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50+ Important Advanced Questions For SSC CGL Tier-II 2019-20 Exam (Eng/Hindi PDF)

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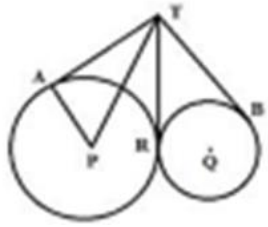
1. In the figure, two circles with centres P and Q touch externally at R. Tangents AT and BT meet the common tangent TR at T. If AP = 6 cm and PT = 10 cm, then BT =?



A. 8 cm
B. 6 cm
C. 10 cm
D. 12 cm

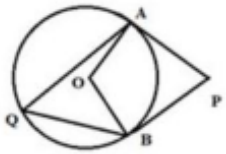
2. If angles of a triangle are in the ratio of 2 : 3 : 4, then the measure of the smallest angle is:
A. 40°
B. 50°
C. 20°
D. 30°

3. Diameter AB of a circle with centre O is produced to a point P such that PO = 16.8 cm. PQR is a secant which intersects the circle at Q and R such that PQ = 12 cm and PR = 19.2 cm. The length of AB (in cm) is:
A. 14.2
B. 15.8
C. 15.2
D. 14.4

4. In Δ PQR, PQ = 24 cm and ∠Q = 58°. S and T are the points on side PQ and PR, respectively, such that ∠STR = 122°. If PS = 14 cm and PT = 12 cm, then the length of RT is:
A. 14.8 cm
B. 16.4 cm
C. 15 cm
D. 16 cm

5. ABCD is a cyclic quadrilateral in which sides AD and BC are produced to meet at P, and sides DC and AB meet at Q when produced. If ∠A = 60° and ∠AB = 72°, then ∠DPC - ∠BQC =
A. 40°
B. 30°
C. 24°
D. 36°

6. In the given figure, AP and BP are tangents to a circle with centre O. If ∠APB = 62° then the measure of ∠AQB is:



A. 28°
B. 118°
C. 31°
D. 59°

7. S is the in centre of ΔPQR. If ∠PSR = 125°, then the measure of ∠PQR is:
A. 80°
B. 55°
C. 75°
D. 70°

8. In ΔABC, D and E are the points on AB and AC respectively such that AD × AC = AB × AE. If ∠ADE = ∠ACB + 30° and ∠ABC = 78°, then ∠A = ?
A. 56°
B. 48°
C. 54°
D. 68°

9. A Sector of radius 10.5 cm with the central angle 120° is folded to form a cone by joining the two bounding radii of the sector. What is the volume (in cm^3) of the cone so formed?
A. $\frac{343\sqrt{2}}{6}\pi$
B. $\frac{343\sqrt{3}}{12}\pi$
C. $\frac{343\sqrt{3}}{6}\pi$
D. $\frac{343\sqrt{2}}{12}\pi$

10. Find the height of a cuboid whose volume is 330 cm^3 and base area is 15 cm^2?

A. 24 cm
B. 21 cm
C. 22 cm
D. 19 cm

11. The volumes of sphere A and B are in the ratio 125 : 64 . If the sum of radii of A and B is 36 cm then the surface area (in cm^2) of A is:
A. 1600 π
B. 512 π
C. 800 π
D. 1024 π

12. The perimeter of a square plot is the same as that of a rectangular plot with sides 35 m and 15 m. The side of the square plot is:
A. 20 m
B. 25 m
C. 50 m
D. 100 m

13. What is the area of a sector of a circle of radius 14 cm and central angle 45°?
$\left(\text{Take}\ \pi \frac{22}{7}\right)$
A. 77 cm^2
B. 70 cm^2
C. 11 cm^2
D. 67 cm^2

14. If the area of an equilateral triangle is $36\sqrt{3}$ sq. cm, then the perimeter of the triangle is :
A. 36 cm
B. 18√3 cm
C. 12 cm
D. 36√3 cm

15. The length, breadth and height of a cuboidal box are in the ratio 7 : 5 : 3 and its whole surface area is 27832 cm^2. Its volume is:
A. 288100 cm^3
B. 280120 cm^3
C. 208120 cm^3
D. 288120 cm^3

16. A circular disc of area 0.64 π sq.m. rolls down a length of 1.408 km. The number of revolutions it makes is: $\left(\text{Take}\ \pi = \frac{22}{7}\right)$
A. 140
B. 280
C. 180
D. 360

17. The area of a field in the shape of a regular hexagon is 2400√3 sqm. The cost of fencing the field at 16.80 rupees/meter is:
A. 4536
B. 3024
C. 4032
D. 3528

18. The diagonal of a square A is (a + b) units. What is the area (in square units) of the square drawn on the diagonal of square B whose area is twice the area of A?
A. $4(a + b)^2$
B. $8(a + b)^2$
C. $2(a + b)^2$
D. $(a + b)^2$

19. A cylindrical vessel of radius 30 cm and height 42 cm is full of water. Its contents are emptied into a rectangular tub of length 75 cm and breadth 44 cm. The height (in cm) to which the water rises in the tub is:
$\left(\text{Take}\ \pi = \frac{22}{7}\right)$
A. 36
B. 45
C. 40
D. 30

20. The circumference of the base of a conical tent is 66 m. If the height of the tent is 36 m, what is the area (in m^2) of the canvas used in making the tent?
$\left(\text{Take}\ \pi = \frac{22}{7}\right)$
A. 1171.5
B. 1155
C. 1237.5
D. 1254

21. If the radius of a right circular cylinder is decreased by 10%, and the height is increased by 20%, then the percentage increase/decrease in its volume is:
A. decrease by 1.8%
B. decrease by 2.8%
C. increase by 2.8%
D. increase by 1.8%

22. The value of $0.5\bar{6} - 0.7\bar{23} + 0.3\bar{9} \times 0.\bar{7}$ is :
A. $0.1\bar{54}$
B. $0.\bar{1}\bar{54}$
C. $0.\bar{1}\bar{58}$
D. $0.1\bar{58}$

