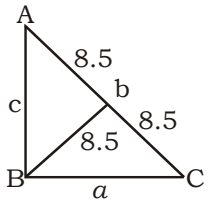
# MATHS (TIER II) MOCK TEST-38 (SOLUTION)

1. (C) Circumradius (R) = 8.5 cm




In-radius (r) = 3 cm
we have,
Hypotnuse (AC) = 2 × R
= 2 × 8.5 = 17 cm
And,

$$r = \frac{a+c-b}{2}$$

$$\Rightarrow 3 = \frac{a+c-17}{2}$$

$\Rightarrow 6 = a + c - 17$
$\Rightarrow a + c = 23$
we know that the triplet (8, 15, 17)
So,
a = 8, c = 15, b = 17

$$\therefore \text{Area of } \Delta ABC = \frac{1}{2} \times a \times c$$

$$= \frac{1}{2} \times 8 \times 15 = 60 \text{ cm}^2$$

2. (A) Let the maximum marks = $x$

$$\text{Pass marks} = x \times \frac{20}{100} + 20 = \frac{x}{5} + 20$$

$$\text{IInd student get} = x \times 49\% = x \times \frac{49}{100}$$

Now,

$$\left(\frac{x}{5}+20\right) \times \frac{100+22.5}{100} = x \times \frac{49}{100}$$

$$\Rightarrow \left(\frac{x}{5}+20\right) \times \frac{122.5}{100} = \frac{x+49}{100}$$

$\Rightarrow x + 100 = 2x$
$\Rightarrow 2x - x = 100$
$\Rightarrow x = 100$

3. (C) Let the salary = ₹100
We have,

$$12\frac{1}{2}\% = \frac{1}{8}$$

$$= 20\% = \frac{1}{5}$$

$$= 33\frac{1}{3}\% = \frac{1}{3}$$

$$\text{Final salary of deepak} = 100 \times \frac{9}{8} \times \frac{6}{5} \times \frac{4}{3}$$

$$= ₹180$$

$$\text{So, overall increase} = \frac{180-100}{100} = 80\%$$

4. (A) Taking options
707281 is square of certain number.

$$\sqrt{707281} = 841 = 29 \times 29$$

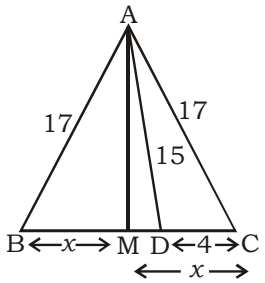
And also 29 is a factor of 841
So, opiton (A) is the right answer.

5. (B) HCF of $11^{-9}$, $11^{-13}$, $11^{-15}$, $11^{-4}$,

$$= \text{HCF of } \frac{1}{11^9}, \frac{1}{11^{13}}, \frac{1}{11^{15}}, \frac{1}{11^4}$$

$$= \frac{\text{H.C.F of } 1,1,1,1}{\text{L.C.M of } 11^9, 11^{13}, 11^{15}, 11^4} = \frac{1}{11^{15}} = 11^{-15}$$

6. (B) A.T.Q,




In $\Delta ABC$,
AB = AC = 17 cm
DC = 4 cm, AD = 15 cm
Let M is the midpoint of BC. And BM = $x$
So, BM = MC = $x$ *cm,* MD = (x – 4) cm
In $\Delta ABM$, $AM^2 = AB^2 - MB^2$

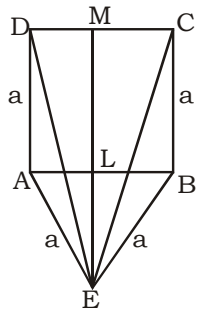
$$\Rightarrow AM = \sqrt{289 - x^2}$$

Now, In $\Delta AMD$,
$AD^2 = AM^2 + MD^2$

$$\Rightarrow 15^2 = \left(\sqrt{289 - x^2}\right) + (x-4)^2$$

$\Rightarrow 225 = 289 - x^2 + x^2 + 16 - 8x$
$\Rightarrow 8x = 305 - 225$
$\Rightarrow 8x = 80$
$\Rightarrow x = 10$, MD = 10 – 4 = 6
So, BD = DM + MD = 10 + 6 = 16 cm

7. (D) A.T.Q,




In given figure, a is the side of square ABCD and equilateral $\Delta$ABE.

Height of $\Delta$ABE

$(EL) = a \times \frac{\sqrt{3}}{2}$

So, ME = a + $a \times \frac{\sqrt{3}}{2} = a\left(\frac{2+\sqrt{3}}{2}\right)$

Area of $\Delta EDC = \frac{1}{2} \times a \times a\left(\frac{2+\sqrt{3}}{2}\right)$

Area of $\Delta ADE = \frac{1}{2} \times DA \times AE \times \sin(90° + 60°)$

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

Hence,

$\frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta EDC}$

$= \frac{\frac{1}{2} \times a \times a \times \frac{1}{2}}{\frac{1}{2} \times a \times a \times \left(\frac{2+\sqrt{3}}{2}\right)} = \frac{1}{2+\sqrt{3}}$

8. (D) Given that,

$x = a + l,\ y = b + l,\quad z = c + l$

Now,

$x - y = a + l - b - l$

$\Rightarrow x - y = a - b$

Similarly,

$y - z = b - c$

$z - x = c - a$

So,

$\frac{x^2 + y^2 + z^2 - xy - yz - zx}{a^2 + b^2 + c^2 - ab - ab - bc - ca}$

$= \frac{\frac{1}{2}\left[(x-y)^2 + (y-z)^2 (z-x)^2\right]}{\frac{1}{2}\left[(a-b)^2 + (b-c)^2 + (c-a)^2\right]}$

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

9. (C) Least number which is divisble by 5, 6, 7 and 8 = 5 × 3 × 7 × 8 = 840

So,

the number which give remainder 3 when divided by 5, 6, 7 and 8 is $(840n + 3)$

If this number is divided by 9

$= \frac{840n+3}{9} = \frac{837n+3n+3}{9}$

Now,

we take $3n + 3$, put value of $n$

$n = 1,\ 3 \times 1 + 3 = 6$

$n = 2,\ 3 \times 2 + 3 = 9$

So,

Required number is = 840 × 2 + 3

= 1680 + 3 = 1683

Sum of digits of number = 1 + 6 + 8 + 3 = 18

10. (C) Total students = 1554

Number of boys = $1554 \times \frac{4}{7} = 888$

Number of Girls = $1554 \times \frac{3}{7} = 666$

Let the number of boys who left the school is $x$.

