SSC TIER II (MATHS) MOCK TEST - 36 (SOLUTION)

1. (C) $\frac{6}{7} = .85$, $\frac{7}{8} = .87$

$\frac{4}{5} = .8$ and $\frac{9}{11} = .81$

$\therefore \frac{4}{5}$ is the smallest fraction.

2. (A) Required remainder will be the remainder when 113 is divided by 37.

Now,

$113 = 37 \times 3 + 2$

$\therefore$ Required remainder = 2

3. (C) Let the three numbers be x, $x+10$ and $x+20$

A.T.Q,

$x + x + 10 + x + 20 = 225$

$\Rightarrow 3x + 30 = 225$

$\Rightarrow 3x = 195 \Rightarrow x = 65$

$\therefore$ Largest number

$= x + 20 = 65 + 20 = 85$

4. (B) Let the total number of friends be x.

Then,

$\frac{180}{x-3} - \frac{180}{x} = 5$

$\Rightarrow \frac{1}{x-3} - \frac{1}{x} = \frac{1}{36}$

On solving, we get $x = 12$

Then, numbers of friends who attended the picnic $= x - 3 = 12 - 3 = 9$

5. (C) Let the two numbers be x and y.

Then,

$x \times y = 12150$ ..... (i)

and, $\frac{x}{y} = \frac{3}{2}$ ..... (ii)

Put $x = 3a$ and $y = 2a$ in equation (i)

$\Rightarrow 3a \times 2a = 12150$

$\Rightarrow a^2 = 2025$

$\Rightarrow a = 45$

Now, Difference between two numbers

$= x - y = 3a - 2a = a = 45$

6. (B) Let the numbers be x and y.

A.T.Q,

$x^2 - y^2 = 36$

$\Rightarrow (x + y)(x - y) = 36$

Here, $36 = 1 \times 36$, 2×18, 3×12, 4×9 and 6×6

Only pair (2, 18) gives the natural values of x and y.

$\therefore$ Number of possible pairs = 1

7. (D) A.T.Q,

$57 \times 63 + 171 \times 27 + 114 \times 28$

$= 57 [63 + 3 \times 27 + 2 \times 28]$

$= 57 [63 + 81 + 56]$

$= 57 \times 200 = 11400$

8. (C) A.T.Q,

$3^x - 3^{x-1} = 1458$

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

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

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

$\Rightarrow 3^x = 2187$

$\Rightarrow 3^x = 3^7$

$\Rightarrow x = 7$

9. (B) A.T.Q,

$\begin{matrix} A + B \rightarrow 3 \\ C \rightarrow 12 \end{matrix} \Big) 12 \Big(\begin{matrix} 4 \\ 1 \end{matrix}$

Now,

Capacity of A = Capacity of B and C

On comparing, we get

Capacity of A = 2.5

and, capacity of B = 1.5

Then, time taken by B to do the work alone $= \frac{12}{1.5} = 8$ hours

10. (C) A.T.Q,

$\begin{matrix} A \rightarrow 15 \\ B \rightarrow 20 \\ C \rightarrow -30 \end{matrix} \Big) 60 \Big(\begin{matrix} 4 \\ 3 \\ -2 \end{matrix}$

Work done by A, B and C in 3 hours

$= 4 + 3 - 2 = 5$ units

Now, time taken to fill unit water 55

$= 3 \times 11 = 33$ hours

Next 4 units will be filled by A in one hour

and remaining 1 unit will be filled by B in $\frac{1}{3}$ hours.

$\therefore$ Total time taken

$= 33 + 1 + \frac{1}{3} = 34\frac{1}{3}$ hours

11. (B) A.T.Q,

$\begin{matrix} A \longrightarrow 10 \\ B \longrightarrow 15 \\ C \longrightarrow 20 \end{matrix} \Big) 60 \Big(\begin{matrix} 6 \\ 4 \\ 3 \end{matrix}$

Work done by A and C in 2 days
= (6 + 3) × 2 = 18 units
Now, total work = 60 + 18 = 78 units
Then, total time taken to finish the work

$= \frac{78}{6+4+3}$ = 6 days.

12. (C) Let the total profit be $2x$.
Now the amount which B gets
as allowance = 12 × 150 = ₹1800
Now,
The profit shared between A and B

$= \frac{2x-1800}{2} = x - 900$

Now, the amount which B pays to A

$= 50,000 \times \frac{10}{100}$ = ₹5000

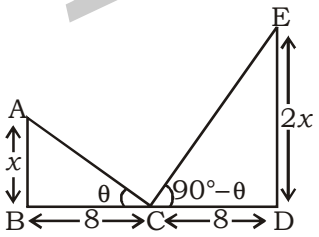
A.T.Q,

$\frac{x-900+5000}{x-900-5000+1800} = \frac{3}{2}$

$\Rightarrow \frac{x+4100}{x-4100} = \frac{3}{2}$

$\Rightarrow 2x + 2 \times 4100 = 3x - 3 \times 4100$
$\Rightarrow x = 5 \times 4100$
$\Rightarrow x = 20500$
Then,
Total profit
$= 2x = 2 \times 20500$ = ₹41000

13. (B) Let the height of the shorter building be x m.



