |
| A2 | | |
| | | |

| | | |
|----|----|--|
| A1 | | |
| | A2 | |
| | | |

Even if one mistake is allowed, we require 4 elements to have all different numerals in both 3×3 and 5×5 matrix.

The correct option is D.

20. Suppose that all the cells adjacent to any particular cell must have different numerals. What is the minimum number of different numerals needed to fill a 3×3 square matrix?

- A. 25
- B. 16
- C. 9
- D. 4

Answer: C

Solution:

Given that $n \times n$ square matrix to be filled with numerals so that no two adjacent cells have the same numeral.

Also, two cells are called adjacent if they touch each other horizontally, vertically, or diagonally.

As per the given definition, in the following matrix, the following are the cases of adjacent cells.

| | | |
|----|----|--|
| A1 | A2 | |
| | | |
| | | |

| | | |
|----|--|--|
| A1 | | |
| A2 | | |
| | | |

| | | |
|----|----|--|
| A1 | | |
| | A2 | |
| | | |

According to the given question, if there is one number, then that needs to have different numbers in all the 8 adjacent cells.

| | | |
|---|---|---|
| 2 | 3 | 4 |
| 9 | 1 | 5 |
| 8 | 7 | 6 |

From the above table in a 3×3 matrix, we get that there should be at least 9 numerals to fill the matrix.

The correct option is C.
21.

Direction: An ATM dispenses exactly Rs. 5000 per withdrawal using 100, 200 and 500 rupee notes. The ATM requires every customer to give her preference for one of the three denominations of notes. It then dispenses notes such that the number of notes of the customer's preferred denomination exceeds the total number of notes of other denominations dispensed to her.

A customer prefers 500 rupee notes. In how many different ways, can the ATM serve a customer with nine 500 rupee notes?

Answer: 3

Solution:

The ATM dispenses only 500, 200 and 100 notes and since 500 rupee notes is the preference, it has to dispense more 500 rupee notes than the other two notes combined. The following are the possible ways:

| 500 rupee notes | 200 rupee notes | 100 rupee notes |
|-----------------|-----------------|-----------------|
| 9 | 2 | 1 |
| 9 | 1 | 3 |
| 9 | 0 | 5 |

Hence, if a customer prefers 500-rupee notes, then a total of three ways are possible for an ATM to serve a customer with nine 500-rupee notes.

The correct answer is 3.

22. If the ATM could serve only 10 customers with a stock of fifty 500-rupee notes and a sufficient number of notes of other denominations, what is the maximum number of customers among these 10 who could have given 500-rupee notes as their preferences?

Answer: 6

Solution:

To serve the maximum number of customers with 500-rupee notes as preference, we need to minimize the number of 500-rupee notes that can be given to any person. From the previous solution, the minimum number of 500-rupee notes that the ATM can dispense to any person with 500-rupee notes as his/her preference is 8. Hence, with fifty 500-rupee notes, a total of 6 persons can be served.

The correct answer is 6.

23. What is the maximum number of customers that the ATM can serve with a stock of fifty 500-rupee notes and a sufficient number of notes of other denominations, if all the customers are to be served with at most 20 notes per withdrawal?

- A. 10
- B. 16
- C. 12
- D. 13

Answer: C

Solution:

Since there are a limited number of 500-rupee notes, we have to minimize the number of 500-rupee notes dispensed to each customer, while ensuring that each customer is served a maximum of 20 notes.

If no 500-rupee note is dispensed, then the minimum number of notes that must be dispensed = 25 (in 200-rupee notes). This is not possible.

If one 500-rupee note is dispensed, the minimum number of notes is 14 (one 500-rupee note, twelve 200-rupee notes and one 100-rupees note) which is also not possible.

If two 500-rupee notes are dispensed, the minimum number of notes is 22 (two 500-rupee notes and twenty 200-rupee notes).

If three 500-rupee notes are dispensed, the minimum number of notes is 21 (three 500-rupee notes, seventeen 200-rupee notes and one 100 rupees note).

If four 500-rupee notes are dispensed, the minimum number of notes = 19 (four 500-rupee notes and fifteen 200-rupee notes).

Hence, the minimum number of 500-rupee notes that can be dispensed to any person is 4. With fifty 500-rupee notes, a maximum of 12 persons can be served.