$\frac{888 - x}{666 + 30} = \frac{7}{6}$

$\Rightarrow (888 - x) \times 6 = 696 \times 7$

$\Rightarrow 5328 - 6x = 4872$

$\Rightarrow 6x = 5328 - 4872$

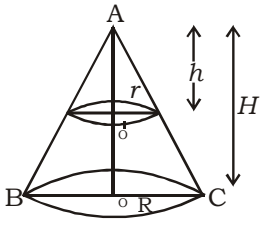
$\Rightarrow 6x = 456$

$\Rightarrow x = 76$

11. (A) Ratio of the volume of these cones

$\frac{V_1}{V_2} = \frac{1}{2}$

We know that,




$\left(\frac{h}{H}\right)^3 = \frac{V^1}{V_2} \Rightarrow \frac{h}{H} = \left(\frac{1}{2}\right)^{\frac{1}{3}}$

$\Rightarrow h : H = 1 : \sqrt[3]{2}$

Now,

$H - h = \sqrt[3]{2} - 1$

So,

Ratio AO' and OO' = $1 : \sqrt[3]{2} - 1$

12. (C) Given,
$x = 101$
$y = 99$
Now,

$$\frac{x^3 - y^3}{x^2 - y^2} - \frac{3xy}{x+y}$$

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

$$= \frac{x^2+y^2+xy-3xy}{x+y}$$

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

$$= \frac{(x-y)^2}{x+y} = \frac{(101-99)^2}{101+99}$$

$$= \frac{4}{200} = \frac{1}{50}$$

13. (B) $9.4\bar{1} + 0.\bar{7} + 0.00\bar{1}$
$= 9.411..... + 0.777 ..... + 0.001...$
$= 10.189... = 10.18\bar{9}$

14. (D) Given,
$12M \times 10 = 20W \times 12$

$$\frac{M}{W} = \frac{2}{1}$$

Now,
$(8M + 4W) \times 9 + (8M + 14w) \times x = 12M \times 10$
$\Rightarrow (8\times2+4\times1)\times9+(8\times2+14\times1)\times x = 12\times2\times10$
$\Rightarrow 180 + 30x = 240$
$\Rightarrow 30x = 60$
$\Rightarrow x = 2$ days

15. (B) Given that P, Q, R and S are in geometric progression
And,

$$R = (P + Q) \times \frac{\left(100 - \frac{275}{9}\right)}{100}$$

$$\Rightarrow \frac{R}{P+Q} = \frac{625}{900}$$

$$\Rightarrow \frac{R}{P+Q} = \frac{25}{36}$$

PQRS
1620 25
$r = \frac{5}{4}$,
So,

$$S = 25 \times \frac{5}{4} = \frac{125}{4}$$

Required percentage

$$= \frac{\frac{125}{4} - 20}{20} \times 100\%$$

$$= \frac{45}{4\times20} \times 100 = 56.25\%$$

16. (B) $S_{max} - s_{actual}\ \alpha\sqrt{n}$
and, $S_{max} - s_{actual} = k\sqrt{n}$
Now, $60 - 48 = k\sqrt{36}$
$\Rightarrow 12 = k \times 6$
$\Rightarrow k = 2$
Now,
$s_{act} = 0$
$\Rightarrow 60 - 0 = 2\sqrt{n}$
$\Rightarrow 60 = 2\sqrt{n}$
$\Rightarrow n = 900$
So, maximum number of wagons will be 899.

17. (B) $a + b + c = 11$, $ab + bc + ca = 20$
$a^3 + b^3 + c^3 - 3abc = (a + b + c)$
$(a^2 + b^2 + c^2 - ab - bc - ca)$
$= (a + b + c)\,[(a + b + c)^2 - 3(ab + bc + ca)]$
$= 11[121 - 60] = 11 \times 61 = 671$

18. (D) Volume of ditch = $l \times b \times h$
$= (48 \times 16.5 \times 4)\ m^3$
Volume of cylinder = $\pi r^2 \times h$

$$= \frac{22}{7} \times 2 \times 2 \times 56 = (22 \times 4 \times 8)\ m^3$$

$$\text{Required fraction} = \frac{22\times4\times8}{48\times16.5\times4} = \frac{2}{9}$$

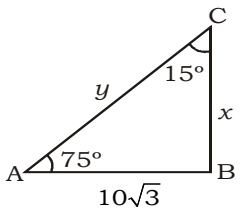
19. (C) $\text{Average area} = \frac{\text{Total area}}{\text{number of squares}}$

$$= \frac{1^2 + 2^2 + 3^2 + 4^2 + .....n^2}{n}$$

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

$$= \frac{(n+1)}{2}\frac{(2n+1)}{3}$$

20. (C)



Let height of telegram post = $x + y$

$\tan 75° = \dfrac{x}{10\sqrt{3}}$

$\Rightarrow \dfrac{\sqrt{3}+1}{\sqrt{3}-1} = \dfrac{x}{10\sqrt{3}}$

$\Rightarrow 2+\sqrt{3} = \dfrac{x}{10\sqrt{3}}$

$\Rightarrow x = 20\sqrt{3} + 30 = 20 \times 1.732 + 30$

$= 64.64$m

Now, $\cos 75° = \dfrac{10\sqrt{3}}{y}$

$\Rightarrow \dfrac{\sqrt{3}-1}{2\sqrt{2}} = \dfrac{10\sqrt{3}}{y}$

$\Rightarrow y = \dfrac{20\sqrt{6}}{\sqrt{3}-1}$

$\Rightarrow y = \dfrac{20 \times 2.45}{1.732-1}$

$\Rightarrow y = \dfrac{20 \times 2.45}{.732}$

$\Rightarrow y = 66.94$ m

Now, height of poll = 64.64 + 66.94

$= 131.58\ m = 132\ m$ (Approx)