Now, In Δ ABC,

$\tan\theta = \frac{x}{8}$ ..... (i)

and,
In Δ CDE

$\tan(90 - \theta) = \frac{2x}{8}$

$\Rightarrow \cot = \frac{2x}{8}$ ..... (ii)

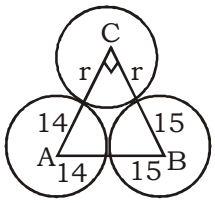
Multiply equation (i) and equation (ii)

$\tan\theta \times \cot\theta = \frac{x}{8} \times \frac{2x}{8}$

$\Rightarrow \frac{x^2}{32} = 1 \Rightarrow x = 4\sqrt{2}$ m

$\therefore$ Height of the shorter building = $4\sqrt{2}$ m

14. (B) Let the radius of the third circle by r.



Then,
In Δ ABC
$(14 + r)^2 + (15 + r)^2 = 29^2$
$\Rightarrow 196 + r^2 + 28r + 225 + r^2 + 30r = 841$
$\Rightarrow 2r^2 + 58r = 420$
$\Rightarrow r^2 + 29r - 210 = 0$
On solving, we get
r = 6
$\therefore$ Radius of the third circle = 6 cm

15. (C) A.T.Q,

	A	B	C	
Old Ratio	2	3	5	) 2
New Ratio	4	5	7	

Now, 2 units = 15
Then, total number of students before the increment of students
= (2 + 3 + 5) units

$= 10 \text{ units} = 10 \times \frac{15}{2} = 75$

16. (C) Let the original speed of the cyclist be x km/hr
Then,

$\frac{18}{x-4} - \frac{18}{x} = \frac{45}{60}$

$\Rightarrow \frac{1}{x-4} - \frac{1}{x} = \frac{1}{24}$

$\Rightarrow x(x - 4) = 96$
On solving, we get
x = 12 km/hr.

17. (B) A.T.Q,
Speed of train is 20% more than that of car.
Now,
Let speed of train be $6x$ and that of car be $5x$.
Then,

$\frac{240}{5x} - \frac{240}{6x} = \frac{40}{60}$

On solving, we get
$x = 12$
Then,
Speed of train = $6x = 6 \times 12$ = 72 km/h

18. (A) A.T.Q,

Cost	Qunatity	
10	4	×45
10	5	×36
20	9	×40

Now, cost price of 360 apples
= 45 × 10 + 36 × 10 = ₹810
and, selling price of 360 apples
= 20 × 40 = ₹800
Then, loss percentage

$$= \frac{810-800}{810}\times 100 = 1\frac{19}{81}\%$$

19. (C) A.T.Q,

A	B	A + B + C	
3	–	8	×9
–	2	9	×8

Now,
New Ratio becomes
A : B : A + B + C = 27 : 16 : 72
Here,
72 units = ₹75600
⇒ 1 unit = ₹1050
Then, share of C = 72 – (27 + 16)
= 29 units = 29 × 1050 = ₹30450

20. (A) A.T.Q,

$$6\frac{2}{3}\% \text{ loss} = \frac{1}{15}$$

Now,

CP	SP	Articles	
15	14	14×5	×3
–	1	3	×14×5

Here,
CP = 15 × 3 = ₹45
and, New SP = 14 × 5 × 1 = ₹70
Then, profit percentage

$$= \frac{70-45}{45}\times 100 = 55\frac{5}{9}\%$$

21. (D) A.T.Q,
Number of pages typed by A in one hour

$$= \frac{48}{3} = 16$$

and,
Number of pages typed by B in one hour

$$= \frac{30}{1.5} = 20$$

Now, Required time $= \frac{120}{16} + \frac{120}{16+20}$

$$= \frac{15}{2} + \frac{10}{3} = 10\frac{5}{6} \text{ hours}$$

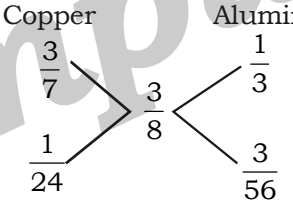
22. (C) A.T.Q,

CP	SP	Profit/loss	
20	23	+3	×17
20	17	–3	×23

Now, (23 × 17) units = ₹782
⇒ 1 unit = ₹2
The, total loss = 23 × 3 – 17 × 3
= 18 units = 18 × 2 = ₹36

23. (C) A.T.Q,
(V + P) × 24 = (V + P) × 8 + 32 V
⇒ 16(V + P) = 32V
⇒ V = P
Let time taken by Vipin to complete the work be x days
Then,
⇒ (V + P) × 24 = V × x
⇒ (1 + 1) × 24 = 1 × x
⇒ x = 48 days
∴ Time taken by Vipin to complete the work = 48 days

24. (C) A.T.Q,



Then,

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

25. (D) A.T.Q,
Ratio of three numbers is 6 : 3 : 1.
Let the numbers be $6x$, $3x$ and x respectively.
Now,
$6x + 3x + x = 3 \times 30$
⇒ x = 9
Then,
Difference between second and third number = $3x - x = 2x = 2 \times 9 = 18$

26. (B) Required time interval $= \frac{80-60}{80} \times 60$
= 15 minutes

27. (C) A.T.Q,
SP of both the articles = ₹5700
Then, CP of both articles

$$= 5700 \times \frac{100}{120} = ₹4750$$

Now, CP of chair $= \frac{7}{12} \times$ CP of table
⇒ 19 units = ₹4750
⇒ 1 unit = ₹250
Then, CP of chair = 7 units
= 7 × 250 = ₹1750

28. (A) A.T.Q,
Effective compound interest rate after paying tax = $10\% - \left(10 \times \frac{20}{100}\right)\% = 8\%$
Now,
Required amount = $P\left[1+\frac{r}{100}\right]^n$
$= 15625\left[1+\frac{8}{100}\right]^3 = ₹19683$

