SSC TIER II (MATHS) MOCK TEST - 48 (SOLUTION)

1. (A) A.T.Q,

$25\% = \frac{1}{4}$

4 units $\longrightarrow$ 5 units

1 unit

1 unit $\longrightarrow$ 9800 – 9440

1 unit $\longrightarrow$ ₹ 360

4 units $\longrightarrow$ 360 × 4 = ₹ 1440

Total interest gain ₹ 1440 in 3 years

3 years $\longrightarrow$ 1440

1 year $\longrightarrow ₹\frac{1440}{3}$ = ₹ 480

Hence, pricipal = ₹ 9440
= ₹ 9440 – 1440
= ₹ 8000

₹ 8000 $\xrightarrow{1\text{year}}$ 480

₹ 100 $\longrightarrow \frac{480 \times 100}{8000}$

Rate $\longrightarrow$ 6%

2. (C) A.T.Q,

4 years	4 years	4 years
₹ 500	₹ 500	₹ 500
After increment in principal	×10%	×25%
₹ 500	₹ 550	₹ 625

= ₹ 1675

3. (A) A. T. Q,
Ratio = 1 : 2 : 3 : 4
Total initial cost = 10^2 = 100 units
After broken = $1^2 + 2^2 + 3^2 + 4^2$ = 30 units
Loss = (100 – 30) units

70 units $\longrightarrow$ ₹ 700

100 units $\longrightarrow$ ₹ 1000
Hence, initial cost is ₹ 1000

4. (C) Ratio of total amount received male and female = 5 : 4
Ratio of amount received by one male and female = 3 : 2
Ratio of no. of male : no of female

$= \frac{5}{3} : \frac{4}{2}$

$\Rightarrow$ 5 : 6

11 units $\longrightarrow$ 66

1 unit $\longrightarrow$ 6

No. of males $\longrightarrow$ 30

No. of female $\longrightarrow$ 36

5. (A) A.T.Q,

33 years $\xrightarrow[\text{After 4 years}]{}$ 37 years

33 years $\xrightarrow{\text{on death of 64 years}} 37 - \frac{64}{8}$

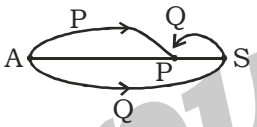
29 years $\xrightarrow[\text{3 years}]{\text{After}}$ 32 year

32 years $\xrightarrow[\text{on death of 72 years}]{} 32 - \frac{72}{8}$

23 years $\xrightarrow[\text{3 years}]{\text{After}}$ 26 years

6. (D) 656656 $\longrightarrow$ (656000 + 656)
656 (1000+1)
656 × 1001
Is divisible by 1001

7. (D)



A.T.Q,
If meeting time is same,
Then the ratio of speed is equal to ratio of distance,

$\frac{S_P}{S_Q} = \frac{D_P}{D_Q} = \frac{48}{72} = \frac{2}{3}$

1 unit $\longrightarrow$ 4 kms/hr

2 units $\longrightarrow$ 8 kms/hr

3 units $\longrightarrow$ 12 kms/hr

Hence, of P and Q is 8 kms/hr and 12 kms/hr respectively

8. (B) A.T.Q,
Time Efficiency

$\frac{A}{B} = \frac{140}{100} = \frac{7}{5} = \frac{5}{7} \times \frac{5}{7}$

$\frac{B}{C} = \frac{80}{100} = \frac{4}{5} = \frac{5}{7} \times \frac{7}{7}$

So, time
A : B : C
25 : 35 : 28

3 units $\longrightarrow$ 6 days

35 units $\longrightarrow$ 70 days

Hence, B will complete this work in 70 days.

9. (D) A.T.Q,

	5 km/hr	7 km/hr
	10 seconds	11 seconds
Distance	50 km	77 km

Distance in unit time = 27 $\frac{km}{hr}$

Hence the speed of train is 27 $\frac{km}{hr}$

10. (C) A.T.Q,
In both cases, distance will be same then the ratio of speed is inverse of ratio of the time,

$$\frac{Speed_1}{Speed_2} = \frac{V+45}{V-45} = \frac{120}{20}$$

$$\Rightarrow \frac{V+45}{V-45} = \frac{6}{1}$$

$\Rightarrow V + 45 = (V - 45) \times 6$
$\Rightarrow V = 63$ km/hr
Then, the speed of faster train is 63 km/hr

11. (B) A.T.Q,
$\because$ (A + B) do whole the work in 10 days

A $\longrightarrow$ 2.5 days $\longrightarrow$ 5 days

B $\longrightarrow$ 8.5 days $\longrightarrow$ (5+12) days

Half work (A+B)	+	B(Half work)
5 days		12 days
Whole work will complete		

$\because$ B does half the work in 12 days.
Hence, B alone does the whole work in 24 days,

12. (B) A.T.Q,
If overall commission is 4% then 1% of 10,000 goes to company then,
Let sales be 100 units

Sales	commission
100%	4%

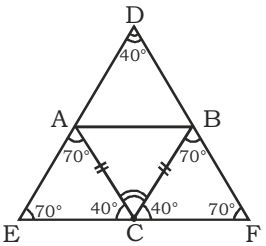
Company

96% $\longrightarrow$ ₹ (31100 + 100)

1% $\longrightarrow$ ₹ 325

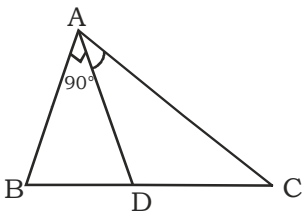
100% $\longrightarrow$ ₹ 32500
Hence, Total sale is ₹ 32500

13. (C)



A.T.Q,
$\because$ EC = AC and CF = BC
= 180° – 40° – 40° = 100°

14. (D)