23. What is the unit digit of $[(9725)^{827} + (2383)^{469}] \times [(8239)^{1256} - (844)^{311}] \times (9837)^{95}$
A. 2
B. 5
C. 8
D. 6

24. If $P=2^2+6^2+10^2+14^2+\ldots 94^2$ and $Q=1^2+5^2+9^2+\ldots 81^2$, then what is the value of P-Q?
A. 24645
B. 29317
C. 26075
D. 31515

25. If $a = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and $b = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, then what is the value of $a^2 + b^2 - ab$?
A. 97
B. $\left(2\sqrt{3}\right)+2$
C. $\left(4\sqrt{6}\right)+1$
D. 98

26. Which of the following statement(s) is/are TRUE?
I. $\sqrt{5}+\sqrt{5} > \sqrt{7}+\sqrt{3}$
II. $\sqrt{6}+\sqrt{7} > \sqrt{8}+\sqrt{5}$
III. $\sqrt{3}+\sqrt{9} > \sqrt{6}+\sqrt{6}$
A. Only I
B. Only I and II
C. Only II and III
D. Only I and III

27. If $N = 1+11+111+1111+------+111111111$ then what is the sum of the digits of N?
A. 45
B. 18
C. 36
D. 5

28. What is the value of $\frac{3.6 \times 1.62 \div 0.48 \times 3.6}{1.8 \times 0.8 \div 10.8 \times 0.3 - 2.16}$?
A. 2.4
B. 2
C. 4
D. 3

$$\frac{1}{1+\frac{1}{1+\frac{1}{1+\frac{1}{x}}}} = \frac{5}{8}$$

29. If , then what is the value of X?
A. 2
B. 3
C. 1
D. 4

30. x, y and z are prime numbers and x + y + z = 38. What is the maximum value of x?
A. 19
B. 23
C. 31
D. 29

31. How many three digits numbers are there in which all the digits are odd?
A. 100
B. 125
C. 500
D. 250

32. which of the following statement(s) is/are true?
i. $(65)^{1/6} > (17)^{1/4} > (12)^{1/3}$

ii. $(17)^{1/4}>(65)^{1/6}>(12)^{1/3}$
iii. $(12)^{1/3}>(17)^{1/4}>(65)^{1/6}$
A. only i
B. only iii
C. only ii
D. None of these

33. Which of the following statement(s) is/are **TRUE?**

i. $\frac{2}{3\sqrt{5}} < \frac{3}{2\sqrt{5}} < \frac{5}{4\sqrt{3}}$

ii. $\frac{3}{3\sqrt{5}} < \frac{3}{2\sqrt{3}} < \frac{7}{4\sqrt{5}}$

A. Only i
B. Only ii
C. Both i and ii
D. Neither i nor ii

34. Which of the following is TRUE?

I. $\sqrt[3]{11} > \sqrt{7} > \sqrt[4]{45}$

II. $\sqrt{7} > \sqrt[3]{11} > \sqrt[4]{45}$

III. $\sqrt{7} > \sqrt[4]{45} > \sqrt[3]{11}$

IV. $\sqrt[4]{45} > \sqrt{7} > \sqrt[3]{11}$

A. Only I
B. Only II
C. Only III
D. Only IV

35. If $2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8zx = (Ax + y + Bz)^2$, then the value of $(A^2 + B^2 - AB)$ is :
A. 16
B. 14
C. 6
D. 18

36. If $X=3^{1/3} - 3^{-1/3}$
Find the value of $(3X^3+9X)$
A. 8
B. 9
C. 5
D. 7

37. Let $x = (633)^{24} - (277)^{38} + (266)^{54}$. What is the units digit of x?
A. 6
B. 4
C. 7
D. 8

38. The length of a shadow of a vertical tower is $\frac{1}{\sqrt{3}}$ times its height. The angle of elevation of the Sun is
A. 30°
B. 45°
C. 60°
D. 90°

39. The angle of elevation of the top of a tree from a point on the ground which is 300 m away from the tree is 30 °. When the tree grew up, its angle of elevation of the top of it became 60° from the same point. How much did the tree grow?
A. 342 m
B. 364 m
C. 384 m
D. 346 m

40. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 6.5 m away from the wall. The length of the ladder is:
A. $6.5\sqrt{3}$ m
B. $13\sqrt{3}$ m
C. 12 m
D. 13 m

41. An observer who is 1.62 m tall is 45 m away from a pole. The angle of elevation of the top of the pole from his eyes is 30°. The height (in m) of the pole is closet to:
A. 26.8
B. 25.8
C. 26.2
D. 27.6

42. P and Q are two points on the ground on either side of a pole. The angles of elevation of the top of the pole as observed from P and Q are 60° and 30°, respectively and the distance between them is $84\sqrt{3}$ m. What is the height (in in) of the pole?

A. 60
B. 63
C. 73.5
D. 52.5

43. A ladder leaning against a window of a house makes an angle of 60° with the ground. If the distance of the foot of the ladder from the wall is 4.2 m, then the height of the point, where the ladder touches the window from the ground is closest to:
A. 7.3 m
B. 7 m
C. 7.8 m
D. 6.8 m

44. A straight tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle of 30 ° with the ground. The distance from the foot of the tree to the point, where the top touches the ground is 10 m. Find the total height of the tree?
A. $10\sqrt{3m}$
B. $\frac{10\sqrt{3}}{3}m$
C. $10\left(\sqrt{3+1}\right)m$
D. $10\left(\sqrt{3-1}\right)m$

45. The angle of depression of two ships from the top of a lighthouse are 45 ° and 30 ° toward the east. If the ships are 200m apart then the height of the lighthouse is how much? (Take √3 = 1.73)
A. 273m
B. 270m
C. 253m
D. 263m

