TEST NO. 59

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

Answer Key

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

Answer key with explanations

1. (D) The required numbers = 1212, 1453, 1694, 1935, 2176, 2417, 2658, 2899
Hence, Required numbers = 8

2. (B) No. of successful students = $\frac{7}{11} \times 143$
= 91
No. of unsuccessful students = $\frac{4}{11} \times 143$
= 52
The required ratio = $\frac{91+8}{52-8} = \frac{99}{44} = \frac{9}{4}$
Hence ratio of successful to unsuccessful students = 9 : 4

3. (D)

80   105

     96

105-96 : 96-80
= 9 : = 16

The required ratio = 9 : 16

4. (C) Let C.P. = ₹x
$(\text{S.P.})_1$ = ₹1175
Profit = $(\text{S.P.})_1$ – C.P.
Profit = $1175 - x$
$(\text{S.P.})_2$ = ₹925
loss = C.P. – $(\text{S.P.})_2$
loss = $x - 925$
ATQ,
$1175 - x = x - 925$
$\Rightarrow 2x = 1175 + 925$
$\Rightarrow 2x = 2100 \Rightarrow x = 1050$
Hence cost price of the article = ₹1050

5. (A) Let original rate per dozen of the bananas = ₹x
Due to 15% fall in the rate of bananas,
rate per dozen of the bananas = $x \times \frac{85}{100}$
$= \frac{17x}{20}$
ATQ,
$\frac{612 \times 20}{17x} - \frac{612}{x} = 3 \Rightarrow 612\left(\frac{20-12}{17x}\right) = 3$
$\Rightarrow \frac{612 \times 3}{17x} = 3 \Rightarrow x = 36$
Hence original rate per dozen of the bananas = ₹36

6. (B) Let sum = P, rate = r %

ATQ,

$$P\left(1+\frac{r}{100}\right)^2 = 9360 \quad \ldots(i)$$

and $$P\left(1+\frac{r}{100}\right)^3 = 11232 \quad \ldots(ii)$$

from eq(i) and eq(ii)

$$1 + \frac{r}{100} = \frac{11232}{9360}$$

$$\Rightarrow \frac{r}{100} = \frac{11232}{9360} - 1$$

$$\Rightarrow \frac{r}{100} = \frac{1872}{9360} \Rightarrow r = 20$$

from eq(i)

$$P\left(1+\frac{20}{100}\right)^2 = 9360$$

$$\Rightarrow P \times \frac{12}{10} \times \frac{12}{10} = 9360 \Rightarrow P = 6500$$

Hence sum = ₹6500

7. (C) $\left[1+\frac{2xy}{x^2+y^2}\right] \div \left[\frac{x^3+y^3}{x+y} + 3xy\right]$

$$\Rightarrow \left[\frac{x^2+y^2+2xy}{x^2+y^2}\right] \div \left[\frac{(x+y)(x^2+y^2-xy)}{x+y} + 3xy\right]$$

$$\Rightarrow \left[\frac{x^2+y^2+2xy}{x^2+y^2}\right] \div \left[x^2+y^2-xy+3xy\right]$$

$$\Rightarrow \left[\frac{x^2+y^2+2xy}{x^2+y^2}\right] \div \left[x^2+y^2+2xy\right]$$

$$\Rightarrow \frac{1}{x^2+y^2}$$

8. (D) $x^2 + y^2 + 4x + 2y + 5 = 0$

$\Rightarrow x^2 + 4x + 4 + y^2 + 2y + 1 = 0$

$\Rightarrow (x + 2)^2 + (y + 1)^2 = 0$

$x + 2 = 0 \Rightarrow x = -2$

and $y + 1 = 0 \Rightarrow y = -1$

Now, $x^3 + y^5$

$\Rightarrow (-2)^3 + (-1)^5$

$\Rightarrow -8 - 1 = -9$

9. (A) $\left(x+\frac{1}{x}\right)^2 = 5 \Rightarrow x + \frac{1}{x} = \sqrt{5}$

On cubing both sides

$$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times x \times \frac{1}{x}\left(x+\frac{1}{x}\right) = (\sqrt{5})^3$$

$$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times \sqrt{5} = 5\sqrt{5}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = 2\sqrt{5}$$

On squaring both sides

$$\Rightarrow x^6 + \frac{1}{x^6} + 2 \times x^3 \times \frac{1}{x^3} = (2\sqrt{5})^2$$

$$\Rightarrow x^6 + \frac{1}{x^6} + 2 = 20 \Rightarrow x^6 + \frac{1}{x^6} = 18$$

10. (C) $\frac{\tan\theta+\sec\theta+1}{\tan\theta+\sec\theta-1} \times \frac{\tan\theta-\sec\theta-1}{\tan\theta-\sec\theta-1}$

$$\Rightarrow \frac{(\tan\theta)^2-(\sec\theta+1)^2}{(\tan\theta-1)^2-(\sec\theta)^2}$$

$$\Rightarrow \frac{\tan^2\theta-(\sec^2\theta+1+2\sec\theta)}{\tan^2\theta+1-2\tan\theta-\sec^2\theta}$$

$$\Rightarrow \frac{\tan^2\theta-\sec^2\theta-1-2\sec\theta}{\sec^2\theta-2\tan\theta-\sec^2\theta}$$

$[\because \tan^2\theta+1= \sec^2\theta]$

$$\Rightarrow \frac{-1-1-2\sec\theta}{-2\tan\theta} \Rightarrow \frac{-2(1+\sec\theta)}{-2\tan\theta}$$

$$\Rightarrow \frac{1+\sec\theta}{\tan\theta} \Rightarrow \frac{1+\frac{1}{\cos\theta}}{\frac{\sin\theta}{\cos\theta}}$$

$$\Rightarrow \frac{\cos\theta+1}{\sin\theta} \Rightarrow \frac{1+\cos\theta}{\sin\theta}$$

11. (B) 3 years ago, the sum of the age of 5 members = 5 × 20 = 100 years

the sum of the ages of 5 members, today = 100 + 3 × 5 = 115 years

the sum of ages with child, today

$= 6\times19\frac{1}{2} = 117$ years

Therefore, age of the child = 117 – 115 = 2 years

12. (C) Given $x^4 + x^3 - 4x^2 + x + 1$

On dividing by x^2

$$\Rightarrow x^2 + x - 4 + \frac{1}{x} + \frac{1}{x^2}$$

$$\Rightarrow x^2 + \frac{1}{x^2} + x + \frac{1}{x} - 4$$

$$\Rightarrow x^2 + \frac{1}{x^2} + 2 + x + \frac{1}{x} - 6$$

$$\Rightarrow \left(x+\frac{1}{x}\right)^2 + \left(x+\frac{1}{x}\right) - 6$$

$$\Rightarrow y^2 + y - 6 \left(\because y = x + \frac{1}{x}\right)$$

13. (D) Let total work = 90 units
Number of units of work done by Arman, Vijay and Ketan together in one day

$= \frac{90}{30} = 3$

Number of units of work done by Arman and Ketan together in one day $= \frac{90}{45} = 2$