A.T.Q,
$\angle A$ will be obtuse angle
(IInd Quadrant)
tanA will be negative
So,
By option only D
Options contain – 2

$$\frac{\tan A}{\tan B} = -2$$

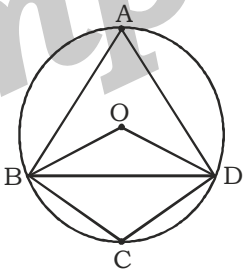
15. (C) A.T.Q,

$$R = \frac{abc}{4A}$$

$$= \frac{a \times 9 \times 17.5}{4 \times \frac{1}{2} \times a \times 3}$$

$$\Rightarrow \frac{52.5}{2} = 26.25 \text{ cm}$$

16. (A)



$\angle OBD - \angle CBD$
$= \angle BDC - \angle ODB$
$\Rightarrow \angle OBD - \angle ODB = \angle BDC - \angle CBD$
ΔOBD ΔBCD
Then, third side of both triangles,
$\angle BOD - \angle BCD = 2\alpha$ (let)
$\angle BAD$ = Half of $\angle BOD = \alpha$
$\angle A + \angle C = 180°$
$\alpha + 2\alpha = 180°$
$\therefore \alpha = 60°$

17. (C) A.T.Q,

	CP	SP	Profit
30 kg	8.9	9.5	= .6×30
40 kg	9.9	9.5	= .4×40

Profit = ₹ 18
Loss = ₹ 16
Over all = 18 – 16 = ₹ 2 Profit

18. (C) Prime cost = Raw material + manufacturing expenses

3 = 1 + 2

6 = 2 + 4

$2\times\frac{12}{5}$ 5

The article, now cost is

= 5 + 4.8 = ₹ 9.8

19. (D) Total cost price of 80 dozens

Bananas at ₹ 10 per dozen

= ₹ 800

12 dozen got rotten and its selling price is,

= ₹ 12 × 6

= ₹ 72

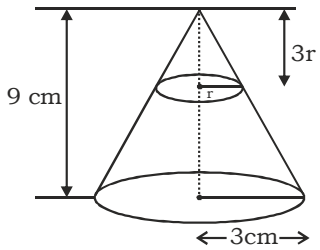
Remaining sold at 14 per dozen

= ₹ 14 × 68

Total selling price = 1024

$$\text{Profit \%} = \frac{1024-800}{800}\times 100 = 28\%$$

20. (B)



The volume of frustum,

= 44 = 14 π

$$\text{Volume of smaller cone} = \frac{1}{3}\pi\times 3^2\times 9 - 14\pi$$

$$\Rightarrow \frac{1}{3}\pi r^2\times 3r = 3\pi$$

$\Rightarrow r^3 = 13$

$\Rightarrow r = \sqrt[3]{13}$

The radius of upper circular surface of the frustum $\sqrt[3]{13}$

21. (A) A.T.Q,

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

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

$\Rightarrow ab = 1$

$(a + 1)^{-1} + (b + 1)^{-1}$

$$\Rightarrow \frac{1}{a+1}+\frac{1}{b+1} = \frac{1}{a+1}+\frac{1}{\frac{1}{a}+1} = 1$$

22. (D) $\cos x = \dfrac{2\cos y - 1}{2 - \cos y}$

Let y = 60°

$$\cos x = \frac{2\times\frac{1}{2}-1}{2-\frac{1}{2}}$$

$\Rightarrow x = 90°$

Then,

$$\tan\left(\frac{x}{2}\right)\cot\left(\frac{y}{2}\right) = \tan 45°\cot 30° = \sqrt{3}$$

23. (A) A.T.Q,

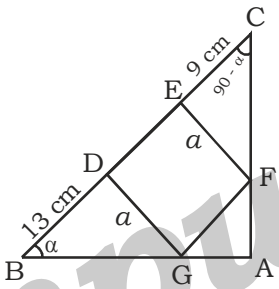
Length of median

$$AD = \frac{1}{2}\sqrt{2AC^2+2AB^2-BC^2}$$

$$= \frac{1}{2}\sqrt{2\times 25+2\times 36-64} = \sqrt{\frac{29}{2}}$$

Then the length of median is $\sqrt{\frac{29}{2}}$

24. (A)



In ΔBDG

$$\tan\alpha = \frac{a}{13} \quad \ldots.(i)$$

In ΔFCE

$$\tan(90-\alpha) = \cot\alpha = \frac{a}{9} \quad \ldots.(ii)$$

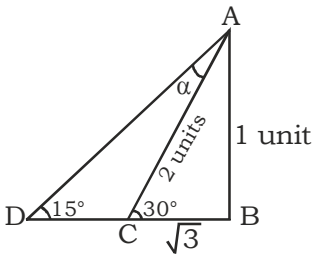
Multiplying equation (i) and (ii)

$$\tan\alpha.\cot\alpha = \frac{a}{13}\times\frac{a}{9}$$

$\Rightarrow a^2 = 117$

Hence, Area of square is 117cm²

25. (C)



α + 15° = 30°

α = 15°

Then, AC = CD = 96 metres

If,

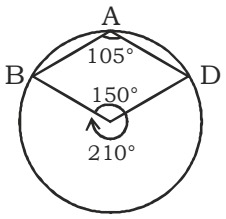
2 units ⟶ 96 metres

Then 1 unit ⟶ 48 metres

AB = 48 metres

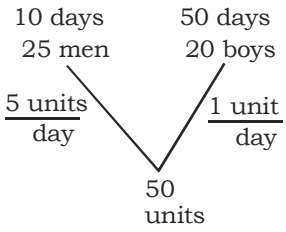
Hence, height of tower is 48 metres

26. (C)



Draw a circle passing through all the points A, B, C and D. 210° is twice of 105°
So, A, B, D will be on circumference of circle and C is the centre.
Radius = BC = CD = AC = 12 cm

27. (A) A.T.Q,



25 men $\xrightarrow{1\text{day}}$ 5 units

5 men $\xrightarrow{1\text{day}}$ 1 unit

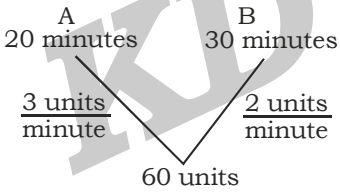
30 days $\xrightarrow{1\text{day}}$ 30 work