46. A balloon leaves from a point P rises at a uniform speed. After 6 minutes, an observer situated at a distance of $450\sqrt{3}$ meters from point P observes angle of elevation of the balloon is $60°$. Assume that point of observation and point P are on the same level. What is the speed (in m/s) of the balloon?
A. 4.25
B. 3.75
C. 4.5
D. 3.45

47. Two trees are standing along the opposite sides of a road. Distance between the two trees is 400 meters. There is a point on the road between the trees. The angle of depressions of the point from the top of the trees are 45° and 60°. If the height of the tree which makes 45° angle is 200 metres, then what will be the height (in metes) of the other tree?
A. 200
B. 200√3
C. 100√3
D. 250

48. Two points P and Q are at the distance of x and y (where y > x) respectively from the base of a building and on a straight line. If the angles of elevation of the top of the building from points P and Q are complementary, then what is the height of the building?
A. xy
B. $\sqrt{(y/x)}$
C. $\sqrt{(x/y)}$
D. $\sqrt{(xy)}$

49. If the angles of elevation of a balloon from two consecutive kilometer-stones along a road are 30° and 60 ° respectively, then the height of the balloon above the ground will be
A. $\frac{\sqrt{3}}{2}km$

B. $\frac{1}{2}\,km$

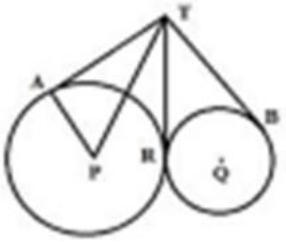
C. $\frac{2}{\sqrt{3}}\,km$

D. $3\sqrt{3}\,km$

50. A 1.6 m tall observer is 45 meters away from a tower. The angle of elevation from his eye to the top of the tower is 30 °, then the height of the tower in meters is
(Take √3 = 1.732)
A. 25.98
B. 26.58
C. 27.58
D. 27.98

###ANSWERS###

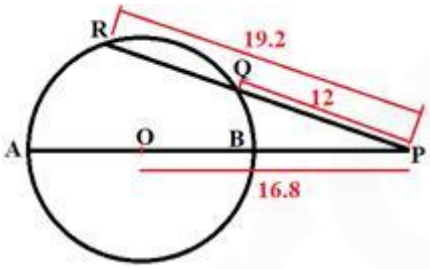
1. Ans. A.



PAT = 90°
$TP^2 = AP^2 + AT^2$
$100 = 36 + AT^2$
AT = 8
AT = TR = 8cm (tangent drawn to the same circle)
TR = TB = 8cm (tangent drawn to the same circle)

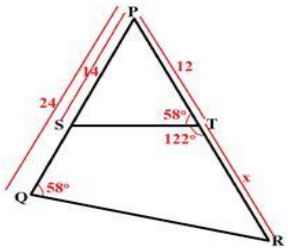
2. Ans. A.
Let the angle be 2x, 3x and 4x respectively.
2x + 3x + 4x = 180
9x = 180
x = 20
Smallest angle = 2x = 40°.

3. Ans. D.



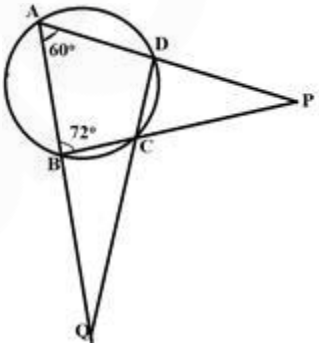
Let OA = r, OA = OB = r (radius)
We know that –
PQ × PR = PB × PA
⇒ 12 × 19.2 = (16.8 – r)(16.8 + r)
⇒ $(16.8)^2 - r^2 = 12 \times 19.2$
⇒ $r^2 = 282.24 - 230.4$
⇒ $r^2 = 51.84$
⇒ r = 7.2
Required AB = 2r = 14.4 cm

4. Ans. D.
A.T.Q.



Let TR = x
∠PTS + ∠STR = 180°
∠PTS = 180 ° – 122 ° = 58 °
In Δ PQR and Δ PST
∠PQR = ∠PTS (Given)
∠P = ∠P (Common angle)
∠PST = ∠PRQ (Third angle)
∴ Δ PQR ~ Δ PTS
Then, PQ/PT = PR/PS
⇒ 24/12 = (12+X)/14
⇒ 28 = 12 + x
⇒ x = 16 cm.

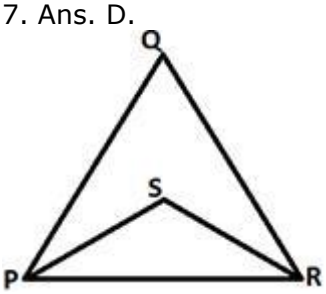
5. Ans. D.



In Δ APB
$\angle APB = 180 - (60 + 72) = 48$
$\angle DCB = 180 - \angle BAD = 120$
$\angle QBC = 180 - \angle ABC = 108$
$\angle BCQ = 180 - \angle BCD = 60$
$\angle BQC = 180 - (180 + 60) = 12$
$\angle DPC - \angle BQC = 48 - 12 = 36°$.

6. Ans. D.
Given ∠APB = 62°
In quadrilateral APBO
∠APB + ∠PBO + ∠BOA + ∠OAP = 360°.....(1)
We know that tangent at any point of the circle is perpendicular to the radius through point of contact.
As AP and BP are tangents to a circle with centre O.

Hence, ∠PBO = ∠OAP = 90°
& ∠APB = 62°
Put these values in equation (1)
⇒ 62°+ 90° + ∠BOA + 90° = 360°
∠BOA = 360° - 180°-62°= 118°
Now we know that angle subtended by the an arc at center is twice the angle subtended by it at any point on the remaining part of the circle
Hence, ∠BOA = 2 ∠AQB
⇒ ∠AQB = (1/2)∠BOA = (1/2)×118 = 59°
7. Ans. D.