Number of units of work done by Vijay alone in one day = 3 – 2 = 1
Number of units of work done by Arman alone in one day = 1 × 0.75 = 0.75
Number of units of work done by Ketan alone in one day = 2 – 0.75 = 1.25
Now, Number of units of work done by Arman alone with increased efficiency in one day = 2 × 0.75 = 1.5
Number of units of work done by Vijay alone with increased efficiency in one day = 1.5 × 1 = 1.5
Number of units of work done by Ketan alone with increased efficiency in one day = 1.6 × 1.25 = 2
Time taken by Arman, Vijay and Ketan together to complete the work

$= \frac{90}{(1.5+1.5+2)} = 18$ days

14. (B) Given that the ratio of selling prices of three article respectively,
S.P1 = 5X, S.P2 = 6X, S.P3 = 9X
And the ratio of their cost prices respectively,
C.P1 = 4Y, C.P2 = 5Y, C.P3 = 8Y
Given that, S.P1 – C.P1 = S.P3 – C.P3
$\Rightarrow 5X - 4Y = 9X - 8Y \Rightarrow X = Y$
Their profit percentages respectively,

$P1 = \frac{(5-4)}{4} \times 100 = 25\%$

$P2 = \frac{(6-5)}{5} \times 100 = 20\%$,

$P3 = \frac{(9-8)}{8} \times 100 = 12\frac{1}{2}\%$

Ratio of the profit percentages respectively

$= 25 : 20 : 12\frac{1}{2} = 10 : 8 : 5$

15. (B) L.C.M. of (2, 4, 5, 6) = $2^2 \times 3 \times 5 = 60$
Divide 3475 by 60,

$\frac{3475}{60} = 57\frac{55}{60}$

[Here 55 represent the remainder. Which need to make 0 for that, 60 – 55 need to do. Answer of subtraction is required answer which need to add in 3475.]
Hence number need to add = 60 – 55 = 5

16. (B) Cost price of 100 kg (20 + 80) mixture of brick powder and chili powder = 20 × 20 + 80 ×100 = 400 + 8000 = ₹8400
Selling price of 100 kg (20 + 80) mixture of brick powder and chilli podwer = 100×105 = ₹10500
Profit earned = 10500 – 8400 = ₹2100

Profit percentage $= \frac{2100}{8400} \times 100 = 25\%$

17. (C) The expression $1^{203} + 2^{203} + 3^{203} + ... + 10^{203}$ can be written as,
$1^3 + 2^3 + 3^3 + ... + 10^3$ [$\because$ every number has a maximum cyclicity of 4]

We know that $1^3 + 2^3 + ... + 10^3 = \left[\frac{n(n+1)}{2}\right]^2$

[where n is the number of digits]

$\Rightarrow 1^3 + 2^3 + 3^3 + ... + 10^3 = \left[\frac{1}{2} \times 10 \times 11\right]^2$

= 3025
Hence unit digit of the expression is 5.

18. (B) Time $= 1 + \frac{73}{365} = 1 + \frac{1}{5} = \frac{6}{5}$ years

Now, S.I. $= \frac{(\text{Principal} \times \text{rate} \times \text{time})}{100}$

$= \frac{\left(12500 \times 8 \times \frac{6}{5}\right)}{100} = ₹1200$

Hence amount paid to clear debt
= 12500 + 1200 = ₹13700

19. (A) Total money = ₹10000
Let he invests ₹x in scheme A
Money invested in scheme B
= ₹$(10000 - x)$
Interest after 2 years = ₹1840

$\Rightarrow \frac{x \times 8 \times 2}{100} + \frac{(10000 - x) \times 10 \times 2}{100} = 1840$

$\Rightarrow 0.16x + 2000 - 0.2x = 1840$
$\Rightarrow x = 4000$
$\therefore$ The man invests ₹4000 in scheme A.

20. (D) **Case I :**
4 women and 6 men are there in the committee
So the number of ways
$= {}^7C_4 \times {}^8C_6 = 35 \times 28 = 980$
Case II :
3 women and 7 men are there in the committee
So the number of ways
$= {}^7C_3 \times {}^8C_7 = 35 \times 8 = 280$
Case III :
2 women and 8 men are there in hte committee
So the number of ways
$= {}^7C_2 \times {}^8C_8 = 21 \times 1 = 21$
So the number of ways in which the committee can be formed
$= 980 + 280 + 21 = 1281$

21. (D) Let the quantity of milk and water in mixture X be $5x$ litres and $2x$ litres respectively.
And, let the quantity of milk and milk and water in mixture Y be $3y$ litres and y litres respectively.
ATQ,
$5x = 3y \Rightarrow y = \frac{5x}{3}$ ...(i)
And, $2x - y = 7$
$\Rightarrow 2x - \frac{5x}{3} = 7$ [using eq.(i)]
$\Rightarrow 6x - 5x = 21 \Rightarrow x = 21$
So, the quantity of mixture X = $5x + 2x$
$= 7x = 7 \times 21 = 147$ litres

22. (B) Let the speed of P = p kmph
Speed of Q = q kmph
ATQ, $p + q = \frac{450}{5} = 90$ ...(i)
And $\frac{450}{q} - \frac{450}{p} = \frac{135}{60}$ ...(ii)
On solving
$p = 50, q = 40$
Hence speed of P = 50 kmph

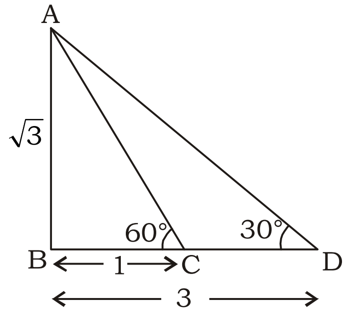
23. (B) Let the quantities of milk and water added be $4k$ litres and k litres respectively.
Given,
After selling 50 litres of milk solution, the remaining quantity = 150 – 50
= 100 litres
ATQ,
$$\Rightarrow \frac{\frac{17}{25} \times 100 + 4k}{\frac{8}{25} \times 100 + k} = \frac{14}{5} \Rightarrow k = 18$$
$\therefore$ The required quantity of milk added
$= 4k = 4 \times 18 = 72$ litres

24. (D) Let the cost price of Anil = ₹a
Then his marked price = ₹$1.5a$
and his selling price = ₹$1.5a(0.8) = 1.2a$
Raman's cost price = ₹$1.2a$
Raman's selling price
$(1.2a + 20) = 1.3a \Rightarrow a = 200$
$\therefore$ Raman's cost price = $1.2a$
= 1.2(200) = ₹240
$\therefore$ Raman's profit % = $\left(\frac{20}{240}\right) \times 100\%$
= 8.33%

25. (C) Let, total work be LCM of 6 and 8 = 24 units
Units of work done by Sumit in a day
$= \frac{24}{6} = 4$ units
Units of work done by Ravish in a day
$= \frac{24}{8} = 3$ units
Units of work done by Sumit in 2 days
= 4 × 2 = 8 untis
Remaining work = 24 – 8 = 16 units
So, 16 units of work will be done in $\frac{16}{7}$ days
Units of work done by Sumit in $\frac{16}{7}$ days
$= 4 \times \frac{16}{7} = \frac{64}{7}$ units
Total units of work done by sumit
$= \frac{64}{7} + 8 = \frac{(64+56)}{7} = \frac{120}{7}$ units
Required percentage
$= \left\{\frac{120}{(24 \times 7)}\right\} \times 100 = 71.43\%$

