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TEST NO. 58

SSC TIER-II : QUANTITATIVE ABILITIES
(Answer with Explanations)

Answer Key

1.	(C)	21.	(D)	41.	(A)	61.	(A)	81.	(B)
2.	(A)	22.	(B)	42.	(B)	62.	(A)	82.	(C)
3.	(B)	23.	(D)	43.	(C)	63.	(D)	83.	(A)
4.	(C)	24.	(A)	44.	(C)	64.	(D)	84.	(A)
5.	(A)	25.	(C)	45.	(C)	65.	(C)	85.	(C)
6.	(C)	26.	(B)	46.	(A)	66.	(A)	86.	(D)
7.	(D)	27.	(A)	47.	(B)	67.	(A)	87.	(B)
8.	(C)	28.	(C)	48.	(D)	68.	(A)	88.	(D)
9.	(C)	29.	(C)	49.	(A)	69.	(C)	89.	(B)
10.	(B)	30.	(D)	50.	(B)	70.	(A)	90.	(D)
11.	(B)	31.	(A)	51.	(A)	71.	(B)	91.	(D)
12.	(B)	32.	(D)	52.	(A)	72.	(B)	92.	(B)
13.	(C)	33.	(D)	53.	(A)	73.	(A)	93.	(D)
14.	(D)	34.	(C)	54.	(C)	74.	(A)	94.	(C)
15.	(D)	35.	(D)	55.	(C)	75.	(A)	95.	(B)
16.	(C)	36.	(D)	56.	(C)	76.	(A)	96.	(C)
17.	(C)	37.	(C)	57.	(A)	77.	(C)	97.	(D)
18.	(C)	38.	(D)	58.	(C)	78.	(B)	98.	(A)
19.	(C)	39.	(B)	59.	(B)	79.	(C)	99.	(D)
20.	(A)	40.	(C)	60.	(D)	80.	(A)	100.	(C)

Answer key with explanations

1. (C) $2\frac{1}{3} + 3\frac{1}{4} + 4\frac{1}{5} + 5\frac{1}{6}$

$\Rightarrow 2 + 3 + 4 + 5 + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}$

$\Rightarrow 14 + \frac{20+18+12+10}{60}$

$\Rightarrow 14 + \frac{57}{60} \Rightarrow 14 + \frac{19}{20}$

The required number $= 1 - \frac{19}{20} = \frac{1}{20}$

2. (A) Given that r = 60
division (d) = 6× 60 = 360

quotient (q) = $\frac{360}{8} = 45$

Dividend(D) = division (d) × quotient(q) + reminder (r)

$\Rightarrow$ D = 360 × 45 + 60

$\Rightarrow$ D = 16200 + 60 = 16260

Hence, Dividend (D) = 16260

3. (B) Let advertised price = ₹ x

S.P. $= x \times \frac{85}{100} = \frac{17x}{20}$

C.P. $= \frac{17x}{20} \times \frac{100}{120} = \frac{17x}{24}$

ATQ,
S.P – C.P = 5100

$\Rightarrow \frac{17x}{20} - \frac{17x}{24} = 5100$

$\Rightarrow \frac{17x}{20} \times \frac{4}{20 \times 24} = 5100$

$\Rightarrow x = 36000$

Hence, advertised price = ₹36000

4. (C) A : B = 3 : 4 and B : C = 5 : 9

A	:	B	:	C
3	:	4	:	**4**
5	:	5	:	**9**
15	:	20	:	**36**

B's share $= \frac{20}{(15+20+36)} = 1065$

$= \frac{20}{71} \times 1065 = ₹300$

5. (A) Quantity of Darjeeling tea = $\frac{9}{17} \times 102 = 54$

Let x kg of Assam tea is to be added to the mixture.
ATQ,

$$\frac{48+x}{54} = \frac{7}{6} \Rightarrow 48 + x = 63 \Rightarrow x = 15$$

Hence, 15kg of Assam tea is to be added to the mixutre.

6. (C) The required ratio = $\dfrac{3\times\frac{4}{5}+4\times\frac{3}{4}+5\times\frac{5}{7}}{3\times\frac{1}{5}+4\times\frac{1}{4}+5\times\frac{2}{7}}$

$$= \frac{\frac{12}{5}+3+\frac{25}{7}}{\frac{3}{5}+1+\frac{10}{7}} = \frac{12\times7+3\times35+25\times5}{3\times7+1\times35+10\times5}$$

$$= \frac{84+105+125}{21+35+50} = \frac{314}{106} = \frac{157}{53}$$

Hence, ratio of milk and water in the fouth container = 157 : 53

7. (D) Let highest score of the players = x
largest score of the player = $x - 172$
ATQ,
$40 \times 50 - x - (x - 172) = 38 \times 48$
$\Rightarrow 2000 - 2x + 172 = 1824$
$\Rightarrow 2x = 2172 - 1824$
$\Rightarrow 2x = 348 \Rightarrow x = 174$
Hence, highest score of the player = 174

8. (C) Let C.P. = x and S.P. = y
ATQ,

$$\frac{5}{100} \times y = \frac{6}{100} \times x$$

$\Rightarrow 5y = 6x$ ...(i)

and $\frac{15}{100} \times y = \frac{16}{100} \times x + 150$

$\Rightarrow 15y = 16x + 15000$

$\Rightarrow 15 \times \frac{6x}{5} = 16x = 15000$

$\Rightarrow 2x = 15000 \Rightarrow x = 7500$
from eq(i)
$5y = 6 \times 7500 \Rightarrow y = 9000$
The required ratio = $x : y$
= 7500 : 9000 = 5 : 6

9. (C) Line = $2x - 10y = 7$

Slope $m_1 = \frac{2}{10} = \frac{1}{5}$

and line $4x + 6y = 5$

Slope $m_2 = \frac{-4}{6} = \frac{-2}{3}$

Now, $\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|$

$$\Rightarrow \tan\theta = \left|\frac{\frac{1}{5}+\frac{2}{3}}{1+\frac{1}{5}\left(\frac{-2}{3}\right)}\right| \Rightarrow \tan\theta = \left|\frac{\frac{3+10}{15}}{\frac{15-2}{15}}\right|$$

$$\Rightarrow \tan\theta = \left|\frac{13}{13}\right| \Rightarrow \tan\theta = -1 \Rightarrow \theta = 45^\circ$$

10. (B) A = 0.657657..... = $\frac{657}{999} = \frac{73}{111}$

and B = 0.531531..... = $\frac{531}{999} = \frac{59}{111}$

Now, $\frac{1}{A} + \frac{1}{B} \Rightarrow \frac{111}{73} + \frac{111}{59}$

$$\Rightarrow \frac{111(59+73)}{73\times59} = \frac{14652}{4307}$$

11. (B) A = $\dfrac{0.216+0.008}{0.36+0.08+0.12}$

$$A = \frac{(0.6)^3+(0.2)^3}{(0.6)^2+(0.2)^2-0.6\times0.2}$$

$$A = \frac{(0.6+0.2)+\left[(0.6)^2+(0.2)^2-0.6\times0.2\right]}{\left[(0.6)^2+(0.2)^2-0.6\times0.2\right]}$$

A = 0.6 + 0.2 = 0.8

$$B = \frac{0.729-0.027}{0.81+0.09+0.27}$$

$$B = \frac{(0.9)^3-(0.3)^3}{\left[(0.9)^2+(0.3)^2+0.9\times0.3\right]}$$

$$B = \frac{(0.9-0.3)\left[(0.9)^2+(0.3)^2+0.9+0.3\right]}{\left[(0.9)^2+(0.3)^2+0.9+0.3\right]}$$

B = 0.9 – 0.3 = 0.6

Now, $(A^2 + B^2)^2 \Rightarrow \left[(0.8)^2+(0.6)^2\right]^2$

$$\Rightarrow [0.64+0.36]^2 = 1$$

12. (B) $a \times 5^2 = 2020.20$

$\Rightarrow a \times \left(\frac{10}{2}\right)^2 = 2020.20$

$\Rightarrow a \times (10)^2 = 8080.80$

$\Rightarrow a = \frac{8080.80}{100} = 80.8080$

Now, $\frac{a \times 10^{-3}}{10^4} = \frac{a}{10^4 \times 10^3} = \frac{a}{10^7}$