The correct option is C.

24. What is the number of 500-rupee notes required to serve 50 customers with 500-rupee notes as their preferences and another 50 customers with 100 rupee notes as their preferences, if the total number of notes to be dispensed is the smallest possible?

- A. 800
- B. 750
- C. 900
- D. 1400

Answer: C

Solution:

Step 1: To dispense the smallest possible number of notes to a person with 500-rupee notes as his/her preference, the ATM should dispense all 500-rupee notes. Hence, minimum number of notes required to serve any person with 500-rupee notes as his/her preference = 10

Total number of 500-rupee notes required to serve 50 = $10 \times 50 = 500$

Step 2: To minimize the number of notes to be served to a person with 100-rupee notes as his/her preference, we can maximize the number of 500-rupee notes served to him, keeping the 100-rupee notes more than the sum of the other two denominations.

Hence, the machine serves eight 500-rupee notes and ten 100-rupee notes, i.e., the total number of 500-rupee notes required to serve 50 customers with 100-rupee notes as his/her preference = $8 \times 50 = 400$

Total number of 500-rupee notes required in the given scenario = $500 + 400 = 900$

The correct answer is C.

25.

Direction: Adriana, Bandita, Chitra, and Daisy are four female students, and Amit, Barun, Chetan, and Deb are four male students. Each of them studies in one of three institutes - X, Y, and Z. Each student majors in one subject among Marketing, Operations, and Finance, and minors in a different one among these three subjects. The following facts are known about the eight students:

- i) Three students are from X, three are from Y, and the remaining two students, both female, are from Z.
- ii) Both the male students from Y minor in Finance, while the female student from Y majors in Operations.
- iii) Only one male student majors in Operations, while three female students minor in Marketing.
- iv) One female and two male students major in Finance.
- v) Adriana and Deb are from the same institute. Daisy and Amit are from the same institute.
- vi) Barun is from Y and majors in Operations. Chetan is from X and majors in Finance.
- vii) Daisy minors in Operations.

From which institute does Chitra come from?

- A. X
- B. Y
- C. Z
- D. Cannot be determined

Answer: C

Solution:

From (vii), Daisy minors in operations (O) and from (iii), other three girls must have minored in Marketing (M).

From (vi), Barun is from Y and majors in Operations. Chetan is from X and majors in Finance.

Z consists of both females. Hence, from (v) Bandita and Chitra are from institute Z.

From (ii), Barun minored in Finance.

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | | | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | | | O |
| Amit | M | | | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | | | |

We know that Amit and Daisy are from the same institute.

From (ii), female students from Y majors in Operations.

Daisy minored in Operations and cannot major in the same stream and from point (v), Adriana and Deb are from Y. Hence, Amit and Daisy are from X.

From (ii), Deb also minored in Finance.

From (iii), we know that in males category only Barun majored in Operations. Hence, Deb majored in Marketing.

From (iv), the remaining male Amit majored in Finance.

We can reach to the following table:

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | Y | O | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | X | | O |
| Amit | M | X | F | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | Y | M | F |

Chitra is a student of institute Z.

The correct option is C.

26. Which subject does Amit minor in?

- A. Finance
- B. Marketing
- C. Operations
- D. Cannot be determined uniquely from the given information

Answer: D

Solution:

From (vii), Daisy minors in Operations (O) and from (iii), other three girls must have minored in Marketing (M).

From (vi), Barun is from Y and majors in Operations. Chetan is from X and majors in Finance.

Z consists of both females. Hence, from (v), Bandita and Chitra are from institute Z. From (ii), Barun minored in Finance.

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | | | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | | | O |
| Amit | M | | | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | | | |

We know that Amit and Daisy are from the same institute.

From (ii), female student from Y majors in Operations.

Daisy minored in operations and cannot major in the same stream and from point (v), Adriana and Deb are from Y. Hence, Amit and Daisy are from X.

From (ii), Deb also minored in Finance.

From (iii), we know that in males category only Barun majored in Operations. Hence, Deb majored in Marketing.

From (iv), the remaining male Amit majored in Finance.

We can reach to the following table:

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | Y | O | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | X | | O |
| Amit | M | X | F | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | Y | M | F |

We cannot uniquely determine the subject in which Amit minored.