21. (A) $\dfrac{x^2+y^2+z^2-64}{xy-yz-zx} = -2$

$\Rightarrow x^2 + y^2 + z^2 - 64 = -2xy + 2yz + 2zx$

$\Rightarrow x^2 + y^2 + z^2 + 2xy - 2yz - 2zx = 64$

$\Rightarrow (x + y - z)^2 = 8^2$

$\Rightarrow x + y - z = 8$

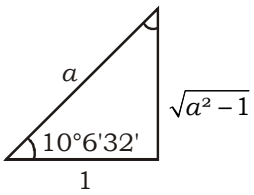
$\Rightarrow x + y = 8 + z$ ...(i)

and, also given $x + y = 3z$ ...(ii)

$\therefore 8 + z = 3z$

$\Rightarrow 2z = 8 \Rightarrow z = 4$

22. (C)




$\cos(10°6'32'') = \dfrac{1}{a}$

$\sin(79°53'28'') + \tan(10°6'32'')$

$= \cos(10°1'32'') + \dfrac{\sqrt{a^2-1}}{1}$

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

23. (A) 64 × volume of bucket = $\dfrac{2}{3}$ × volume of tank.

volume of bucket = $\dfrac{2}{3} \times \dfrac{(2.4)^3}{64}$ m$^3$

$= 144 \times 1000$ cm$^3$ = 144 litre

24. (C) $4a^2 + 9b^2 + 12a - 24b + 25$

$= (2a)^2 + 2\times 2a \times 3 + 9 + (3b)^2 - 2 \times 3b \times 4 + 16$

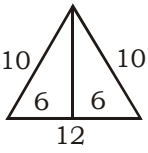
$= (2a + 3)^2 + (3b - 4)^2$

= A + B (say)

A & B are the perfect squares so minimum value of A & B = 0

so, minimum value of given expression = 0

25. (B)




Given triangle is an isosceles triangle

so, height of this triangle = $\sqrt{10^2 - 6^2}$

= 8

this perpendicular from the top will pass through the diametrically opposite points of each circle. Therefore, the length of the perpendicular will be same as the sum of all the diameters.

so, circumference of all circles

= π × diameter

= π × 8

= 8π

26. (C) Let the expenditure of Ram = 400

then the savings of Ram = 100

| Income | – Saving | = Expenditure |
|---|---|---|
| 500 | – 100 | = 400 |
| +20% ( | | ) +12% ( ) +88 |
| 600 | – 112 | = 488 |

% increase in expenditure = $\dfrac{88}{400} \times 100$

= 22%

27. (A) P → 48 h (4) → 192 total capacity of tank

Q → 64 h (3) →

Water filled by pipe Q in 32 hour

= 32 × 3 = 96 units

Remaining water = 192 – 96 = 96 unit

$\therefore$ Required time = $\dfrac{96}{4}$ = 24 hours

28. (A) Present average age of family (8members)
= 18 + 2 = 20 years
total age of the 8 members = 20 × 8
= 160 years
after addition of baby average age
= 18 years
total age of these 9 members = 18 × 9
= 162 years
Age of child = 162 – 160
= 2 years

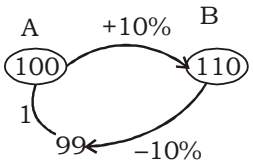
29. (B) Let the age of A after 15 years = $2x$
So, age of his son = $x$
5 years ago,
Age of A = 4 × age of his son
$\Rightarrow 2x - 20 = 4(x - 20)$
$\Rightarrow 2x - 20 = 4x - 80$
$\Rightarrow x = 30$
Now, the present age of A = 2 × 30 – 15
= 45 Years.

30. (A) Discount given by dealer

$$= \left(30 + 20 - \frac{30 \times 20}{100}\right)\% = 44\%$$

So, the customer got less what he expected.

31. (D) Let cost price of an article = 100




total profit to A = 11
profit % = 11%

32. (D) Given that

$$\frac{a}{b} = \frac{b}{c}$$

$\Rightarrow b^2 = ac$

Now, $\frac{a^4}{b^4} = \frac{a^4}{(ac)^2}$

$\Rightarrow \frac{a^4}{b^4} = \frac{a^2}{c^2}$

$\Rightarrow a^4 : b^4 = a^2 : c^2$

33. (B) $\frac{(3)^{102.4} \times (243)^{5.3}}{3^{107.4} \times 3^{13.5}}$

$= 3^{102.4+26.5-107.4-13.5} = 3^8 = 6561$

34. (B) $\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + \ldots + \frac{1}{100\times101}$

$= 1 - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \ldots \frac{1}{100} - \frac{1}{101}$

$= 1 - \frac{1}{101} = \frac{100}{101}$

35. (D) $\frac{\sqrt{7}}{\sqrt{\left(3+\sqrt{7}\right)^2} - \sqrt{\left(3-\sqrt{7}\right)^2}}$

$= \frac{\sqrt{7}}{3+\sqrt{7}-3+\sqrt{7}} = \frac{\sqrt{7}}{2\sqrt{7}} = \frac{1}{2}$

36. (C) Distance = $\frac{s_1 \times s_2}{(s_1 - s_2)}$ × time

$= \frac{40\times96}{(96-40)} \times \left(2 + \frac{6}{60}\right) = \frac{40\times96}{56} \times \frac{21}{10}$

= 144 km

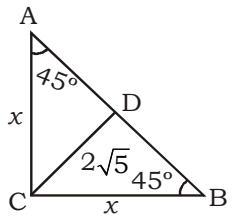
37. (A) cot

$41^\circ\left(\cot 49^\circ . \cos^2 33^\circ + \frac{1}{\tan 49^\circ . \sec^2 57^\circ}\right)$

$= \cot 41^\circ . \cot 49^\circ . \cos^2 33^\circ + \frac{\cot 41^\circ}{\cot 41^\circ . \sec^2 57^\circ}$

$= \cos^2 33^\circ + \cos^2 57^\circ$
$= \cos^2 33^\circ + \sin^2 33^\circ = 1$

38. (B)