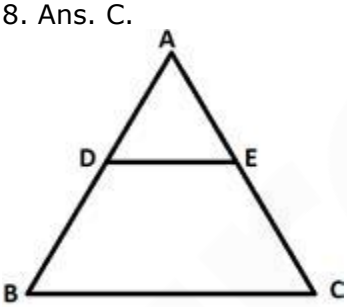


$$\angle PSR = 90 + \frac{1}{2}\angle Q$$

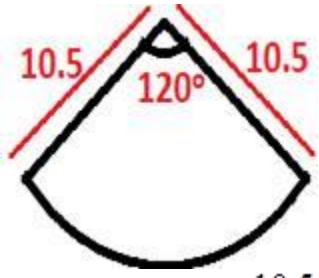
$$125 = 90 + \frac{1}{2}\angle Q$$

$$\angle Q = 70^\circ$$

8. Ans. C.



AD x AC = AB x AE
AB/AC = AD/AE (Here, corresponding sides are in proportion)
Then, ΔADE ~ ΔABC.
So, ∠ABC = ∠ADE = 78°
∠ADE = ∠ACB + 30°
∠ACB = 78° – 30° = 48°
∠BAC = 180° – (78° + 48°)
= 180° – 126° = 54°
9. Ans. D.



Radius of sector $= 10.5cm$
Perimeter of sector = perimeter of base of cone
Let radius of base of cone $= r$

$$\frac{120}{360} \times 2\pi \times 10.5 = 2 \times \pi r$$

$$r = 3.5$$

Radius of sector = slant height of cone l

$$l = 10.5$$

$$h^2 = l^2 - r^2 =$$

$$= (10.5)^2 - (3.5)^2 = 14 \times 7$$

$$h = 7\sqrt{2}$$

$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3}\pi \times 3.5^2 \times 7\sqrt{2}$$

$$= \frac{1}{3}\pi \times \frac{49}{4} \times 7\sqrt{2}$$

$$= \frac{343\sqrt{2}}{12}\pi$$

10. Ans. C.
Volume of Cuboid = base Area × height
300 = 15 × h
H = 22cm.
11. Ans. A.
Let the radius be r_1 and r_2.

$$\frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{125}{64}$$

$$\frac{r_1^3}{r_2^3} = \left(\frac{5}{4}\right)^3$$

r_1/r_2 = 5/4

A.T.Q.
$r_1 + r_2 = 9k = 36$
$k = 4$
$r_1 = 20, r_2 = 16$
Surface area of A = $4\pi r_1^2$
$= 4 \times \pi \times 400$
$= 1600\pi$.
12. Ans. B.
Perimeter of square plot = 4× side
Perimeter of rectangular plot = 2(l+b)
Side of rectangle = 35 m and 15 m
Hence perimeter = 2 (35 + 15) = 2(50) = 100 m
Hence 4(side) = 100
Side of square = 100/4 = 25 m
13. Ans. A.
Radius of circle = 14 cm
central angle = 45°

Area of sector of circle = $\frac{\pi r^2\theta}{360^\circ}$ = $\frac{\pi r^2(45^\circ)}{360^\circ} = \frac{22}{7}\times 14\times 14\times\frac{1}{8} = 77cm^2$

14. Ans. A.
Area of equilateral triangle = $(\sqrt{3}/4)\times(\text{side})^2 = 36\sqrt{3}$
$\Rightarrow (\text{side})^2 = 144$
$\Rightarrow$ side = 12 cm
Perimeter of equilateral triangle – 3× side = 3(12) = 36 cm
15. Ans. D.
Given that length, breadth and height of a cuboidal box are in the ratio 7 : 5 : 3.
Let length of a cuboidal box = 7x
breadth of a cuboidal box = 5x
Height of a cuboidal box = 3x
Total surface Area of cuboidal box = $2(lb+bh+hl)$

$\Rightarrow 2(lb+bh+hl) = 27832$

$\Rightarrow 2(35x^2+15x^2+21x^2) = 27832$

$\Rightarrow 142x^2 = 27832$

$\Rightarrow x^2 = 196$

$\Rightarrow x = \pm 14$

But sides of cuboidal box can not take negative values.
Hence, x = 14
So, Volume of cuboidal box = $l\times b\times h$

$\Rightarrow l\times b\times h = (7\times 14)\times(5\times 14)\times(3\times 14)\ \text{cm}^3 = 288120\ \text{cm}^3$

16. Ans. B.
Area of circular disc =π r^2 = 0.64m^2
Hence, $(22/7)\times r^2 = 0.64$
$\Rightarrow$ r = 0.8
Length = 1.408 km = 1408 m
Now total length = No. of revolution × Perimeter

Number of revolution = $\frac{1408}{2\times\frac{22}{7}\times 0.8} = 280$

17. Ans. C.
Let the side be 'a' cm.
Area of hexagon = 6 × $(\sqrt{3}/4)a^2$
$6(\sqrt{3}/4)a^2 = 2400\sqrt{3}$
a = 40
Perimeter of hexagon = 40 × 6 = 240
Cost of fencing = 240 × 16.80
= Rs. 4032.
18. Ans. C.
The diagonal of square A is (a + b) units
Diagonal of a square = √2x, where x is the side of square.
Hence,
$\sqrt{2}x = a + b$
$\Rightarrow x = (a+b)/\sqrt{2}$
Side of a square, A = $(a+b)/\sqrt{2}$
Hence, Area of square A = x^2
= $\left(\frac{a+b}{\sqrt{2}}\right).\left(\frac{a+b}{\sqrt{2}}\right) = \frac{(a+b)^2}{2}$
Area of square B is twice the area of square A = $2\times\frac{(a+b)^2}{2} = (a+b)^2$
Side of square B = $\sqrt{(a+b)^2}$ = (a+b)
Diagonal of square B = √2(a+b)
= $(\sqrt{2}(a+b))^2 = 2(a+b)^2$
19. Ans. A.
Given cylindrical vessel of radius 30 cm and height 42 cm is full of water. Its contents are emptied into a rectangular tub of length 75 cm and breadth 44 cm.
Volume of cylindrical vessel = $\pi r^2 h$ = $(22/7)\times 30\times 30\times 42\ \text{cm}^3$
Volume of rectangular tub = length × breadth × height = 75 × 44 × height
A.T.Q.:

