TEST NO. 56

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

Answer Key

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

Answer key with explanations

1. (B) Whole numbers = 0,1, 2.........49, 50

Sum = $\frac{50}{2}(50+1) = 25 \times 51 = 1275$

The required unit digit = 5

2. (A) $\frac{(1.4)^3+(0.3)^3+(0.6)^3-0.756}{(1.15)\left[(1.4)^2+(0.3)^2+(0.6)^2-0.42-0.18-0.84\right]}$

We know that, $a^3 + b^2 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$\Rightarrow \frac{(2.3)\left[(1.4)^2+(0.3)^2+(0.6)^2-0.42-0.18-0.84\right]}{(1.15)\left[(1.4)^2+(0.3)^2+(0.6)^2-0.42-0.18-0.84\right]}$

$\Rightarrow \frac{2.3}{1.15} = 2$

3. (C) $\frac{1}{1\times4\times7}+\frac{1}{1\times3}+\frac{1}{4\times7\times10}+\frac{1}{3\times5}+$....upto 15 terms

$\Rightarrow\left[\frac{1}{1\times4\times7}+\frac{1}{4\times7\times10}+\ldots\text{upto 8 terms}\right]$

$+\left[\frac{1}{1\times3}+\frac{1}{3\times5}+\ldots\text{upto 7 terms}\right]$

$\Rightarrow\left[\frac{1}{1\times4\times7}+\frac{1}{4\times7\times10}+\ldots+\frac{1}{22\times25\times28}\right]$

$+\left[\frac{1}{1\times3}+\frac{1}{3\times5}+\ldots..+\frac{1}{13\times15}\right]$

$\Rightarrow\frac{1}{6}\left[\left(\frac{1}{1\times4}-\frac{1}{4\times7}\right)+\left(\frac{1}{4\times7}-\frac{1}{7\times10}\right)+\ldots\left(\frac{1}{22\times25}-\frac{1}{25\times28}\right)\right]$

$+\frac{1}{2}\left[\left(1-\frac{1}{3}\right)+\left(\frac{1}{3}-\frac{1}{5}\right)+\ldots+\left(\frac{1}{13}-\frac{1}{15}\right)\right]$

$\Rightarrow\frac{1}{6}\left(\frac{1}{1\times4}-\frac{1}{25\times28}\right)+\frac{1}{2}\left(1-\frac{1}{15}\right)$

$\Rightarrow\frac{1}{6}\left(\frac{25\times7-1}{25\times28}\right)+\frac{1}{2}\left(\frac{15-1}{15}\right)$

$\Rightarrow\frac{1}{6}\times\frac{174}{25\times28}+\frac{1}{2}\times\frac{14}{15}\Rightarrow\frac{29}{700}+\frac{7}{15}$

$\Rightarrow\frac{87+980}{2100}=\frac{1067}{2100}$

4. (B) $\frac{1}{\sqrt[3]{11}}=\frac{1}{(11)^{\frac{4}{12}}}=\frac{1}{(14641)^{\frac{1}{12}}}$

$\frac{1}{\sqrt[4]{26}}=\frac{1}{(26)^{\frac{3}{12}}}=\frac{1}{(17576)^{\frac{1}{12}}}$

$\frac{1}{\sqrt{5}}=\frac{1}{(5)^{\frac{6}{12}}}=\frac{1}{(15625)^{\frac{1}{12}}}$

Hence, $\frac{1}{\sqrt[4]{26}}<\frac{1}{\sqrt{5}}<\frac{1}{\sqrt[3]{11}}$

5. (C) $A + B + AB = 84$ $(A, B \le 20)$
$A = 16, B = 4$ satisfy the equation
Hence, $A + B = 16 + 4 = 20$

6. (D) Given that, $A = 2 + \sqrt{3}$

$\Rightarrow \frac{1}{A} = \frac{1}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}} \Rightarrow \frac{1}{A} = 2 - \sqrt{3}$

and $AB = 1 \Rightarrow B = \frac{1}{A} = 2 - \sqrt{3}$

$\frac{1}{B} = A = 2 + \sqrt{3}$

Now, $\frac{1}{A^2} - \frac{1}{B^2}$

$\Rightarrow \left(2-\sqrt{3}\right)^2 - \left(2+\sqrt{3}\right)^2$

$\Rightarrow 4 + 3 - 4\sqrt{3} - 4 - 3 - 4\sqrt{3}$

$\Rightarrow -8\sqrt{3}$

7. (B) $\frac{a+b}{c} = \frac{7}{5} \Rightarrow \frac{a+b+c}{c} = \frac{12}{5}$

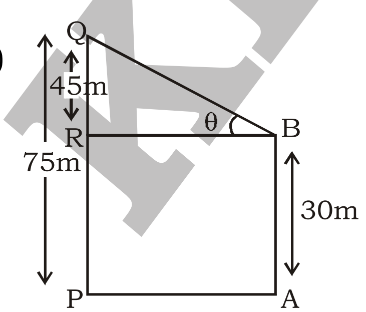
$\frac{b+c}{a} = \frac{3}{1} \Rightarrow \frac{b+c+a}{a} = \frac{4}{1} = \frac{12}{3}$

here $a = 3$, $c = 5$, then $b = 4$

Now, $\frac{a+c}{b} = \frac{3+5}{4} = \frac{8}{4} = 2$

8. (A) $4x + 7y + 6z = 78$ ...(i)
and $6x + 5y + 9z = 95$ ...(ii)
eq(i) × 3 – eq(ii) × 2
$21y - 10y = 78 \times 3 - 95 \times 2$
$\Rightarrow 11y = 234 - 190$
$\Rightarrow 11y = 44 \Rightarrow y = 4$

9. (B)



Given that $\tan\theta = \frac{15}{8}$

In ΔQRB:

$\tan\theta = \frac{45}{RB}$

$\Rightarrow \frac{15}{8} = \frac{45}{RB} \Rightarrow RB = 24$

Now, $QB = \sqrt{(45)^2 + (24)^2}$

$= \sqrt{2025 + 576} = \sqrt{2601} = 51$

Hence, length of the rope = 51 m

10. (B) Statement I

$\sqrt{121} + \sqrt{1.21} + \sqrt{0.0121} + \sqrt{0.000121}$

$\Rightarrow 11 + 1.1 + 0.11 + 0.011$

$\Rightarrow 12.221$

Statement I is incorrect.

Statement II

$\sqrt{98.01} + \sqrt{0.2209} + \sqrt{196}$

$\Rightarrow 9.9 + 0.47 + 14 = 24.37$

Statement II is correct.

Hence only statement II is correct.

11. (C) Ratio of slant height = 3 : 5
Let slant heights = $3x$, $5x$
Let radius = r
ATQ.,
$\pi r \times (5x) = 300$
$\Rightarrow \pi r x = 60$
Curved surface area of the smaller cone
$= \pi r \times 3x = \pi r x \times 3$
$= 60 \times 3 = 180$ cm^2

12. (A) Ratio = 13 : 9 : 5
Let length, breadth and height
$= 13x, 9x, 5x$
ATQ.,
Lateral surface area = 880 cm^2
$\Rightarrow 2(13x + 9x) \times 5x = 880$
$\Rightarrow 220x^2 = 880$
$\Rightarrow x^2 = 4 \Rightarrow x = 2$
Volume of cuboid $= 13x \times 9x \times 5x$
$= 585x^3 = 585 \times 2^3 = 4680$ cm^3
Curved surface area of cube = 16 cm^2
$4a^2 = 16 \Rightarrow a^2 = 4 \Rightarrow a = 2$
Volume of cube $= 2^3 = 8$

The number of small cubes $= \frac{4680}{8}$

$= 585$

13. (B) ATQ, $\dfrac{1}{1+\dfrac{1}{1-\dfrac{1}{1+\dfrac{1}{1-\dfrac{1}{x}}}}} = \dfrac{4}{9}$