$= \frac{80.8080}{10^7} = 0.00000808080$

13. (C) $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$

$\Rightarrow \frac{2}{3} \times \left(\frac{20}{20}\right) = \frac{40}{60}$

$\Rightarrow \frac{3}{4} \times \left(\frac{15}{15}\right) = \frac{45}{60}$

$\Rightarrow \frac{4}{5} \times \left(\frac{12}{12}\right) = \frac{48}{60}$

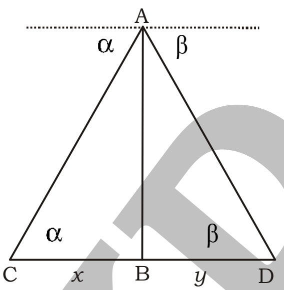
$\Rightarrow \frac{5}{6} \times \left(\frac{10}{10}\right) = \frac{50}{60}$

So, The largest fraction $= \frac{50}{60} = \frac{5}{6}$,

and the smallest fraction $= \frac{40}{60} = \frac{2}{3}$

The required difference $= \frac{5}{6} - \frac{2}{3} = \frac{1}{6}$

14. (D) Let height of aeroplane (AB) = h km



In ΔABC,

$\frac{h}{x} = \tan\alpha \Rightarrow x = \frac{h}{\tan\alpha}$ ...(i)

In ΔABD,

$\frac{h}{y} = \tan\beta \Rightarrow y = \frac{h}{\tan\beta}$ ...(ii)

Addding eq(i) and (ii)

$x + y = \frac{h}{\tan\alpha} + \frac{h}{\tan\beta}$

$\Rightarrow 1 = \frac{h(\tan\beta + \tan\alpha)}{\tan\beta.\tan\alpha}$

($x + y$ =1, since they are consecutive milestones)

$\Rightarrow h = \frac{\tan\beta.\tan\alpha}{\tan\beta + \tan\alpha}$

The required height $= \frac{\tan\beta.\tan\alpha}{\tan\beta + \tan\alpha}$ km

15. (D) Number of diagonals in a regular polygon of n sides $= \frac{n(n-3)}{2}$

Number of diagonals of a nonagon

$= \frac{9(9-3)}{2} = 27$

16. (C) Red balls in bag A = 0.55 ×160 = 88

Red balls in bag B = 0.65 × 240 = 156

Total red balls = 88 + 156 = 244

Percentage of red balls $= \frac{244}{400} \times 100\%$

= 61%

17. (C) $(4^{22} + 4^{22} + 4^{22})(3^{22} + 3^{22} + 3^{22})$

$\Rightarrow 4^{22}\ (1+1+1+1) \times 3^{22}(1+1+1)$

$\Rightarrow 4^{22} \times 4 \times 3^{22} \times 3$

$\Rightarrow 2^{2(23)} \times 3^{23} \Rightarrow 2^{46} \times 3^{23}$

$\Rightarrow$ Total number of prime factors

= 46 + 23 = 69

18. (C) The sum of the 24 numbers

= 24 × 65 =1560

The sum of the first 11 numbers

= 11 × 67 = 737

The sum of last 10 numbers

= 10 × 70 = 700

The sum of 12th , 13th and 14th numbers = 1560 – (737 + 700) = 123

Let the numbers 12^{th}, 13^{th} and 14^{th} be a, b, and c

$a + b + c = 123$ ...(i)

Given that,

$a = b - 13,\ c = b + 1$

On putting in eq(i),

$\Rightarrow b - 13 + b + b + 1 = 123$

$\Rightarrow 3b = 135$

$\Rightarrow b = 45$ (13th number)

$\Rightarrow 12^{th}$ number (a) $= b - 13$

= 45 – 13 = 32

$\Rightarrow 14^{th}$ number (c) $= b + 1 = 45 + 1 = 46$

$\Rightarrow$ Average of a and $c = \frac{(32+46)}{2} = 39$

19. (C) The required population

= 20,00,000 ×1.05 ×1.1 ×1.15 ×1.2 ×1.1

= 35,06,580

20. (A) Divisibility law of 8 $\Rightarrow$ A number divisible by 8 if its last three digits are divisible by 8
Divisibility law of 9 $\Rightarrow$ A number is divisible by 9 if the sum of its digits is divisible by 9
The nine-digit number is $785x3678y$ is divisible by 72, so we can say number also divisble by 8 and 9.
$785x3678y$ is divisible by 8 if last digit three digit $78y$ is divisible by 8.
$78y$ is divisible by 8 if $\boldsymbol{y = 4}$
$785x36784$ is divisible by 9 if the sum of its digits is divisible by 9.
$7 + 8 + 5 + x + 3 + 6 + 7 + 8 + 4$
$= 48 + x$
Put $\boldsymbol{x = 6}$
$= 48 + 6 = 54$
As we know 54 is divisible by 9
Now, $7x - 5y = 7 \times 6 - 5 \times 4$
$= 42 - 20 = 22$

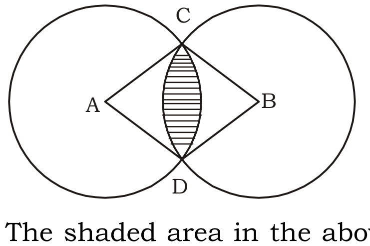
21. (D) A : B : C : D
$= [8400 \times 10] : [(9000 \times 4) + \{9000 \times (2/3) \times 6\}] : [6000 \times 10] : [10000 \times 6]$
$= 84000 \times 72000 : 60000 : 60000$
$= 7 : 6 : 5 : 5$
Let the profit shares of A, B, C and D be $7x$, $6x$, $5x$ and $5x$ respectively
ATQ,
$7x + 8400 - 6x = 9600$
$\Rightarrow x = 1200$
The total profit = $[\{(7 + 6 + 5 + 5) \times 1200\} + 8400]$ = ₹36,000

22. (B) Ratio of milk to water in the mixture = 64 : 61
Proporation of milk $= \frac{64}{64+61} = \frac{64}{125}$
$= \left(\frac{4}{5}\right)^3 = \left(1 - \frac{1}{5}\right)^3$
$\therefore \frac{1}{5}$ of the inital quantity is taken out in one time.
Initial quantity of milk = $5 \times 16 = 80l$

23. (D) No. of males $= \frac{5}{8} \times 240 = 150$
No. of Females $= \frac{3}{8} \times 240 = 90$
Let 'a' males and 'a' females joined the party.
ATQ,
$$\frac{150 + a}{90 + a} = \frac{35}{23}$$
$\Rightarrow 3450 + 23a = 3150 + 35a$
$\Rightarrow 12a = 300 \Rightarrow a = 25$
Therefore, 50 persons joined the party.

24. (A) Let the sum deposited in each bank = P
ATQ,
$$P\left[\left(1 + \frac{13}{100}\right)^2 - 1\right] = 4153.5$$
$$\Rightarrow P\left[\left(\frac{113}{100}\right)^2 - 1\right] = 4153.5$$
$$\Rightarrow P\left[\frac{2769}{10000}\right] = 4153.5 \Rightarrow P = 15000$$
Now, $6000 = \frac{15000 \times r \times 5}{100} \Rightarrow r = 8$

25. (C) Given, $\left(\frac{y - z - x}{2}\right)^3 + \left(\frac{x - x - y}{2}\right)^3 + \left(\frac{x - y - z}{2}\right)^3$
$$\Rightarrow \left(\frac{y - (z + x)}{2}\right)^3 + \left(\frac{z - (x + y)}{2}\right)^3 + \left(\frac{x - (y + z)}{2}\right)^3$$
$$\Rightarrow \left(\frac{y - (-y)}{2}\right)^3 + \left(\frac{z - (-z)}{2}\right)^3 + \left(\frac{x - (-x)}{2}\right)^3$$
($\because x + y + z = 0 \Rightarrow x + z = -y$ etc)
$$\Rightarrow \left(\frac{2y}{2}\right)^3 + \left(\frac{2z}{2}\right)^3 + \left(\frac{2x}{2}\right)^3$$
$\Rightarrow y^3 + z^3 + x^3 = 3xyz$
($\because$ if $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$)