Remaining,
Work = 50 – 30 = 20 units

1 day $\longrightarrow$ 1 unit

20 boys
20 units work done by
20 boys in 20 days

28. (B)



A fill the tank in $\frac{1}{2}$

minute $\longrightarrow \frac{3}{2}$ unit

(A + B) fill the tank another

$\frac{1}{2}$ minute $\longrightarrow \frac{5}{2}$

[A + (A + B)] fill the tank in 1 minute is

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

Total time taken to fill the tank is

$= \frac{60}{4}$ = 15 minutes

29. (A) Average of each 4 groups = 500 gm
Let, weight of 4 packets = 500 gm
2 packets = 250 gm
6 packets = 750 gm

30. (C) A.T.Q,
Let CP_I – 100x and CP_{II} – 100y
Profit–1 10x 20y ....(i)
Profit–2 20x 10y ....(ii)
Substracting equation (i) and (ii)
$\Rightarrow$ 10x – 10y = 5 ....(iii)
$\Rightarrow$ Multiply equation (iii) by 10 both sides
$\Rightarrow$ 100x – 100y = ₹ 50
Hence difference of cost prices is ₹ 50

31. (A) Put $\beta = 0$
$2\sin^2\beta + 4\cos(\alpha+\beta)\times \sin\alpha.\sin\beta + \cos2(\alpha+\beta)$
$\Rightarrow 0 + 0 + \cos2\alpha$
$\Rightarrow \cos2\alpha$

32. (D) Total distance covers by A and B in one hour = 4 + 2 = 6 km

2nd – hour $\longrightarrow$ 6.5 kms

3rd – hour $\longrightarrow$ 7 kms

It is certainly from an A.P (Arithematic Progression)
A.P $\rightarrow$ 6 + 6.5 + 7 + 7.5 +..... = 72

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

$\Rightarrow 72 = \frac{n}{2}[2\times 6+(n-1)\times 5]$

$\Rightarrow n = 9$

They will meet each other = $9\times 4\left(\frac{km}{hr}\right)$

= 36 kms from A
Or mid-way between A and B

33. (C) $A+\sqrt{B} = \frac{4+3\sqrt{3}}{\sqrt{7+4\sqrt{3}}}$

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

$= \frac{4+3\sqrt{3}}{2+\sqrt{3}}$

Rationalizing the given equation,

$A+\sqrt{B} = \frac{(4+3\sqrt{3})(2-\sqrt{3})}{4-3}$

$= \frac{8+6\sqrt{3}-4\sqrt{3}-9}{1}$

$A+\sqrt{B} = -1 + 2\sqrt{3}$
A = –1
B = 12
Hence,
$\Rightarrow$ B – A = 12 + 1 = 13

34. (B) $\frac{1}{\sqrt[3]{25}+\sqrt[3]{20}+\sqrt[3]{16}} = 5^{\frac{1}{3}}A + 4^{\frac{1}{3}}B + C$

Multiplying and dividing by $\left(5^{\frac{1}{3}} - 4^{\frac{1}{3}}\right)$

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

$= 5^{\frac{1}{3}}A + 4^{\frac{1}{3}}B + C$

$\Rightarrow 5^{\frac{1}{3}} - 4^{\frac{1}{3}} = 5^{\frac{1}{3}}A + 4^{\frac{1}{3}}B + C$

Comparing above equation,

A = 1

B = –1

C = 0

$\Rightarrow$ A + B + C = –1 + 1 + 0 = 0

35. (B) A.T.Q,

$\sqrt{4} - \sqrt{8} = \frac{6}{\sqrt{14} + \sqrt{8}} \longrightarrow$ (IV)

$\sqrt{12} - \sqrt{6} = \frac{6}{\sqrt{12} + \sqrt{6}} \longrightarrow$ (III)

$\sqrt{13} - \sqrt{7} = \frac{6}{\sqrt{13} + \sqrt{7}} \longrightarrow$ (II)

$\sqrt{11} - \sqrt{5} = \frac{6}{\sqrt{11} + \sqrt{5}} \longrightarrow$ (I)

Hence,

$\sqrt{11} - \sqrt{5} > \sqrt{12} - \sqrt{6} > \sqrt{13} - \sqrt{7} > \sqrt{14} - \sqrt{8}$

36. (A) A.T.Q,

Let,

$\left(\frac{1}{9}\right)^x = (18)^{2y} = 2^{32} = k$

$\Rightarrow \frac{1}{9} = k^{\frac{1}{x}}$, $18 = k^{\frac{1}{2y}}$

$\Rightarrow 2 = k$

$\Rightarrow \frac{1}{9} \times 18 = 2$

Putting all values,

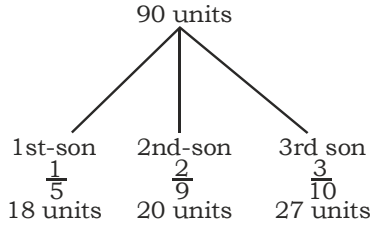
$\Rightarrow k^{\frac{1}{x}}.k^{\frac{1}{2y}} = k^{\frac{1}{32}}$

$\Rightarrow \frac{1}{x} + \frac{1}{2y} = \frac{1}{32}$

$\Rightarrow \frac{2y + x}{2xy} = \frac{1}{32}$

$\Rightarrow Z.\left(\frac{x + 2y}{xy}\right) = \frac{2}{3}$

37. (A) A.T.Q,



4th – son find = 90 – 18 – 20 – 27

= 25 units

Given,

25 units $\longrightarrow$ 75 cows

1 unit $\longrightarrow$ 3 cows

90 units $\longrightarrow$ 270 cows

38. (C) A.T.Q,

3E7 + 2F8 + 5G9 = 1114

[$\because$ At unit place digit's sum is 24, we take 4 and carry 2 again tens digit place 1 is so total sum of digits is 11]