$\Rightarrow 1+\dfrac{1}{1-\dfrac{1}{1+\dfrac{1}{1-\dfrac{1}{x}}}} = \dfrac{9}{4}$

$\Rightarrow \dfrac{1}{1-\dfrac{1}{1+\dfrac{1}{1-\dfrac{1}{x}}}} = \dfrac{5}{4} \Rightarrow 1-\dfrac{1}{1+\dfrac{1}{1-\dfrac{1}{x}}} = \dfrac{4}{5}$

$\Rightarrow \dfrac{1}{1+\dfrac{1}{1-\dfrac{1}{x}}} = 1-\dfrac{4}{5} \Rightarrow \dfrac{1}{1+\dfrac{1}{1-\dfrac{1}{x}}} = \dfrac{1}{5}$

$\Rightarrow 1+\dfrac{1}{1-\dfrac{1}{x}} = 5$

$\Rightarrow \dfrac{1}{1-\dfrac{1}{x}} = 4 \Rightarrow 1-\dfrac{1}{x} = \dfrac{1}{4} \Rightarrow \dfrac{1}{x} = 1-\dfrac{1}{4}$

$\Rightarrow \dfrac{1}{x} = \dfrac{3}{4} \Rightarrow x = \dfrac{4}{3}$

14. (A) L.C.M. of 45 sec., 54 sec. and 72 sec.
= 1080 sec. = 18 minutes
The required time = 18 minutes

15. (C) Let number = $100x + 10y + z$
ATQ.,
$100x + 10y + z - x - y - z$
$\Rightarrow 99x + 9y = 9(11x + y)$
Hence, the number is divisible by 3 and 9.

16. (B)

For A

Income	Saving	Expenditure
100	25	80
20% Increased ↓		50% Increased ↓
120	0	120

New Saving % of A = 00

For B

Income	Saving	Expenditure
100	20	75
25% Increased ↓		60% Increased ↓
125	5	120

New Saving % of B = $\dfrac{5}{175} \times 100 = 4$

The required difference = 4 – 0 = 4%

17. (C) Let number of males who left the KD Campus = x
ATQ.,

$\dfrac{\frac{5}{8} \times 960 - x}{\frac{3}{8} \times 960 + 15} = \dfrac{13}{15}$

$\Rightarrow \dfrac{600 - x}{360 + 15} = \dfrac{23}{15}$
$\Rightarrow 9000 - 15x = 23 \times 375$
$\Rightarrow 15x = 9000 - 8625$
$\Rightarrow 15x = 375 \Rightarrow x = 25$
Hence, the required number of males = 25

18. (D) Distance = $\dfrac{64 \times 48}{64 - 48} \times \dfrac{15 + 10}{60}$

Distance = $\dfrac{64 \times 48}{16} \times \dfrac{25}{60}$

Distance = 80km

19. (C) The required ratio = $\dfrac{100 - 13}{100 + 16}$

$= \dfrac{87}{116} = \dfrac{3}{4} = 3 : 4$

20. (D) $\dfrac{3}{7} = 0.43,\ \dfrac{5}{11} = 0.45$

$\dfrac{7}{17} = 0.41,\ \dfrac{11}{19} = 0.58$

The required number = $\dfrac{11}{19}$

21. (A) Let B joins the business after x months.
A : B = 15000 × 12 : 18000 × (12 – x)
= 10 : (12 – x)
ATQ.,

$\dfrac{10}{10+12-x} = \dfrac{500}{900} \Rightarrow 18 = 22 - x \Rightarrow x = 4$

Hence, B joined the business after 4 months.

22. (B) Let C.P or 1st computer = x

C.P. of 2nd computer = $29000 - x$

Total C.P. = ₹29000

S.P. of 1st computer = $x \times \frac{90}{130} = \frac{9x}{10}$

S.P. of 2nd computer = $(29000 - x) \times \frac{120}{100}$

$= \frac{12(29000 - x)}{10}$

Total S.P. = $\frac{9x}{10} + \frac{12(29000 - x)}{10}$

$= \frac{348000 - 37x}{10}$

ATQ.,

$\frac{348000 - 3x}{10} - 29000 = 1600$

$\Rightarrow \frac{348000 - 3x}{10} = 30600$

$\Rightarrow 3x = 42000 \Rightarrow x = 14000$

Hence cost prices of computers

= ₹14000, ₹15000

23. (B) $(3 + \tan^2\theta)\,(3 + \cot^2\theta)$

$\Rightarrow (2 + 1 + \tan^2\theta)\,(2 + 1 + \cot^2\theta)$

$\Rightarrow (2 + \sec^2\theta)\,(2 + \operatorname{cosec}^2\theta)$

$\Rightarrow 4 + 2\sec^2\theta + 2\operatorname{cosec}^2\theta + \sec^2\theta.\operatorname{cosec}^2\theta$

$\Rightarrow 4 + \frac{2}{\cos^2\theta} + \frac{2}{\sin^2\theta} + \frac{1}{\sin^2\theta.\cos^2\theta}$

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

$\Rightarrow 4 + \frac{2 + 1}{4\sin^2\theta.\cos^2\theta} \times 4$

$\Rightarrow 4 + \frac{12}{\sin^2 2\theta} \Rightarrow 4 + \frac{12 \times 25}{12} = 29$

24. (D) ATQ,

$\frac{5}{7}$ $\qquad$ $\frac{8}{21}$

$\frac{19}{42}$

$\frac{19}{42} - \frac{8}{21}$ $\qquad$ $\frac{5}{7} - \frac{19}{42}$

$= \frac{19 - 16}{42} : \frac{30 - 19}{42}$

$= \frac{3}{42} : \frac{11}{42} = 3 : 11$

The required ratio = 3 : 11

25. (B) CP = 2500

S.P. = $2500 \times \frac{(100 - 16)}{100} \times \frac{(100 + 26)}{100}$

$= 2500 \times \frac{84}{100} \times \frac{126}{100} = 2646$

Overall increase in price

= 2646 – 2500 = ₹146

26. (C) $1m + 3w + 4b = \frac{1}{96}$ ...(i)

$2m + 8b = \frac{1}{80}$ ...(ii)

$2m + 3w = \frac{1}{120}$ ...(iii)

eq(i) + eq(ii) – eq(iii)

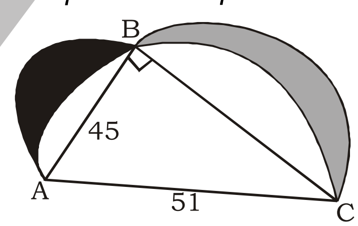
$1m + 12b = \frac{1}{96} + \frac{1}{80} - \frac{1}{120}$

$= \frac{10 + 12 - 8}{960} = \frac{14}{960} = \frac{7}{480}$

1 men and 12 boys can do the work in

$= \frac{480}{7}$ hrs = $68\frac{4}{7}$ hrs

27. (A)



In ΔABC,

$BC^2 = AC^2 - AB^2 = (51)^2 - (45)^2$

= 2601 – 2025 = 576

then BC = 24

Area of shaded part = $\frac{1}{2} \times AB \times BC$

$= \frac{1}{2} \times 45 \times 24 = 540$ sq.cm

28. (B) ATQ.,

$\frac{2\pi rh}{2\pi r(h + r)} = \frac{3}{7} \Rightarrow \frac{h}{h + r} = \frac{3}{7}$

$\Rightarrow \frac{h}{r} = \frac{3}{4}$

Let $h = 3x$, $r = 4x$

Now, $2\pi r(h + r) = 2816$

$\Rightarrow 2 \times \frac{22}{7} \times 4x \times 7x = 2816$

$\Rightarrow x^2 = 16 \Rightarrow x = 4$

Volume of cylinder = $\pi r^2 h$

$= \pi(4x)^2 \times 3x = \pi \times 16x^2 \times 3x$

$= \pi \times 48 \times (4)^3 = 3072\pi$ cm^3

29. (A) When prism is cut in 3 parts of equal heights, volume of all the parts will be same.
$\therefore$ Ratio of the volume of the top, Middle and the bottom part = 1 : 1 : 1