26. (B) Let, number of friends who attended picnic = x
ATQ,
$\Rightarrow \frac{10800}{x} - \frac{10800}{x+20} = 18$
$\Rightarrow x = 100$
Hence the number of friends who attended picnic = 100

27. (B)



ATQ,
Time taken by car to cover 2 units distance = 20 min
Time taken by car cover 3 units distance

$= \frac{20}{2} \times 3 = 30$ min

$\therefore$ Required time $= \frac{30}{60} = \frac{1}{2}$ hours

28. (C) $Pipe_1$ 9 — 2
$\quad$ 18
$Pipe_2$ 6 — 3

Required time $= \frac{18}{(3-2)} \times \frac{5}{6} = 15$ hours

29. (C) ATQ,
3A = 7B and 5B = 9 C
15A = 35B = 63C

Required time $= \frac{63}{15} \times 25 = 105$ days

30. (B) Let, they meet after time 'T' minutes
$T = \sqrt{63} \times \sqrt{28}$
$= 2 \times 3 \times 7 = 42$ minutes
Required time = 42 + 28 = 70 minutes

31. (C) Let required rate = R%
ATQ,

$$16000 \times \frac{11}{200} + 48000 \times \frac{6}{100} + 36000 \times \frac{R}{100} = 7360$$

$\Rightarrow 880 + 2880 + 360R = 7360$
$\Rightarrow 360R = 3600 \Rightarrow R = 10\%$

32. (C) Total number of males in Haryana

$= 3276000 \times \frac{15}{100} \times \frac{3}{5} = 294840$

Total number of males in Punjab

$= 3276000 \times \frac{20}{100} \times \frac{3}{4} = 491400$

Total number of males in Himachal

$= 3276000 \times \frac{12}{100} \times \frac{3}{8} = 147420$

Required percentage

$= \frac{294840 + 491400 + 147420}{3276000} \times 100$

$= \frac{933660}{3276000} \times 100 = 28.5\%$

33. (D) The required number

$= 3276000 \times \frac{25}{100} \times \frac{7}{9} + 3276000 \times \frac{20}{100} \times \frac{4}{5}$

$= 637000 + 524160 = 1161160$

34. (D) Required number $= \dfrac{3276000 \times \frac{9}{100} \times \frac{4}{7}}{3276000 \times \frac{8}{100} \times \frac{3}{5}}$

$= \frac{9 \times 4 \times 5}{7 \times 8 \times 3} = \frac{15}{14}$

Hence the required ratio = 15 : 14

35. (B) Required number $= 3276000 \times \frac{15}{100} \times \frac{3}{5}$

$= 294840$

36. (A) Required Ratio $= \dfrac{3276000 \times \frac{15}{100} \times \frac{100}{110}}{3276000 \times \frac{20}{100} \times \frac{100}{112}}$

$= \frac{15 \times 112}{20 \times 110} = \frac{42}{55}$

Hence the required ratio = 42 : 55

37. (A) ATQ,

$$\begin{array}{r|l|l}
8 & 6561 & 81 \\
8 & 64 & \\
\hline
161 & 161 & \\
\times 1 & 161 & \\
\hline
 & 0 &
\end{array}$$

Hence, 0 is subtracted from 6561 to make it a perfect square.

38. (C) ATQ,

Required marks $= \frac{550}{68.75} \times \frac{100}{2} = 400$

39. (A) Let C.P of Ist article = x
and C.P of IInd article = x

Profit on Ist article $=16\frac{2}{3}\% = \frac{1}{6}$

S.P of Ist article $= x \times \frac{7}{6} = \frac{7x}{6}$

Profit on both articles $= 25\% = \frac{1}{4}$

S.P of both articles $= 2x \times \frac{5}{4} = \frac{5x}{2}$

ATQ,

$\frac{7x}{6} + \frac{7x}{6} + 2400 = \frac{5x}{2}$

$\Rightarrow \frac{7x}{3} + 2400 = \frac{5x}{2}$

$\Rightarrow \frac{5x}{2} - \frac{7x}{3} = 2400$

$\Rightarrow \frac{15x - 14x}{6} = 2400$

$\Rightarrow \frac{x}{6} = 2400 \Rightarrow x = 14400$

Hence the required cost price = ₹14400

40. (C)

	Alcohol		Water
I. Mixture	4	:	3
II. Mixture	5	:	7

$\frac{4}{7}$ $\quad$ $\frac{5}{12}$

$\frac{1}{2}$

$\frac{1}{12}$ $\quad$ $\frac{1}{14}$

Ratio $= \frac{1}{12} : \frac{1}{14} = 14 : 12 = 7 : 6$

$\downarrow 5\times \quad \downarrow \times 5$

35 $\quad$ 30

Required quantity of mixture = 30 lit.

41. (C) $x + y + z = 4$
On squaring
$\Rightarrow x^2 + y^2 + z^2 + 2(xy + yz + zx) = 16$
$\Rightarrow x^2 + y^2 + z^2 + 2\times(-19) = 16$
$[\because xy + yz + zx = -19]$
$\Rightarrow x^2 + y^2 + z^2 = 16 + 38$
$\Rightarrow x^2 + y^2 + z^2 = 54$

Now, $\sqrt{x^3 + y^3 + z^3 - (x + y + z)}$

$\Rightarrow \sqrt{(x+y+z)(x^2+y^2+z^2-xy-yz-zx)+3xyz-(x+y+z)}$

$\Rightarrow \sqrt{4[54-(-19)]+3\times(-21)-4}$

$[\because xyz = -21]$

$\Rightarrow \sqrt{4\times 73 - 63 - 4} \Rightarrow \sqrt{292 - 63 - 4}$

$\Rightarrow \sqrt{225} = 15$

42. (B) 75% of A = 30% of B

$\Rightarrow \frac{75}{100} \times A = \frac{30}{100} \times B \Rightarrow 5A = 2B$

and 20% of B = 50% of C

$\Rightarrow \frac{20}{100} \times B = \frac{50}{100} \times C \Rightarrow 2B = 5C$

Hence 5A = 2B = 5C
Now, 10% of C = x% of A

$\Rightarrow \frac{10}{100} \times C = \frac{x}{100} \times A \Rightarrow 10C = x \times A$

$\Rightarrow 10A = x \times A \Rightarrow x = 10$

43. (C) $(117)^{213} \times (323)^{217} \times (129)^{277} \times (434)^{279} \times (66)^{29}$
$\Rightarrow (117)^{4\times53+1} \times (323)^{4\times54+1} \times (129)^{4\times69+1} \times (434)^{4\times69+3} \times (66)^{4\times7+1}$
$\Rightarrow$ Unit digit $= 7^1 \times 3^1 \times 9^1 \times 4^3 \times 6^1$
$\Rightarrow$ Unit digit $= 1\times 9 \times 4 \times 6$
$\Rightarrow$ Unit digit $= 9 \times 4 = 6$