$\therefore$ E + F + G = 9

For F maximum E and G will be 1 and 2

So, F = 6

39. (C) A.T.Q,

CP 100 $\xrightarrow{25\% \text{ increase}}$ 125

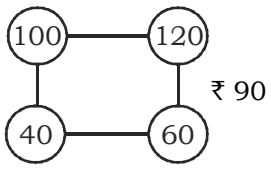
SP 250

Profit margin = $\frac{1250 - 125}{125} \times 100$

= 100%

40. (B) A.T.Q,

Let the cost price 100 units



60 units $\longrightarrow$ ₹ 90

100 units $\longrightarrow$ ₹ $\frac{90 \times 100}{60}$

Hence, cost price is ₹ 150

41. (A) A.T.Q

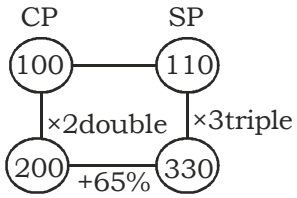
18.75% = $\frac{3}{16}$

	CP		SP
I-article	16	+3	19
II-article	22	-3	19

Loss percent on second–II article

= $\frac{3}{22} \times 100$ = 13.63%

42. (D) A.T.Q,
Let cost price of 100 units



$= \frac{110-100}{100} \times 100 = 10\%$

43. (C) Let fares of different classes be–
First class = $10x$
Second class = $7x$
Third class = $2x$
Then increased fares;

First class = $\frac{10x+1}{4\times 10x} = 12.5x$

Second class = $\frac{7x+1}{8\times 7x} = \frac{63}{8x}$

third class = $\frac{2x-(10\times 2x)}{100} = 1.8x$

Ratio of passengers = 4 : 9 : 17
Assume passengers in first class, second class and third class are 4y, 9y and 7y respectively

Then total fare = $\frac{4y\times 12.5x + 9y\times 63}{8x\times 17y\times 1.8x}$

$60590 = 50xy + 70.875\ xy + 30.6xy$
$60590 = 151.475\ xy$
$\Rightarrow xy = 400$
Amount received from third class
$\Rightarrow 17y \times 1.8x = 12240$

44. (B) Total population of town $=15x$

$\frac{\text{(Number of males)}}{\text{(Number of females)}} = \frac{7}{8}$

$\therefore$ Number of males and females = $7x$ and $8x$
Number of male children = 25% of $7x$

$= \frac{25}{100\times 7x} = 1.75x$

Number of adult females = $8x - 1.6x$
$= 6.4x$

$\Rightarrow 6.4x = 235200$

$\Rightarrow x = \frac{235200}{6.4} = 36750$

$\therefore$ Total population of town = 15×36750
= 551250

45. (A) Let number of spherical balls be n
25% of (Volume of cone) = n × volume of sphere,

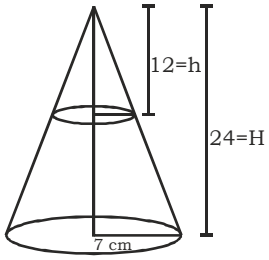
$\frac{1}{4}\times\frac{1}{3}\pi r^2 h = n\times\frac{4}{3}\pi R^3$

$\frac{1}{4}\times\frac{1}{3}\pi\times 5\times 5\times 8$

$= n\times\frac{4}{3}\pi\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}$

n = 100

46. (B)



Volume of bigger cone

$= \frac{1}{3}\pi\times 7^2\times 24$

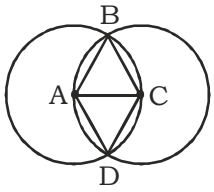
$= \frac{1}{3}\times\frac{22}{7}\times 7\times 7\times 24 = 1232\ cm^3$

$= \frac{\text{Volume of smaller cone}}{\text{volume of bigger cone}} = \frac{h^3}{H^3}$

$= \frac{\text{Volume of smaller cone}}{1232} = \frac{12^3}{24^3}$

Volume of smaller cone = $1232\times\frac{(12)^3}{(24)^3}$
$= 154\ cm^3$

47. (C)



AD = DC = AB = AC = BC = radius = 1 unit
$\therefore$ ΔACB and ΔACD is an equilateral triangle.
$\therefore$ $\angle CAB = \angle CAB = 60°$
$\angle DAB = 60° + 60° = 120°$
Area of sector ABD = Area of sector CBD

$= \pi r^2\frac{120°}{360°} = \frac{\pi r^2}{3}$

Area of Rhombus ABCD = product of two adjecent side × sin of angle between them,
= 1 × 1 × sin 120°
= sin(90° + 30°)

$= \cos 30° = \frac{\sqrt{3}}{2}$

Area common to both = Area of sector ABD + Area of sector CDB – Area of Rhombus ABCD,

$= 2 \times \frac{\pi r^2}{3} - \frac{\sqrt{3}}{2}$

$= \frac{4\pi - 3\sqrt{3}}{6}$

48. (B) Rate = 30% = $\frac{30}{100} = \frac{3}{10}$

Let Principal $\Rightarrow$ 1000

C.I 1st year $\rightarrow 1000 \times \frac{3}{10} = 300$

C.I 2nd year $\rightarrow 1000 \times \frac{3}{10} + 3000 \times \frac{3}{10}$

$\Rightarrow 300 + 90 = 390$

C.I 3rd year $\rightarrow 1000 \times \frac{3}{10} + 300 \times \frac{3}{10} + 390 \times \frac{3}{10}$