In isocoles ΔABC -
$\angle A = \angle B = 45^\circ$
let AC = BC = $x$
Now, In ΔCBD,

$\cos 45^\circ = \frac{x^2 + 6^2 - \left(2\sqrt{5}\right)^2}{2 \times x \times 6}$

$\Rightarrow \frac{1}{\sqrt{2}} = \frac{x^2 + 36 - 20}{2 \times x \times 6}$

$\Rightarrow 6\sqrt{2}\, x = x^2 + 16$

$\Rightarrow x^2 - 6\sqrt{2}\, x + 16 = 0$

$\Rightarrow x = \frac{6\sqrt{2} + \sqrt{72 - 64}}{2 \times 1}$

$$\left[\text{by formula } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\right]$$

$\Rightarrow x = \dfrac{6\sqrt{2} + 2\sqrt{2}}{2}$

$\Rightarrow x = 4\sqrt{2}$

and, AB = $x \times \sqrt{2}$

$\Rightarrow$ AB = $4\sqrt{2} \times \sqrt{2}$ = 8 cm

$\therefore$ AD = 8 – 6 = 2 cm.

39. (C) $x + \dfrac{1}{x-9} = (x-9) + \dfrac{1}{x-9} + 9$

we know that minimum value of

$(x-9) + \dfrac{1}{x-9}$ is –2

So, min. value of $x + \dfrac{1}{x-9}$

= –2 + 9 = 7

40. (D) $4 - \dfrac{5}{1 + \dfrac{1}{3 + \dfrac{1}{2 + \frac{1}{4}}}} = 4 - \dfrac{155}{40} = \dfrac{5}{40} = \dfrac{1}{8}$

$\dfrac{1}{8}$ part $\Rightarrow$ 10 min

$\dfrac{3}{5}$ part $\Rightarrow 10 \times 8 \times \dfrac{3}{5}$ = 48 min.

41. (B) Given

$\dfrac{p}{x} + \dfrac{q}{y} + \dfrac{r}{z} = 1$

and, $\dfrac{x}{p} + \dfrac{y}{q} + \dfrac{z}{r} = 0$

$\Rightarrow xqr + ypr + zpq = 0$

Now

$\dfrac{p^2}{x^2} + \dfrac{q^2}{y^2} + \dfrac{r^2}{z^2}$

$= \left(\dfrac{p}{x} + \dfrac{q}{y} + \dfrac{r}{z}\right)^2 - 2\left(\dfrac{pq}{xy} + \dfrac{qr}{yz} + \dfrac{pr}{zx}\right)^2$

$= 1 - 2.\left(\dfrac{zpq + xqr + ypr}{xyz}\right)^2 = 1 - 2 \times 0 = 1$

42. (C) Speed of tiger = 5 × 8 = 40 m/min

Speed of Dear = 4 × 5 = 20 m/min

Distance between them = 50 × 8 = 400 m

time taken by tiger to catch dear

$= \dfrac{400}{(40-20)}$ = 20 min

$\therefore$ Distance travelled by tiger

= 40 × 20 = 800 m

43. (C) Given

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

$\Rightarrow (x-5) = -\dfrac{3}{4x}$

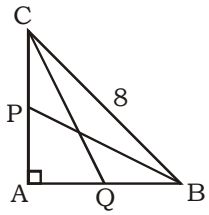
$\Rightarrow x(x-5) = -\dfrac{3}{4}$

Now,

$\dfrac{13}{x^2 - 5x + 4} = \dfrac{13}{x(x-5) + 4}$

$= \dfrac{13}{\frac{-3}{4} + 4} = \dfrac{13}{\frac{13}{4}} = 4$

44. (B)




$\Delta$ABC is a right angle triangle and BP & CQ are medians.

So,

$BP^2 + CQ^2 = \dfrac{5}{4} BC^2 = \dfrac{5}{4} \times 8^2$

$= \dfrac{5}{4} \times 64 = 80$ cm

45. (D) $3^{625}, 4^{500}, 5^{375}, 6^{250}$

$= (3^5)^{125}, (4^4)^{125}, (5^3)^{125}, (6^2)^{125}$

$= (243)^{125}, (256)^{125}, (125)^{125}, (36)^{125}$

$\therefore$ Greatest number = $(256)^{125} = 4^{500}$

46. (B) $\dfrac{1-x^4}{1+x} \div \dfrac{1+x^2}{x} \times \dfrac{(1-x^3)}{x^2(1+x^2+x)}$

$= \dfrac{(1+x^2)(1-x^2)}{1+x} \times \dfrac{x}{(1+x^2)} \times \dfrac{(1-x)(1+x^2+x)}{x^2(1+x^2+x)}$

$= \dfrac{(1+x)(1-x)(1-x)}{(1+x)x} = \dfrac{(1-x)^2}{x}$

47. (A) $\dfrac{9^n (3^2) \times \left(3^{\frac{-n}{2}}\right)^{-2} - 27^n}{3^{3m}.2^3} = \dfrac{1}{729}$

$\Rightarrow \dfrac{3^{2n}.3^2 \times 3^n - 3^{3n}}{3^{3m}.2^3} = \dfrac{1}{729}$

$\Rightarrow \dfrac{3^{3n+2} - 3^{3n}}{3^{3m}.8} = \dfrac{1}{3^6}$

$\Rightarrow \frac{3^{3n}[8]}{3^{3m}\times 8} = 3^{-6}$

$\Rightarrow 3^{3(n-m)} = 3^{-6}$

$\therefore 3(n-m) = -6$

$\Rightarrow n - m = -2$

$\Rightarrow m - n - 2 = 0$

48. (B) $x + \frac{1}{x} = 5$

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

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

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

Now,

$x^3 - \frac{1}{x^3} - 3\sqrt{21}$

$= 21\sqrt{21}$

$\Rightarrow x^3 - \frac{1}{x^3} = 24\sqrt{21}$

49. (D We know that

$\frac{S_A}{S_B} = \sqrt{\frac{t_B}{t_A}}$

$\Rightarrow \frac{8}{S_B} = \sqrt{\frac{16}{\frac{64}{3}}}$

$\Rightarrow \frac{8}{S_B} = \sqrt{\frac{1}{4}}$

$\Rightarrow S_B = 8 \times 2$

$\Rightarrow S_B = 16$ km/h

50. (A) Rate (r) = $7\frac{1}{7} = \frac{1}{14}$

| | Amount | Istallment |
|---|---|---|
| 210 | 15 × 14 | 15 × 15 |
| 196 | 14 ×14 | 15 × 15 |
| 406 (A) | | 225 (I) |