44. (B) Let number of sides of the polygon = n
ATQ,

$\frac{180\times(n-2)}{n} - \frac{360}{n} = 135$

$\Rightarrow \frac{180n - 360 - 360}{n} = 135$

$\Rightarrow 180n - 720 = 135n$
$\Rightarrow 180n - 135n = 720$
$\Rightarrow 45n = 720 \Rightarrow n = 16$
Hence number of sides of the polygon = 16

45. (D) $x^2 - 11x + 27 = 0$
$\Rightarrow x^2 - 4x - 7x + 28 - 1 = 0$
$\Rightarrow x(x-4) - 7(x-4) - 1 = 0$
On dividing by $(x-4)$

$\Rightarrow x - 7 - \frac{1}{x-4} = 0$

$\Rightarrow x - 4 - \frac{1}{x-4} = 3$

On cubing both sides

$\Rightarrow (x-4)^3 - \frac{1}{(x-4)^3} - 3\times(x-4) \times \frac{1}{x-4} \left[x - 4 - \frac{1}{x-4}\right] = 3^3$

$\Rightarrow (x-4)^3 - \frac{1}{(x-4)^3} - 3 \times 3 = 27$

$\Rightarrow (x-4)^3 - \frac{1}{(x-4)^3} = 36$

46. (B) Let number = $10x + y$

ATQ,

$y = 2x$ ...(i)

and $x + y - 2 = (10x + y) \times \frac{1}{6}$

from eq(i)

$x + 2x - 2 = (10x + 2x) \times \frac{1}{6}$

$\Rightarrow 3x - 2 = 12x \times \frac{1}{6} \Rightarrow 3x - 2 = 2x$

$\Rightarrow x = 2$ and $y = 4$

$\therefore$ The required number = $10 \times 2 + 4$

$= 20 + 4 = 24$

47. (C) $\dfrac{1^2 + 2^2 + 3^2 + 4^2 + 5^2}{\sqrt{7+4\sqrt{3}} - \sqrt{4+2\sqrt{3}}}$

$\Rightarrow \dfrac{1+4+9+16+25}{\sqrt{(2+\sqrt{3})^2} - \sqrt{(\sqrt{3}+1)^2}}$

$\Rightarrow \dfrac{55}{2+\sqrt{3}-\sqrt{3}-1} = \dfrac{55}{1} = 55$

48. (B) $2^{50} = (2^5)^{10} = (32)^{10}$

$3^{40} = (3^4)^{10} = (81)^{10}$

$4^{30} = (4^3)^{10} = (64)^{10}$

$5^{70} = (5^2)^{10} = (25)^{10}$

Hence greatest number = $(81)^{10} = 3^{40}$

49. (C) Given that

$x^2 + y^2 + z^2 = xy + yz + zx$

$\Rightarrow 2(x^2 + y^2 + z^2) = 2(xy + yz + zx)$

$\Rightarrow 2(x^2 + y^2 + z^2) - 2(xy + yz + zx) = 0$

$\Rightarrow (x - y)^2 + (y - z)^2 + (z - x)^2 = 0$

Here $x = y = z$

Now, $\dfrac{7x^4 + 9y^4 + 11z^4}{36x^2y^2 + 12y^2z^2 + 6z^2x^2}$

$\Rightarrow \dfrac{7x^4 + 9x^4 + 11x^4}{36x^4 + 12x^4 + 6x^4}$ $[\because x = y = z]$

$\Rightarrow \dfrac{27x^4}{54x^4} = \dfrac{1}{2}$

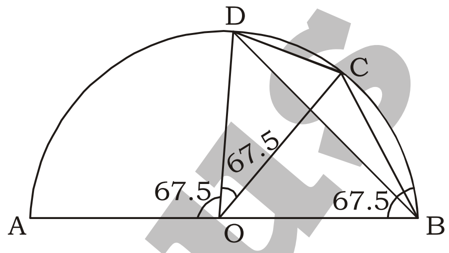
50. (D) $\frac{4}{3}\tan^2\left(\frac{\pi}{3}\right) + 3\sin^2\left(\frac{2\pi}{3}\right) - 4\sec^2\left(\frac{\pi}{4}\right) + 8\sin\left(\frac{\pi}{2}\right) = ?$

$\Rightarrow \frac{4}{3} \times (\sqrt{3})^2 + 3 \times \left(\frac{\sqrt{3}}{2}\right)^2 - 4 \times (\sqrt{2})^2 + 8 \times 1$

$\Rightarrow \frac{4}{3} \times 3 + 3 \times \frac{3}{4} - 4 \times 2 + 8$

$\Rightarrow 4 + \frac{9}{4} - 8 + 8 \Rightarrow \frac{25}{4}$

51. (A)



BD||OD

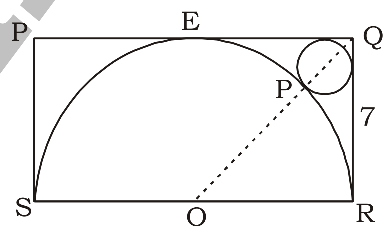
Area of ΔBCD = ΔBOC's Area

Area of ΔBCD = ΔBCD's Area + Area of $\overline{BC}$

$= \Delta BOC + \overline{BC} = \overline{BOC}$

$= \frac{45^\circ}{360^\circ} \times \pi \times (6)^2 = \frac{9\pi}{2}$

52. (B)



EO = SO = OR = 7 cm

In ΔOQR, $(QR)^2 + (OR)^2 = (OQ)^2$

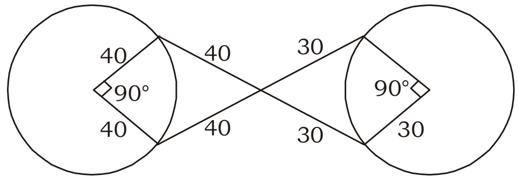
$QO = 7\sqrt{2}$

r is a radius of small circle

$OQ = OP + r + \sqrt{2}\,r \Rightarrow 7\sqrt{2} = 7 + r(\sqrt{2}+1)$

$r = \dfrac{7(\sqrt{2}-1)}{\sqrt{2}+1} = 21 - 14\sqrt{2}$

53. (B)

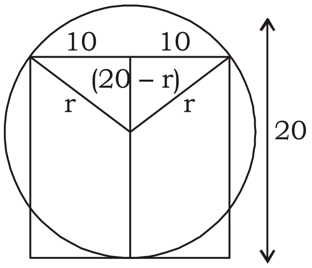


Length of string

$= 140 + 2\pi \times \frac{40}{360} \times 270 + \frac{2\pi}{360} \times 30 \times 270$

$= 140 + 105\pi$

54. (A)



Now,

$(20 - r)^2 + (10)^2 = r^2$

$400 - 40r + r^2 + 100 = r^2$

$r = \frac{50}{4} = \frac{25}{2}$

Area of circle = πr^2

$= 3.14\left(\frac{25}{2}\right)^2$

$= \frac{22}{7} \times \frac{625}{4}$

$= 490.625$

55. (A) ATQ,

The unit's digit will be 1×5 = 5 (no carry over)