$\Rightarrow 300 + 90 + 117 = 507$

Total C.I = 300 + 390 + 507 = 1197

S.I = 300 + 300 + 300 = 900

$\% = \frac{1197 - 900}{900} \times 100 = \frac{297}{9} = 33\%$

49. (D) S.I for 2 years = $\frac{16000 \times 15 \times 2}{100} = 4800$

Principal for C.I = 16000+4800 = 20800

C.I Rate $\rightarrow 12\% = \frac{12}{100} = \frac{3}{25}$

Compound Interest for 1st year

$= 20800 \times \frac{3}{25} = 2496$

C.I for 2nd year = $20800 \times \frac{3}{25} + 2496 \times \frac{3}{25}$

= 2496 + 299.52 = 2795.52

Total interest after 4 years = 4800 + 2496 + 2796.52 = 10091.52

50. (D) A + B + C + D = 56 lakhs ....(i)

$B + C + D = \frac{460A}{100}$

$B + C + D = \frac{23A}{5}$ ....(ii)

A + C + D = 366.66% B

$A + C + D = \frac{11}{3}B$ ....(iii)

$C = \frac{40}{100}(A+B+C)$

$A + B + D = \frac{5}{2}C$ ....(iv)

From (i) and (ii)

A = 10 lakhs

From (i) and (iii)

B = 12 lakhs

From (i) and (iv)

C = 16 lakhs

D = 56 lakhs – 38 lakhs = 18 lakhs

51. (B) Petrol used = $\frac{2400}{18} = \frac{400}{3} = 133\frac{1}{3}$

=133.33 litres

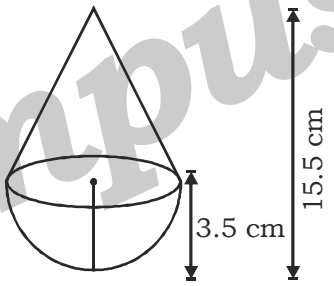
Monthly Expenses = 133.33 × 28 = 3733.24

Increase price = $28 \times \frac{107}{100} = 29.96$

New monthly Expenses = 29.96×133.33 = 3994.56

Increase in Expenses = 3994.56 – 3733.24 = 261.32 $\cong$ 261

52. (B)



Total surface area of toy = $\pi rl + \pi r^2$

Radius of cone = 3.5 cm

Height of cone = 15.5 – 3.5 = 12 cm

Slant height of cone,

$= \sqrt{h^2 + r^2}$

$= \sqrt{144 + 12.25} = \sqrt{156.25} = 12.5$

Total surface area of cone,

$= \pi \times 3.5 \times 12.5 + \pi(3.5)^2$

$= 43.75\pi + 12.25\pi = 56\pi$

Surface area of Toy

$= 24.5\pi + 56\pi - \pi r^2$

$= 80.5\pi - \pi r^2$

$= 80.5 \times \frac{22}{7} - \frac{22}{7} \times (3.5)^2$

$= (80.5 - 12.25) \times \frac{22}{7}$

$= 68.25 \times \frac{22}{7} = 214.5 \text{ cm}^2$

53. (D) A.T.Q,
$57 \times 63 + 171 \times 27 + 114 \times 28$
$= 57 [63 + 3 \times 27 + 2 \times 28]$
$= 57 [63 + 81 + 56]$
$= 57 \times 200 = 11400$

54. (C) A.T.Q,
$3^x - 3^{x-1} = 1458$

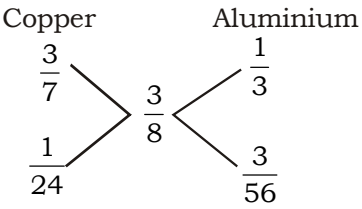
$\Rightarrow 3^x - \frac{3^x}{3} = 1458$

$\Rightarrow 3^x \left(1 - \frac{1}{3}\right) = 1458$

$\Rightarrow 3^x \times \frac{2}{3} = 1458$

$\Rightarrow 3^x = 2187$
$\Rightarrow 3^x = 3^7$
$\Rightarrow x = 7$

55. (C) A.T.Q,

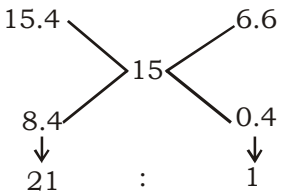


Then,
Required Ratio = $\frac{1}{24} : \frac{3}{56} = 7 : 9$

56. (A) A.T.Q,
Effective compound interest rate after paying tax = $10\% - \left(10 \times \frac{20}{100}\right)\% = 8\%$
Now,
Required amount = $P\left[1 + \frac{r}{100}\right]^n$

$= 15625 \left[1 + \frac{8}{100}\right]^3 = ₹19683$

57. (B) A.T.Q,



Now, 1 unit = 5 wickets
Then,
Total number of wickets before his last match = 21 units
$= 21 \times 5 = 105$

58. (C) A.T.Q,
Total number of digits
$= 1 \times 9 + 2 \times 90 + 3 \times 351$
$= 1242$

59. (C) Let the three digits number be x.
Then,
$625 = x \times P + R$ ..... (i)
and, $2406 = x \times Q + R$ ..... (ii)
From equation (i) and (ii), we get
$x(Q - P) = 2406 - 625$
$\Rightarrow x(Q - P) = 1781$
$\Rightarrow x(Q - P) = 13 \times 137$
Here, $x = 137$
$\therefore$ Sum of the digits of the number
$= 1 + 3 + 7 = 11$

60. (B) A.T.Q,
$\begin{matrix} A + B \rightarrow 2 \\ C \rightarrow 1 \end{matrix} \Big| \times 4 \Rightarrow \begin{matrix} 8 \\ 4 \end{matrix} \Big) 12$
and,
$\begin{matrix} A + C \rightarrow 3 \\ B \rightarrow 1 \end{matrix} \Big| \times 3 \Rightarrow \begin{matrix} 9 \\ 3 \end{matrix} \Big) 12$
Now,
Capacity of A, B and C becomes 5 units, 3 units and 4 units respectively.
Then,
Time taken by A to complete the work
$= \frac{12 \times 12}{5} = 28\frac{4}{5}$ days

61. (B) A.T.Q,

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

$= \frac{1}{\left(\sqrt{3} + \sqrt{2}\right)^3} + \frac{1}{\left(\sqrt{3} - \sqrt{2}\right)^3}$