Installment $225 \rightarrow 1800$

$1 \rightarrow 8$

Amount $406 \rightarrow 8 \times 406 = ₹3248$

51. (B) Let total cost of car = 1200

three types costs are = 500, 400, 300

New cost

$= 500 \times \frac{120}{100}, 400\times\frac{105}{100}, 300\times\frac{99}{100}$

= 600, 420 , 297

Now total cost = 1317

percentage rise in cost of the car

$= \frac{117}{1200}\times 100 = 9.75\%$

52. (B) $a = bc$ .....(i)

and,

$c = a - b$

$\Rightarrow b = a - c$

Now put b in equation (i)

$a = (a - c) \times c$

$\Rightarrow a = ac - c^2$

$\Rightarrow c^2 = a\,(c - 1)$

$\Rightarrow a = \frac{c^2}{c-1}$

53. (A) Amount after 3 years

$= 25000 \times \left(1+\frac{5}{100}\right)\left(1+\frac{10}{100}\right)\left(1+\frac{20}{100}\right)$

$= 25000 \times \frac{21}{20}\times\frac{11}{10}\times\frac{6}{5} = ₹34650$

54. (B) Let the number be = $10x + y$

so, $x + y = 7$

From option (A),

Half the number = $\frac{43}{2} \neq$ integer

Now, from option (B) i.e. 52

Half the number = 26

unit digit of 52 = ten's digif of 26

Ten's digit of 52 = (unit digit of 26) – 1

So, the correct option is 52.

55. (B) $5^{101} + 5^{102} + 5^{103} + 5^{104}$

$= 5^{101}[1 + 5 + 25 + 125]$

$= 5^{101} \times 156$

$= 5^{101} \times 13 \times 12$

$\therefore$ Given expression is divisible by 13.

56. (C) Surface area of cube = $6a^2$

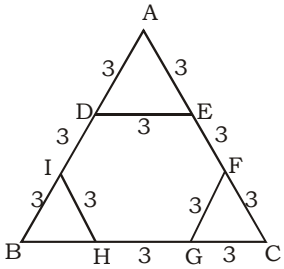
So,

$\frac{\text{S.A of smaller cube}}{\text{S.A of Larger Cube}}$

$= \frac{6\times 1^2}{6\times 15^2} = \frac{1}{225}$

= 1 : 225

57. (C)




Given equilateral triangle Δ ABC side of 9 cm.

So, side of hexagone will be 3 cm each

Area of Hexagone DEFGHI

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

$= \frac{27}{2}\sqrt{3} = 13.5\sqrt{3}$ cm²

58. (C) Average age of whole class

$= \frac{2\times 50 + 8\times 0 + 10\times 60}{20} = \frac{700}{20} = 35$

59. (D) Required sum = ∠1 + ∠2 + ∠3 + ∠4 + ∠5

= (n – 4) 180°

= (5 – 4)× 180°

= 180°

60. (B) Let these amounts are equal in 't' years

So,

$700 + \frac{700\times 12\times t}{100} = 830 + \frac{830\times 10\times t}{100}$

$\Rightarrow 84t - 83t = 830 - 700$

$\Rightarrow t = 130$ years

61. (C) A.T.Q,

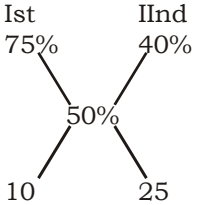
Overall rate of interest

$= \frac{3850}{7700} \times 100\% = 50\%$

Ist rate of 6 years = $6\times 12\frac{1}{2} = 75\%$

IIrd rate of 6 years = $6 \times 6\frac{2}{3} = 40\%$

By alligation method,




Ratio of amounts → 2 : 5

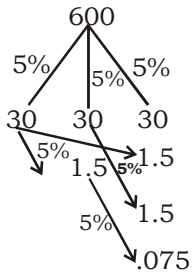
7 → 7700

1 → 1100

Ist part = 2 × 1100 = ₹2200

IInd part = 5 × 1100 = ₹5500

62. (C) Ist method




Difference between C.I and S.I for 3 years

= 1.5 + 1.5 + 1.5 + .075 = ₹4.575

Alternate method

Difference between C.I & S.I

$= \frac{p\times r\times r\times (300+r)}{100\times 100\times 100}$

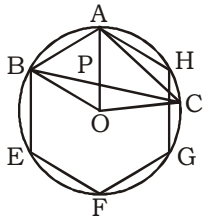
$= \frac{600\times 5\times 5\times 305}{100\times 100\times 100} = ₹4.575$

63. (C) Area of path (inside) = (l + b – 2x) × 2x

= (500 + 400 – 2 × 5) × 2 × 5

= 890 × 10 = 8900 m²

64. (B) Let ABEFGH is a regular hexagone.




And AC is a side of regular pentagon

In ΔAOB

∠ABO = ∠BOA = ∠BAO = 60°

In a regular pentagone angle at centre O.

$\angle AOC = \frac{360°}{5} = 72°$

So,

∠BOC = 60 + 72 = 132°

In ΔBOC-

$\angle CBO = \frac{180° - 132°}{2} = 24°$

So,

∠PBO = 24°

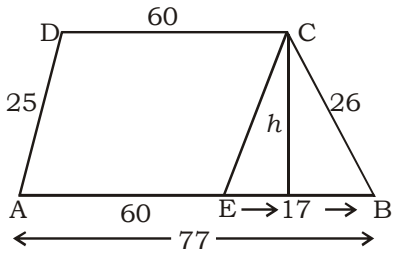
∠ABP = ∠ABO – ∠PBO

= 60° – 24° = 36°

External angle, ∠APC = ∠ABP + ∠BAP

= 36° + 60° = 96°

65. (C) In a trapezium ABCD, AB || DC.