26. (B)


The shaded area in the above figure is the area common to the two circles.
Shaded Area = Area of sector ACD – Area of triangle ACD + Area of sector BCD – Area of triangle BCD
$$= \frac{90}{360} \times \pi \times (2)^2 - \frac{1}{2} \times 2 \times 2 + \frac{90}{360} \times \pi \times (2)^2 - \frac{1}{2} \times 2 \times 2$$
$= 2(\pi - 2)$ sq. cm

27. (A) Amount after first years
$= 30,000 \times 1.075 = ₹32250$
Amount after second year
$= 32250 \times 1.08 = ₹34830$

28. (C) $(a + b\sqrt{2}) = (5 + 2\sqrt{2})(6 - \sqrt{2})$
$(a + b\sqrt{2}) = (30 - 5\sqrt{2} + 12\sqrt{2} - 4)$
$(a + b\sqrt{2}) = (26 + 7\sqrt{2})$
On comparing, $a = 26$, $b = 7$
Now, $a + b = 26 + 7 = 33$

29. (C) Let, cost price of both aricles be ₹ 'x'
So, Selling price of article A =108% of x
$= 1.08x$
And selling price of article B $= \frac{340}{3}$% of x
$= \frac{17x}{15}$
Marked price of article A $= \frac{1.08x}{0.9} = 1.2x$
Marked price of article B $= \frac{\left(\frac{17x}{15}\right)}{0.85} = \frac{4x}{3}$
Required ratio $= 1.2x : \left(\frac{4x}{3}\right) = 9 : 10$

30. (D) Given,
$\frac{777}{x} = y$ ...(i)
and $\frac{777}{x-1} = y + \frac{7}{12}$ ...(ii)
From eq(i) and (ii)
$\frac{777}{x-1} = \frac{777}{x} + \frac{7}{12}$
$\Rightarrow 777\left[\left\{\frac{1}{(x-1)}\right\} - \left\{\frac{1}{x}\right\}\right] = \frac{7}{12}$
$\Rightarrow \frac{111}{x(x-1)} = \frac{1}{12}$
$\Rightarrow x^2 - x - 1332 = 0$
$\Rightarrow (x - 37)(x + 36) = 0$
$\therefore x = 37$

31. (A) Volume of cone $= \frac{1}{3} \times$ base area $\times$height
$\Rightarrow$ Volume of 1st small cone
$= \frac{1}{3} \times 16\pi \times 3 = 16\pi \text{ cm}^3$
$\Rightarrow$ Volume of 2nd small cone
$= \frac{1}{3} \times 144\pi \times 5 = 240\pi \text{ cm}^3$
$\Rightarrow$ Volume of 3rd small cone
$= \frac{1}{3} \times 25\pi \times 12 = 100\pi \text{ cm}^3$
$\Rightarrow$ Volume of 4th small cone
$= \frac{1}{3} \times 64\pi \times 15 = 320\pi \text{ cm}^3$
$\Rightarrow$ Volume of large cone $= 16\pi + 240\pi + 100\pi + 320\pi$
$\Rightarrow \frac{1}{3} \times$ base area $\times$ height $= 676\pi \text{ cm}^3$
$\Rightarrow \frac{1}{3} \times$ base area $\times 12 = 676\pi \text{ cm}^3$
$\therefore$ Base area of large cone
$= \frac{3 \times 676\pi}{12} = 169\pi \text{ cm}^2$

32. (D) (A + B) : (B + C) : (C + A) = 6:8:7
Let A + B = $6x$, B + C = $8x$ and C + A = $7x$
2(A + B + C) = $6x + 8x + 7x$
Given that, A + B + C = 42 ...(i)
$\Rightarrow 2 \times 42 = 21x \Rightarrow x = 4$
So, A + B = 6 × 4 = 24 ...(ii)
and B + C = 8 × 4 = 32 ...(iii)
and C + A = 7 × 4 = 28 ...(iv)
On solving (i) and (iii), we get
A = 10
On solving (i) and (iv), we get
B = 14
On solving (i) and (ii), we get
C = 18
So, (B – A) : (C – B) : (C – A)
= (14 – 10) : (18 –14) : (18 – 10) = 4 : 4 : 8
= 1 : 1 : 2
$\therefore$ The required ratio = 1 : 1 : 2

33. (D) Let the number of men who gave votes of candidate X = x
and the number of men who gave votes to candidate Y = y
Given, $y = x \times \frac{64}{100} \Rightarrow y = \frac{16x}{25}$ ...(i)
Also given, $x - y = 9000$
$\Rightarrow x - \frac{16x}{25} = 9000$ [from eq(i)]
So, $x = 25000$ and $y = 16000$
Now, the total number of women in the village = 64000 – 25000 –16000
= 23000
The required percentage
$= \left(\frac{23000}{64000}\right) \times 100 = 35.94\%$ (approx.)

34. (C) Area of right angled triangle

$= \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 21 \times 25 = 262.5 \text{ cm}^2$

ATQ,

Area of circular sheet = $\frac{11}{3} \times 262.5$

$\Rightarrow \pi \times (\text{radius})^2 = 962.5 \text{ cm}^2$

$\Rightarrow \frac{22}{7} \times (\text{radius})^2 = 962.5 \text{ cm}^2$

$\Rightarrow$ Radius of circle = $\frac{35}{2}$ cm

$\because$ Circumference of circular sheet

$= 2\pi \times \text{radius} = 2 \times \frac{22}{7} \times \frac{35}{2} = 110$ cm

35. (D) Let the distance between A and B be x km and the speed of current be y km/hr and the speed of the ferry be s km/hr, then the distance between A and C is $2x$ km.

ATQ,

For the distance of A to B

$\frac{x}{s-y} + \frac{x}{s+y} = 15$ ...(i)

For the distance of A to C

$\frac{2x}{s-y} = 25 \Rightarrow \frac{x}{s-y} = \frac{25}{2}$ ...(ii)

From eq(i) and eq(ii)

$\frac{25}{2} + \frac{x}{s+y} = 15$

$\Rightarrow \frac{x}{s+y} = 15 - 12.5 = 2.5$

Hence time taken for C to A = $\frac{2x}{s+y}$

$= 2 \times 2.5 = 5$ hrs

36. (D) Sachin complete $\left(\frac{1}{3}\right)$ part of work in = 6 days

$\Rightarrow$ Sachin's 1 day work = $\frac{1}{18}$

$\Rightarrow$ Rakesh complete $\left(\frac{3}{5}\right)$ part of work in = 18 days

$\Rightarrow$ Rakesh's 1 day work = $\frac{1}{30}$

$\Rightarrow$ Chandan complete $\left(\frac{7}{6}\right)$ part of work in = 14 days

$\Rightarrow$ Chandan's 1 day work = $\frac{1}{12}$

$\Rightarrow$ Working together for 1 day = $\left(\frac{1}{18}\right) + \left(\frac{1}{30}\right) + \left(\frac{1}{12}\right)$

$\Rightarrow$ Working together for 1 day

$= \frac{(10+6+5)}{180}$

$\therefore$ Time to complete the work together

$= \frac{180}{31}$ days

37. (C) Let cost price of 1000 grams be ₹ x

Suppose he uses y grams instead of 1kg

$\Rightarrow$ Cost price of y grams = $\frac{x \times y}{1000}$

But selling price of grams = x

Profit% = $\frac{\left(x - \frac{xy}{1000}\right)}{\left(\frac{xy}{1000}\right)} \times 100 = \frac{100}{9}$

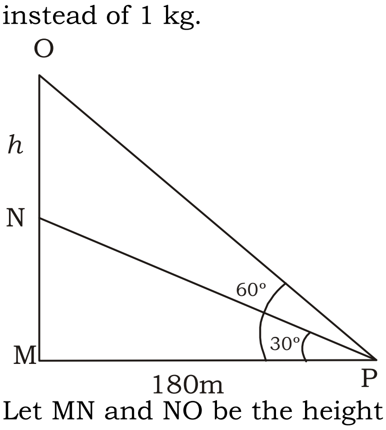
$\Rightarrow \frac{(1000x - xy)}{xy} \times 100 = \frac{100}{9}$

$\Rightarrow \frac{(1000 - y)}{y} \times 100 = \frac{100}{9}$

$\Rightarrow 10y = 9000 \Rightarrow y = 900$

$\therefore$ The shopkeeper uses 900 gram instead of 1 kg.