length × breadth × height = 75 × 44 × height
⇒ (22/7) × 30 × 30 × 42 = 75 × 44 × height
⇒ Height = (22/7) × 30 × 30 × 42 × (1/75) × (1/44) = 36 cm
Height (in cm) to which the water rises in the tub is 36 cm.
20. Ans. C.
Here the circumference of base = 66 m
2 π r = 66
2 × 22/7 × r = 66
⇒ r = 21/2
Height of tent = 36 m
Area of canvas = πrl = $\frac{22}{7} \times \frac{21}{2} \times \sqrt{36^2 + \left(\frac{21}{2}\right)^2}$
= 22/7 × 21/2 × 75/2
= 1237.5 m^2
21. Ans. B.
Volume of cylinder = $\pi r^2 h$
A.T.Q.
Radius of decreased by 10%,
Then, new radius = 0.9r
Height is increased by 20% then new height = 1.2h
New volume = $\pi(0.9r)^2 \times 1.2h$
= 0.81 × 1.2 × $\pi r^2 h$
= 0.972 × $\pi r^2 h$
% change = $\frac{\pi r^2 h - 0.972\pi r^2 h}{\pi r^2 h} \times 100$
= 0.028 × 100 = 2.8% decreased.
22. Ans. A.

$$0.5\bar{6} - 0.7\overline{23} + 0.3\bar{9} \times 0.\bar{7}$$
$$= \frac{56-5}{90} - \frac{723-7}{990} + \frac{39-3}{90} \times \frac{7}{90}$$
$$= \frac{51}{90} - \frac{716}{990} + \frac{28}{90}$$
$$= \frac{79}{90} - \frac{716}{990}$$
$$= \frac{869-716}{990} = \frac{153}{990}$$
$$= 0.1\overline{54}$$

23. Ans. C.
Cyclicity of 0,1,5,6 is 1
⇒
$unit\ digit\ of\ any\ number\ like\ (\ldots\ldots\ldots\ldots 0)^n = 0$
⇒
$unit\ digit\ of\ any\ number\ like\ (\ldots\ldots\ldots\ldots 1)^n = 1$
⇒
$unit\ digit\ of\ any\ number\ like\ (\ldots\ldots\ldots\ldots 5)^n = 5$
⇒
$unit\ digit\ of\ any\ number\ like\ (\ldots\ldots\ldots\ldots 6)^n = 6$
Cyclicity of 4,9 is 2
⇒ $unit\ digit\ of\ (\ldots\ldots\ldots\ldots 4)^n$
i) $when\ n\ is\ odd = 4$
ii) $when\ n\ is\ even = 6$
⇒ $unit\ digit\ of\ (\ldots\ldots\ldots\ldots 9)^n$
i) $when\ n\ is\ odd = 9$
ii) $when\ n\ is\ even = 1$
Cyclicity of 2,3,7 and 8 is 4
So in case of any number with unit digit 2,3,7 and 8 raised to some power, power is divided by 4 and remainder is obtained. We can find unit digit in this case using following table

Unit digit/Remainder	4n+1	4n+2	4n+3	4n+4
2	2	4	8	6
3	3	9	7	1
7	7	9	3	1
8	8	4	2	6

$[(9725)^{827} + (2383)^{469}] \times [(8239)^{1256} - (844)^{311}] \times (9837)^{95}$
⇒ Unit digit of $(9725)^{827} = 5$
⇒ Unit digit of $(2383)^{469} = 3^1 = 3$
⇒ Unit digit of $(8239)^{1256} = 1$
⇒ Unit digit of $(844)^{311} = 4$
⇒ Unit digit of $(9837)^{95} = 7^3 = 3$
⇒ (5+3)×(1-4)×(3)
Note: (1-4) should be solved by taking carry viz. (11-4 = 7)
⇒ 8 × 7 × 3 = 8
unit digit of $[(9725)^{827} + (2383)^{469}] \times [(8239)^{1256} - (844)^{311}] \times (9837)^{95}$
= 8
24. Ans. C.
$P=2^2+6^2+10^2+14^2+\ldots 94^2$
Total term $n = 24$

Q=$1^2+5^2+9^2+...81^2$,

Total term $n = 21$

$P - Q = (2^2 - 1^2) + (6^2 - 5^2) + (10^2 - 9^2) + ---- + (82^2 - $
$+ 86^2 + 90^2 + 94^2$

$= (3 + 11 + 19 + --- + 163) + 86^2 + 90^2 + 9$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$= \frac{21}{2}[2\times3 + (21-1)8] + 7396 + 8100 + 88$

$= \frac{21}{2}[6 + 160] + 24332$

$= 21\times83 + 24332$

$= 26075.$

25. Ans. A.

$a^2 + b^2 - ab = (a + b)^2 - 3ab$

ab = 1

$a + b = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} + \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} = \frac{(\sqrt{3}+\sqrt{2})^2+(\sqrt{3}-\sqrt{2})^2}{\sqrt{3^2}-\sqrt{2^2}} = \frac{5+2\sqrt{6}+5-2\sqrt{6}}{3-2} =$ 10

$(a + b)^2 - 3ab = (10)^2 - 3 = 97$

26. Ans. B.

Here all have constant sum.

I. $\sqrt{5} + \sqrt{5} > \sqrt{7} + \sqrt{3}$

On squaring both sides.

$5+5+2\sqrt{25} > 7+3+\sqrt{21}$ (true)

II. $\sqrt{6} + \sqrt{7} > \sqrt{8} + \sqrt{5}$

On squaring both sides

$6+7+2\sqrt{42} > 8+5+\sqrt{40}$ (true)

III. $\sqrt{3} + \sqrt{9} > \sqrt{6} + \sqrt{6}$

On squaring both sides

$3+9+\sqrt{27} > 6+6+\sqrt{36}$ (false)

Hence Only I and II are true.