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

$= 2\left[\left(\sqrt{3}\right)^3 + 3 \times \sqrt{3} \times \left(\sqrt{2}\right)^2\right]$

$= 2\left[3\sqrt{3} + 6\sqrt{3}\right] = 18\sqrt{3}$

62. (B) A.T.Q,

Distance travelled in $33\frac{3}{5}$ minutes at the speed of 5 km/h

$= \frac{168}{5} \times \frac{5000}{60} = 2800$ m

Let length and breadth of the rectangle be $4x$ and $3x$.
Then,

$2(4x + 3x) = 2800$

$\Rightarrow x = 200$

Now,

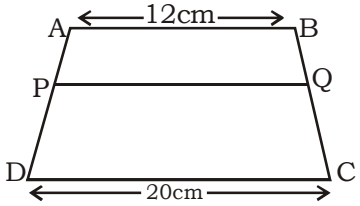
length of the field = $4 \times 200 = 800$ m

and, breath of the field = $3 \times 200 = 600$ m

Then, area of the field = 800×600

= 480000 m^2 = 48 hectare

63. (C) A.T.Q,

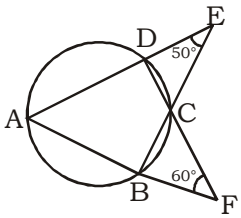


AP : PD =1 : 3

Then, length of PQ = $\frac{AP \times DC + PD \times AB}{AP + PD}$

= $\frac{1 \times 20 + 3 \times 12}{1 + 3}$ = 14 cm

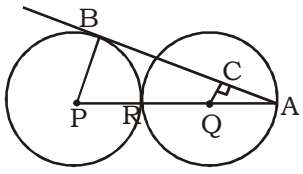
64. (A) A.T.Q,



Required angle = $\frac{180° - (\angle E + \angle F)}{2}$

= $\frac{180° - (50° + 60°)}{2}$ = 35°

65. (C) A.T.Q,



QC is perpendicular to AB.

and,

We know that radius of the circle makes right angle with tangent.

$\therefore$ PB $\perp$ AB

Now,

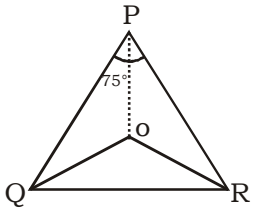
$\Delta ABP \sim \Delta ACQ$

Then,

$\frac{PB}{QC} = \frac{AP}{QA} = \frac{3r}{r} = \frac{3}{1}$

$\therefore$ Required ratio = 3 : 1

66. (D) We know that,



Angle made at the centre of the circle is always double the angle made at the circumference.

Then, $\angle QOR = 75° \times 2 = 150°$

and $\angle ORQ = \frac{180° - 150°}{2} = 15°$

Now, $\angle PRO = 80° - 15° = 65°$

and, $\angle PRO = \angle OPR$

$\therefore \angle OPR = 65°$

67. (B) $\left(\frac{4}{9}\right)^{-\frac{3}{2}} \times \left(\frac{1}{2}\right)^{-5} - 3 \times (27)^{\frac{2}{3}} - \left(\frac{1}{4}\right)^{-2} \times 5° \times \left(\frac{16}{9}\right)^{\frac{-1}{2}}$

= $\left(\frac{3}{2}\right)^3 \times 2^5 - 3 \times 3^2 - 4^2 \times 1 \times \frac{3}{4}$

= 108 – 27 – 12 = 69

68. (C) $\frac{105}{43}$

69. (D) A.T.Q,

Sum of the roots $(\alpha + \beta)$

= $5 + \sqrt{24} + 5 - \sqrt{24} = 10$

and, Product of the roots $(\alpha\beta)$

= $\left(5 + \sqrt{24}\right) \times \left(5 - \sqrt{24}\right) = 1$

Now,

Required equation $\Rightarrow x^2 - (\alpha + \beta)x + \alpha = 0$

$\Rightarrow x^2 - 10x + 1 = 0$

70. (A) A.T.Q,

$10^3 + 11^3 + 12^3 + \ldots\ldots\ldots\ldots + 25^3$

= (sum of the cube of first 25 natural numbers – (sum of the cube of first 9 natural numbers

= $\left(\frac{25 \times 26}{2}\right)^2 - \left(\frac{9 \times 10}{2}\right)^2$

= 105625 – 2025 = 103600

71. (C) Alchol Water

$$\begin{matrix}5 & 9 & |\times 1\\ 2 & 5 & |\times 2\end{matrix}$$

Now, New ratio is-

Alchol Water

$$1\begin{pmatrix}5 & 9\\ 4 & 10\end{pmatrix}$$

Here, mixture to be taken out = $\frac{1}{5}$

Now, $\frac{1}{5}$ units = 5 litre

Then, total quantity = 1 unit

= 5 × 5 = 25 litre

72. (D) $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\ \ldots\ldots\ldots\ +\ \frac{1}{240}$

$$=\left(1-\frac{1}{2}\right)+\left(\frac{1}{2}-\frac{1}{3}\right)+\left(\frac{1}{3}-\frac{1}{4}\right)+\ldots..\left(\frac{1}{15}-\frac{1}{16}\right)$$

$$= 1 - \frac{1}{16} = \frac{15}{16}$$

73. (A) A.T.Q,

$$\frac{(m+n)x+(a-b)}{(m-n)x+(a+b)}=\frac{(m+n)x+(c-d)}{(m-n)x+(c+d)}$$

$\Rightarrow (m^2- n^2)x + (m + n)(c + d)x + (a - b)(m - n)x + (a - b)(c + d)$

$= (m^2 - n^2)x + (m - n)(c - d)x + (m + n)(a + b)x + (a + b)(c - d)$

$\Rightarrow 2mdx + 2ncx + 2ad = 2anx + 2bmx + 2bc$

$$\Rightarrow x = \frac{ad-bc}{m(b-d)+n(a-c)}$$

74. (A) $\frac{(\cos 18^\circ-\cos 54^\circ)(\sin 84^\circ+\sin 36^\circ)}{(\cos 24^\circ-\cos 96^\circ)(\sin 42^\circ-\sin 6^\circ)}$

$$=\frac{(2\sin 36^\circ \sin 18^\circ)(2\sin 60^\circ \cos 24^\circ)}{(2\sin 60^\circ \sin 36^\circ)(2\cos 24^\circ \sin 18^\circ)}$$