AB = 77cm, DC = 60cm
AD = 25cm, BC = 26cm
Now,
We draw EC parallel to AD.
So,
EC = 25, EB = 77 – 60 = 17 cm
In $\Delta$ECB-

$s = \frac{25+26+17}{2} = 34$ cm

Area of triangle ECB

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

$= \sqrt{34(34-17)(34-25)(34-26)}$

$= \sqrt{34\times17\times9\times8} = 204$ cm$^2$

Now again,

Area of $\Delta ECB = \frac{1}{2} \times EB \times h$

$\Rightarrow 204 = \frac{1}{2} \times 17 \times h$

$\Rightarrow h = \frac{408}{17}$

$\Rightarrow h = 24$ cm

So,

Area of trapezium $= \frac{1}{2} \times h \times (AB + CD)$

$= \frac{1}{2} \times 24 \times (77 + 60)$

$= 12 \times 137 = 1644$ cm$^2$

66. (B) Given,
Total milk = 20 litres
taken out milk and replaced = 10 litres
Remaining milk after = 4 times taken out

= Initital milk $\times \left(1-\frac{x}{c}\right)^h$

$= 20 \times \left(1-\frac{10}{20}\right)^4$

$= 20 \times \frac{1}{16} = 1.25$ litres

67. (B) $\frac{13^{1002}}{170} = \frac{\left(13^2\right)^{501}}{170} = \frac{(169)^{501}}{170}$

$= \frac{(170-1)^{501}}{170} = -1$ or 169

68. (B) Greatest number that divide 19411 and 43031 leaving remaining 19 and 23
= HCF of [(19411 – 19), (43031 – 23)]
= HCF of [19392, 43008] = 192

69. (B) $(\tan\theta + \sec + 1)(\cot\theta - \operatorname{cosec}\theta + 1) - 3 = x$

$\Rightarrow x = \left(\frac{\sin\theta}{\cos\theta} + \frac{1}{\cos\theta} + 1\right)\left(\frac{\cos\theta}{\sin\theta} - \frac{1}{\sin\theta} + 1\right) - 3$

$\Rightarrow x = \frac{(\sin\theta + 1 + \cos\theta)(\sin\theta + \cos\theta - 1)}{\sin\theta\cdot\cos\theta} - 3$

$\Rightarrow x = \frac{(\sin\theta + \cos\theta)^2 - 1^2}{\sin\theta \times \cos\theta} - 3$

$\Rightarrow x = \frac{\sin^2\theta + \sin^2\theta + 2\sin\theta\cos\theta - 1}{\sin\theta\cos\theta} - 3$

$\Rightarrow x = \frac{1 + 2\sin\theta\cos\theta - 1}{\sin\theta\sin\theta} - 3$

$\Rightarrow x = 2 - 3$

$\Rightarrow x = -1$

Alternate method-
By assuming value of $\theta$
take $\theta = 45°$
$x$ = (tan45° + sec45° + 1)(cot45° – cosec45° + 1) –3

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

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

$\therefore x = -1$

70. (C) A.T.Q,
Let the weight of 1000gm = 100/-
09 × 1000 gm ——— 100/- × 9
10 × 900 gm ——— 120 /- × 10

900 → 1200
P = 300

Over all profit = $\frac{300}{900} \times 100 = 33\frac{1}{3}\%$

71. (D) Sin12°. Sin24°. Sin48°. Sin 84°

$= \frac{\sin12°\cdot\sin48°\cdot\sin72°\cdot\sin24°\cdot\sin84°}{\sin72°\cdot}$

$= \frac{1}{4}\frac{\sin(3\times12°)\cdot\sin24°\cdot\sin84°}{\sin72°\cdot}$

$[\because \sin\theta \cdot \sin(60-\theta)\sin(60+\theta) = \frac{1}{4}\sin 3\theta]$

$= \frac{1}{4}\sin 24° \cdot \sin 36° \cdot \frac{\sin 84°}{\sin 72°}$

$= \frac{1}{4} \times \frac{1}{4} \frac{\sin(3\times 24°)}{\sin 72°} = \frac{1}{16}$

72. (B) We have

Capital × Time = Profit

So,

| | A | : | B | : | C |
|---|---|---|---|---|---|
| profit | 5 | : | 6 | : | 11 |
| Time | 2 | : | 3 | : | 6 |
| Capital = | $\frac{5}{2}$ | : | $\frac{6}{3}$ | : | $\frac{11}{6}$ |
| | = 15 | : | 12 | : | 11 |

73. (D) Area of triangle

$= \frac{1}{2}|x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)|$

$= \frac{1}{2}|t(t+2-t)+(t+2)(t-t+2)+(t+3)(t-2-t-2)|$

$= \frac{1}{2}|2t+2t+4-4t-12|$

$= \frac{1}{2}\times|-8| = 4$ sq. Unit

74. (A) Internal angle of a regular polygone

$= \frac{(n-2)\times 180°}{n}$

Accoding to question,

$\frac{\frac{(5n-2)\times 180°}{5n}}{\frac{(6n-2)\times 180°}{6n}} = \frac{24}{25}$

$\Rightarrow \frac{(5n-2)\times 6}{(6n-2)\times 5} = \frac{24}{25}$

$\Rightarrow \frac{5n-2}{6n-2} = \frac{4}{5}$

$\Rightarrow 25n - 10 = 24n - 8$

$\Rightarrow n = 2$

So, No of sides are 10, 12.

75. (C) Let speed of these trains $x$ & y.

length of Ist train = $x \times 27 = 27x$

length of IInd train = y × 17 = 17y

When they crossed each other

$(x+y)\times 23 = 27x + 17y$

$\Rightarrow 23x + 23y = 27x + 17y$

$\Rightarrow 4x = 6y$

$\Rightarrow \frac{x}{y} = \frac{3}{2}$

$\Rightarrow x : y = 3 : 2$

76. (C) Let the number is $(x + 24)$, divisible by $x$.