38. (D)



Let MN and NO be the height of the building and the tower respectively

In ΔMNP,

$\Rightarrow \tan 30° = \frac{MN}{MP}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{MN}{180}$

$\Rightarrow MN = 60\sqrt{3}$ m

In ΔPMO,

$\Rightarrow \tan 60° = \frac{MO}{MP} \Rightarrow \sqrt{3} = \frac{MN + NO}{180}$

$\Rightarrow$ MN + ON = $180\sqrt{3}$

$\Rightarrow 60\sqrt{3} + h = 180\sqrt{3}$

$\Rightarrow h = 180\sqrt{3} - 60\sqrt{3} \Rightarrow h = 120\sqrt{3}$

$\Rightarrow h = 120 \times 1.732 \Rightarrow h = 207.84$ m

$\therefore$ Height of the tower = 208 m(approx.)

39. (B) Let the marked price of the article be ₹ a

Discount offered on the article

= 14.28% = $\frac{1}{7}$th of the marked price

$\Rightarrow$ S. P. = $\frac{6}{7} \times a = \frac{6a}{7}$

Cost price of the article = ₹320

Profit percentage = 25%

$\Rightarrow$ Selling price of the article

= $\left(1 + \frac{25}{100}\right) \times 320$ = ₹400

ATQ, $\frac{6a}{7} = 400 \Rightarrow a = \frac{(400 \times 7)}{6}$

$\Rightarrow a = 466.66$

$\therefore$ The marked price of the article

= ₹466.66

40. (C) **a.** Trapezium doesn't have equal opposite angles.

b. Square does have equal opposite angles but all angles are equal as well.

c. Parallelogram the equal opposite angles.

d. Rectangle have all angles equal.

$\therefore$ Parallelogram is the required answer.

41. (A) $\frac{p}{q} = \frac{1}{4}$ …(i)

and $\frac{q}{r} = \frac{2}{3}$ …(ii)

Now multiply equation (ii) by 2 on numerator and denominator

We have $\frac{p}{q} = \frac{1}{4}$ and $\frac{q}{r} = \frac{4}{6}$

From above $p : q : r$ = 1 : 4 : 6

So, $p = x$, $q = 4x$ and $r = 6x$

Now, $\frac{12p^2 - 8r^2}{33p^2 + r^2}$

By putting the value of p, q and r

$\Rightarrow \frac{\left(12 \times (x)^2 - (8 \times (6x)^2\right)}{\left(33 \times (x)^2 + (6x)^2\right)}$

$\Rightarrow \frac{(12 - 8 \times 36)}{(33 + 36)} = -4$

42. (B) The point (x_1, y_1), (x_2, y_2), (x_3, y_3) are colliner if $\frac{y_2 - y_1}{x_2 - x_1} = \frac{y_3 - y_1}{x_3 - x_1}$

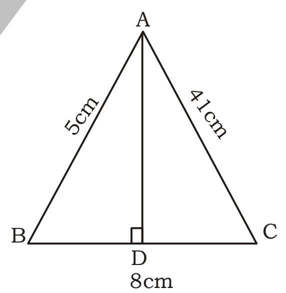
ATQ,

$\frac{0+3}{-2-2} = \frac{x+3}{6-2} \Rightarrow 12 = -4x - 12$

$\Rightarrow x = -\frac{24}{4} \Rightarrow x = -6$

Note: if three points A,B,C are collinear then their slopes would be equal i.e. AB = BC = AC

43. (C)



AB = 5cm, AC = $\sqrt{41}$ cm and BC = 8cm

cos B = $\frac{\left(5^2 + 8^2 - 41\right)}{(2 \times 5 \times 8)} = \frac{3}{5}$

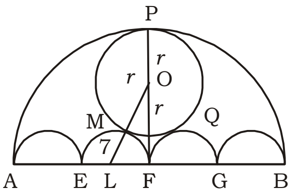
AB = 5cm & cosB = $\frac{3}{5}$

$\therefore$ BD = $5 \times \frac{3}{5}$ = 3cm

$\therefore$ AD = 4cm (Pythagoras theorem)

$\therefore$ Area of ΔABD = $\frac{1}{2} \times 4 \times 3 = 6\text{cm}^2$

44. (C)



In the figure, AB = 56 cm, then radius of small semicircles = ML = LF = 7cm and OF = PF – PO = (28 – r)

In ΔOLF

$OL^2 = OF^2 + LF^2$

$\Rightarrow (7+r)^2 = (28-r)^2 + 7^2$

$\Rightarrow 49 + r^2 + 14r = 784 + r^2 - 56r + 49$

$\Rightarrow 70r = 784 \Rightarrow r = 11.2$ cm

$\therefore$ Area of shaded region

$= \frac{22}{7} \times 11.2 \times 11.2 = 394.24\ cm^2$

45. (C) Work done by both in x days $= \frac{x}{40} + \frac{x}{45}$

Work done by Aditi in (x + 14) days

$= \frac{x+14}{40}$

ATQ,

$\frac{x}{40} + \frac{x}{45} + \frac{x+14}{40} = 1 \Rightarrow x = 9$

$\therefore$ Celina leave the work after 9 days.

46. (A) Let the efficiency of filling = x

Efficiency of discharging = (x + 10)

ATQ,

$\frac{4800}{x} - \frac{4800}{x+10} = 16$

By option we get, $x = 50m^3$/min

47. (B) Let their shares are $4x$, $6x$ and $9x$

Sherry's share = $4x + 28$

Berry's share = $6x + 37$

and Cherry's share = $9x + 18$

Now, $(4x+28)+(6x+37)+(9x+18) = 5783$

$\Rightarrow 19x = 5783 - 83$

$\Rightarrow 19x = 5700 \Rightarrow x = 300$

Hence, Sherry's shares = 4 × 300 + 28

= ₹1228

48. (D) Product of 8 consective integers = 8!

8! = 1×2×3×4×6×7×8 = 40320

4! = 1×2×3×4 = 24

6! = 1×2×3×4×5×6 = 720

Hence, 8! is divisible by all 8!, 4! and 6!

49. (A) $ab + bc + ca = abc$ (Given)

Now, $\frac{b+c}{bc(a-1)} + \frac{a+c}{ac(b-1)} + \frac{a+b}{ab(c-1)}$

$\Rightarrow \frac{b+c}{abc-bc} + \frac{a+c}{abc-ac} + \frac{a+b}{abc-ab}$

$\Rightarrow \frac{b+c}{ab+ac} + \frac{a+c}{ab+bc} + \frac{a+b}{bc+ac}$

$\Rightarrow \frac{b+c}{a(b+c)} + \frac{a+c}{b(a+c)} + \frac{a+b}{c(a+b)}$

$\Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \Rightarrow \frac{ab+bc+ca}{abc}$

$\Rightarrow \frac{abc}{abc} = 1$

50. (B) Let their saving are $4x$, $5x$ and $6x$ respectively.

Then, 30% of A's salary = $4x$

A's salary = $4x \times \frac{100}{30} = \frac{40x}{3}$

25% of B's salary = $5x$

B's salary = $5x \times \frac{100}{25} = 20x$

20% of C's salary = $6x$

C's salary = $6x \times \frac{100}{20} = 30x$

$\therefore$ Ratio of their salaries = $\frac{40}{3}$: 20: 30

= 4 : 6 : 9

51. (A) Let x be added to each of 14, 12 and 34 and 30 so, the numbers become in proportion.