30. (C) Volume of solid spherical ball = $\frac{4}{3}\pi(5)^3$
20% of solid is wasted.
Remaining volume = $\frac{80}{100}\times\frac{4}{3}\pi(5)^3$
ATQ.,
$10\times\frac{80}{100}\times\frac{4}{3}\pi(5)^3=\frac{4}{3}\pi R^3$
$\Rightarrow$ $10\times\frac{4}{5}\times(5)^3=R^3$
$\Rightarrow$ $R^3 = 2^3 \times 5^3 \Rightarrow R = 10$ cm

31. (D) $XY^2 = 64 + 64$
XY = $8\sqrt{2}$ cm
$\therefore$ YZ = ZX = $8\sqrt{2}$ cm
$\therefore$ Base area of the pyramid
= $\frac{\sqrt{3}}{4}\times\left(8\sqrt{2}\right)^2 = \frac{\sqrt{3}}{4}\times128=32\sqrt{3}$ cm^2
In ΔXBY, $\angle B = 90°$, $\angle BOY = 90°$
So, Height of rest three surfaces of the pyramid = $4\sqrt{3}$
Area of 3 surfaces of pyramid
= $3\times\frac{1}{2}\times4\sqrt{2}\times8\sqrt{2}=96$ cm^2
Total surface area
= $96+32\sqrt{3}=32\left(3+\sqrt{3}\right)$ cm^2

32. (B) A = 15% of total applicants who are present at exam centre F
A = 0.15 × 0.15 × 0.64 × 1200000 = 17280
B = total present applicants at exam centre K
B = 0.16 × 0.8 × 1200000 = 153600
$\therefore$ The required percentage
= $\left(\frac{17280}{153600}\right)\times100 = 11.25$

33. (B) Total number of offline applicants from exam centre H, K and F
= (0.2 × 0.48 + 0.16 × 0.62 + 0.15 × 0.7) × 1200000
= (0.096 + 0.0992 + 0.105) × 1200000
= 360240
Total number of present applicants from exam centre G and J
= (0.25 × 0.75 + 0.24 × 0.82) × 1200000
= (0.1875 + 0.1968) × 1200000
= 461160
$\therefore$ Required difference = 461160 – 360240
= 100920

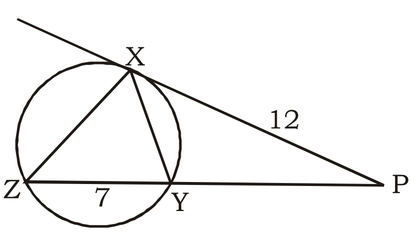
34. (C) Total number of offline applicants from the exam centre F, H, J and G
= (0.15 × 0.7 + 0.2 × 0.48 + 0.24 × 0.54 + 0.25 × 0.56) ×1200000
= (0.105 +0.096 + 0.1296+ 0.14) ×1200000
= 564720

35. (B) Total number of present applicants from exam centre K = 0.16 × 0.8 × 1200000
= 0.128 × 1200000 = 153600
Total number of offline application from exam centre J = 0.14 × 0.54 × 1200000
= 0.1296 × 1200000 = 155520
$\therefore$ Required Ratio = 153600 : 155520
= 80 : 81

36. (C) Total number of present applicants from exam centre H and G togetgher
= (0.2 × 0.68 + 0.25 × 0.75) × 1200000
= (0 136 + 0.1875) × 1200000
= 388200

37. (A) Let n be number of half years
Amount = 8000 + 2648 = 10648
ATQ,
$10648 = 8000\left(1+\frac{20}{200}\right)^n$
$\Rightarrow 1.331 = (1.1)^n \Rightarrow n = 3$
$\therefore$ 3 half year means 18 months.

38. (C)



Let PY = x
We have, $PX^2 = PY \times PZ$
$\Rightarrow 144 = x(x + 7) \Rightarrow x = 9$
Also $\angle PXY = \angle XZY$ [Alternate Segment Theorem]
$\therefore$ ΔPXY is similar to ΔPZX
$\therefore$ Perimeter of PXZ = $\frac{27}{3}\times4 = 36$ cm

39. (A)

CP 100

C.P. = 4% less → new CP. 96 ; 100 → 110 SP

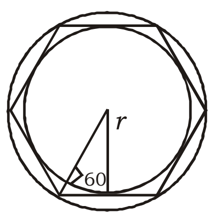
$P\% = 18\frac{3}{4}\%$ i.e. 18/- → SP_2 = 114/- ; Diff is 4/-

When diff. = 4, then C.P. = 100

When diff. = 10, then C.P. = $\frac{100 \times 10}{4}$

= ₹250

40. (B)



Let the radius of the smaller circle be *r*. The radius of the bigger circle

$= \frac{r}{\sin 60^\circ} = \frac{2r}{\sqrt{3}}$

41. (A) $\frac{\tan 5\theta + \tan 3\theta}{\cos 4\theta(\tan 5\theta - \tan 3\theta)}$

$\Rightarrow \frac{\frac{\sin 5\theta}{\cos 5\theta} + \frac{\sin 3\theta}{\cos 3\theta}}{\cos 4\theta\left[\frac{\sin 5\theta}{\cos 5\theta} - \frac{\sin 3\theta}{\cos 3\theta}\right]}$

$\Rightarrow \frac{\sin 5\theta.\cos 3\theta + \cos 5\theta.\sin 3\theta}{\cos 4\theta[\sin 5\theta.\cos 3\theta - \cos 5\theta.\sin 3\theta]}$

$\Rightarrow \frac{\sin 8\theta}{\cos 4\theta.\sin 2\theta} \Rightarrow \frac{2\sin 4\theta.\cos 4\theta}{\cos 4\theta.\sin 2\theta}$

$\Rightarrow \frac{2 \times 2\sin 2\theta.\cos 2\theta}{\sin 2\theta} \Rightarrow 4\cos 2\theta$

42. (C) Equation $x^2 + 3x + 5 = 0$

$\alpha + \beta = -3$ and $\alpha\beta = 5$

$\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$

$= (-3)^3 - 3 \times 5 \times (-3) = -27 + 45 = 18$

and $\alpha^3\beta^3 = (5)^3 = 125$

New equation

$x^2 - (\alpha^3 + \beta^3)x + (\alpha\beta)^3 = 0$

$\Rightarrow x^2 - 18x + 125 = 0$

43. (C) $\frac{\cos 3\theta + 2\cos 5\theta + \cos 7\theta}{\cos \theta + 2\cos 3\theta + \cos 5\theta} + \sin 2\theta.\tan 3\theta$

$\Rightarrow \frac{\cos 3\theta + \cos 7\theta + 2\cos 5\theta}{\cos \theta + \cos 5\theta + 2\cos 3\theta} + \sin 2\theta.\tan 3\theta$

$\Rightarrow \frac{2\cos 5\theta.\cos 2\theta + 2\cos 5\theta}{2\cos 3\theta.\cos 2\theta + 2\cos 5\theta} + \sin 2\theta.\tan 3\theta$

$\Rightarrow \frac{2\cos 5\theta(\cos 2\theta + 1)}{2\cos 3\theta(\cos 2\theta + 1)} + \sin 2\theta.\tan 3\theta$

$\Rightarrow \frac{\cos 5\theta}{\cos 3\theta} + \sin 2\theta.\frac{\sin 3\theta}{\cos 3\theta}$

$\Rightarrow \frac{\cos(3\theta + 2\theta)}{\cos 3\theta} + \sin 2\theta.\frac{\sin 3\theta}{\cos 3\theta}$

$\Rightarrow \frac{\cos 3\theta.\cos 2\theta - \sin 2\theta.\sin 3\theta + \sin 2\theta.\sin 3\theta}{\cos 3\theta}$