27. Ans. A.

$N = 1 + 11 + 111 + 1111 + ------ + 111111111$

= 123456789

sum of the digits of N $= 1 + 2 + 3 + 4 + ---- + 9$

$\text{sum of digit} = \frac{n(n+1)}{2} = 9 \times \frac{10}{2} = 45.$

28. Ans. D.

$\frac{3.6(1.62 + 0.48)}{1.44 + 3.24 - 2.16}$

$= \frac{3.6 \times 2.1}{2.52} = 3.$

29. Ans. A.

In this type of questions we solve it by using the options.

$Let\ x = 2$

$\frac{1}{1 + \frac{1}{1+\frac{1}{1+\frac{1}{x}}}} = \frac{5}{8}$

$\therefore \frac{5}{8} = \frac{5}{8}$

30. Ans. C.

2 and 3 are the smallest two prime numbers.

If we choose 2, 3 and x then

x = 38 - 2 - 3 = 33

which is not a prime number.

Lets choose 2, 5, x then

x = 38 - 2 - 5 = 31

which is a prime number and hence the answer.

31. Ans. B.

Short Trick:

There are 5 odd and 5 even numbers. So there are 5 possible values of each place. And there are 3 places. So total number of 3 digit numbers in which all the digits are odd = 5*5*5 = 125

Basic Explanation:

First odd number in which all the digits are odd is 111, and last one is 999

Let us see all such numbers starting from 1.

They are 111, 113, 115,117,119,131,133, 135, 137, 139, 151, 153, 155, 157, 159, 171, 173, 175, 177, 179, 191, 193, 195, 197, 199

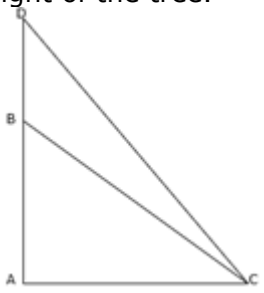
So there are 25 odd numbers starting with 1 in which all digits are odd. So same for 3, 5, 7 and 9

Hence total odd number in which all the digits are odd are 25× 5=125

32. Ans. B.

LCM of (3,4,6) = 12

Taking 12th power of each, we get
$(65)^{12/6}$, $(17)^{12/4}$,$(12)^{12/3}$
$(65)^2$,$(17)^3$,$(12)^4$
4225, 4913, 20736
Hence
$(12)^{1/3}>(17)^{1/4}>(65)^{1/6}$
33. Ans. A.
i. $\frac{2}{3\sqrt{5}} < \frac{3}{2\sqrt{5}} < \frac{5}{4\sqrt{3}}$
compare first and second term
$\frac{2}{3\sqrt{5}} \& \frac{3}{2\sqrt{5}}$
Cross multiply the term
4√5 and 9√5 so term
$\frac{3}{2\sqrt{5}}$ *is greater than* $\frac{2}{3\sqrt{5}}$
For second and third term, on cross multiplication we get, 12√3=20.78 and 10√5=22.36
so term $\frac{3}{2\sqrt{5}}$ *is less than the* $\frac{5}{4\sqrt{3}}$
I is true
Now in (ii)
$\frac{3}{3\sqrt{5}} < \frac{3}{2\sqrt{3}} < \frac{7}{4\sqrt{5}}$
Cross multiply first and second term
We get 6√3=10.39 and 9√5=20.12
Now Cross multiply first and second term
12√5=26.83 and 14√3=24.24
Which means so (ii) is incorrect series.
Hence option A is the correct series.
34. Ans. C.
$\sqrt[3]{11} = (11)^{\frac{1}{3}} = (11)^{\frac{1}{3}\times 12} = 11^4 = 121^2 = 14641$
$\sqrt{7} = (7)^{\frac{1}{2}} = (7)^{\frac{1}{2}\times 12} = 7^6 = (7^3)^2 = 343^2 = 117649$
$\sqrt[4]{45} = (45)^{\frac{1}{4}} = 45^{\frac{1}{4}\times 12} = 45^3 = 91125$
Hence by comparing
$\sqrt{7} > \sqrt[4]{45} > \sqrt[3]{11}$.
35. Ans. B.
$2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8zx = (Ax + y + Bz)^2$ or
$(-\sqrt{2}x + y + 2\sqrt{2}z)^2 = (Ax + y + Bz)^2$
Comparing LHS to RHS.
A = $-\sqrt{2}$, B = $2\sqrt{2}$
Required $(A^2 + B^2 - AB) = 2 + 8 + 4$
= 14.
36. Ans. A.
$X^3=(3^{1/3} - 3^{-1/3})^3$
$=3-1/3 -3\times3^{1/3-1/3}\times X$
$=3-1/3-3x$
$3x^3=9-1-9X$
$3X^3+9X=8$
37. Ans. D.
We will check cyclicity of 3 and 7, as 6 raised to any power will have unit digit as 6. Hence,
$\text{unit digit of } x = 3^{4k} - 7^{4k+2} + 6$
$= 1 - 9 + 6$
$= 7 - 9$ = -2
Since Unit digit can't be negative;
So, 10 + (-2) = 8 will be the unit digit.
38. Ans. C.
Let the length of a vertical tower be x m.
Therefore, length of a shadow of a vertical tower = $\frac{1}{\sqrt{3}} \times x = \frac{x}{\sqrt{3}}$
Therefore,
$\tan\theta = \frac{x}{\frac{x}{\sqrt{3}}} = \sqrt{3}$
$\tan\theta = \sqrt{3}$
$\tan\theta = \tan 60°$
$\theta = 60°$
39. Ans. D.
Let AB be the tree and BD be the increased height of the tree.