$\Rightarrow \frac{(14+x)}{(12+x)} = \frac{(34+x)}{(30+x)}$

Using dividendo and componedo

$\Rightarrow \frac{(14+x+12+x)}{(14+x-12-x)} = \frac{(34+x+30+x)}{(34+x-30-x)}$

$\Rightarrow \frac{(26+2x)}{2} = \frac{(64+2x)}{4}$

$\Rightarrow 26 + 2x = 32 + x$

$\Rightarrow 2x - x = 32 - 26$

$\Rightarrow x = 6$

Now, put the value of x in $\sqrt{(12x+9)}$

$= \sqrt{(12 \times 6 + 9)}$

$= \sqrt{(72+9)}$

$= \sqrt{81}$

$= \sqrt{9 \times 9}$

= 9

52. (A) The 1st AP is (1 + 6 + 11 + ...) and the 2rd AP is (4 + 5 + 6 + ...)

$S = S_1 + S_2$

= (1+ 6 + 11+ ...... to 100 terms) + (4 + 5 + 6 +.....+ to100 terms)

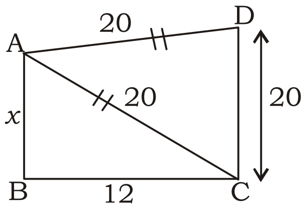
$= \frac{100[2\times1+(100-1)\times5]}{2} + \frac{100[2\times4+(100-1)\times1]}{2}$

= 50(2 + 99×5) + 50(8 + 99)

= 24,850 + 5,350

= 30,200

53. (A) ATQ,



Area of quadrilateral (ABCD)

= Area of right angle triangle + Area of equilateral triangle

In DABC

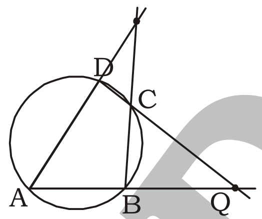
$x = \sqrt{20^2 - 12^2} = 16$

Area of quadrilateral

$= \frac{1}{2} \times 16 \times 12 + \frac{\sqrt{3}}{4} \times 20 \times 20$

= 269.2 cm^2

54. (C) ATQ,



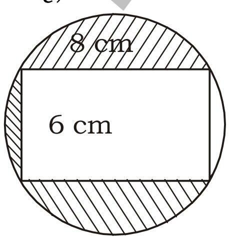
ABCD is a cyclic quadrilateral

$\angle DCB = 180° - \angle A = 180° - 60°$ = 120°

$\angle ABC = 80°$, therefore $\angle BCQ = 180° - 120° = 60°$ and $\angle CBQ = 180° - 80° = 100°$

Then, In ΔBCQ, $\angle Q = 180° - 100° - 60°$ = 20°

55. (C) ATQ,



Diameter of the circle = diagonal of rectangle = $\sqrt{8^2 + 6^2}$ = 10 cm

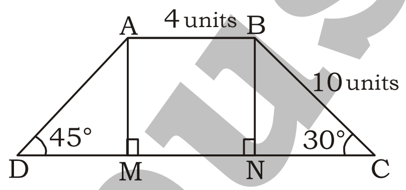
Radius = $\frac{10}{2}$ = 5 cm

Area of shaded portion = $\pi r^2 - lb$

$= 3.14 \times 5^2 - 8 \times 6$

= 30.57 cm^2

56. (C) ATQ,



AB and DC are the || sides

Height = AM = BN

AB = MN = 4 units

ΔBNC and ΔAMD are right angle triangles

In ΔBNC

$\Rightarrow \sin30° = \frac{BN}{10} \Rightarrow BN = 5$ units

Using pythagoras theorem

NC = $\sqrt{10^2 - 5^2} = 5\sqrt{3}$ untis

Now, In ΔADM,

AM = 5 units

$\tan45° = \frac{AM}{DM} \Rightarrow DM = 5$ units

Area of trapezium = $\frac{1}{2}$(sum of || sides) × height

$= \frac{1}{2}(4 + 4 + 5 + 5\sqrt{3}) \times 5$

$= \frac{5(13+5\sqrt{3})}{2}$ units^2

57. (A) ATQ,

Let the bigger circle radius = R

Let the radius of smaller circle = r

Now,

$\pi R^2 + \pi r^2 = 116\pi$

$R^2 + r^2 = 116$ ...(i)

And R – r = 6

Squaring both sides

$(R - r)^2 = R^2 + r^2 - 2Rr$

$\Rightarrow 36 = 116 - 2Rr$

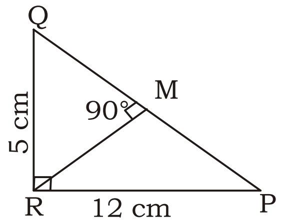
Rr = 40 ...(ii)

From eq(i) and (ii)

R = 10 cm

r = 4 cm

58. (C) ATQ,



QP = $\sqrt{5^2+12^2}$ = 13 cm

Area of ΔPQR = $\frac{1}{2}$×12×5 = 30 cm^2

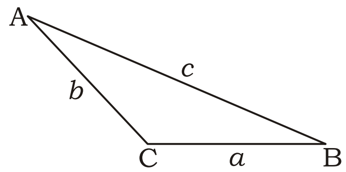
As RM is a ⊥ drawn to the hypotenuse

So, RM = $\frac{2\times \text{Area}}{\text{Hypotenuse}} = \frac{2\times 30}{13} = \frac{60}{13}$ cm

59. (B) ATQ,
$x \times y \times z$ = lb × bh × lh = (lbh)
Volume of cuboid = lbh
So, V^2 = (lbh)^2 = (xyz)

60. (D) ADBC is a cyclic quadrilateral
∠ADB = 180° – 48° = 132°

61. (A) Let distance after 4 hours is c (km)



a = 3×4 = 12 km, b = 2×4 = 8 km

$s = \frac{a+b+c}{2} = \frac{12+8+c}{2} = 10 + \frac{c}{2}$

Area = $\sqrt{s(s-a)(s-b)(s-c)}$

Area = $\frac{1}{2}ab\sin120° = \frac{1}{2}\times12\times8\sin120°$

= $24\sqrt{3}$ km^2

Now,

$24\sqrt{3} = \sqrt{\left(10+\frac{c}{2}\right)\left(\frac{c}{2}-2\right)\left(2+\frac{c}{2}\right)\left(10-\frac{c}{2}\right)}$

After solving,
We get

$c = 4\sqrt{19}$ km

62. (A) ATQ,

Number of zeros = $\left[\frac{137}{5}\right]+\left[\frac{137}{5^2}\right]$

$+\left[\frac{137}{5^3}\right]+$.....

= 27 + 5 + 1 = 33 zeros

63. (D) ATQ,

$= \frac{2851\times(2862)^2\times(2873)^3}{23}$

$= \frac{22\times10\times10\times21\times21\times21}{23}$

$= \frac{22\times8\times441\times21}{23}$

$= \frac{22\times21\times8\times4}{23}$

$= \frac{462\times32}{23}$

$= \frac{2\times9}{23}$

Hence, remainder is 18

64. (D) ATQ,

$\frac{n(n-3)}{2} = 65$

⇒ n^2 – 3n = 130
⇒ n^2 – 3n – 130 = 0
⇒ n^2 – 13n + 10n – 130 = 0
(n – 13)(n + 10) = 0
n = 13
Hence, The number of sides are 13.