$\Rightarrow \frac{\cos 3\theta.\cos 2\theta}{\cos 3\theta} = \cos 2\theta$

44. (D) Equation $ax^2 + bx + c = 0$

$\alpha + \beta = \frac{-b}{a}$ and $\alpha\beta = \frac{c}{a}$

Now, $\frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{\alpha}{\beta^2} + \frac{\beta}{\alpha^2}$

$\Rightarrow \frac{\beta^2 + \alpha^2 + \alpha^3 + \beta^3}{\alpha^2\beta^2}$

$\Rightarrow \frac{(\alpha+\beta)^2 - 2\alpha\beta + (\alpha+\beta)^3 - 3\alpha\beta(\alpha+\beta)}{(\alpha\beta)^2}$

$\Rightarrow \frac{\left(-\frac{b}{a}\right)^2 - 2 \times \frac{c}{a} + \left(\frac{-b}{a}\right)^3 - 3 \times \frac{c}{a} \times \left(-\frac{b}{a}\right)}{\left(\frac{c}{a}\right)^2}$

$\Rightarrow \frac{\frac{b^2}{a^2} - \frac{2c}{a} - \frac{b^3}{a^3} + \frac{3bc}{a^2}}{\frac{c^2}{a^2}}$

$\Rightarrow \frac{\frac{ab^2 - 2a^2c - b^3 + 3abc}{a^3}}{\frac{c^2}{a^2}}$

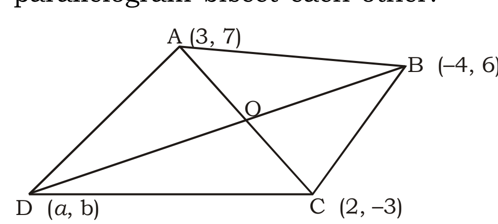
$\Rightarrow \frac{ab^2 + 3abc - 2a^2c - b^3}{ac^2}$

45. (B) Given that

A = (3, 7), B = (–4, 6) and C = (2, –3)

Let fourth vertex D = (*a*, *b*)

We know that the diagonals of a parallelogram bisect each other.



Therefore O is a mid point of AC as well as BD.

Mid-point of AC = $\left(\frac{3+2}{2}, \frac{7-3}{2}\right)$

$= \left(\frac{5}{2}, 2\right)$

Mid-point of BD = $\left(\frac{-4+a}{2}, \frac{6+b}{2}\right)$

Now, $\frac{-4+a}{2} = \frac{5}{2} \Rightarrow a = 9$

$\frac{6+b}{2} = 2 \Rightarrow b = -2$

Hence fourth vertex D = (9, –2)

46. (B) ATQ,

$\frac{45 \times 48}{46575} = \frac{16 \times x \times 2}{17250}$

$\Rightarrow x = 25$

$\therefore$ Required number of men = 25

47. (D) Two days work of A + B = $\frac{1}{24} + \frac{1}{18}$

$= \frac{3+4}{72} = \frac{7}{72}$

20 days works = $\frac{70}{72}$

Remaining work = $\frac{2}{72} = \frac{1}{36}$

When A starts the works

Remaining work will completed in

$= \frac{\frac{1}{36}}{\frac{1}{24}} = \frac{1}{36} \times \frac{24}{1} = \frac{2}{3}$ days

When B starts the work

Remaining work will complete in

$= \frac{\frac{1}{36}}{\frac{1}{18}} = \frac{1}{2}$ day

$\therefore$ Extra time when A starts

$= \frac{2}{3} - \frac{1}{2} = \frac{1}{6}$ day

48. (B) 45W $\rightarrow$ 48 days $\rightarrow$ ₹46575

$\therefore$ 1W $\rightarrow$ 48 days $\rightarrow$ ₹ $\frac{46575}{45}$

$\therefore$ 1W $\rightarrow$ 1 days $\rightarrow$ ₹ $\frac{46575}{45 \times 48}$(wages)

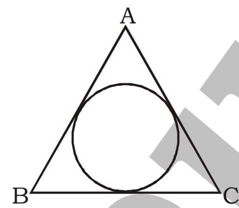
Now, according to question

Wage of 1M = 2 × wage of 1 W

$= \frac{2 \times 46575}{45 \times 48} = \frac{345}{8}$ / day

Required number = $\frac{17250}{\frac{345}{8} \times 16} = 25$ men

49. (A)



AB = 10, BC = 14, AC = 12

Semi-perimeter of ΔABC

$S = \frac{10+14+12}{2} = 18$

$\Delta = \sqrt{18 \times 8 \times 4 \times 6} = 24\sqrt{6}$

In-radius, $r = \frac{\Delta}{S} = \frac{24\sqrt{6}}{18} = \frac{4\sqrt{6}}{3}$

Area of the circle = πr^2

$= \pi \times \left(\frac{4\sqrt{6}}{3}\right)^2 = \frac{32}{3}\pi$

50. (B) $x - \frac{1}{x} = 5$ …(i)

Now, $x^2 + \frac{1}{x^2} = 5^2 + 2$

$\Rightarrow x^2 + \frac{1}{x^2} = 27$

and $x^4 + \frac{1}{x^4} = 27^2 - 2$

$\Rightarrow x^4 + \frac{1}{x^4} = 727$ …(ii)

and $x^3 - \frac{1}{x^3} = 5^3 + 3 \times 5$

$\Rightarrow x^3 - \frac{1}{x^3} = 140$ …(iii)

eq(i) × eq(ii)

$x^5 + \frac{1}{x^3} - x^3 - \frac{1}{x^5} = 5 \times 727$

$\Rightarrow \left(x^5 - \frac{1}{x^5}\right) - \left(x^3 - \frac{1}{x^3}\right) = 3635$

From eq(iii)

$\Rightarrow x^5 - \frac{1}{x^5} - 140 = 3635$

$\Rightarrow x^5 - \frac{1}{x^5} = 3775$

51. (C) $f(x) = 2x^3 + ax^2 + 3x - 5$

$g(x) = x^3 + x^2 - 2x + a$

By remainder theorem,

$f(2) = 2(2)^3 + a(2)^2 + 3 \times 2 - 5$

$= 17 + 4a$

$g(2) = (2)^3 + (2)^2 - 2 \times 2 + a$

$= 8 + a$

now, $17 + 4a = 8 + a$

$\Rightarrow 3a = -9 \Rightarrow a = -3$

52. (D) Tiger takes 4 leaps for every 5 leaps of dog

$\therefore$ Ratio of leaps of tiger to dog = 4 : 5

Given that, 1 leap of tiger = 4 dog leaps

On converting tiger leaps into dog leaps

$\therefore$ Speed of tiger speed of dog

$= 4 \times 4 : 5 = 16 : 5$

53. (D) Sum of marks obtained in both the subjects,

U = 75 + 80 = 155

V = 63 + 87 = 150

W = 80 + 70 = 150

X = 72 + 75 = 147

As the maximum marks are same i.e. 200

So the person having highest marks will also have highest percentage.