The tens digits will be (4×1 + 5×2) = 4 (carry over)

The hundreds digit will be = (3×1 + 4×2 + 5×1) = 6 + 1(carried over) = 7

Hence, Answer is 745

56. (A) ATQ,

Last digit = $1^2 + 2^2 + 3^2 + 4^2 + \ldots\ldots + 99^2$

$= \frac{n(n+1)(2n+1)}{6}$

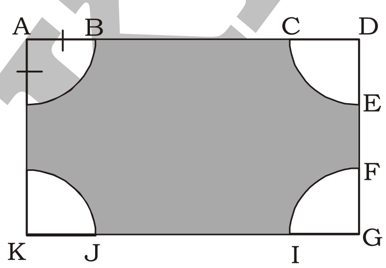
$= \frac{99 \times 100 \times 199}{6}$

$= 33 \times 50 \times 99$

= 328, 350

Last digit is zero.

57. (C)



KJ = radius of semicircles = 10 cm

4 Quadrants of equal radius = 1 circle of that radius

Area of shaded portion = Area of rectangle – Area of circle

$= 28 \times 26 - 3.14 \times 10^2$

$= 414\ cm^2$

BC = 28 – (10 + 10) = 8 cm and EF = 26 – (10 + 10) = 6 cm

Perimeter of shaded portion

$= 28\ cm + 2\pi r$

$= 28 + 2 \times 3.14 \times 10$

= 90.8 cm

Hence, Area = 414 cm^2

Perimeter = 90.8 cm

58. (C) $x = \frac{\sqrt{6}}{\sqrt{3}+\sqrt{2}}$

$\Rightarrow \frac{x}{\sqrt{3}} = \frac{\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

Applying componendo-dividendo

$\Rightarrow \frac{x+\sqrt{3}}{x-\sqrt{3}} = \frac{\sqrt{2}+\sqrt{3}+\sqrt{2}}{\sqrt{2}-\sqrt{3}-\sqrt{2}} = \frac{2\sqrt{2}+\sqrt{3}}{-\sqrt{3}}$ ...(i)

$x = \frac{\sqrt{6}}{\sqrt{3}+\sqrt{2}}$

Using componendo-dividendo Rule

$\Rightarrow \frac{x}{\sqrt{2}} = \frac{\sqrt{3}}{\sqrt{3}+\sqrt{2}}$

$\frac{x+\sqrt{2}}{x-\sqrt{2}} = \frac{\sqrt{3}+\sqrt{3}+\sqrt{3}}{\sqrt{3}-\sqrt{3}-\sqrt{2}} = \frac{2\sqrt{3}+\sqrt{2}}{-\sqrt{2}}$

Now,

$\frac{x+\sqrt{3}}{x-\sqrt{3}} - \frac{x+\sqrt{2}}{x-\sqrt{2}}$

$= \frac{2\sqrt{2}+\sqrt{3}}{-\sqrt{3}} + \frac{2\sqrt{3}+\sqrt{2}}{-\sqrt{2}}$

$= \frac{-4-\sqrt{6}+6+\sqrt{6}}{\sqrt{6}}$

$= \frac{2}{\sqrt{6}} = \sqrt{\frac{2}{3}}$

59. (C) Put q = 2

2p + 1 = 2 and 2r + 1 = r

$p = \frac{1}{2}$ $\quad$ r = 1

Now,

$3r + \frac{3}{p} + 5pqr$

$= -3 + 3\times2 + 5\times\frac{1}{2}\times2\times(-1)$

= – 2

60. (A) Put $b = c = 0$

$x = a$, $y = 3a$ and $z = -4a$

Now,

$$\frac{x^2 + y^2 - z^2}{xy} = \frac{a^2 + 9a^2 - 16a^2}{3a^2}$$

$= -2$

61. (A) Let

$x = .9$

$y = .2$

and $z = .3$

then the given expression

$$= \frac{x \times x \times x + y \times y \times y + z \times z \times z - 3xyz}{x \times x + y \times y + z \times z - x \times y - y \times z - z \times x}$$

$$= \frac{x^3 + y^3 + 2^3 - 3xyz}{(x^2 + y^2 + z^2 - xy - yz - zx)}$$

$= (x + y + z)$

$= .9 + .2 + .3$

$= 1.4$

62. (C) $\dfrac{\cot^2 15° - 1}{\cot^2 15° + 1} = \dfrac{\cos^2 15 - \sin^2 15°}{\cos^2 15° + \sin^2 15}$

$= \dfrac{\cos 30°}{1} = \dfrac{\sqrt{3}}{2}$

63. (C) Let $\alpha = \beta = 45°$

$\dfrac{\sec^4 45°}{\sec^2 45°} - \dfrac{\tan^2 45°}{\tan^2 45°} = 0$

64. (A) $2 \sin\alpha + 15 \cos^2\alpha = 7$

$\Rightarrow 2 \sin\alpha + 15(1 - \sin^2\alpha) = 7$

$\Rightarrow 15 \sin^2\alpha - 2\sin\alpha - 8 = 0$

$\Rightarrow 15 \sin^2\alpha - 12\sin\alpha + 10 \sin\alpha - 8 = 0$

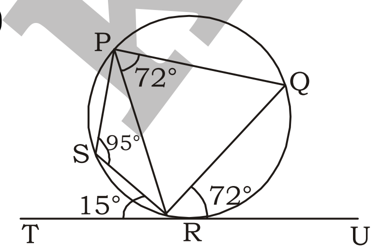
$\Rightarrow (5 \sin\alpha - 4)(3\sin\alpha + 2) = 0$

Here $\sin\alpha = \dfrac{4}{5}, \dfrac{-2}{3}$ but, α is acute angle,

So, $\sin\alpha = \dfrac{4}{5}$

then $\cot\alpha = \dfrac{3}{4}$

65. (A)



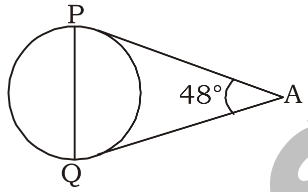
PQRS is a cyclic quadrilateral

$\angle S + \angle Q = 180°$

$\angle Q = 180° - 95°$

$\angle PQR = 85°$

66. (B) ATQ,



$\because$ PA = PQ

$\therefore$ ΔAPQ becomes an isosceles triangle

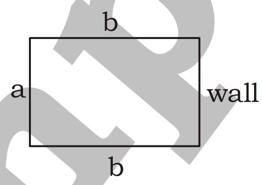
$\angle P + \angle Q + \angle A = 180°$

$\angle P + \angle P + 48° = 180°$

$\angle P = 66°$

Hence, $\angle APQ = 66°$

67. (A)



a × b = 100 …(i)

2b + a = 30 …(ii)

From (i) and (ii)