= 1

75. (C) A.T.Q,

Sum of the roots $(\tan\alpha+\tan\beta) = \frac{-b}{a}$

and,

product of the roots $(\tan\alpha\tan\beta) = \frac{c}{a}$

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

Putting the respective values, we get

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

76. (B) A.T.Q,

$$\tan(A + B) = \frac{\tan A+\tan B}{1-\tan.\tan B}$$

$$= \frac{a+b+a-b}{1-(a+b)(a-b)}$$

$$= \frac{2a}{1-\left(a^2-b^2\right)} \ \ldots\ldots\ldots \text{(i)}$$

and, $\tan(A - B) = \frac{\tan A-\tan B}{1+\tan A.\tan B}$

$$= \frac{(a+b)-(a-b)}{1+(a+b)(a-b)} = \frac{2b}{1+\left(a^2-b^2\right)} \ \ldots. \text{(ii)}$$

Multiply equation (i) and (ii), we get

$\tan(A + B).\ \tan(A - B)$

$$= \frac{2a}{1-\left(a^2-b^2\right)} \times \frac{2b}{1+\left(a^2-b^2\right)}$$

$$= \frac{4ab}{1-\left(a^2-b^2\right)^2}$$

77. (A) A.T.Q,

Area of the church to be painted

= Area of four walls + C.S.A of hemisphere + (area of roof – area of circular part of hemisphere)

$= 4a^2 + 2\pi r^2 + a^2 - \pi r^2$

$= 5a^2 + \pi r^2$

Here, a = 28 cm

and, radius of hemisphere = $\frac{a}{2}$ = 14 cm

Then, required area

$= 5 \times 28 \times 28 + \frac{22}{7} \times 14 \times 14$ = 4536 m^2

Now,

cost of white wash = 15 × 4536 = ₹68040

78. (B) A.T.Q,

A	B	C
4000 × 3	6000 × 6	5000 × 8
+6000 × 9	+4000× 6	+15000 × 4
66000	56000	100000

The, Ratio of profit of A, B and C

= 33 : 28 : 50

And,

Total profit = ₹6750

and, the amount which C gets due to his continutiy = 100 × 12 = ₹1200

Now, profit to be shared among A, B and C = 6750 – 1200 = ₹5550

Here,

(33 + 28 + 50) units = ₹5550

$\Rightarrow$ 111 units = ₹5550

$\Rightarrow$ 1 unit = ₹50

Then, share of B = 28 units

= 28 × 50 = ₹1400

79. (B) Let the investments of the person be P_1, P_2 and P_3

A.T.Q,

$$P_1\left[\frac{r_1t_1}{100}+1\right] = P_2\left[\frac{r_2t_2}{100}+1\right] = P_3\left[\frac{r_3t_3}{100}+1\right]$$

$\Rightarrow P_1\left[\frac{6\times5}{100}+1\right]=P_2\left[\frac{8\times5}{100}+1\right]=P_3\left[\frac{10\times6}{100}+1\right]$

$\Rightarrow 13P_1 = 14P_2 = 16P_3$

Then,

$P_1 : P_2 : P_3 = 14 \times 16 : 13 \times 16 : 13 \times 14$

$= 112 : 104 : 91$

$\therefore$ Required ratio = 112 : 104 : 91

80. (A) A.T.Q,

CP	MP	SP	
4	5		×3
6		7	×2

Now, Ratio of CP, MP and SP

= 12 : 15 : 14

Then, discount percent

$= \frac{15-14}{15}\times100\%$

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

81. (B) A.T.Q,

$x = \frac{\sqrt{9}+\sqrt{7}}{\sqrt{9}-\sqrt{7}}$

$\Rightarrow x = \frac{\left(\sqrt{9}+\sqrt{7}\right)\left(\sqrt{9}+\sqrt{7}\right)}{\left(\sqrt{9}-\sqrt{7}\right)\left(\sqrt{9}+\sqrt{7}\right)}$

$\Rightarrow x = 8+\sqrt{63}$

and, $\frac{1}{x} = \frac{1}{8+\sqrt{63}} = 8-\sqrt{63}$

Then, $x+\frac{1}{x} = 8+\sqrt{63}+8-\sqrt{63} = 16$

Now, $\frac{x^2-6x+1}{2x} = \frac{x-6+\frac{1}{x}}{2}$

$= \frac{16-6}{2} = 5$

82. (C) Here,

$3^{50} = (3^5)^{10} = 243^{10}$,

$4^{40} = (4^4)^{10} = 256^{10}$,

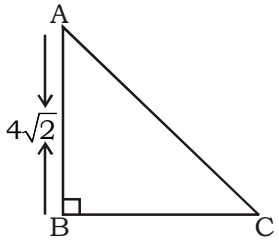
$5^{30} = (5^3)^{10} = 125^{10}$,

and,

$6^{20} = (6^4)^{10} = 36^{10}$,

$\therefore$ Greatest number = $256^{10} = 4^{40}$

83. (D) Let AC = x unit



Then, BC = $x-2$ unit

Using pythagoras, we get

$x^2-(x-2)^2 = \left(4\sqrt{2}\right)^2$

$\Rightarrow (x-x+2)(x+x-2) = 32$

$\Rightarrow x = 9$

Now,

$\sec A + \tan A = \frac{AC}{AB}+\frac{BC}{AB} = \frac{9+7}{4\sqrt{2}} = 2\sqrt{2}$