∠ BCA = 30°
Here distance AC = 300m
We need to find the value of BD.
By trigonometric ratios we have

Tan30° = $\frac{AB}{AC} = \frac{AB}{300}$

$\frac{1}{\sqrt{3}} \times 300 = 100\sqrt{3} = AB$

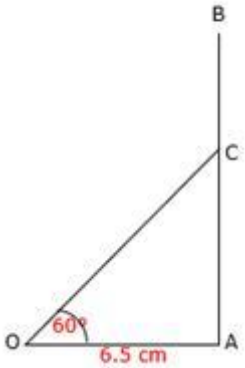
Tan60° = $\frac{AD}{AC} = \frac{AD}{300}$

So ; √3 × 300 = AD

BD = AD – AB

BD = 300√3 – 100√3 = 200√3 ≈ 346 m

40. Ans. D.



We need to find the value of OC

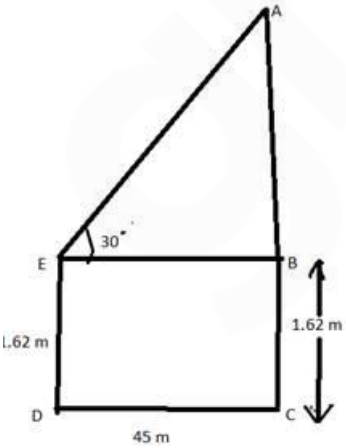
Cos60° = $\frac{OA}{OC} = \frac{6.5}{OC}$

$\frac{1}{2} = \frac{6.5}{OC}$

OC = $\frac{2 \times 6.5}{1} = 13\ cm$

41. Ans. D.

Let ED is an observer who is 1.62 m tall is 45 m away from a pole AC as shown in figure :



Here, DC = EB = 45m

& ED = BC = 1.62 m

Let AB = x meter

In right angled triangle ABE

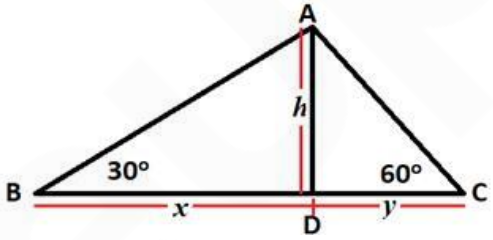
⇒ $tan\,30^0 = \frac{AB}{EB} = \frac{x}{45}$

⇒ $x = \frac{45}{\sqrt{3}} = \frac{45\sqrt{3}}{3} = 15\sqrt{3}$ meter

Height (in m) of the pole = $15\sqrt{3} + 1 \cdot 62 = 15 \times (1 \cdot 73) + 1 \cdot 62 = 27.6$ m

42. Ans. B.

Let the height of pole be $= h$



$\tan ABC = \frac{AD}{BD}$

$BD = \frac{AD}{\tan 30°} = \frac{h}{1/\sqrt{3}}$

$= h\sqrt{3} = x$

$\tan 60° = \frac{h}{y}$

$y = \frac{h}{\sqrt{3}}$

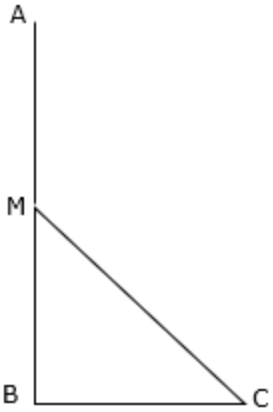
$x + y = 84\sqrt{3}$

$h\sqrt{3} + \frac{h}{\sqrt{3}} = 84\sqrt{3}$

$3h + h = 84 \times 3$

$h = 63m$

43. Ans. A.



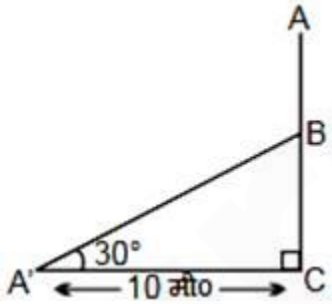
Let CM denotes the ladder leaning against the wall
$\angle C = 60°$
And BC = 4.2 m
We need to find BM
So applying trigonometric ratios

$\text{Cot}60° = \frac{BC}{BM} = \frac{4.2}{BM}$

$$\frac{1}{\sqrt{3}} = \frac{4.2}{BM}$$

Hence BM = $4.2 \times \sqrt{3} = 7.3\ cm$

44. Ans. A.



In triangle, A'BC,

$$\tan 30 = \frac{BC}{AC}$$

$$\frac{1}{\sqrt{3}} = \frac{BC}{10}$$

$$BC = \frac{10}{\sqrt{3}}$$

Now, by Pythagoras theorem,

$$A'B^2 = BC^2 + A'C^2$$

$$= \frac{100}{3} + 10^2$$

$$= \frac{100}{3} + 100$$

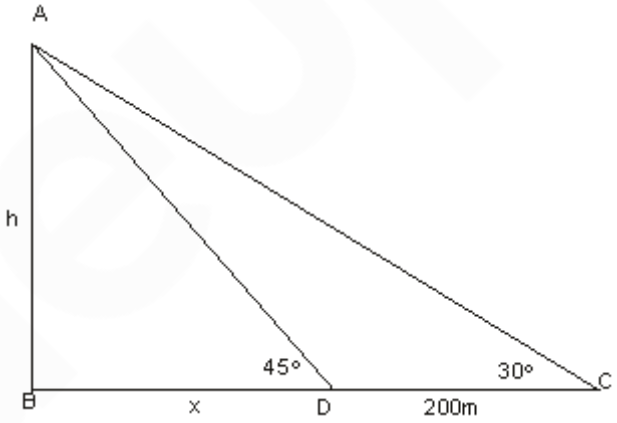
$$A'B = \sqrt{\frac{400}{3}}$$

$$A'B = \frac{20}{\sqrt{3}}$$

Thus, total height of the tree = A'B + BC

$$\frac{20}{\sqrt{3}} + \frac{10}{\sqrt{3}} = \frac{30}{\sqrt{3}} = 10\sqrt{3}\ m$$