$2b + \dfrac{100}{b} = 30$

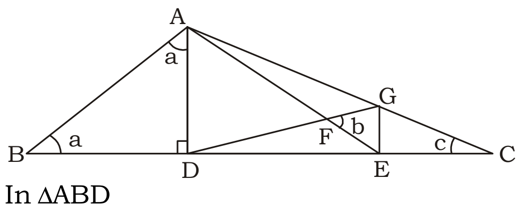
$b^2 - 15b + 50 = 0$

b = 5, 10

b = 5 ; a = 20

So, dimension are 20, 5

68. (B)



In ΔABD

$2a = 90° \Rightarrow a = 45°$

In ΔADG

AD = AG and DF = FG

F is mid point

$\Rightarrow AF \perp DG$

b = 90°

In ΔADC

$\text{Sin } C = \dfrac{AD}{AC}$

$= \dfrac{x}{2x} = \dfrac{1}{2}$

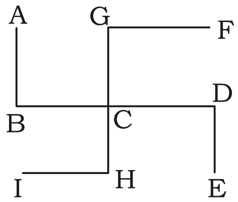
C = 30°

Now, a + b + c

= 45° + 90° + 30°

= 165°

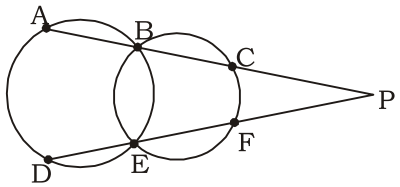
69. (B)



$\because \angle FGC = 80°$ (AB||GH||DE and GF||BD||HI)

$\therefore \angle CHI = 80°$

70. (A)



In the smaller circle

PC × PB = PF × PE

$\Rightarrow PE = \frac{9 \times 12}{8} = \frac{27}{2}$ cm

In the larger circle,

PB × PA = PE × PD

$\Rightarrow 12 \times 18 = PD \times \frac{27}{2}$

$\Rightarrow PD = 16$

Therefore, DE = PD – PE = 16 – 13.5 = 2.5 cm

71. (A) $\frac{\sin^8\theta - \cos^8\theta}{\cos 2\theta(1+\cos^2 2\theta)}$

$= \frac{(\sin^4\theta + \cos^4\theta)(\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)}{(\cos^2\theta - \sin^2\theta)[(1+(\cos^2\theta - \sin^2\theta)^2]}$

$= \frac{-(\cos^4\theta + \cos^4\theta)}{1+\cos^4\theta + \sin^4\theta - 2\sin^2\theta\cos^2\theta}$

$= \frac{-(1-2\sin^2\theta.\cos^2\theta)}{1+1-2\sin^2\theta\cos^2\theta - 2\sin^2\theta\cos^2\theta}$

$= \frac{-1}{2}$

72. (A) $(a_1b_2 - a_2b_1)(b_1c_2 - b_2c_1) = (c_1a_2 - c_2b_1)^2$

$(1\times3 - 1\times2)[-2\times(-m) - 3\times(-3)] = [(-3)\times1-(-m)\times1]^2$

$\Rightarrow -2m + 9 = 9 + m^2 - 6m$

$\Rightarrow m^2 - 4m = 0$

$\Rightarrow m(m-4) = 0$

$m = 4$ $(\because m \neq 0)$

73. (A) $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab+bc+ca)$

$\Rightarrow 36 = 16 + 2(ab+bc+ca)$

$ab + bc + ca = 10$

74. (C) $\frac{x^2-1}{x} = \sqrt{5}$

$\Rightarrow x - \frac{1}{x} = \sqrt{5}$ ...(i)

Squaring both sides eq(i)

$x^2 + \frac{1}{x^2} = 7$ ...(ii)

Taking cube eq(i) both sides

$\left(x-\frac{1}{x}\right)^3 = x^3 + \frac{1}{x^3} - 3\left(x-\frac{1}{x}\right)$

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

$x^3 + \frac{1}{x^3} = 8\sqrt{5}$ ...(iii)

Multiplying eq(ii) and (iii)

$\left(x^2+\frac{1}{x^2}\right)\left(x^3+\frac{1}{x^3}\right)$

$= 7 \times 8\sqrt{5}$

$= 56\sqrt{5}$

75. (D) ATQ,

Let $y = (9-x)(2-x)$

$y = x^2 - 11x + 18$

$\frac{dy}{dx} = 2x - 11$

for maximum or minimum value

Put $\left(\frac{dy}{dx}\right) = 0$

$2x - 11 = 0$

$x = \frac{11}{2}$

min value $= \left(9-\frac{11}{2}\right)\left(2-\frac{11}{2}\right)$

$= \frac{7}{2}\times\left(\frac{-7}{2}\right)$

$= \frac{-49}{4}$

76. (B) $x = \sqrt[3]{5} + 2$

$(x-2) = \sqrt[3]{5}$

Taking cube both sides

$(x-2)^3 = (\sqrt[3]{5})^3$

$x^3 - 8 - 6x(x-2) = 5$

$x^3 - 6x^2 + 12x - 13 = 0$

77. (C) $(a - b) = 2$, $ab = 15$

$(a + b) = \sqrt{(a-b)^2 + 4ab} = \sqrt{4 + 4 \times 15} = 8$

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

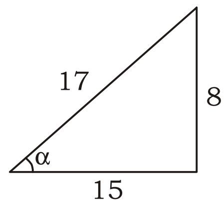
$= 4 \times 8 \times [(a + b)^2 - ab]$

$= 4 \times 8[8^2 - 15]$

$= 32 \times [64 - 15]$

$= 1568$

78. (B)



$\cot\alpha = \frac{15}{8}$

$\frac{(2 + 2\sin\alpha)(1 - \sin\alpha)}{(1 + \cos\alpha)(2 - 2\cos\alpha)}$

$= \frac{\left(2 + 2 \times \frac{8}{17}\right)\left(1 - \frac{8}{17}\right)}{\left(1 + \frac{15}{17}\right)\left(2 - 2 \times \frac{15}{17}\right)}$

$= \frac{\frac{50}{17} \times \frac{9}{17}}{\frac{32}{17} \times \frac{4}{17}} = \frac{50 \times 9}{32 \times 4} = \frac{225}{64}$

79. (D) $\sin\theta + \sin^2\theta + \sin^3\theta = 1$

$\Rightarrow \sin\theta + \sin^3\theta = 1 - \sin^2\theta$

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

$\Rightarrow \sin\theta(1 + \sin^2\theta) = \cos^2\theta$

$\Rightarrow \sin\theta(2 - \cos^2\theta) = \cos^2\theta$

Squaring both sides

$\sin^2\theta(2 - \cos^2\theta)^2 = \cos^4\theta$

$(1 - \cos^2\theta)(4 + \cos^4\theta - 4\cos^2\theta) = \cos^4\theta$

On solving

$\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta = 4$

80. (B) ATQ,

Surface area of sphere $= 4\pi \times (\text{radius})^2$

$\Rightarrow 4 \times \frac{22}{7} \times (\text{radius})^2 = 1386$

$\Rightarrow (\text{radius})^2 = \frac{441}{4}$

$\Rightarrow$ Radius of spherical ball $= \sqrt{\left(\frac{441}{4}\right)}$

$= \frac{21}{2} = 10.5$

$\because$ Volume of sphere $= \left(\frac{4}{3}\right)\pi \times (\text{radius})^3$