29. (C) Required rate of interest
$= \frac{27225-24750}{24750} \times 100$
$= \frac{2475}{24750} \times 100 = 10\%$

30. (C) A.T.Q,

	Ethanol	Water
I	3	4
II	1	2
III	6	5

Let quantity taken from third bottle be $11x$.
Then,
$3 \times 2 + 1 \times 2 + 6x$
$= 4 \times 2 + 2 \times 2 + 5x$
$\Rightarrow 6x + 8 = 5x + 12$
$\Rightarrow x = 4$
$\therefore$ Required quantity $= 11x$
$= 11 \times 4 = 44$ litres

31. (B) Let CP of the two articles be x and y respectively.
A.T.Q,
$\left(\frac{11x}{10}+\frac{13y}{10}\right) - \left(\frac{13x}{10}+\frac{11y}{10}\right) = 10$
$\Rightarrow \frac{2y}{10} - \frac{2x}{10} = 10$
$\Rightarrow y - x = 50$
$\therefore$ Difference between the CP of the articles = ₹50

32. (A) A.T.Q,

	tin	lead	zinc	copper	
I	3	2	1		×3
II		2	3	4	×2

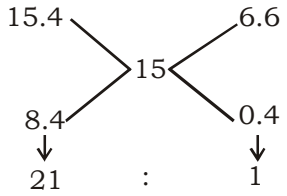
New Ratio becomes

tin	lead	zinc	copper
9	6	3	
	4	6	8
9	10	9	8

Then, weight of zinc per kg = 9 gm.
$= \frac{9}{9+10+9+8} \times 1000 = 250$ gm

33. (C) A.T.Q,
Total CP of the mobile
$= 7200 \times \frac{85}{100} \times \frac{90}{100} + 392$
$= ₹5900$
and, SP of the mobile = ₹6000
Then, Profit earned by Rohan
$= 6000 - 5900 = ₹100$

34. (B) A.T.Q,

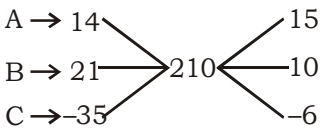


Now, 1 unit = 5 wickets
Then,
Total number of wickets before his last match = 21 units
$= 21 \times 5 = 105$

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

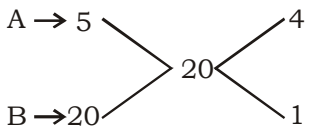
36. (B) A.T.Q,
Principal $= \frac{9.15 \times 100 \times 100 \times 100}{5 \times 5 \times (300+5)}$
$\Rightarrow$ Principal = ₹1200

37. (D) A.T.Q,



Now,
Work done by A and B and B and C in 2 days = (15 + 10) + (15 – 6)
= 34 units
Then,
Work done in 12 days = 34 × 6 = 204 units
and, time taken to complete remaining 6 units work
$= \frac{6}{25}$ days
$\therefore$ Total time taken
$= 12 + \frac{6}{25} = 12\frac{6}{25}$ days

38. (D) A.T.Q,



Time taken by A and B to fill the cistern

$= \frac{20}{4+1}$ = 4 hours

and, total time taken to fill the cistern
= 4 + 1 = 5 hours
Now, quantity of water leaked through pipe C = 5 × 5 – 20 = 5 units
Then, time taken by C to empty the cistern = $\frac{5}{5} \times 20$ = 20 hours

39. (C) A.T.Q,

$2^{x-1} + 2^{x+1} = 640$

$\Rightarrow 2^{x-1}[1+2^2] = 640$

$\Rightarrow 2^{x-1} = 128 = 2^7$

On comparing, we get

$x - 1 = 7$

$\Rightarrow x = 8$

40. (A) A.T.Q,

	upstream	downstream
Time	3	1
Speed	1	3

Then,

Speed of man in still water = $\frac{1+3}{2}$ = 2 units

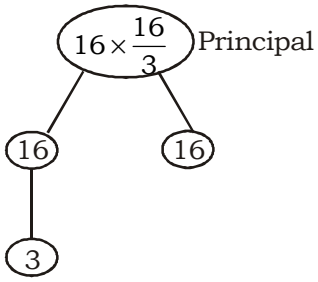
and, speed of current = $\frac{3-1}{2}$ = 1 unit

Now, speed of man (2 units) = $\frac{23}{3}$ kmph

Then, speed of current (1 unit)

$= \frac{23}{3} \times \frac{1}{2} = \frac{23}{6} = 3\frac{5}{6}$ kmph

41. (B) A.T.Q,



Here,
Compound interest for 2 years
= 16 + 16 + 3 = 35 units
and, simple interest = 16 + 16 = 32 units
Now,
35 units = ₹595

Then, 32 units = $\frac{595}{35} \times 32$ = ₹544

$\therefore$ Simple interest for 2 years = ₹544

42. (C) Let capacity of Vivek and Vipul of doing the work be A and B respectively.
Then,

$$\frac{A \times 20}{\frac{60}{100}} = \frac{(A+B) \times 10}{\frac{40}{100}}$$

$\Rightarrow 4A = 3A + 3B$

$\Rightarrow A = 3B$

$\Rightarrow \frac{A}{B} = \frac{3}{1}$

Now,
Let time taken by Vipul to complete the work be x days.
Now,

$$B \times x = \frac{A \times 20}{\frac{60}{100}}$$

$$\Rightarrow 1 \times x = \frac{3 \times 20 \times 100}{60}$$

$\Rightarrow x$ = 100 days

$\therefore$ Time taken by Vipul to complete the work = 100 days.