Now,

$\frac{2(x+24)}{x}$ = Remainder (11)

$\frac{48}{x}$ = Remainder (11)

Divisor $(x)$ = 48 – 11 = 37

77. (A)

| | A | : | B |
|---|---|---|---|
| Capital– | 7 | : | 9 |

Now,

profit = $7 \times 3 + 7 \times \frac{1}{3} \times 6 : 9 \times 4 + 9 \times \frac{2}{3} \times 5$

= 21 + 14 : 36 + 30

= 35 : 66

total profit = 35 + 66 = 101units

101 units —— 10201

1 unit —— 101

Share of A = 35 × 101 = ₹3535/-

Share of B = 66 × 101 = ₹6666/-

78. (C) $216^{\sin\theta} \cdot 1296^{\cos\theta}$

$= 6^{3\sin\theta} \cdot 6^{4\cos\theta}$

$= 6^{3\sin\theta + 4\cos\theta}$

Maximum Value of $3\sin\theta + 4\cos\theta$

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

Now,

Maximum value of $6^{3\sin\theta+4\cos\theta} = 6^5 = 7776$

79. (B) $x + \frac{1}{x} = 3$

$x^2 + \frac{1}{x^2} = 7$ and $x^3 + \frac{1}{x^3} = 27 - 9 = 18$

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

$= 18 \times 7 - 3 = 123$

Now,

$x^7 + \frac{1}{x^7} = \left(x^5\times\frac{1}{x^5}\right)\left(x^2+\frac{1}{x^2}\right) - \left(x^3+\frac{1}{x^3}\right)$

$\Rightarrow x^7 + \frac{1}{x^7} = 123 \times 7 - 18$

$\Rightarrow x^7 + \frac{1}{x^7} = 861 - 18$

$\Rightarrow x^7 + \frac{1}{x^7} = 843$

80. (C) Let speed = x km/h and
time = y hours
Acc. to question

$xy = (x + 5)\left(y - \frac{2}{3}\right)$

$\Rightarrow xy = xy + 5y - \frac{2}{3}x - \frac{10}{3}$

$\Rightarrow 2x - 15y = -10$.....(i)

and,

$xy = (x - 2)\left(y + \frac{1}{2}\right)$

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

$x - 4y = 2$ ..... (ii)

On solving (i) and (ii) we have

$x = 10, \quad y = 2$

Distance = $xy = 10 \times 2 = 20$ km

Alternate method :–

We have formula

Distance = $\frac{S_1 \times S_2}{(S_1 - S_2)} \times$ time

Now let speed = $x$

Distance = $\frac{x \times (x+5)}{5} \times \frac{40}{60} = \frac{x \times (x-2) \times 30}{2 \times 60}$

$\Rightarrow (x + 5) \times 8 = 15 (x-2)$

$\Rightarrow 8x + 40 = 15x - 30$

$\Rightarrow 7x = 70$

$\Rightarrow x = 10$

$\therefore$ Distance = $\frac{10 \times 15}{5} \times \frac{40}{60} = 20$ km

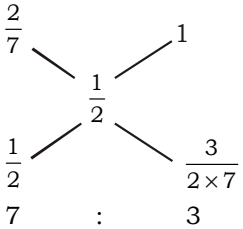
81. (B) According to question

| Water | Milk | = | Total |
|---|---|---|---|
| Initial | 25 | = | 7 |
| Final | $1_{\times 5}$ | = | 5 |
| | $1_{\times 5}=5$ | = | 10 |

So, water add in final = $\frac{3}{10}$ Unit

or, alternative method :

Water (in itial) Water (add)




7 : 3

So, Required fraction = $\frac{3}{10}$ part

82. (B) S. P of racket = $400 - 400 \times \frac{15}{100} - 40$

= ₹300 Rs.

Now, CP of racket when profit is 20%

= $\frac{300}{120} \times 100 =$ ₹ 250.

83. (B) $\cos\left(\frac{\pi}{4} - x\right) \cdot \cos\left(\frac{\pi}{4} - y\right) - \sin\left(\frac{\pi}{4} - x\right) \sin\left(\frac{\pi}{4} - y\right)$

$= \left(\frac{1}{\sqrt{2}}\cos x + \frac{1}{\sqrt{2}}\sin x\right) \cdot \left(\frac{1}{\sqrt{2}}\cos y + \frac{1}{\sqrt{2}}\sin y\right) -$

$\left(\frac{1}{\sqrt{2}}\cos x - \frac{1}{\sqrt{2}}\sin x\right) \cdot \left(\frac{1}{\sqrt{2}}\cos y - \frac{1}{\sqrt{2}}\sin y\right)$

$= \frac{1}{\sqrt{2}}(\cos x + \sin x)(\cos y + \sin y) \times \frac{1}{\sqrt{2}} -$

$\frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}}(\cos x - \sin x)(\cos y - \sin y)$

$= \frac{1}{2}(\cos x \cos y + \cos x \sin y + \sin x \cos y +$

$\sin x \sin y) - \frac{1}{2}(\cos x \cos y - \cos x \sin y - \sin x$

$\cos y + \sin x \sin y)$

$= \frac{1}{2}[\cos x \cos y + \cos x \sin y + \sin x \cos y +$

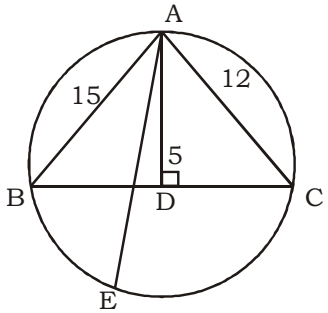
$\sin x \cdot \sin y - \cos x \cos y + \cos x \sin y + \sin x$

$\cos y - \sin x \sin y)$

$= \frac{1}{2}[2\sin x \cos y + 2\cos x \sin y]$

$= \sin(x + y)$

84. (C)