65. (C) ATQ,

$26 - 15\sqrt{3} = \frac{52-30\sqrt{3}}{2}$

$= \frac{25+27-2\times5\times3\sqrt{3}}{2}$

$= \frac{(3\sqrt{3}-5)^2}{2}$

Now,

$38 + 5\sqrt{3} = \frac{76+2\times5\sqrt{3}}{2}$

$= \frac{75+1+2\times1\times5\sqrt{3}}{2}$

$= \frac{(5\sqrt{3}+1)^2}{2}$

$= \frac{\sqrt{\frac{(3\sqrt{3}-5)^2}{2}}}{5\sqrt{2}-\sqrt{\frac{(5\sqrt{3}-1)^2}{2}}}$

$= \frac{\frac{3\sqrt{3}-5}{\sqrt{2}}}{5\sqrt{2}-\frac{(5\sqrt{3}+1)}{\sqrt{2}}}$

$= \dfrac{3\sqrt{3}-5}{5\times\sqrt{2}\times\sqrt{2}-(5\sqrt{3}+1)}$

$= \dfrac{3\sqrt{3}-5}{9-5\sqrt{3}}$

$= \dfrac{1}{\sqrt{3}}\left(\dfrac{3\sqrt{3}-5}{3\sqrt{3}-5}\right)$

$= \dfrac{1}{\sqrt{3}}$

66. (A) $(x-5) = (y+6) = (z-8) = k$(let)

$k \times k \times k = 1331$

$k^3 = 11^3 \Rightarrow k = 11$

$x - 5 = 11 \Rightarrow x = 16$

$(y+6) = 11 \Rightarrow y = 5$

$(z-8) = 11 \Rightarrow z = 19$

Minimum value of $(x+y+z) = (16+5+19) = 40$

67. (A) ATQ,

$(bc+ca+ab)^3 - b^3c^3 - c^3a^3 - a^3b^3$

$= b^3c^3 + c^3a^3 + a^3b^3 + 3(bc+ca)(ca+ab)(ab+bc) - b^3c^3 - c^3a^3 - a^3b^3$

$= 3(bc+ca)(ca+ab)(ab+bc)$

$= 3abc(a+b)(b+c)(a+c)$

68. (A) ATQ,

$x + \dfrac{1}{x} = 5 \Rightarrow x^2 + \dfrac{1}{x^2} = 5^2 - 2 = 23$ ...(i)

$\left(x+\dfrac{1}{x}\right) = 5 \Rightarrow x^3 + \dfrac{1}{x^3} = 5^3 - 3\times5 = 110$

...(ii)

Adding equation (i) and (ii)

$x^2 + \dfrac{1}{x^2} + x^3 + \dfrac{1}{x^3} = 23 + 110$

$\Rightarrow x^2 + \dfrac{1}{x^3} + x^3 + \dfrac{1}{x^2} = 133$

$\Rightarrow 8 + x^3 + \dfrac{1}{x^2} = 133$

$\Rightarrow x^3 + \dfrac{1}{x^2} = 133 - 8$

$= 125$

69. (C) ATQ,

$(x^2+2x+1)(x^2-2x+1)$

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

Coefficient of $x^2 = 4$

70. (A) ATQ, $x^2 - 5x + 6 = 0$

sum of roots $= \alpha + \beta = -\dfrac{B}{A} = \dfrac{-(-5)}{1} = 5$

Product of roots $= \alpha\beta = \dfrac{C}{A} = \dfrac{6}{1} = 6$

Now,

If roots are $\dfrac{1}{\alpha}, \dfrac{1}{\beta}$

then,

sum of roots $= \dfrac{1}{\alpha} + \dfrac{1}{\beta} = \dfrac{\alpha+\beta}{\alpha\beta}$

By putting the value of $(\alpha+\beta)$ are $\alpha\beta$

$\dfrac{\alpha+\beta}{\alpha\beta} = \dfrac{5}{6}$

Product of roots $= \dfrac{1}{\alpha}\times\dfrac{1}{\beta} = \dfrac{1}{\alpha\beta} = \dfrac{1}{6}$

Required quadratic equation

x^2 – (sum of roots)x + (Product of roots) = 0

$x^2 - \dfrac{5}{6}x + \dfrac{1}{6} = 0$

$6x^2 - 5x + 1 = 0$

71. (B) ATQ,

$8\sec\theta + 6\operatorname{cosec}\theta = 20$

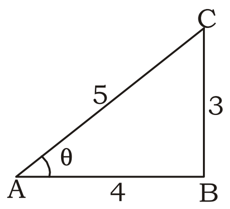
$\Rightarrow \dfrac{8}{20}\sec\theta + \dfrac{6}{20}\operatorname{cosec}\theta = 1$

$\Rightarrow \dfrac{2}{5}\sec\theta + \dfrac{3}{10}\operatorname{cosec}\theta = 1$

If we consider

$\dfrac{2}{5}\sec\theta = \dfrac{3}{10}\operatorname{cosec}\theta = \dfrac{1}{2}$

then, $\sec\theta = \dfrac{5}{4}$ and $\operatorname{cosec}\theta = \dfrac{5}{3}$



In ΔABC

$\cot\theta = \dfrac{4}{3}$

72. (B) When $\alpha = 60°$ or $120°$ or $240°$ or $340°$

then $\cos^2\theta + \cos^2(\alpha-\theta) + \cos^2(\alpha+\theta) = \dfrac{3}{2}$

Hence, $\cos^2 10 + \cos^2 50° + \cos^2 70 = \dfrac{3}{2}$

73. (A) $\frac{\cos(90°-\theta).\sec(90°-\theta)\tan\theta}{\text{cosec}(90°-\theta).\sin(90°-\theta).\cot(90°-\theta)}$

$= \frac{\sin\theta\,\text{cosec}\theta\tan\theta}{\sec\theta\cos\theta\tan\theta}$

= 1

74. (A) $7\sin^2\theta + 3\cos^2\theta = 4$

$4\sin^2\theta + 3\sin^2\theta + 3\cos^2\theta = 4$

$4\sin^2\theta + 3 = 4$

$\sin^2\theta = \frac{1}{4} \Rightarrow \sin\theta = \frac{1}{2}$

$\theta = 30°$

$\tan\theta = \tan 30 = \frac{1}{\sqrt{3}}$

75. (A) $\tan\theta = \frac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$

$\frac{\sin\theta}{\cos\theta} = \frac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$

let $\sin\alpha - \cos\alpha = k\sin\theta$

$\sin\alpha + \cos\alpha = k\cos\theta$

Adding after squaring

$\sin^2\alpha + \cos^2\alpha - 2\sin\alpha\cos\alpha + \sin^2\alpha + \cos^2\alpha + 2\sin\alpha\cos\alpha = k^2(\sin^2\theta + \cos^2\alpha)$

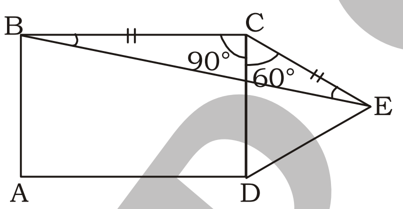
$\Rightarrow 2 = k^2$

$\Rightarrow k = \sqrt{2}$

Hence $\sin\alpha - \cos\alpha = \sqrt{2}\sin\theta$

$\sin\alpha + \cos\alpha = \sqrt{2}\cos\theta$

76. (A) ATQ,



ΔBCE becomes an isosceles triangle and ΔCDE is an equilateral triangle.

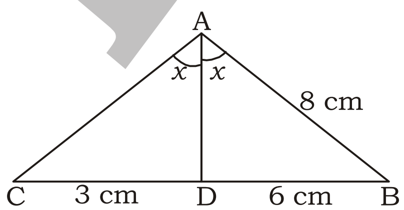
$\because BC = CE$

$\therefore \angle EBC = \angle CEB = \theta$

$\theta + \theta + 150° = 180°$

$\theta = 15°$

77. (C)



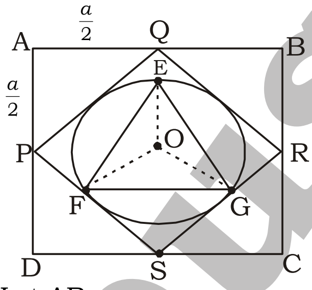
$\because$ AD is the angle bisector of $\angle CAB$

$\frac{AB}{AC} = \frac{BD}{DC} \Rightarrow \frac{8}{AC} = \frac{6}{3}$

$AC = \frac{3\times 8}{6}$

AC = 4 cm

78. (B)



Let AB = a cm

then AQ = AP = $\frac{a}{2}$ cm

$PQ = \sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{a}{2}\right)^2} = \frac{a}{\sqrt{2}}$ cm