43. (C) Let the three digit 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

44. (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

45. (B) A.T.Q,

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

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

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

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

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

46. (A) A.T.Q,
Ratio of share of A, B and C

$$=\frac{1}{3}\times 60:\frac{1}{4}\times 60:\frac{1}{5}\times 60$$

= 20 : 15 : 12
Now,
(20 + 15 + 12) units = ₹1410
$\Rightarrow$ 47 units = 1410

Then, Share of B = $\frac{1410}{47}\times 15$ = ₹450

47. (B) A.T.Q,

	Red	Yellow	
Total	5	4	×10
Upper half	3	2	×9

New Ratio becomes

	Red	Yellow
Total	50	40
Upper half	27	18
lower half	23	22

Then,
Required ratio = 23 : 22

48. (A) Required percentage = $\frac{1.55-1.5}{1.5}\times 100$

$$=\frac{0.05}{1.5}\times 100=3\frac{1}{3}\%$$

49. (D) A.T.Q,

$$\text{Total CP of watch} = 800+800\times\frac{15}{100}=₹920$$

and,

$$\text{SP of the watch} = 920\times\frac{125}{100}=₹1150$$

Now,

$$\text{Discount} = 16\frac{2}{3}\% = \frac{1}{6}$$

Then,

$$\text{MP of the watch} = ₹1150\times\frac{6}{5}=₹1380$$

50. (C) Let the number be 300.

After increment of $33\frac{1}{3}\%$,

number = $300+300\times 33\frac{1}{3}\%=400$

Now,
Required decrement

$$=\frac{400-300}{400}\times 100=25\%$$

51. (C) A.T.Q,

Total length of the rope =105 × $2\pi r$
= 105 × 14 × 2π
It has to be circled around another cylinder.
Let number of rounds be *n*.
Then,
$n\times 2\pi\times 49=105\times 14\times 2\pi$
On solving, we get
n = 30
$\therefore$ Number of rounds = 30

52. (B) Let the number of spherical bullets be *n*.
Now,
Total volume of spherical balls must be equal to volume of rectangular block.

Then, $n\times\frac{4}{3}\times\frac{22}{7}\times(7)^3$

= 110cm × 50cm × 98cm
On solving, we get
n = 375
$\therefore$ Number of spherical balls = 375

53. (A) We Know that,

Volume of frustum = $\frac{\pi h}{3}(R^2+r^2+Rr)$

$$=\frac{22}{7}\times\frac{14}{3}[15^2+12^2+15\times 12]=8052\ \text{cm}^3$$

54. (D) A.T.Q,

$$\frac{\text{C.S.A}}{\text{T.S.A}}=\frac{2}{3}$$

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

$$\Rightarrow\frac{h}{h+r}=\frac{2}{3}$$

$\Rightarrow h \Rightarrow 2r$
Now,
T.S.A of the cylinder = 231
$\Rightarrow 2\pi r\times 3r=231$
On solving, we get

$r = \frac{7}{2}$ cm

and, $h = 2r = 7$ cm

Then, volume of the cylinder = $\pi r^2 h$

$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7 = 269.5 \text{ cm}^3$

55. (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,

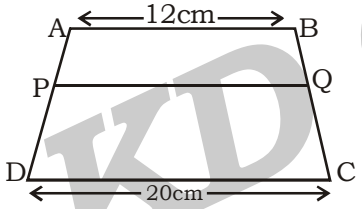
length of the field = $4 \times 200 = 800$ m

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

Then, area of the field = 800×600

$= 480000 \text{ m}^2 = 48$ hectare

56. (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

57. (A) We know that,

Area of the minor sector

$= \frac{1}{2} \times$ length of arc $\times$ radius $= \frac{1}{2} \times 28 \times 7$

$= 98 \text{ cm}^2$

58. (B) When a sphere is cut into eight equal parts, then surface area of one part

$= \frac{1}{8} \times$ (surface area of sphere) + 2× (area of semicircle)

$= \frac{1}{8} \times 4\pi r^2 + 2 \times \frac{\pi r^2}{2} = \frac{3\pi r^2}{2}$

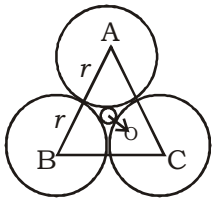
Then,

Ratio of surface area of one part to that of whole sphere

$= \frac{\frac{3\pi r^2}{2}}{4\pi r^2} = \frac{3}{8}$

$\therefore$ Required ratio = 3 : 8

59. (A) Here,



ABC is an equilateral triangle of sides 2r units each.

and, centre of the circle is the centroid of ΔABC.

Then,

$AO = \left(\frac{\sqrt{3}}{2} \times 2r\right) \times \frac{2}{3} = \frac{2\sqrt{3}}{3} r$ units

Now, radius of the smaller circle

$= \frac{2\sqrt{3}}{3} r - r = r\left(\frac{2}{\sqrt{3}} - 1\right)$ units

60. (C) A.T.Q,

Volume of the cube = 512 m^3

Then,

each side of the cube = $\sqrt[3]{512} = 8$ m

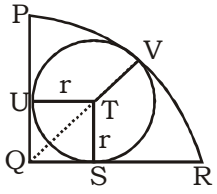
Now,

Total surface area of the cuboid

$= 2[lb + bh + hl]$

$= 2[24 \times 8 + 8 \times 8 + 8 \times 24] = 896 \text{ m}^2$

61. (A) Let the radius is the circle be r.