So the answer is U

54. (B) Total marks in History

(75 + 63 + 80 + 72) = 290

Total marks in Geography

= (80 + 87 + 70 + 75) = 312

Total marks in Geography + History

= 602

Required percentage

$= \frac{290}{602} \times 100 = 48.17\%$

55. (C) Total percentage marks in History

= (75 + 63 + 80 + 72) = 290

The requirted average = 290 ÷ 4 = 72.5

56. (C) Let both sides are equal to K

$K = (\sec\alpha + \tan\alpha)(\sec\beta + \tan\beta)(\sec\gamma + \tan\gamma)$ ...(1)

$K = (\sec\alpha + \tan\alpha)(\sec\beta - \tan\beta)(\sec\gamma - \tan\gamma)$ ....(2)

Multiplying eq. (1) and (2)

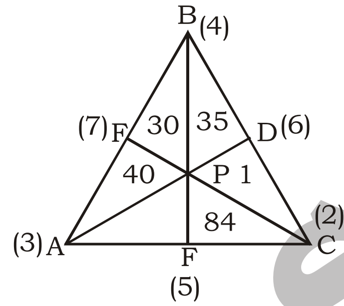
$K^2 = (\sec^2\alpha - \tan^2\alpha)(\sec^2\beta - \tan^2\beta)(\sec^2\gamma - \tan^2\gamma)$

$\Rightarrow K^2 = 1 \times 1 \times 1$

$K = \pm 1$

57. (C) ATQ,

using mass point thoerum



From figure $\frac{Ar(\text{BPF})}{Ar(\text{APF})} = \frac{\text{BF}}{\text{AF}} = \frac{30}{40}$

Start with F

Let mass at f = 7 kg

$\frac{Ar(\Delta \text{ADE})}{Ar(\Delta DEC)} = \frac{\text{AE}}{\text{CE}} = \frac{2}{3}$

$\frac{Ar(\text{ADE})}{84} = \frac{2}{3}$

$\text{Ar (ADE)} = \frac{84 \times 2}{3} = 56 \text{ cm}^2$

Similarly, $\frac{Ar(\text{BPD})}{Ar(\text{PDC})} = \frac{\text{BD}}{\text{DC}} = \frac{2}{4}$

$\therefore$ Ar(BPD) = 35

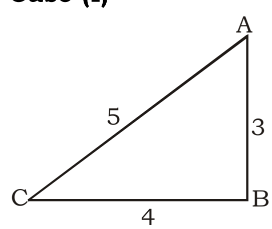
Ar (PDC) = 70 cm^2

area of (ΔABC) = 30 + 35 + 70 + 56 + 40

= 231 cm^3

58. (A) ATQ.,

Case (i)

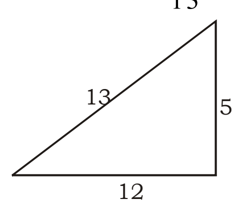


$\cos(\alpha + \beta) = \frac{4}{5}$

$\tan(\alpha + \beta) = \frac{3}{4}$

Case (ii)

$\sin(\alpha - \beta) = \frac{5}{13}$



$\tan(\alpha - \beta) = \frac{5}{12}$

$\tan(2\alpha) = \tan[(\alpha + \beta) + (\alpha - \beta)]$

$= \frac{\tan(\alpha+\beta)+\tan(\alpha-\beta)}{1-\tan(\alpha+\beta)\tan(\alpha-\beta)}$

$= \frac{\frac{3}{4}+\frac{5}{12}}{1-\frac{3}{4}\times\frac{5}{12}}$

$= \frac{14}{12}\times\frac{48}{(48-15)}$

$= \frac{14}{12}\times\frac{48}{33}$

$= \frac{56}{33}$

59. (A) $\frac{76}{4+\sqrt{7}+\sqrt{11}}$

Rationalization above eq.

$= \frac{76(4+\sqrt{7}-\sqrt{11})}{[(4+\sqrt{7})+\sqrt{11}][(4+\sqrt{7})-\sqrt{11}]}$

$= \frac{76(4+\sqrt{7}-\sqrt{11})}{(4+\sqrt{7})^2-(\sqrt{11})^2}$

$= \frac{76(4+\sqrt{7}-\sqrt{11})}{8\sqrt{7}+12}$

$= \frac{19(4+\sqrt{7}-\sqrt{11})}{2\sqrt{7}+3}$

Now, Again rationalization

$= \frac{19(4+\sqrt{7}-\sqrt{11})\times(2\sqrt{7}-3)}{(2\sqrt{7})^2-3^2}$

$= \frac{19(2+5\sqrt{7}+3\sqrt{11}-2\sqrt{77})}{28-9}$

$= 2 + 5\sqrt{7} + 3\sqrt{11} - 2\sqrt{77}$

$= p+q\sqrt{7}+r\sqrt{11}-s\sqrt{7}$

Comparing both sides.

$p = 2$, $q = 5$, $r = 3$ and $s = -2$

Now, $\sqrt{p+q+r+s} = \sqrt{2+5+3-2}$

$= 2\sqrt{2}$

60. (D) $p = \sqrt{5} - 2 \Rightarrow P + 2 = \sqrt{5}$

Squaring both sides

$\Rightarrow (p + 2)^2 = (\sqrt{5})^2$

$\Rightarrow p^2 + 4 + 4p = 5$

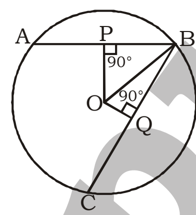
$\Rightarrow p^2 + 4p = 1$

Again Squaring both sides

$p^4 + 16p^2 + 8p^3 = 1$

$\Rightarrow p^4 + 16p^2 + 8p^3 + 4 = 5$

61. (D)



In ΔBQO

$OB^2 = OQ^2 + BQ^2$

$\Rightarrow 10^2 = 6^2 + BQ^2$

$\Rightarrow BQ^2 = 10^2 - 6^2 = 64$

$\Rightarrow BQ = 8$ units

Hence, Chord

$BC = 2 \times QB = 2 \times 8 = 16$ cm

Now, Again in right angle triangle ΔOPB

$OB^2 = OP^2 + PB^2$

$10^2 = 8^2 + PB^2$

$PB = 6$ cm

Hence, Chord (AB) $= 2 \times 6 = 12$ cm

Required difference = BC – AB

= 16 – 12 = 4 cm

62. (A) ATQ.,

Let the two numbers are M and N and quotient are a and b.

$M = 8 \times a + 3$ ...(1)

$N = 8 \times b + 7$ ....(2)

Now, Adding eq. (1) and (2)

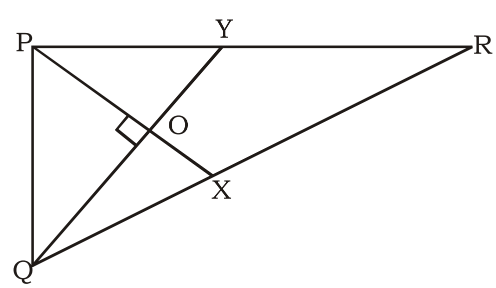
$M + N = 8(a + b) + 10$

When sum of these number is divisible by 8 then remainder is 10.

10 is divisible by = 1, 2, 5, 10

unit digit is 8.

63. (C)



Let QO = 4a and XO = 3a

The area of $\Delta OQX = 96\ cm^2$

$\Rightarrow \frac{1}{2} \times 4a \times 3a = 96$

$\Rightarrow$ a = 4

So, OQ = 16 cm and OX = 12 cm

$\because$ O is the centroid of ΔPQR.

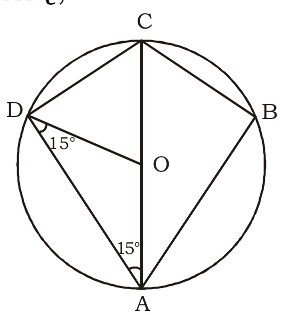
$\therefore$ PX : XO = 3 : 1, QY : QO = 3 : 2

PX = 3 × XO = 3 × 12 = 36 cm

And, QY = $\frac{3}{2} \times OQ = \frac{3}{2} \times 16 = 24$ cm

Required difference = 36 – 24 = 12 cm.