$\Rightarrow$ Volume of spherical ball $= \frac{4}{3} \times \frac{22}{7} \times \left(\frac{21}{2}\right)^3 = 4851$ cm^3

Now,

Volume of a cube $= (\text{side})^3 = (3)^3 = 27$ cm^3

$\Rightarrow$ No. of cuboid that be formed

$= \frac{\text{volume of spherical ball}}{\text{volume of cuboid}} = \frac{4851}{27}$

$= 179.67$

$\therefore$ 179 cubes can be formed

81. (D) $\angle ABC = 120°$

$\Rightarrow \angle ABM = 180° - 120° = 60°$

In ΔAMB, $\angle AMB = 90°$, $\angle ABM = 60°$

$\therefore \angle MAB = 180° - 90° - 60° = 30°$

$\Rightarrow AM = AB \times \cos 30° = 12 \times \sqrt{\frac{3}{2}} = 6\sqrt{3}$

$\Rightarrow MB = AB \times \sin 30° = 12 \times \frac{1}{2} = 6$

$\Rightarrow MC = MB + BC = 6 + 10 = 16$

$\Rightarrow AC^2 = MC^2 + AM^2 = (6\sqrt{3})^2 + 16^2 = 364$

$\Rightarrow AC = 19.07$

82. (D) Approximate dimensions of a cuboid = 10 cm × 12 cm × 16 cm

$\Rightarrow$ Approx. volume of a cuboid $= 10 \times 12 \times 16 = 1920$ cm^3

$\Rightarrow$ Approx. volume of 5 cuboids $= 5 \times 1920 = 9600$ cm^3

$\therefore$ Neither 8000 cm^3 nor 9000 cm^3 would be enough to make 5 solid cuboids of given dimensions

83. (B) A hollow hemisphere can be made by removing a small hemisphere from a bigger hemisphere

$\Rightarrow$ Volume of material required = volume of hollow hemisphere – Volume of smaller hemisphere

Also, Volume of smaller hemisphere = Volume of liquid the vessel can contain $= 1152\pi$ cm^3

$\because$ Volume of hemisphere $= \left(\frac{2}{3}\right)\pi \times (\text{radius})^3$

$\Rightarrow 1152\pi = \left(\frac{2}{3}\right)\pi \times (\text{radius})^3$

$\Rightarrow$ Internal radius of vessel $= r = \sqrt[3]{\left(\frac{3}{2} \times 1152\right)} = \sqrt[3]{1728} = 12$ cm

$\because$ Thickness of vessel = 3 cm

$\Rightarrow$ External radius of vessel = 12 + 3 = 15 cm

$\Rightarrow$ Volume of bigger hemisphere $= \left(\frac{2}{3}\right)\pi \times (15)^3 = 2250\pi$ cm^3

$\therefore$ Volume of material required

$= 2250\pi - 1152\pi = 1098$ cm^3

84. (D) Let the radii of the two cylinder be 'R' cm and 'r' cm, while their heights be 'H' cm and 'h' cm respectively

$\because$ Curved surface area of cylinder = $2\pi \times$ radius $\times$ height

$\Rightarrow$ Ratio of curved surface area of two cylinders $= \frac{RH}{rh} = \frac{10}{9}$

Also, ratio of heights $= \frac{H}{h} = \frac{5}{6}$

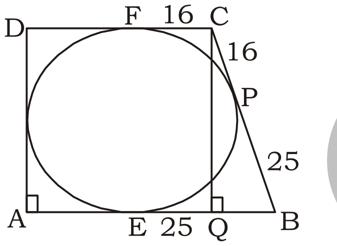
$\Rightarrow$ Ratio of radii of cylinders $= \frac{R}{r} = \frac{10}{9} \times \frac{6}{5} = \frac{4}{3}$

Now,

$\therefore$ Volume of cylinder $= \pi \times (\text{radius})^2 \times$ height

$\therefore$ Ratio of volume of two cylinders $= \frac{R^2H}{r^2h} = \frac{16}{9} \times \frac{5}{6} = \frac{40}{27} = 40 : 27$

85. (D)



Given :

EB = 25 cm and FC = 16 cm

Since CF and CP are tangents to the circle from the same point C, CP = CF = 16 cm

Similarly, BP = BE = 25 cm

BC = 16 + 25 = 41 cm

CQ is perpendicular to BA:

QB = 25 – 16 = 9 cm

In ΔBCQ :

CQ $= \sqrt{(41^2 - 9^2)} = 40$ cm

Hence, diameter of the circle = 40 cm

86. (C) Area of right-angled triangle $= \frac{1}{2} \times$ base $\times$ height $= \frac{1}{2} \times 21 \times 25 = 262.5$ cm^2

$\Rightarrow$ Area of circular sheet $= \frac{11}{3} \times 262.5 = 962.6$ cm^2

$\because$ Area of circle $= \pi \times (\text{radius})^2$

$\Rightarrow$ Radius of circle $= \sqrt{\left(\frac{7}{22} \times 962.5\right)}$

$= \sqrt{\left(\frac{1225}{4}\right)} = \frac{35}{2}$ cm

$\because$ Circumference of circle $= 2\pi \times$ radius

$\therefore$ Circumference of circular sheet

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

87. (A) ATQ, area of triangle = A = 60 cm^2

Semi-perimeter = s $= \frac{40}{2} = 20$ cm

$\because$ Length of in radius $= \frac{\text{Area of triangle}}{\text{Semi- perimeter}}$

$\Rightarrow$ Length of in radius $= \frac{60}{20} = 3$ cm

$\Rightarrow$ Length of circum radius = 11.5 – 3 = 8.5 cm

Now,

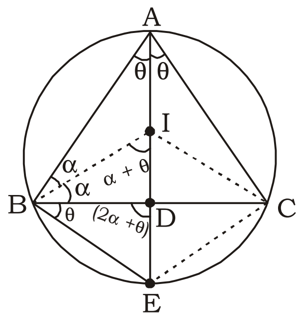
Length of circum radius

$= \frac{\text{Product of sides}}{(4 \times \text{Area of triangle})}$

$\Rightarrow$ Product of sides of triangle = 4 $\times$ length of cricum radius $\times$ Area of triangle

$\therefore$ Product of sides of triangle = 4$\times$ 8.5 $\times$ 60 = 2040 cm^3

88. (B) ATQ,



BE = 6 cm, AI = 10 cm

We know that,

IE = BE = CE

So, IE = BE = 6 cm

ΔBDE ~ ΔABE

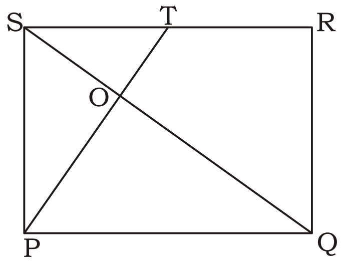
$\frac{DE}{BE} = \frac{BE}{AE}$

$\frac{DE}{6} = \frac{6}{16}$

DE $= \frac{36}{16} = 2.25$ cm

Hence, DE = 2.25 cm

89. (A)