45. Ans. A.



In triangle ABC,

$$\tan 30° = \frac{AB}{BC} = \frac{h}{x + 200m}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{x + 200m} \quad \ldots (1)$$

$$\tan 45° = \frac{AB}{BD} = \frac{h}{x}$$

$$1 = \frac{h}{x}$$

$$h = x \quad \ldots . \ (2)$$

From (1) and (2), we get

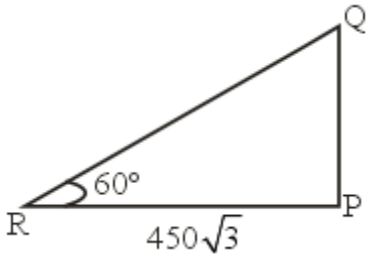
$$\frac{1}{\sqrt{3}} = \frac{h}{h + 200m}$$

$$\sqrt{3}h - h = 200\,m$$

$$\left(\sqrt{3} - 1\right)h = 200\,m$$

$$h = \frac{200\,m}{\left(\sqrt{3} - 1\right)} = \frac{200}{(1.732 - 1)} = \frac{200}{0.732} = 273m(approx)$$

46. Ans. B.



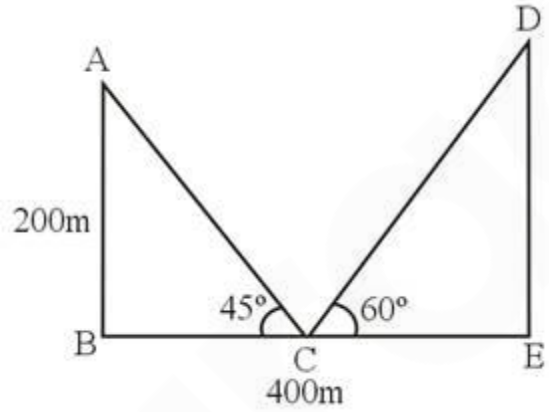
Time taken in rising to height of 450√3 is 6 minutes
Here PQ=450√3
So in triangle PQR

$\tan 60° = \frac{PQ}{PR}$

$\sqrt{3} = \frac{PQ}{450\sqrt{3}}$

PQ=1350m
So speed of balloon= $\frac{1350}{6\times60} = 3.75m/sec$

47. Ans. B.



In triangle ABC

$tan45° = \frac{AB}{BC}$

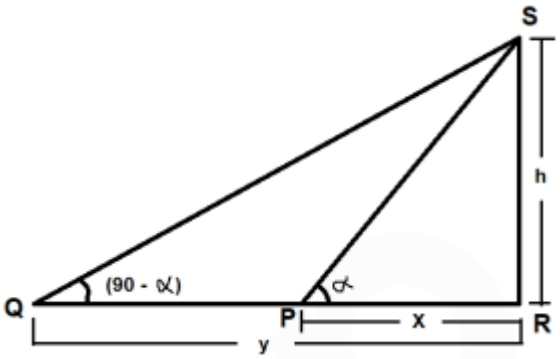
$1 = \frac{AB}{BC}$

AB=BC=200
BE=400 metre
CE=400-200=200
In triangle DEC

$tan60° = \frac{DE}{CE} = \sqrt{3} = \frac{DE}{200}$

So DE=200√3
Hence height of tree will be 200√3 metre

48. Ans. D.



tanα = h/x .....(i)

$\tan(90-\alpha) = \frac{h}{y}$

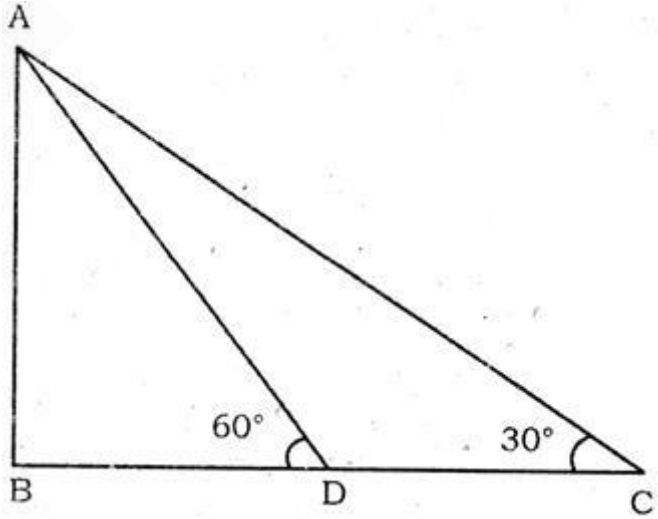
$\cot\alpha = \frac{h}{y} \ldots\ldots\ldots(ii)$

$eqn\ (i)\times(ii)$

$\tan\alpha \cdot \cot\alpha = \frac{h\cdot h}{xy}$

$h = \sqrt{xy}.$

49. Ans. A.



AB = Height of balloon = h km
BD = *x* km and CD = 1 km

$\Delta ABD, \tan 60° = \frac{AB}{BD}$

From

$\Rightarrow \sqrt{3} = \frac{h}{x}$

$$\Rightarrow x = \frac{h}{\sqrt{3}} km$$ ...(i)

From $$\Delta ABC, \tan 30° = \frac{AB}{BC}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{\frac{h}{\sqrt{3}} + 1} \Rightarrow \sqrt{3}h = \frac{h}{\sqrt{3}} + 1$$

$$\Rightarrow \sqrt{3}\,h - \frac{h}{\sqrt{3}} = 1 \Rightarrow \frac{3h - h}{\sqrt{3}} = 1$$

$$\Rightarrow 2h = \sqrt{3} \Rightarrow h = \frac{\sqrt{3}}{2} km$$

50. Ans. C.

$\tan 30° = \frac{h}{45}$

$\Rightarrow$ h = 45/√3 = 15√3 = 25.98 cm

Height of the tower = h + 1.6

= 25.98 + 1.6

= 27.58 m

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