Diameter of circle = $\frac{a}{\sqrt{2}}$ cm

Radius = $\frac{a}{2\sqrt{2}}$ cm

O is the centre of the circle

Then $\angle EOF = 120°$

The area of EOF = $\frac{1}{2}$ EO×OF sin120°

$= \frac{1}{2}\times\frac{a^2}{8}\times\frac{\sqrt{3}}{2}$

$= \frac{\sqrt{3}a^2}{32}$ cm²

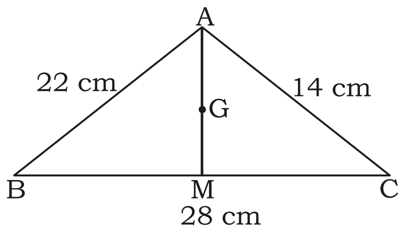
The area of $\Delta EFG = \frac{3\sqrt{3}a^2}{32}$

Put a = 16 cm

Hence, The area of $\Delta EFG = \frac{3\sqrt{3}\times 16^2}{32}$

$= 24\sqrt{3}$ cm²

79. (C) ATQ,



Length of median

$= \frac{1}{2}\sqrt{2b^2 + 2c^2 - a^2}$

AM = $\frac{1}{2}\sqrt{2\times22^2 + 2\times14^2 - 28^2}$

$= \frac{1}{2}\sqrt{968 + 392 - 784}$

= 12 cm

GM = $\frac{1}{3}$ × AM

$= \frac{1}{3}\times12$ = 4 cm

80. (A) ATQ,

Original cost price

= ₹ $\frac{100}{115}\times5750$

= ₹5000

New cost price = ₹1.3 × 5000 = ₹6500

Price paid by the students

= 1.2 × 5750

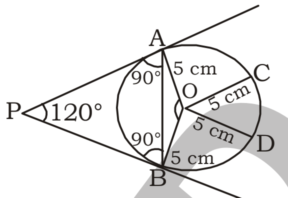
= ₹6900

Profit

$= \frac{400}{6500}\times100$

$= 6\frac{2}{13}\%$

81. (B) ATQ,



So, ΔAOB is an equilateral triangle

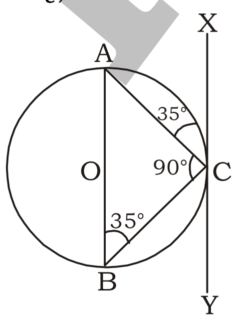
So, ∠APB + ∠AOB = 180°

∠APB = 120°

∠APB = ∠COD

∴ ∠COD = 120°

82. (C) ATQ,



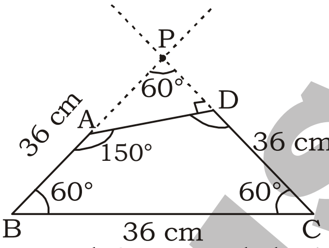
∠ABC = ∠ACX

So, ∠ACB = 90°

Because AB is diameter

So, ∠BAC = 90° – 35° = 55°

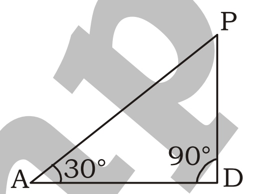
83. (A)



AB and CD extended to P to make an equilateral ΔBPC.

∠DAP = 180° – 150° = 30°

In ΔADP



AD = 18 cm (given)

tan30° = $\frac{PD}{AD}$

⇒ PD = $\frac{18}{\sqrt{3}} = 6\sqrt{3}$ cm

Area of quadrilateral ABCD

= Area of equilateral ΔPBC – Area of ΔPAD

$= \frac{\sqrt{3}}{4}\times36^2 - \frac{1}{2}\times18\times6\sqrt{3}$

$= 324\sqrt{3} - 54\sqrt{3}$

$= 270\sqrt{3}$ cm²

84. (A) Case I

Let principal is 100

for K.D. Live at SI

SI = $\frac{100\times20\times2}{100}$

= 40

Amount = 140

Case II

for K.D. construction at CI

100

1st year 20

2nd year 20 4

Amount = 144

Percentage earning of the K.D. Live at the end of two years on the entire amount

$= \frac{144 - 140}{100}\times100$

= 4%

85. (C) $20 - [2.8 \times 5 + 6 - 3 \div 0.9 \times 1.5 + 2]$

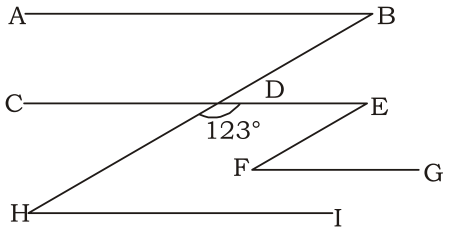
$= 20 - \left[14 + 6 - 3 \times \left(\frac{1}{0.9}\right) \times 1.5 + 2\right]$

$= 20 - \left[20 - \left(\frac{1}{0.3}\right) \times 1.5 + 2\right]$

$= 20 - [20 - 5 + 2]$

$= 20 - 17 = 3$

86. (D)



$\Rightarrow \angle HDE = \angle CDB$ ($\because$ vertical opposite angles are equal)

$\Rightarrow \angle CDB = 123°$

$\Rightarrow \angle CDB + \angle ABD = 180°$ (adjacent angle)

$\Rightarrow 123° + \angle ABD = 180°$

$\Rightarrow \angle ABD = 57°$

$\Rightarrow \angle HDE + \angle DEF = 180°$ (adjacent angle)

$\Rightarrow 123° + \angle DEF = 180°$

$\Rightarrow \angle DEF = 57°$

$\Rightarrow \angle DEF = \angle EFG$ ($\because$ alternate angles are equal)

$\Rightarrow \angle EFG = 57°$

$\therefore$ Required answer are $\angle EFG = 57°$ and $\angle ABD = 57°$

87. (B) $x^4 + \frac{1}{x^4} = 527$

$\Rightarrow x^2 + \frac{1}{x^2} = 23$

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

$\Rightarrow x^2 + 1 = 5x$

$\Rightarrow x^2 - 5x = -1$ ...(i)

$\Rightarrow (x-1)(x-4) \times (x-2)(x-3)$

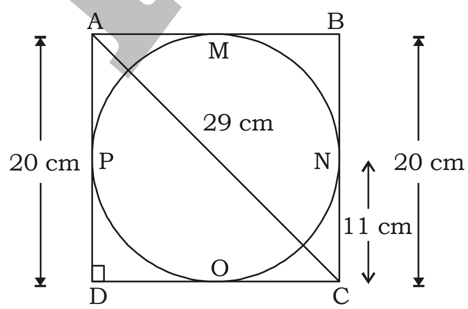
$\Rightarrow (x^2 - 5x + 4) \times (x^2 - 5x + 6)$

From (i)

$\Rightarrow (-1 + 4) \times (-1 + 6)$

$= 15$

88. (D)



In ΔADC,

$\Rightarrow DC^2 = AC^2 - AD^2 \Rightarrow DC^2 = 29^2 - 20^2$

$\Rightarrow DC^2 = 9 \times 49 \Rightarrow DC = 21$ cm

$\Rightarrow$ OC = NC (length of a tangent draw from external point to the circle are equal)

$\Rightarrow$ DO = DC – OC = 21 – 11 = 10 cm

$\Rightarrow$ DO = DP (length of a tangent draw from external point to the circle are equal)

$\Rightarrow$ DP = 10 cm

$\Rightarrow$ AP = AD – DP = 20 – 10 = 10 cm

$\Rightarrow$ AP = AM (length of a tangent draw from external point to the circle are equal)

$\Rightarrow$ AM = 10 cm ...(i)

$\Rightarrow$ BN = BC – NC = 20 – 11 = 9 cm

$\Rightarrow$ BN = BM (length of a tangent draw from external point to the circle are equal)

$\Rightarrow$ BM = 9 cm ...(ii)

From (i) and (ii)

$\Rightarrow$ AM – BM = 10 – 9 = 1 cm

$\therefore$ Required answer is 1 cm

89. (B) ATQ,

$R - r = 7$ ...(i)

And $2\pi rh = 150\pi$

$\Rightarrow 2 \times \pi \times r \times 15 = 150\pi$

So, r = 5 cm

Now, from (i)