64. (B) ATQ,



In ΔADO,

$\angle ADO = 15°$

$\because$ OD = OA = The radius of the circle

$\therefore$ $\angle DAO = \angle ADO = 15°$

$\angle AOD = 180 - 15° - 15°$

= 150°

Chord AD makes $\angle AOD$ at centre and $\angle ACD$ at circumference

$\therefore$ $\angle ACD = \frac{\angle AOD}{2} = \frac{150}{2} = 75°$

$\because$ OC = OD

$\therefore$ $\angle ODC = \angle OCD = 75°$

In ΔODC

$\angle COD = 180 - 75° - 75° = 30°$

AC is the bisector of $\angle BCD$ and AC is also diameter of the circle

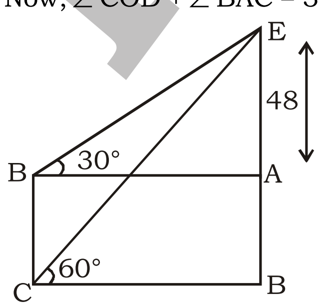
$\angle ABC = 90°$

In ΔBAC

$\angle BCA = 180 - 90 - 75° = 15°$

Now, $\angle COD + \angle BAC = 30° + 15° = 45°$

65. (B)



Let AE be the height of lamp

In ΔABE

$\tan 30° = \frac{AE}{AB}$

$\frac{1}{\sqrt{3}} = \frac{48}{AB} \Rightarrow AB = 48\sqrt{3}$

AB = CD = $48\sqrt{3}$ cm

In ΔDCE

$\tan 60° = \frac{DE}{DC}$

$\Rightarrow \sqrt{3} = \frac{DE}{48\sqrt{3}}$

$\Rightarrow$ DE = 144

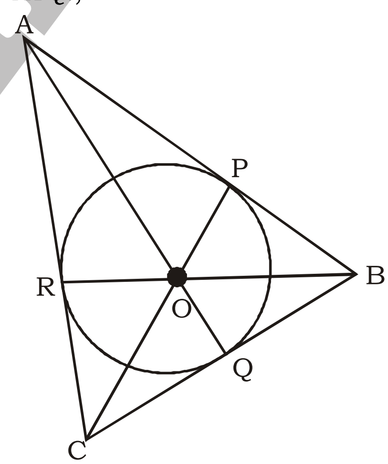
AD = DE – AE = 144 – 48 = 96

Area of rectangle = l × b

= $48\sqrt{3} \times 96$

= $4608\sqrt{3}\ cm^2$

66. (D) ATQ.,



Let the radius of the circle be r cm.

$\pi r^2 = 9\pi$

r = 3 cm

So, PO = RO = OQ = 3 cm

Let, AB = 3a, BC = 4a and AC = 5a

So, The area of ($\Delta AOB + \Delta BOC + \Delta COA$) = Area of ΔABC

$\frac{1}{2}\left[(3a \times 3) + (4a \times 3) + (5a \times 3)\right]$

$= \frac{1}{2} \times 3a \times 4a$

$\Rightarrow$ $(9a + 12a + 15a) = 12a^2$

$\Rightarrow$ $36a = 12a^2$

$\Rightarrow$ $a = 3$

Required difference = AC – AB = 3 × (5 –3) = 6 cm

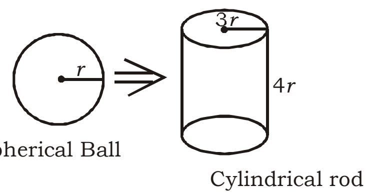
67. (C) ATQ.,

Remainder (x) = $\frac{3^{61284}}{5} = 1$

Remainder (y) = $\frac{4^{96}}{6} = 4$

Now, $2x - y = 2 \times 1 - 4$
$= -2$

68. (B) ATQ,

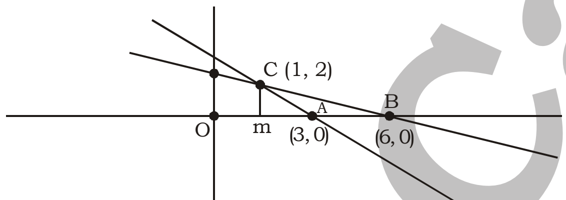


$$N \times \frac{4}{3}\pi r^3 = \pi r^2 l$$

$$\Rightarrow N \times \frac{4}{3}\pi r^3 = \pi 9r^2 \times 4r$$

N = 27
Hence, Spherical balls are 27.

69. (B) $x + y - 3 = 0$ ...(1)
$2x + 5y = 12$ ...(2)
And x–axis



For intersection point C.
Multiplying equation 1 by 2

$2x + 2y = 6$
$2x + 5y = 12$
$y = 2$
$x = 1$

Area of $\Delta ABC = \frac{1}{2} AB \times MC$

$= \frac{1}{2} \times 3 \times 2$

= 3 units

70. (D) $4^1 \times 4^2 + 4^3 \times 4^4 + 4^5 \times 4^6 + ... + 4^{63} \times 4^{64}$
= (4 × 6)+(4×6) + (4 × 6)+....up to 32 times
= 4 + 4 + 4 +...... units digit is 8.
= 4 × 32
Hence, unit digit is 8

71. (B) ATQ,
$x^3 - 21x - 20$
Since, the constant (–20) is negative so product of contant number of factors must be negative)
Now,
from options
Option A: –4 × 5 × 1 = –20
Option B: 4 × (–5) × 1 = –20
Option C: 4 × (–5) × (–1) ≠ 20
Option D: –4×(–1) × (5) ≠ 20
⇒ Anwer is either option A or B
Now, by putting the values of factor A and factor B.
Option B given the required factor.
∴ $(x + 4)(x - 5)$ and $(x + 1)$ are the factor of $x^3 - 21x - 20$

72. (D) $7^{21} \div 7^{19} \div 7^{17} \div .... \div 7^1$

$= 7^{21} \times \frac{1}{7^{19}} \times \frac{1}{7^{17}} \times \frac{1}{7^{15}} \times .... \times \frac{1}{7^1}$

$= 7^{21} \times \frac{1}{7^{(19+17+15+.....+1)}}$

$= 7^{21} \times \frac{1}{7^{100}}$

$= \frac{1}{7^{100-21}}$

$= \frac{1}{7^{79}}$

73. (B) Let the sides of cuboid be $3a$, $8a$ and $5a$ respectively,
Volume of cuboid = $3a \times 8a \times 5a$
$120000 = 3a \times 8a \times 5a$
⇒ $a = 10$
⇒ Sides of the cuboid = 30, 80, 50
Diagonal of the cuboid

$= \sqrt{30^2 + 80^2 + 50^2}$

$= \sqrt{900 + 6400 + 2500}$

$= \sqrt{9800}$

$= \sqrt{4900 \times 2}$

$= 70\sqrt{2}$ cm

74. (C) Perimeter of rectangle
$2(32x + 21x)$
$212 = 2(53x)$
$x = 2$
length = 64, breadth = 42
cost of laying carpet on floor
= 42 × 64 × 2.5
= ₹6720

75. (A) $(a + b + c)^3 = a^3 + b^3 + c^3 + 3a^2b + 3ab^2 + 3b^2c + 3bc^2 + 3a^2c + 3ac^2 + 6abc$
⇒ $6^3 = a^3 + b^3 + c^3 + 3 \times 48 + 6(-42)$
⇒ $216 + 252 - 144 = a^3 + b^3 + c^3$
⇒ $a^3 + b^3 + c^3 = 324$

76. (B) $p^2 + 2q^2 = 57$ and $pq = 14$

Now, $p^2 + 2q^2 + 2\sqrt{2}pq = 57 + 2\sqrt{2}pq$

$(p+\sqrt{2}q)^2 = 57 + 2\sqrt{2} \times 14$

$(p+\sqrt{2}q)^2 = 49 + 8 + 2 \times 7 \times 2\sqrt{2}$

$(p+\sqrt{2}q)^2 = 7 + 2\sqrt{2}$

Taking root both sides

$p + \sqrt{2}q = 7 + 2\sqrt{2}$

Comparing both sides

$p = 7$ and $q = 2$

Now, $(p + q)^2 = (7 + 2)^2 = 81$

77. (A) ATQ.,

$\cos^2 10 - \cos 10° \cos 50° + \cos^2 50°$

$(\cos^2 50 = 1 - \sin^2 50)$

$= \cos^2 10 - \sin^2 50 + 1 - \cos 10 \cos 50$

$[\because \cos^2 10 - \sin^2 50 = \cos(A + B)\cos(A - B)]$

$= \cos 60 \cos 40 + 1 - \cos 10 \cos 50$

$= \dfrac{\cos 40 + 2 - 2\cos 10 \cos 50}{2}$

$[\because 2\cos A \cos B = \cos(A + B) + \cos(A - B)]$

$= \dfrac{\cos 40 + 2 - \cos 60 - \cos 40}{2}$

$= \dfrac{2 - \frac{1}{2}}{2} = \dfrac{3}{4}$

78. (D) ATQ, $\dfrac{1}{2}\sqrt{1+\sin\theta} + \dfrac{1}{2}\sqrt{1-\sin\theta}$

$= \dfrac{1}{2}\sqrt{\left(\sin\dfrac{\theta}{2} + \cos\dfrac{\theta}{2}\right)^2} + \dfrac{1}{2}\sqrt{\left(\cos\dfrac{\theta}{2} - \sin\dfrac{\theta}{2}\right)^2}$