Then, QSTU is a square of side r units

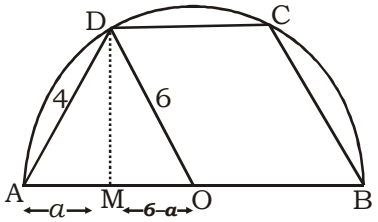
Now, QV = QT + TV

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

$\Rightarrow r = \frac{2}{\sqrt{2} + 1} = 2\left(\sqrt{2} - 1\right)$ units

$\therefore$ Radius of the circle = $2\left(\sqrt{2} - 1\right)$ units

62. (B) Let AM be a metre.



Then, OM = (6 – a) m

Now, using pythagoras

$6^2 - (6-a)^2 = 4^2 - a^2$

$\Rightarrow 36 - 36 - a^2 + 12a = 16 - a^2$

$\Rightarrow a = \frac{4}{3}$ m

Then,

length of CD = AB – 2a

$= 12 - 2 \times \frac{4}{3} = \frac{28}{3} = 9\frac{1}{3}$ m

63. (B) Let length, breadth and height of the cuboid be $4x$, $2x$ and x respectively.

Then, volume of the cuboid

$= 4x \times 2x \times x = 8x^3$

After changes, the dimensions of the cuboid becomes $2x$, $4x$ and $\frac{x}{2}$ respectively.

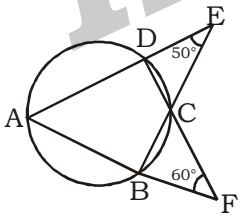
Then,

Volume of the cuboid = $2x \times 4x \times \frac{x}{2} = 4x^3$

$\therefore$ Required percentage change

$= \frac{8x^3 - 4x^3}{8x^3} \times 100\% = 50\%$

64. (A) A.T.Q,



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

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

65. (D) A.T.Q,

$x^2 - \sqrt{3}x - 1 = 0$

$\Rightarrow x - \frac{1}{x} = \sqrt{3}$ ..... (i)

We know that,

$\left(x + \frac{1}{x}\right)^2 - \left(x - \frac{1}{x}\right)^2 = 4$

Then,

$x + \frac{1}{x} = \sqrt{7}$ ..... (i)

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

$x^2 - \frac{1}{x^2} = \sqrt{21}$

Taking cube both sides, we get

$x^6 - \frac{1}{x^6} - 3\left(x^2 - \frac{1}{x^2}\right) = 21\sqrt{21}$

$\Rightarrow x^6 - \frac{1}{x^6} = 24\sqrt{21}$

66. (C) Given expression is the square of $x^2 + 2x + 5$

Now,

$(x^2 + 2x + 5)^2 = x^4 + 4x^2 + 25 + 4x^3 + 20x + 10x^2$

$= x^4 + 4x^3 + 14x^2 + 20x + 25$

On comparing, we get

$a = 14$ and $b = 20$

Then, $a + b = 14 + 20 = 34$

67. (A) A.T.Q,

$\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 5$

Applying Componendo and Dividendo method,

$\frac{\sin\theta}{\cos\theta} = \frac{5+1}{5-1}$

$\Rightarrow \tan\theta = \frac{3}{2}$

Now,

$\sin^4\theta - \cos^4\theta$

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

$= \frac{\tan^2\theta - 1}{\tan^2\theta + 1} = \frac{5}{13}$

68. (B) A.T.Q,

$2\tan^2 A + \tan^4 A = 1$

$\Rightarrow \tan^2 A (2 + \tan^2 A) = 1$

$\Rightarrow (\sec^2 A - 1)(\sec^2 A + 1) = 1$

$\Rightarrow \sec^4 A - 1 = 1$

$\Rightarrow \sec^4 A = 2$

69. (A) A.T.Q,

$\sec\theta + \tan\theta = P$ ..... (i)

Then, $\sec\theta - \tan\theta = \frac{1}{P}$ ..... (ii)

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

$2\sec\theta = P + \frac{1}{P}$

and, $2\tan\theta = P - \frac{1}{P}$

Now,

$\sin\theta = \frac{2\tan\theta}{2\sec\theta} = \frac{P^2-1}{P^2+1}$

and, $\cos\theta = \frac{1}{\sec\theta} = \frac{2P}{P^2+1}$

Then, $\sin\theta + \cos\theta = \frac{P^2-1+2P}{P^2+1}$

70. (B) A.T.Q,

$3\sin^2\theta \cdot \operatorname{cosec}\theta - 10 + 3\operatorname{cosec}\theta = 0$

$\Rightarrow 3\sin\theta - 10 + \frac{3}{\sin\theta} = 0$

$\Rightarrow 3\sin^2\theta - 10\sin\theta + 3 = 0$

$\Rightarrow 3\sin^2\theta - 9\sin\theta - \sin\theta + 3 = 0$

$\Rightarrow 3\sin\theta(\sin\theta - 3) - 1(\sin\theta - 3) = 0$

$\Rightarrow \sin\theta = 3$ or $\sin\theta = \frac{1}{3}$

As $\sin\theta = 3$ is not possible, so $\sin\theta = \frac{1}{3}$

$\Rightarrow \operatorname{cosec}\theta = 3$

Now, $\cot\theta = \sqrt{\operatorname{cosec}^2\theta - 1} = 2\sqrt{2}$

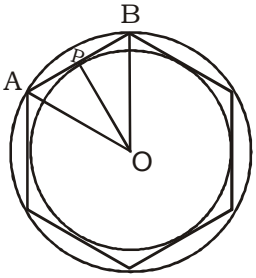
71. (B) A.T.Q,

$\sqrt{\frac{x-y}{x+y}} + \sqrt{\frac{x+y}{x-y}} = \frac{x-y+x+y}{\sqrt{x^2-y^2}}$

$= \frac{2x}{\sqrt{x^2-y^2}} = \frac{2}{\sqrt{1-\left(\frac{y}{x}\right)^2}} = \frac{2}{\sqrt{1-\cos^2\theta}}$

$= 2\operatorname{cosec}\theta$

72. (B) A.T.Q,



OA is the radius of circumscribed circle and OP is the radius of inscribed circle.