R = 7 + 5 = 12

So, the volume of metal used to make the roller $= \pi(R^2 - r^2) \times h$

$\Rightarrow \frac{22}{7} \times (12^2 - 5^2) \times 15$

$\therefore 5610$ cm^3

90. (D) Let the ratio be x

So, length = $15x$

Breadth = $12x$

And height = $8x$

According to question,

Lateral surface area = 432 cm^2

$2(l + b) \times h = 432$

$2(15x + 12x) \times 8x = 432$

$432x^2 = 432$

So, $x = 1$

So, the volume of cuboid $= 15x \times 12x \times 8x$

$= 1440x^3 = 1440$ cm^3

Now, area of cube = 16 cm^2

$4a^2 = 16$

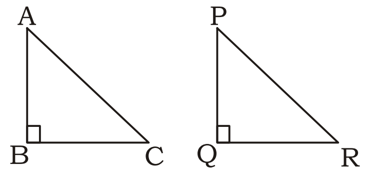
$a = 2$

Volume of cube = $2^3 = 8$ cm^3

So, the number of small cubes $= \frac{1440}{8}$

Hence, 180

91. (D)



Given, $\frac{AC}{BC} = 2.4 = \frac{12}{5}$

The ratio of the corresponding sides of two similar triangles are equal,

$\because \angle ABC = \angle PQR$

$\Rightarrow$ Ratio of corresponding sides = $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$

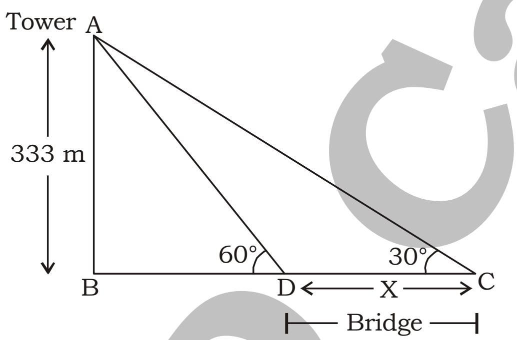
Hence, we can write,

$\Rightarrow QR = \left(\frac{BC}{AC}\right) \times PR$

Substituting values,

$\therefore$ Length of sides QR = $\frac{5}{12} \times 6 = 2.5$ cm

92. (B)



In a triangle ABD,

$\Rightarrow \tan 60° = \frac{AB}{BD} = \frac{333}{BD}$

$\Rightarrow \sqrt{3} = \frac{333}{BD}$

$\Rightarrow BD = 111\sqrt{3}$ m

In a triangle ABC,

$\Rightarrow \tan 30° = \frac{AB}{BC} = \frac{333}{BC}$

$\Rightarrow \left(\frac{1}{\sqrt{3}}\right) = \frac{333}{BC}$

$\Rightarrow BC = 333\sqrt{3}$

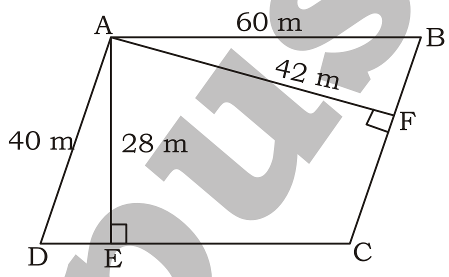
$\Rightarrow DC = BC - BD = 333\sqrt{3} - 111\sqrt{3}$

$\Rightarrow DC = 222\sqrt{3}$ m

$\therefore$ The length of the bridge is $222\sqrt{3}$ m

93. (D) ATQ,

$AE \perp DC$, AE = 28 m, AB = 60 m, AD = 40 m and $AF \perp BC$



AD = BC and AB = DC

($\because$ ABCD is a parallelogram)

$\Rightarrow$ AD = BC

$\Rightarrow$ BC = 40 m

$\Rightarrow$ AB = DC

$\Rightarrow$ DC = 60 m

$\Rightarrow AE = h_1 = 28$ m

$\Rightarrow AF = h_2$

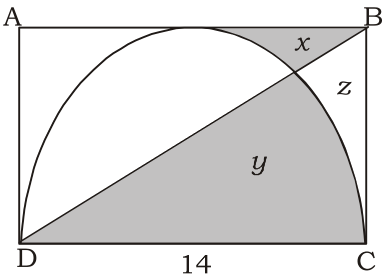
$\Rightarrow DC \times h_1 = BC \times h_2$

$\Rightarrow 60 \times 28 = 40 \times h_2$

$\Rightarrow h_2 = \frac{(60 \times 28)}{40} = 42$ m

$\therefore$ Required answer AF is 42 m.

94. (C)



Now, $y + z = \frac{1}{2} \times 14 \times 7 = 49$ ...(i)

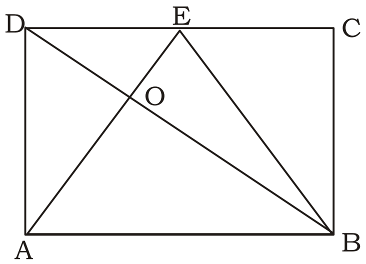
$x + z = (7)^2 - \frac{\pi \times 49}{4}$ ...(ii)

eq(i) – eq(ii)

$y - x = \frac{22}{7} \times \frac{49}{4}$

$= \frac{77}{2}$ cm^2

95. (B)



Let ar(DOE) = S_1 and ar(AOB) = S_2

Since CD||AB

We have,

area of parallelogram

$2 \times ar(AOB) + 2\sqrt{Ar(AOB) \times Ar(DOE)}$

$\Rightarrow 2S_2 + \sqrt[2]{S_1 S_2}$

$\Rightarrow 2 \times 63 + \sqrt[2]{7 \times 63}$

$\Rightarrow 168\ cm^2$

96. (C) In quadrilateral P and Q are mid points

Ar(ΔAEQ) + Ar(ΔQFB)

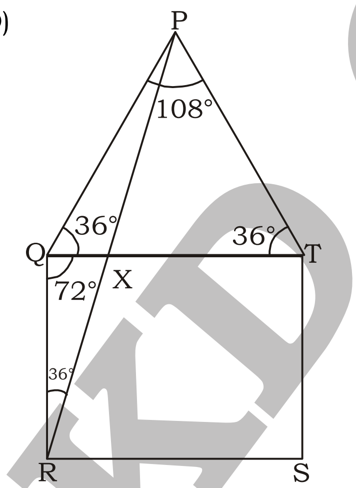
Ar(ΔPCF) + Ar(ΔDEP)

17 + 16 = 18 + Ar(ΔDEP)

Ar(ΔDEP) = 33 – 18

= 15 m^2

97. (D)



Each angle of pentagon = 108°

In ΔPQT, PQT = 36°

So, ∠RQX = 72°

So, exterior angle of ΔRXQ

∠TXR = 108°

98. (A) Smallest side = 20 cm

Largest side = 40 cm

Assume middle side = 21 cm

Volume = 20×40×21

= 16800

if Assume middle side = 39 cm

volume = 31200

So, volume between

16800 < V < 31200

option A is right

99. (D) $\frac{\text{new volume}}{\text{original volume}} = \left(\frac{240}{100}\right)^3 = \left(\frac{2.4}{1}\right)^3$

$= \frac{13.824}{1}$

% increase $= \frac{(13.824 - 1)}{1} \times 100$

$= \frac{12.824}{1} \times 100$

= 1282.4%

100. (C) ATQ,

Let the total distance between Lucknow to Mukherjinagar is *d* km and speed *s* km/hr

$\frac{d}{s} - \frac{d}{s+6} = 4$

$d = \frac{2s(s+6)}{3}$ ...(i)

$\frac{d}{s-6} - \frac{d}{s-6} = 10$

$d = \frac{5(s^2 - 36)}{6}$ ...(ii)

from eq(i) and (ii)

$\frac{5(s^2 - 36)}{6} = \frac{2s(s+6)}{3}$

$5s^2 - 180 = 4s^2 + 24s$

$s^2 - 24s - 180 = 0$

$(s - 30)(s + 6) = 0$

$s = 30$ km/hr

Putting the value of *s* in eq(i)

$d = \frac{2 \times 30 \times 36}{3} = 720$ km