The correct option is D.

27. Which of the given combinations must be true?

- A. Bandita – Z(institute) – Operations(major) – Marketing(minor)
- B. Chitra – Z(institute) – Finance(major) – Marketing(minor)
- C. Barun – X(institute) – Operations(major) – F(minor)
- D. Deb – Y(institute) – Marketing(major) – Finance(minor)

Answer: D

Solution:

From (vii), Daisy minors in operations (O) and from (iii), other three girls must have minored in Marketing (M).

From (vi), Barun is from Y and majors in Operations. Chetan is from X and majors in Finance.

Z consists of both females. Hence, from (v), Bandita and Chitra are from institute Z. From (ii), Barun minored in Finance.

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | | | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | | | O |
| Amit | M | | | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | | | |

We know that Amit and Daisy are from the same institute.
From (ii), female student from Y majors in Operations.
Daisy minored in Operations and cannot major in the same stream and from point (v), Adriana and Deb are from Y. Hence, Amit and Daisy are from X.
From (ii), Deb also minored in Finance.
From (iii), we know that in males category only Barun majored in Operations. Hence, Deb majored in Marketing.
From (iv), the remaining male Amit majored in Finance.
We can reach to the following table:

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | Y | O | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | X | | O |
| Amit | M | X | F | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | Y | M | F |

Deb is from institute Y, majored in Marketing, and minored in Finance.

The correct option is D.

28. If Bandita majors in Finance, which subject does Daisy major in?

- A. Finance
- B. Marketing
- C. Operations
- D. Cannot be determined uniquely from the given information

Answer: B

Solution:

From (vii), Daisy minors in Operations (O) and from (iii), other three girls must have minored in Marketing (M).

From (vi), Barun is from Y and majors in Operations. Chetan is from X and majors in Finance.

Z consists of both females. Hence, from (v), Bandita and Chitra are from institute Z.
From (ii), Barun minored in Finance.

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | | | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | | | O |
| Amit | M | | | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | | | |

We know that Amit and Daisy are from the same institute.
 From (ii), female student from Y majors in Operations.
 Daisy minored in Operations and cannot major in the same stream and from point (v), Adriana and Deb are from Y. Hence, Amit and Daisy are from X.
 From (ii), Deb also minored in Finance.
 From (iii), we know that in the males category only Barun majored in Operations. Hence, Deb majored in Marketing.
 From (iv), the remaining male Amit majored in Finance.
 We can reach to the following table:

| Name | Gender | Institute | Major | Minor |
|---------|--------|-----------|-------|-------|
| Adriana | F | Y | O | M |
| Bandita | F | Z | | M |
| Chitra | F | Z | | M |
| Daisy | F | X | | O |
| Amit | M | X | F | |
| Barun | M | Y | O | F |
| Chetan | M | X | F | |
| Deb | M | Y | M | F |

If Bandita majors in finance, Daisy must have majored in marketing
The correct option is B.
 29.

Direction: Fuel contamination levels at each of 20 petrol pumps P1, P2, ..., P20 were recorded as either high, medium, or low.

- i) Contamination levels at three pumps among P1 – P5 were recorded as high.
- ii) P6 was the only pump among P1 – P10 where the contamination level was recorded as low.
- iii) P7 and P8 were the only two consecutively numbered pumps where the same levels of contamination were recorded.
- iv) High contamination levels were not recorded at any of the pumps P16 – P20.
- v) The number of pumps where high contamination levels were recorded was twice the number of pumps where low contamination levels were recorded.

Which of the following **MUST** be false?

- A. The contamination level at P10 was recorded as low.
- B. The contamination level at P12 was recorded as high.
- C. The contamination level at P13 was recorded as low.
- D. The contamination level at P20 was recorded as medium.

Answer: A

Solution:

From (iii), no level of contamination can appear for more than 10 times.

From (i) and (ii), we get

| | | | | | |
|----|----|----|----|----|----|
| P1 | P2 | P3 | P4 | P5 | P6 |
| H | M | H | M | H | L |

From (iv), we get 2 cases:

| | | | | |
|-----|-----|-----|-----|-----|
| P16 | P17 | P18 | P19 | P20 |
| L | M | L | M | L |
| M | L | M | L | M |

Since no same level of contamination can be recorded for consecutive numbered pumps, the total number of high pipes cannot be equal to 10.