Then,

OA = 12 cm

and, $OP = 12 \times \frac{\sqrt{3}}{2} = 6\sqrt{3}$ cm

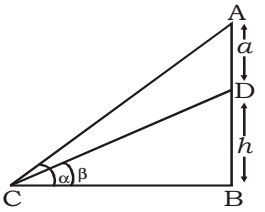
Now,

Required difference of areas

$= \pi(OA^2 - OP^2) = \pi\left(12^2 - \left(6\sqrt{3}\right)^2\right)$

$= 36\pi$ cm^2

73. (B) Let the height of the cliff b h m.



Now,

In ΔABC,

$BC = (a + h)\cot\alpha$ ..... (i)

and,

In ΔDBC

$BC = h\cot\beta$ ..... (ii)

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

$(a + h)\cot\alpha = h\cot\beta$

$\Rightarrow h = \frac{a\cot\alpha}{\cot\beta - \cot\alpha}$

$\therefore$ Height of the cliff $= \frac{a\cot\alpha}{\cot\beta - \cot\alpha}$

74. (D) Let the rise in the level of water in the tank be h m.

Then,

$\frac{22}{7} \times \left(\frac{21}{2}\right)^2 \times h = \left(\frac{60}{100\times100}\right) \times 11000 \times 7$

On solving, we get

$h = \frac{4}{3}$ m

75. (B) A.T.Q,

Each side of the rectangle with maximum area $= \frac{bh}{b+h}$

$= \frac{15\times21}{15+21} = \frac{35}{4}$ cm

Then, area of the rectangle $= \left(\frac{35}{4}\right)^2$

$= 76.5625$ sq. cm

76. (D) A.T.Q,

$x = 5 + 2\sqrt{6}$ .....(i)

Then,

$\frac{1}{x} = 5 - 2\sqrt{6}$ .....(ii)

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

$x - \frac{1}{x} = 4\sqrt{6}$

Cubing Both sides, we get

$x^3 - \frac{1}{x^3} - 3\left(x - \frac{1}{x}\right) = 384\sqrt{6}$

$\Rightarrow x^3 - \frac{1}{x^3} = 384\sqrt{6} + 12\sqrt{6} = 396\sqrt{6}$

77. (C) A.T.Q,

$$\frac{1}{1+a^{a-b}} + \frac{1}{1+a^{b-a}}$$

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

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

78. (C) A.T.Q,

$x + y = 2\sqrt{2}$

and,

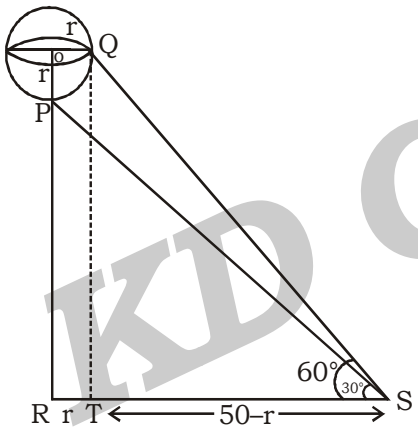
$$xy = \left(\sqrt{2}\right)^2 - \left(\frac{1}{\sqrt{2}}\right)^2 = \frac{3}{2}$$

Now,

$x^2 + y^2 + 4xy = (x + y)^2 + 2xy$

$$= \left(2\sqrt{2}\right)^2 + 2 \times \frac{3}{2} = 8 + 3 = 11$$

79. (C) A.T.Q,



In Δ PRS,

$$\tan 30° = \frac{PR}{RS}$$

$$\Rightarrow PR = \frac{50}{\sqrt{3}}\ m$$

and, In Δ QTS,

$$\tan 60° = \frac{QT}{TS}$$

$$\Rightarrow \sqrt{3} = \frac{\frac{50}{\sqrt{3}} + r}{50 - r}$$

$$\Rightarrow \sqrt{3}(50 - r) = \frac{50 + \sqrt{3}r}{\sqrt{3}}$$

$$\Rightarrow (150 - 3r) = 50 + \sqrt{3}r$$

$$\Rightarrow r = \frac{100}{3+\sqrt{3}} = 50\left(1 - \frac{1}{\sqrt{3}}\right)m$$

$$\therefore \text{Radius of the sphere} = 50\left(1 - \frac{1}{\sqrt{3}}\right)m$$

$$1 + \tan A \cdot \tan\frac{A}{2}$$

$$= 1 + \frac{2\tan\frac{A}{2}}{1-\tan^2\frac{A}{2}} . \tan\frac{A}{2}$$

$$= \frac{1-\tan^2\frac{A}{2}+2\tan^2\frac{A}{2}}{1-\tan^2\frac{A}{2}}$$

$$= \frac{1+\tan^2\frac{A}{2}}{1-\tan^2\frac{A}{2}} = \frac{1}{\cos A} = \sec A$$