If $0 < \theta < 45°$

then $\cos\theta > \sin\theta$

Here,

$0 < \theta < 69$

$0 < \dfrac{\theta}{2} < \dfrac{69}{2}$

So, $\cos\dfrac{\theta}{2} > \sin\dfrac{\theta}{2}$

Now,

$= \dfrac{1}{2}\left[\left(\sin\dfrac{\theta}{2}\right) + \cos\left(\dfrac{\theta}{2}\right) + \dfrac{1}{2}\left(\cos\dfrac{\theta}{2} - \sin\dfrac{\theta}{2}\right)\right]$

$= \cos\dfrac{\theta}{2}$

79. (A) ATQ,

$\tan 9° - \tan 27° - \tan 63° + \tan 81°$

$= \tan 9° - \tan 27° - \tan(90 - 27) + \tan(90 - 9)$

$= \tan 9° + \cot 9° - \tan 27° - \cot 27°$

$= \dfrac{\sin 9}{\cos 9} + \dfrac{\cos 9}{\sin 9°} - \dfrac{\sin 27°}{\cos 27°} - \dfrac{\cos 27°}{\sin 27°}$

$= \dfrac{1}{\sin 9° \cos 9°} - \dfrac{1}{\cos 27° \sin 27°}$

Multiplying numerator and Denumerator by (2)

$= \dfrac{2}{\sin 18°} - \dfrac{2}{\sin 54°}$

$(\because 2\sin 9° \cos 9° = \sin 18°)$

By putting value of

$\left(\sin 18° = \dfrac{\sqrt{5}-1}{4} \text{ and } \cos 36° = \dfrac{\sqrt{5}+1}{4}\right)$

$= \dfrac{2}{\frac{\sqrt{5}-1}{4}} - \dfrac{2}{\frac{\sqrt{5}+1}{4}} = 8\left(\dfrac{\sqrt{5}+1-\sqrt{5}+1}{5-1}\right)$

$= 4$

$= 8 \times \dfrac{1}{2} = 4$

80. (C) ATQ,

$= \dfrac{\cot^3 2A + 3\cot(2A)\operatorname{cosec}^2 2A}{\operatorname{cosec}^3 2A(\cos^6 A - \sin^6 A)}$

$= \dfrac{\dfrac{\cot^3 2A}{\operatorname{cosec}^3 2A} + \dfrac{3\cot 2A \operatorname{cosec}^2 2A}{\operatorname{cosec}^3 2A}}{(\cos^6 A - \sin^6 A)}$

$= \dfrac{\cos^3 2A + 3\cos 2A}{(\cos^2 A - \sin^2 A)(\cos^4 A + \sin^4 A + \cos^2 A \sin^2 A)}$

$= \dfrac{\cos 2A(\cos^2 2A + 3)}{\cos 2A\left[(\cos^2 A + \sin^2 A)^2 - 2\cos^2 A \sin^2 A + \cos^2 A \sin^2 A\right]}$

$= \dfrac{(\cos^2 A - \sin^2 A)^2 + 3}{1 - \sin^2 A \cos^2 A}$

$= \dfrac{\cos^4 A + \sin^4 A - 2\cos^2 A \sin^2 A + 3}{1 - \cos^2 A \sin^2 A}$

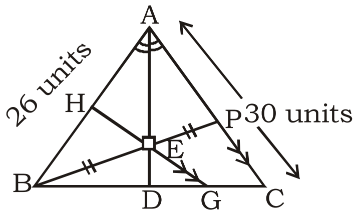
$= \dfrac{\cos^4 A + \sin^4 A + 2\cos^2 A \sin^2 A - 4\cos^2 A \sin^2 A + 3}{1 - \cos^2 A \sin^2 A}$

$= \dfrac{(\cos^2 A + \sin^2 A)^2 - 4\cos^2 A \sin^2 A + 3}{1 - \cos^2 A \sin^2 A}$

$= \dfrac{4(1 - \cos^2 A \sin^2 A)}{(1 - \cos^2 A \sin^2 A)}$

$= 4$

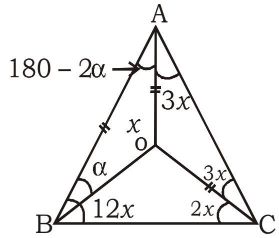
81. (C) ATQ,



$\frac{AB}{AC} = \frac{26}{30} = \frac{13}{15} = \frac{BD}{DC}$

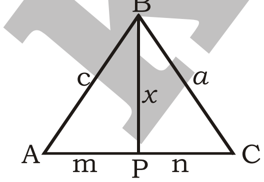
($\because$ AD is angle bisector)
In ΔPBC
EG || PC
$\because$ E is mid-point of line BP
$\therefore$ G is also mid-point of side BC
Hence, BG = 14 units
DG = BG – BD
= 14 – 13
= 1 unit

82. (B)



In ABC
$\angle A + \angle B + \angle C = 180°$
$\Rightarrow$ $12x + 5x + 180 - 2\alpha + 3x = 180°$
$12x + 5x - 2\alpha + 3x = 0$
$\alpha = 10x$
Now, $\Delta B = 12x$
In ΔBOC
$\angle B = 12x - \alpha$
$= 12x - 10x$
$= 2x$
$\because$ $\angle B = \angle C$ (In ΔBOC)
$\therefore$ BO = CO
Hence, ΔAOB becomes equilateral triangle.
$10x = 60°$
$x = 6°$

83. (A) ATQ.,



AB + BC = 22 cm
AC = 12cm
Let BP = x cm
In ΔABP
$c - m < x < c + m$ ...(i)
And In ΔBPC
$a - n < x < a + n$ ....(ii)
Adding eq. (i) and (ii)
$(a + c) - (m + n) < 2x < (a + c) + (m + n)$
$22 - 12 < 2x < 22 + 12$
$5 < x < 17$
Hence, minimum value of x = 6 cm

84. (B) $66\frac{1}{11} + 66\frac{2}{11} + 66\frac{3}{11} + \ldots + 66\frac{10}{66}$

$= 66 + \frac{1}{11} + 66 + \frac{2}{11} + 66 + \frac{3}{11} + \ldots + 66 + \frac{10}{66}$

$= (66 \times 10) + \frac{1}{11} + \frac{2}{11} + \frac{3}{11} + \ldots + \frac{10}{11}$

$= 660 + \frac{1+2+3+4+\ldots+10}{11}$

$= 660 + \frac{10 \times (10+1)}{2 \times 11}$

$\because$ $1 + 2 + 3 + 4 + 5 + 6 \ldots + n = \frac{n(n+1)}{2}$

$= 660 + 5$
$= 665$

85. (B) ATQ.,

$\frac{\sqrt{a^2 + b^2}}{52/60} = 15$

$\Rightarrow$ $\sqrt{l^2 + b^2} = 13$
$l^2 + b^2 = 169$ ...(1)
and

$\frac{(l + b)}{68/60} = 15$

$(l + b) = 17$ ....(2)
From (1) & (2)
$l \times b = 60$ m^2

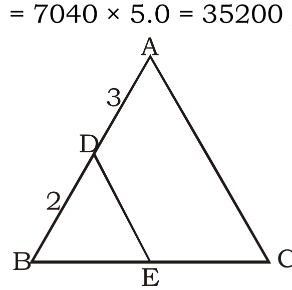
86. (C) Volume of the hollow cylinder
$= \pi h(R + r)(R - r)$