Let's take the number of high pipes as 4, 6, and 8.

According to point (v):

| High | Low | Medium | |
|------|-----|--------|--------------|
| 4 | 2 | 14 | Not possible |
| 6 | 3 | 11 | Not possible |
| 8 | 4 | 18 | Possible |

P7 and P8 can be either HH or MM. Therefore, two cases arise for P1 – P10.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--------|---|---|---|---|---|---|---|---|---|----|
| Case 1 | H | M | H | M | H | L | M | M | H | M |
| Case 2 | H | M | H | M | H | L | H | H | M | H |

Case 1 is not possible as we need to have at least 5 high from the first 10 pipes because the total number of high are 8 and from pipes 15 to 20 we cannot have high contamination.

From Case 2, we can further derive 4 cases for P1 – P 20.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|--------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| Case 1 | H | M | H | M | H | L | H | H | M | H | M | H | M | H | M | L | M | L | M | L |
| Case 2 | H | M | H | M | H | L | H | H | M | H | L | M | H | M | H | M | L | M | L | M |
| Case 3 | H | M | H | M | H | L | H | H | M | H | M | L | H | M | H | M | L | M | L | M |
| Case 4 | H | M | H | M | H | L | H | H | M | H | M | H | L | M | H | M | L | M | L | M |

No. (L) = 4, No. (H) = 8, No. (M) = 8

P10 was recorded high in every case.

The correct answer is A.

30. What best can be said about the number of pumps at which the contamination levels were recorded as medium?

- A. More than 2
- B. At most 4
- C. Exactly 8
- D. At least 8

Answer: C

Solution:

From (iii), no level of contamination can appear for more than 10 times.

From (i) and (ii), we get

| | | | | | |
|----|----|----|----|----|----|
| P1 | P2 | P3 | P4 | P5 | P6 |
| H | M | H | M | H | L |

From (iv), we get 2 cases:

| | | | | |
|-----|-----|-----|-----|-----|
| P16 | P17 | P18 | P19 | P20 |
| L | M | L | M | L |
| M | L | M | L | M |

Since no same level of contamination can be recorded for consecutive numbered pumps, the total number of high pipes cannot be equal to 10.

Let's take the number of high pipes as 4, 6, and 8.

According to point (v):

| High | Low | Medium | |
|------|-----|--------|--------------|
| 4 | 2 | 14 | Not possible |
| 6 | 3 | 11 | Not possible |
| 8 | 4 | 18 | Possible |

P7 and P8 can be either HH or MM. Therefore, two cases arise for P1 – P10.

| | | | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Case 1 | H | M | H | M | H | L | M | M | H | M |
| Case 2 | H | M | H | M | H | L | H | H | M | H |

Case 1 is not possible as we need to have at least 5 high from the first 10 pipes because the total number of high are 8 and from pipes 15 to 20 we cannot have high contamination.

From Case 2, we can further derive 4 cases for P1 – P 20.

| | | | | | | | | | | | | | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Case 1 | H | M | H | M | H | L | H | H | M | H | M | H | M | H | M | L | M | L | M | L |
| Case 2 | H | M | H | M | H | L | H | H | M | H | L | M | H | M | H | M | L | M | L | M |
| Case 3 | H | M | H | M | H | L | H | H | M | H | M | L | H | M | H | M | L | M | L | M |
| Case 4 | H | M | H | M | H | L | H | H | M | H | M | H | L | M | H | M | L | M | L | M |

No. (L) = 4, No. (H) = 8, No. (M) = 8

There were exactly 8 pumps at which the contamination levels were recorded as medium.

The correct answer is C.

31. If the contamination level at P11 was recorded as low, then which of the following MUST be true?

- A. The contamination level at P18 was recorded as low.
- B. The contamination level at P12 was recorded as high.
- C. The contamination level at P15 was recorded as medium.
- D. The contamination level at P14 was recorded as medium.

Answer: D

Solution:

From (iii), no level of contamination can appear for more than 10 times.