81. (D) A.T.Q,

$x^4 - x^2 + 1 = 0$

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

Cubing both sides, we get

$$x^6 + \frac{1}{x^6} + 3 \times x^2 \times \frac{1}{x^2}\left(x^2 + \frac{1}{x^2}\right) = 1$$

$$\Rightarrow x^6 + \frac{1}{x^6} = 1 - 3$$

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

Here, $x^6 = -1$

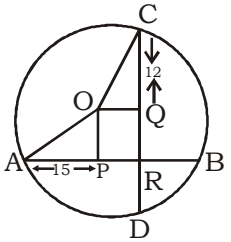
Now,

$x^{24} - x^{18} + x^{12} - x^6 + 1$

$= (x^6)^4 - (x^6)^3 + (x^6)^2 + x^6 + 1$

$= 1 - (-1) + 1 - (-1) + 1 = 5$

82. (A) A.T.Q,



OA and OC are the radius of the circle

Now,

$OQ^2 = 17^2 - 12^2 = 145$

and,

$OP^2 = 17^2 - 15^2 = 64$

Then,

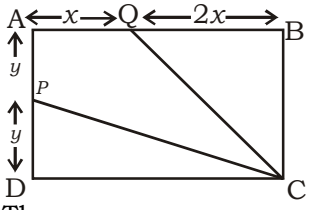
$OR = \sqrt{OP^2 + OQ^2}$

$= \sqrt{145 + 64}$

$= \sqrt{209}$ cm

$\therefore$ Required distance = $\sqrt{209}$ cm

83. (B) Let length of side AB be $3x$ cm and that of AD be $2y$ cm



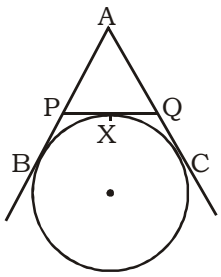
Then,
Area of AQCP = ar(ABCD) – [ar(QBC) + ar(PDC)

$\Rightarrow 25 = 3x \times 2y - \left[\frac{1}{2} \times 2x \times 2y + \frac{1}{2} \times y \times 3x\right]$

$\Rightarrow 25 = 6xy - \frac{7xy}{2}$

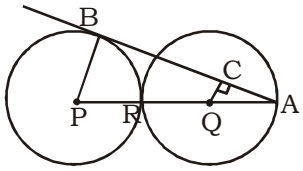
On solving, we get $xy = 10$
Now,
area of ABCD = $3x \times 2y$
= $6xy = 6 \times 10 = 60$ cm^2

84. (B) A.T.Q,



PB = PX
and QC = QX
Now,
Perimeter of ΔAPQ
= AP + PQ + AQ
= AP + PX + QX + AQ
= AP + PB + QC + AQ
= AB + AC
= 10 + 10 = 20 cm

85. (C) A.T.Q,



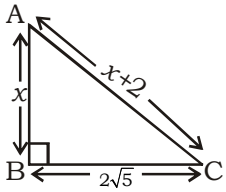
QC is perpendicular to AB.
and,
We know that radius of the circle makes right angle with tangent.
$\therefore$ PB $\perp$ AB
Now,
ΔABP $\sim \Delta$ACQ
Then,

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

$\therefore$ Required ratio = 3 : 1

86. (C) (1 + cotA – cosecA) (1 + tanA + secA)
Put $\theta = 45°$
= (1+ cot45° – cosec45°) (1+tan45° + sec45°)
= $(1 + 1 - \sqrt{2})(1 + 1 + \sqrt{2})$
= $(2 - \sqrt{2})(2 + \sqrt{2}) = 2$

87. (A) Let AB be x units

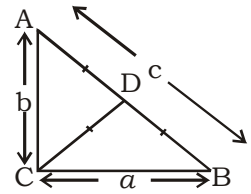


Then, length of AC = $(x + 2)$ units
Now,
Using pythagoras
$(x + 2)^2 - x^2 = (2\sqrt{5})^2$
$\Rightarrow (x + 2 + x)(x + 2 - x) = 20$
$\Rightarrow (2x + 2) = 10$
$\Rightarrow x = 4$ units
Then,

$\sec C + \tan C = \frac{AC}{BC} + \frac{AB}{BC}$

$= \frac{2x+2}{2\sqrt{5}} = \frac{10}{2\sqrt{5}} = \sqrt{5}$ units

88. (D) We know that,

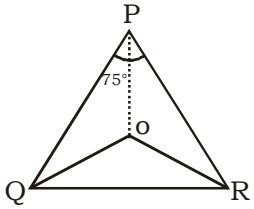


Circumradius of a right angle triangle is equal to half of its hypotenuse.
Then,
c = 52 × 2 = 104 cm
Now,
perimeter of ABC = 112 × 2
$\Rightarrow$ a + b + c = 224 cm
$\Rightarrow$ a + b = 120 cm
and,
$(a + b)^2 = 120^2$
$\Rightarrow a^2 + b^2 + 2ab = 120^2$
$\Rightarrow 2ab = 120^2 - c^2$
$\Rightarrow 2ab = 120^2 - 104^2$
$\Rightarrow 2ab = 16 \times 224$
Then,

Area of ABC = $\frac{1}{2}ab$

$= \frac{16 \times 224}{4} = 896$ cm^2

89. (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, $\angle PRO = \angle OPR$