84. (A) A.T.Q,

$\frac{C.S.A}{T.S.A} = \frac{3}{4}$

$\Rightarrow \frac{2\pi rh}{2\pi r(h+r)} = \frac{3}{4}$

$\Rightarrow h = 3r$

Now, T.S.A of the cylinder = 1232 cm^2

$\Rightarrow 2\pi r(h+r) = 1232$

On putting $h = 3r$ and solving, we get

$r = 7$ cm

85. (A) A.T.Q,

$x = \sqrt[3]{a+\sqrt{a^2+b^3}} + \sqrt[3]{a-\sqrt{a^2+b^3}}$

On cubing both sides, we get

$x^3 = a+\sqrt{a^2+b^3}+a-\sqrt{a^2+b^3}+3\left(a^2-(a^2+b^3)\right)^{\frac{1}{3}}x$

$\Rightarrow x^3 = 2a-3bx$

$\Rightarrow x^3+3bx = 2a$

86. (B) Here, D, E and F are the midpoints of side AC, AB and BC respectively.

$\therefore$ BD is the median of ΔABC.

87. (A) A.T.Q,

$\frac{1}{x}:\frac{1}{y}:\frac{1}{z} = 3:4:5$

x : y : z = 20 : 15 : 12

88. (C) A.T.Q,

$x = \sqrt{3}+\sqrt{4}+\sqrt{5}$

$\Rightarrow x-2 = \sqrt{3}+\sqrt{5}$

Squaring both sides, we get

$x^2+4-4x = 3+5+2\sqrt{15}$

$\Rightarrow x^2-4-4x = 2\sqrt{15}$

Again squaring both sides, we get

$x^4+16x^2+16-8x^3+32x-8x^2 = 60$

$\Rightarrow x^4-8x^3+8x^2+32x = 44$

Multiply both sides by 3

$3x^4-24x^3+24x^2+96x = 132$

Now,

$3x^4-24x^3+28x^2+80x-148$

$= 132+4x^2-16x-148$

$= 132+4[4+2\sqrt{15}]-148 = 8\sqrt{15}$

89. (C) A.T.Q,

$(1+\sec40°+\cot50°)(1-\operatorname{cosec}40°+\tan50°)$

$= (1+\sec40°+\tan40°)(1-\operatorname{cosec}40°+\cot40°)$

$= \left(1+\frac{1}{\cos40°}+\frac{\sin40°}{\cos40°}\right)\left(1-\frac{1}{\sin40°}+\frac{\cos40°}{\sin40°}\right)$

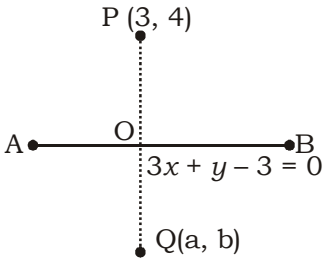
$= \frac{(1+\cos40°+\sin40°)(\sin40°-1+\cos40°)}{\cos40°.\sin40°}$

$= \frac{(\cos40°+\sin40°)^2-1}{\cos40°.\sin40°}$

$$= \frac{1+2\cos 40^\circ \sin 40^\circ - 1}{\cos 40^\circ \sin 40^\circ} = 2$$

$\therefore$ Required value = 2

90. (A) A.T.Q,



Equation of line AB is $3x + y - 3 = 0$.....(i)
Then, slope of line AB = – 3

and, slope of line PQ = $\frac{1}{3}$

($\because$ PQ $\perp$ AB)
Now, equation of line PQ is

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

$\Rightarrow 3y - 12 = x - 3$

$\Rightarrow x - 3y + 9 = 0$ ..... (ii)

Solving equation (i) and (ii). we get
$x = 0$ and $y = 3$
We know that
O(0, 3) is the mid point of PQ

Then, $0 = \frac{a+3}{2} \Rightarrow -3$

and, $3 = \frac{b+4}{2} \Rightarrow b = 2$

$\therefore$ Required point = (–3, 2)

91. (B) For 1997
100% = 42980,

$1\% = \frac{42980}{100}$,

For C

$10\% = \frac{42980}{100} \times 10$,

$= 4298$

For 1998
100% = 48640

$1\% = \frac{48640}{100}$

For D

$9\% = \frac{48640}{100} \times 9$

$= 4377.6$

92. (C) Change was maximum in B

$\frac{48640}{100} \times 10 - \frac{42980}{100} \times 6 = 2285.2$

93. (C) B in 1997 = $\frac{42980 \times 6}{100} = 2578.8$

B in 1998 = $\frac{48640 \times 10}{100} = 4864$

Difference = 4864 – 2578.8 = 2285

94. (B) D = 500

D% = $\frac{5000}{48640} \times 100 = 10.27$

95. (C) A in 1997 = $\frac{42980}{100} \times 20$

A in 1998 = $\frac{48640}{100} \times 22$

Required % = $\frac{\frac{48640 \times 22}{100}}{\frac{42980}{100} \times 20} \times 100$

$= \frac{945560}{859600} = 115$

96. (C) $\frac{150-125}{150} \times 100$

$= \frac{25}{150} \times 100 = 61.6\% \sim 16.3$

97. (D) P $\rightarrow 100 + 125 + 200 + 225 + 275 + 275 = 1200$
Q $\rightarrow 175 + 150 + 125 + 175 + 175 + 275 = 1025$

P	:	Q
1200	:	1025
$\Rightarrow$ 48	:	41

98. (C) $\frac{\text{Type Q (2010)}}{\text{Type P (2014)}} \times 100$

$\Rightarrow \frac{150}{275} \times 100 = 54.5$

99. (A) Average production (Type P) = 200
No. of years productions of type P is higher than average = 3

100. (C) $\frac{100+200}{150+225} \times 100 = \frac{300}{375} \times 100 = 80\%$

SSC TIER II (MATHS) MOCK TEST - 48 (ANSWER KEY)

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