$= \frac{22}{7} \times 14(22 + 18)(22 - 18)$

$= \frac{22}{7} \times 14 \times 4 = 7040$ cm^3

So, total weight of the hollow cylinder
= 7040 × 5.0 = 35200 gm = 35.2 kg

87. (D)



$$\frac{Ar(\Delta BED)}{Ar(\Delta ABC)} = \left(\frac{2}{5}\right)^2$$

$$= \frac{4}{25}$$

$$\therefore \frac{Ar(\Delta BED)}{Ar(ACED)} = \frac{4}{21}$$

So required ratio = $\frac{Ar(ACED)}{Ar(BED)} = \frac{21}{4}$

88. (D) Side of square = $\frac{40\sqrt{2}}{\sqrt{2}} = 40$

Side of rhombus = 40

ATQ.,

$$\sqrt{\left(\frac{3x}{2}\right)^2 + \left(\frac{4x}{2}\right)^2} = 40$$

$$\sqrt{\frac{25x^2}{4}} = 40$$

$$\frac{5x}{2} = 40$$

$x = 16$ cm

Area of rhombus ⇒ $\frac{1}{2} \times (16 \times 3)(4 \times 16)$

= 1536 cm^2

89. (A) l = 5 × 8 = 40 cm

b = 5 cm

h = 5 cm

Total surface area ⇒

2(40 × 5 + 40 × 5 + 5 × 5)

850 cm^2

90. (B) 362A471B is divisible by 55 i.e., divisible by 5 and 11.

362A471B is divisible by 5 i.e., B is either 5 or 0

Divisiblity condition by 11

sum of digits in even position = (6 + A + 7 + B) = 13 + A + B

Sum of digits in odd positions

When B = 5,

Difference = 18 + A – 10 = 8 + A

So, A = 3

When B = 0

Difference = 13 + A – 10 = 3 + A

So, A = 8

Since, A is even

Difference = 18 + A – 10 = 8 + A

So, A = 3

when B = 0

Difference = 13 + A – 10 = 3 + A

So, A = 8

Since, A is even

Thus, A = 8 and B = 0

Hence, (7A + 8B) = 7 × 8 + 8 × 0 = 56

91 (D) Sum of interior angle of regular Polygon = $(n-2) \times 180$

⇒ $(n-2) \times 180° = 1980°$

⇒ $(n-2) = \frac{1980°}{180°} = 11$

⇒ $n = 13$

Numbers of diagonal = $\frac{n(n-3)}{2}$

$= \frac{13(13-3)}{2} = 13 \times 5$

= 65

Required defference = (65 – 13) = 52

92. (C) $\frac{(17.2)^3 + (18.7)^3 + 146.41 \times 12.1 - 226.27 \times 51.6}{(17.2)^2 + (18.7)^2 + (12.1)^2 - 321.64 - 226.27 - 208.12} = 3 \times 2^K$

$$\frac{(17.2)^3 + (18.7)^3 + (12.1)^3 - 3 \times 17.2 \times 18.7 \times 12.1}{(17.2)^2 + (18.7)^2 + (12.1)^2 - 17.2 \times 18.7 - 18.7 \times 12.1 - 12.1 \times 17.2} = 3 \times 2^k$$

we know that,

$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

Thus, (17.2 + 18.7 + 12.1) = 3 × 2^K

= 48 = 3 × 2^K

= 2^K = 16

Hence, K = 4

93. (C) ATQ,

Radius of the cone = $\frac{960\pi}{40\pi}$ = 24 cm

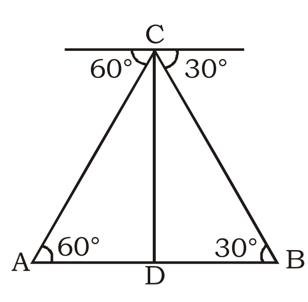
Thus, height of the cone

$= \sqrt{(40^2) - (24^2)} = 32$

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

$= \frac{1}{3} \times \pi \times 24 \times 32 = 6144\pi\ cm^3$

94. (D)



CD = 210 m
In ΔACD

$\tan 60° = \frac{CD}{AD}$

$AD = \frac{210}{\sqrt{3}}$

Similarly in ΔBCD

$BD = \frac{CD}{\tan 30°}$

$= 210\sqrt{3}$

So, the distance
AB = AD + BD

$= \frac{210}{\sqrt{3}} + 210\sqrt{3}$

$= \frac{840}{\sqrt{3}} = 280\sqrt{3}$ metre

95. (A) ATQ,
Volume of prism = 6120 cm^3

⇒ Area of trapezium × height = 6120

⇒ Area of trapezium = $\frac{6120}{24}$

⇒ $\frac{1}{2}$ × (Sum of parallel sides) × distance = 255

⇒ $\frac{1}{2} \times 34$ × distance = 255

⇒ Distance = $\frac{255 \times 2}{34}$

⇒ Distance = 15 cm

96. (C) $a = \sqrt{\sqrt{10}+1} - \sqrt{\sqrt{10}-1}$

$a^2 = \sqrt{10}+1+\sqrt{10}-1-2\times\sqrt{\sqrt{10}+1}\times\sqrt{\sqrt{10}-1}$

$a^2 = 2\sqrt{10} - 2\sqrt{10-1} = 2\sqrt{10} - 6$

$a^2 = 2\left(\sqrt{10}-3\right)$

Now, $\frac{2}{a^2} = \frac{2}{2\left(\sqrt{10}-3\right)} = \frac{\sqrt{10}+3}{\left(\sqrt{10}-3\right)\left(\sqrt{10}+3\right)}$

$= \sqrt{10} + 3 = 3.16 + 3 = 6.16$

97. (B) In ΔABC, $\cos B = \frac{\text{Base}}{\text{Hypotenuse}}$

$= \frac{BC}{AB}$

And, In ΔCTB, $\cos B = \frac{\text{Base}}{\text{Hypotenuse}}$

$= \frac{BT}{BC}$

So, $\left(\frac{BC}{AB}\right) = \left(\frac{BT}{BC}\right) \Rightarrow \left(\frac{12}{14}\right) = \left(\frac{BT}{12}\right)$

$\Rightarrow BT = \frac{12^2}{14} = \frac{72}{7}$

98. (B) $\frac{\sec 8A(\tan 10A + \tan 6A)}{4(\tan 10A - \tan 6A)}$

$= \frac{\left(\frac{\sin 10A}{\cos 10A} + \frac{\sin 6A}{\cos 6A}\right)}{4\cos 8A\left(\frac{\sin 10A}{\cos 10A} - \frac{\sin 6A}{\cos 6A}\right)}$

$= \frac{\left(\frac{\sin 10A\cos 6A + \sin 6A\cos 10A}{\cos 10A\cos 6A}\right)}{4\cos 8A\left(\frac{\sin 10A\cos 6A - \sin 6A\cos 10A}{\cos 10A\cos 6A}\right)}$

$= \frac{\sin 10A\cos 6A + \sin 6A\cos 10A}{4\cos 8A\sin(10A - 6A)}$

$= \frac{\sin(10A-6A)}{4\cos 8A\sin 10A - 6A)}$

$= \frac{\sin 16A}{4\cos 8A\sin 4A} = \frac{(2\sin 8A\cos 8A)}{(4\cos 8A\sin 4A)}$

$= \frac{(4\sin 4A\cos 4A)}{(4\sin 4A)} = \cos 4A$

99. (A) $(a + b)^2 = a^2 + b^2 + 2ab$
$12^2 = a^2 + b^2 + 70$
$a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$
$a^3 + b^3 = 12 \times (74 - 35)$
$a^3 + b^3 = 468$

100. (B) S = semi perimeter of triangle

$S = \frac{(50+70+80)}{2} = 100$

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

$= \sqrt{100\times 50\times 30\times 20}$

$= 1732.05 m^2$

ATQ.,

$\frac{\sqrt{3}}{4}x^2 = 1732.05$

$x^2 = 4000$

$x = 63.24$m