From (i) and (ii), we get

| | | | | | |
|----|----|----|----|----|----|
| P1 | P2 | P3 | P4 | P5 | P6 |
| H | M | H | M | H | L |

From (iv), we get 2 cases:

| | | | | |
|-----|-----|-----|-----|-----|
| P16 | P17 | P18 | P19 | P20 |
| L | M | L | M | L |
| M | L | M | L | M |

Since no same level of contamination can be recorded for consecutive numbered pumps, the total number of high pipes cannot be equal to 10.

Let's take the number of high pipes as 4, 6, and 8.

According to point (v):

| High | Low | Medium | |
|------|-----|--------|--------------|
| 4 | 2 | 14 | Not possible |
| 6 | 3 | 11 | Not possible |
| 8 | 4 | 18 | Possible |

P7 and P8 can be either HH or MM. Therefore, two cases arise for P1 – P10.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--------|---|---|---|---|---|---|---|---|---|----|
| Case 1 | H | M | H | M | H | L | M | M | H | M |
| Case 2 | H | M | H | M | H | L | H | H | M | H |

Case 1 is not possible as we need to have at least 5 high from the first 10 pipes because the total number of high are 8 and from pipes 15 to 20 we cannot have high contamination.

From Case 2, we can further derive 4 cases for P1 – P 20.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|--------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| Case 1 | H | M | H | M | H | L | H | H | M | H | M | H | M | H | M | L | M | L | M | L |
| Case 2 | H | M | H | M | H | L | H | H | M | H | L | M | H | M | H | M | L | M | L | M |
| Case 3 | H | M | H | M | H | L | H | H | M | H | M | L | H | M | H | M | L | M | L | M |
| Case 4 | H | M | H | M | H | L | H | H | M | H | M | H | L | M | H | M | L | M | L | M |

No. (L) = 4, No. (H) = 8, No. (M) = 8

The given condition is of case 2, therefore, we can say that if the contamination level at P11 was recorded as low, then the contamination level at P14 was recorded as medium.

The correct option is D.

32.If contamination level at P15 was recorded as medium, then which of the following MUST be FALSE?

- A. Contamination levels at P13 and P17 were recorded as the same.
- B. Contamination levels at P11 and P16 were recorded as the same.
- C. Contamination levels at P10 and P14 were recorded as the same.
- D. Contamination level at P14 was recorded to be higher than that at P15

Answer: B

Solution:

From (iii), no level of contamination can appear for more than 10 times.

From (i) and (ii), we get

| P1 | P2 | P3 | P4 | P5 | P6 |
|----|----|----|----|----|----|
| H | M | H | M | H | L |

From (iv), we get 2 cases:

| P16 | P17 | P18 | P19 | P20 |
|-----|-----|-----|-----|-----|
| L | M | L | M | L |
| M | L | M | L | M |

Since no same level of contamination can be recorded for consecutive numbered pumps, the total number of high pipes cannot be equal to 10.

Let's take the number of high pipes as 4, 6, and 8.

According to point (v):

| | | | |
|------|-----|--------|--------------|
| High | Low | Medium | |
| 4 | 2 | 14 | Not possible |
| 6 | 3 | 11 | Not possible |
| 8 | 4 | 18 | Possible |

P7 and P8 can be either HH or MM. Therefore, two cases arise for P1 – P10.

| | | | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Case 1 | H | M | H | M | H | L | M | M | H | M |
| Case 2 | H | M | H | M | H | L | H | H | M | H |

Case 1 is not possible as we need to have at least 5 high from the first 10 pipes because the total number of high are 8 and from pipes 15 to 20, we cannot have high contamination.

From Case 2, we can further derive 4 cases for P1 – P 20.

| | | | | | | | | | | | | | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Case 1 | H | M | H | M | H | L | H | H | M | H | M | H | M | H | M | L | M | L | M | L |
| Case 2 | H | M | H | M | H | L | H | H | M | H | L | M | H | M | H | M | L | M | L | M |
| Case 3 | H | M | H | M | H | L | H | H | M | H | M | L | H | M | H | M | L | M | L | M |
| Case 4 | H | M | H | M | H | L | H | H | M | H | M | H | L | M | H | M | L | M | L | M |

No. (L) = 4, No. (H) = 8, No. (M) = 8

The given condition is of the case 1 from the derived table. We can say that the statement “Contamination levels at P11 and P16 were recorded as the same” is definitely false.

The correct option is B.

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