$\frac{ST}{TR} = \frac{4}{5}$, PQ = 10.5 cm

Hence PQ = 9 units

$\Delta SOT \sim \Delta QOP$

$\frac{ST}{PQ} = \frac{SO}{QO} = \frac{4}{9}$

In ΔSPQ

$SP^2 = SO \times SQ$

$PQ^2 = QO \times SQ$

$\frac{SP^2}{PQ^2} = \frac{SO}{QO} = \frac{4}{9}$

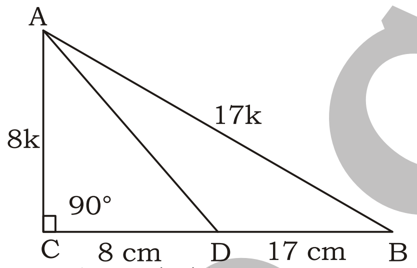
$\frac{SP}{PQ} = \frac{2}{3}$

3 units $\rightarrow$ 10.5 cm

2 units $\rightarrow \frac{10.5}{3} \times 2$ cm

Hence, SP = 7 cm

90. (C) ATQ,



$\because$ AD is angle bisector

$\frac{AC}{AB} = \frac{DC}{BD} = \frac{8}{17}$

15k = 25

$k = \frac{5}{3}$

then, AC = $8 \times \frac{5}{3}$ cm

In ΔACD

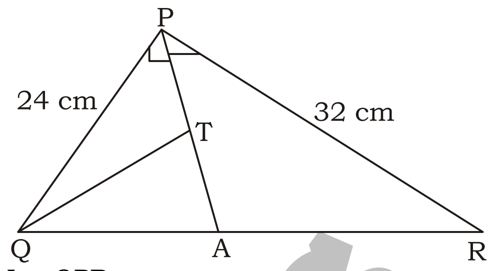
$AD^2 = AC^2 + DC^2$

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

$= 8\sqrt{\frac{25}{9} + 1}$

$= \frac{8\sqrt{34}}{3}$ cm

91. (D)



In ΔQPR

$QR^2 = QP^2 + PR^2$

$= 24^2 + 32^2$

= 1600

QR = 40 cm

AQ = AR = 20 cm

$\because$ QT is Angle bisector

$\therefore \frac{QP}{QA} = \frac{24}{20} = \frac{PT}{TA}$

$\frac{PT}{TA} = \frac{6}{5}$

$\because$ PA is also circum radius

$\therefore$ PA = 20 cm

11 units $\rightarrow$ 20 cm

6 units $\rightarrow \frac{120}{11}$ cm

Hence, PT = $\frac{120}{11}$ cm

92. (D) ATQ,

$$\frac{3.6 \times 1.62 + 0.48 \times 3.6}{1.8 \times 0.8 + 10.8 \times 0.3 - 2.16}$$

$$= \frac{(1.8)^3 + (1.2)^3}{(1.2)^2 + (1.8)^2 - 1.2 \times 1.8}$$

$$= \frac{(1.8 + 1.2)(1.8^2 + 1.2^2 - 1.2 \times 1.8)}{(1.2^2 + 1.8^2 - 1.2 \times 1.8)} = 3$$

93. (C) ATQ,

$x + y + z = 38$

Put $z = 2$

$y = 5$

$x + 5 + 2 = 38$

$x = 31$

94. (B) $\sqrt{261}$ $\quad\quad$ $\sqrt{45109}$

$\downarrow$ $\quad\quad$ $\downarrow$

16 $\quad\quad$ 213

Natural numbers = 213 – 16 = 196

95. (C) $x + \frac{1}{x} = \frac{\sqrt{3} + 1}{2}$

Squaring both sides

$x^2 + \frac{1}{x^2} + 2 = \frac{3 + 1 + 2\sqrt{3}}{4}$

$\Rightarrow x^2 + \frac{1}{x^2} = \frac{2\sqrt{3} - 4}{4}$

Again squaring both sides

$x^4 + \frac{1}{x^4} + 2 = \frac{12+16-16\sqrt{3}}{16}$

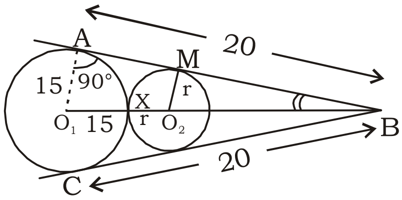
$\Rightarrow x^4 + \frac{1}{x^4} = \frac{28-16\sqrt{3}}{16} - 2$

$\Rightarrow x^4 + \frac{1}{x^4} = \frac{-16\sqrt{3}-4}{16}$

$\Rightarrow x^4 + \frac{1}{x^4} = \frac{-4\sqrt{3}-1}{4}$

Hence, $x^4 + \frac{1}{x^4} = \frac{-4\sqrt{3}-1}{4}$

96. (B)



In ΔPOB

$O_1P^2 = OB^2 + PB^2$

$= 15^2 + 20^2$

$O_1P = 25$ cm

$O_2P = 25 - 15 - r$

$= 10 - r$

$\Delta PO_1B \sim \Delta PO_2M$

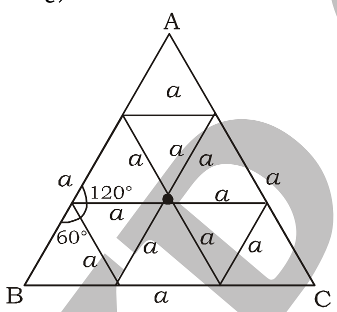
$\frac{O_2M}{O_1B} = \frac{O_2P}{O_1P} \Rightarrow \frac{r}{15} = \frac{10-r}{25}$

$5r = 30 - 3r$

$8r = 30$

$r = 3.75$ cm

97. (A) ATQ,



Required Ratio $= \frac{\text{Area of hexagon}}{\text{Area of } \triangle ABC}$

$= \frac{6 \times \frac{\sqrt{3}}{4}a^2}{9 \times \frac{\sqrt{3}}{4}a^2} = \frac{2}{3} \times 100$

$= 66.66$

98. (B) 1st year 10×11 11×11 (for equal installment)

2nd year 100 121

121 units = ₹100000

210 units = ₹ $\frac{100000 \times 210}{121}$

= ₹173554

Hence, Amount borrowed by KD Live is ₹173554

99. (A) We assume 100 students

Total	60 Boys	and	40 Girls
	↓ 15%		↓ 7.5%
Fee waiver	9boys	and	3 girls

12 students getting fee waiver → 90(In question)

1 student → $\frac{90}{12} = 7.5$

Now, number of students not getting a fee waiver = 51 boys and 37 girls

50% concession → 25.5 boys and 18.5 girls (i.e. a total of 44)

Hence, Required number of students

= 44×7.5

= 330

100. (D) you do not know the number of days in the month.

Hence, the question cannot be answered.

TEST NO. 58

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

43. (B) Explanation is correct. The correct answer should be opiton (B) in place of (C).

44. (D) Explanation is correct. The correct answer should be option (D) in place of (C).