$\therefore \angle OPR = 65°$

90. (B) A.T.Q,

$4x + \frac{12}{x} = 19$

$\Rightarrow 4x^2 - 19x + 12 = 0$

$\Rightarrow 4x^2 - 16x - 3x + 12 = 0$

$\Rightarrow 4x(x-4) - 3(x-4) = 0$

$\Rightarrow x = 4$ and $x = \frac{3}{4}$

Now,

$x^2 + \frac{1}{x^2} = 4^2 + \frac{1}{4^2} = \frac{257}{16}$

and, $x^2 + \frac{1}{x^2} = \left(\frac{3}{4}\right)^2 + \left(\frac{4}{3}\right)^2$

$= \frac{9}{16} + \frac{16}{9} = \frac{337}{144}$

$\therefore$ Minimum value of $x^2 + \frac{1}{x^2} = \frac{337}{144}$

91. (B) A.T.Q,

$2[2016^2 - 2015^2 + 2014^2 - 2013^2 + \ldots\ldots + 2^2 - 1^2]$

$= 2[(2016 + 2015)(2016 - 2015) + (2014 + 2013)(2014 - 2013) \ldots\ldots (2 + 1)(2 - 1)$

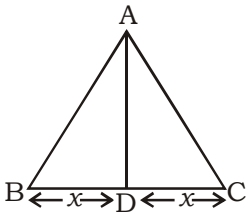
$= 2[2016 + 2015 + 2014 + 2013 + \ldots\ldots + 1]$

$= 2 \times \frac{2016 \times 2017}{2} = 2016 \times 2017$

Now, $2016 \times 2017 = 2016^2 + 2016$

$\therefore$ The number which must be subtracted to make it a perfect square = 2016

92. (A) Let the length of side BC be $2x$ cm.



Then,

Length of AC and AB = $2x \times \frac{5}{8} = \frac{5x}{4}$

Perimeter of the triangle = 54 cm

$\Rightarrow 2x + \frac{5x}{4} + \frac{5x}{4} = 54$

On solving, we get

$x = 12$

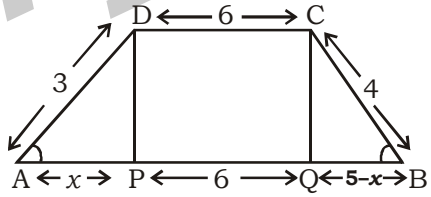
Now, length of side AC = $\frac{5x}{4} = 15$cm

and, AD = $\sqrt{15^2 - 12^2} = 9$ cm

Then, Area of ABC = $\frac{1}{2} \times BC \times AD$

$= \frac{1}{2} \times 2 \times 12 \times 9 = 108$ cm^2

93. (B) Let the length of AP be x.



Then, QB = 11 – (AP + PQ)

= 11 – (x + 6) = 5 – x

Now,

$3^2 - x^2 = 4^2 - (5 - x^2)$

$\Rightarrow 9 - x^2 = 16 - 25 - x^2 + 10x$

$\Rightarrow 10x = 18$

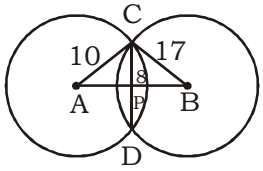
$\Rightarrow x = 1.8$

Then,

Distance between AB and CD = $\sqrt{3^2 - x^2}$

= $\sqrt{3^2 - 1.8^2}$ = 2.4 cm

94. (D) A.T.Q,



Radii of the two circles are 10 cm and 17 cm

respectively and CP = $\frac{16}{2}$ = 8 cm

Now,

Using pythagoras, we get

AP = $\sqrt{10^2 - 8^2}$ = 6 cm

and PB = $\sqrt{17^2 - 8^2}$ = 15

Then, Distance between the centres (AB) = 6 + 15 = 21 cm

95. (C) We know that,
length of the traverse common tangent

$(l) = \sqrt{d^2 - (r_1 + r_2)^2}$

Now,

$17 = \sqrt{d^2 - (5+12)^2}$

$\Rightarrow d^2 = 17^2 + 17^2$

$\Rightarrow d = 17\sqrt{2}$

Then,
Distance between the centres of the circles = $17\sqrt{2}$ cm

96. (A) Number of students studying Science from institute D

$= 17 \times \frac{5400}{100} = 918$

and, Number of students studying Commerce from institute B

$= 16 \times \frac{4500}{100} = 720$

Then,
Required ratio = 918 : 720 = 51 : 40

97. (A) Number of students studying Science from instititue E

$= \frac{5400}{100} \times 9 = 486$

and, Number of students studying Commerce from institute D

$= \frac{4500}{100} \times 21 = 945$

Then,
Total students = 486 + 945 = 1431

98. (D) Number of students studying Science from instititue B

$= \frac{5400}{100} \times 11 = 594$

Then, Number of students studying Commerce from institute B

$= \frac{4500}{100} \times 16 = 720$

Then,
Total students = 594 + 720 = 1314

99. (D) Required ratio = $\frac{5400}{100} \times 15 : \frac{4500}{100} \times 7$
= 18 : 7

100. (B) Total number of students studying Commerce from institute B and D

$= \frac{4500}{100} \times (16 + 21) = 1665$

SSC TIER II (MATHS) MOCK TEST - 36 (ANSWER KEY)

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

Note:- If your opinion differs regarding any answer, please message the mock test and question number to 8860330003

Note:- Whatsapp with Mock Test No. and Question No. at 7053606571 for any of the doubts, also share your suggestions and experience of Sunday Mock

Note:- If you face any problem regarding result or marks scored, please contact 9313111777