Given,

AB = 15 cm, AC = 12 cm, AD = 5 cm

Area of $\Delta$ ABC = $\frac{1}{2} \times$ BC × AD

= $\frac{1}{2} \times$ BC × 5

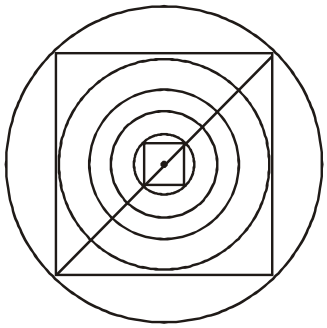
We have,

Circumradius (R )= $\frac{abc}{4 \times \Delta}$

= $\frac{AB \times AC \times BC}{4 \times \frac{1}{2} \times BC \times 5} = \frac{15 \times 12}{2 \times 5}$

= 18 cm

85. (A)



Side of small square = 20 cm

Diagonal of innermost square = $20 \times \sqrt{2}$

$= 20\sqrt{2}$ cm

Distance between these circles = 1.414 cm

$= \sqrt{2}$ cm

Diagonal of outermost square

$= 20\sqrt{2} + 8\times \sqrt{2} = 28\sqrt{2}$ cm

Side of this square = $\frac{28\sqrt{2}}{\sqrt{2}}$ = 28 cm

$\therefore$ Area = $28^2 = 784$ cm$^2$

86. (B) Work done in 8 days by both of them = $\frac{8}{25}$

Rest work done by Ram $\frac{17}{25}$ work = 34 days

Ram complete total work

$= \frac{34\times 25}{17}$ day = 50 days

87. (A) L.C.M of 45 min, 1 h 20 min, 1 hour &

$1\frac{1}{2}$h = $\frac{3}{4}$h , $\frac{4}{3}$h, 1h, $\frac{3}{2}$h

L.C.M = $\frac{12}{1}$h

So, they ring together after 12 hours i.e at 12 mid night

88 (B $8^{20} \times (343)^4 \times (16)^4 \times 1331 \times 100$

$= 2^{60} \times 7^{12} \times 2^{16} \times (11)^3 \times 2^2 \times 5^2$

total Prime factors = 60 + 12 + 16 + 3 + 2 + 2 = 95

89. (B) Required ratio

$= \frac{15}{100}\times 4600 \times \frac{3}{5} : \frac{22}{100}\times 4600 \times \frac{1}{2} = 9 : 11$

90. (A) Total number of employees in accounts department $= 4600 \times \frac{8}{100} = 368$

Number of women = $\frac{368\times 1}{4}$ = 92

91. (C) Required number of males

$= \frac{1}{4}\times\frac{26}{100}\times 4600 + \frac{1}{2}\times\frac{11}{100}\times 4600$

= 299 + 253 = 552

92. (C) Total number of male employees

$= 46 \times 11 \times \frac{1}{2} + 46 \times 8 \times \frac{3}{4} + 46 \times 15 \times \frac{3}{5} +$

$46 \times 26 \times \frac{1}{4} + 46 \times 22 \times \frac{1}{2} + 46 \times 18 \times \frac{5}{6}$

$= 46 \times \left(\frac{11}{2} + 6 + 9 + \frac{13}{2} + 11 + 15\right)$

$= 46 \times 53$

Total number female employees

$= 46 \times 11 \times \frac{1}{2} + 46 \times 8 \times \frac{1}{4} + 46 \times 15 \times \frac{2}{5} +$

$46 \times 26 \times \frac{3}{4} + 46 \times 22 \times \frac{1}{2} + 46 \times 18 \times \frac{1}{6}$

$= 46\left(\frac{11}{2} + 2 + 6 + \frac{39}{2} + 11 + 3\right) = 46 \times 47$

Required ratio = $\frac{46\times 53}{46\times 47}$ = 53 : 47

93. (C) Required percentage

$= \frac{\left(\frac{3}{4}\times\frac{26}{100}\times 4600\right)}{4600}\times 100 = \frac{3\times 26}{400}\times 100$

= 19.5%

94. (A) $16\frac{2}{3}\% = \frac{1}{6}$

let CP of both articles = $6x$

S.P of Ist article = $7x$

S.P of IInd article = $7x + 2400$

According to question

$12x \times \frac{4}{3} = 14x + 2400$

$\Rightarrow 16x = 14x + 2400$

$\Rightarrow x = 1200$

$\therefore$ C. P of the each article

= 6 × 1200 = ₹7200

95. (B) Let the age of A = $x$

Now, the age of C = $x + 6$

the age of B = $2x$

According to question,

$\frac{2x+3}{x+6} = \frac{7}{5}$

$\Rightarrow 10x + 15 = 7x + 42$

$\Rightarrow 3x = 27$

$\Rightarrow x = 9$

$\therefore$ the present age of B = 9 × 2 = 18 years.

96. (C) Downstream speed

$= \frac{1}{\frac{30}{7}} = \frac{7\times60}{30} = 14$ km/h

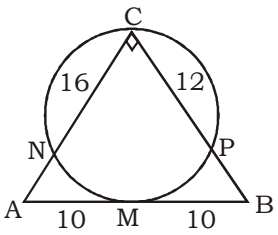
Upstream speed $= \frac{3}{\frac{45}{2}} = \frac{3\times2\times60}{45} = 8$ km/h

Speed of boat in still water

$= \frac{\text{downstrem speed} + \text{ups speed}}{2} = \frac{14+8}{2}$

$= 11$ km/hr

97. (C)




Let the length of AN be $x$.

We know that

$AN \times AC = AM^2$

$\Rightarrow x \times 16 = 10^2$

$\Rightarrow x = \frac{25}{4}$ cm

$AN : AC = \frac{25}{4} : 16 = 25 : 64$

98. (A) A man can buy 5 egg less when price increased.

Price increased in amount

$= 120 \times \frac{25}{100} = ₹\,30$

Rate of eggs $= \frac{30}{5} = ₹\,6$/egg.

or by alternative method

Final Price $= \frac{\text{Amount}}{\text{Quantity less / more}} \times \frac{\text{Percentage}}{100}$

$= \frac{120}{5} \times \frac{25}{100} = ₹6$/egg

99. (C) Given series

1, 5 , 14 , 39 , 88.....

$1 + 2^2 =$ 5

$5 + 3^2 =$ 14

$14 + 5^2 =$ 39

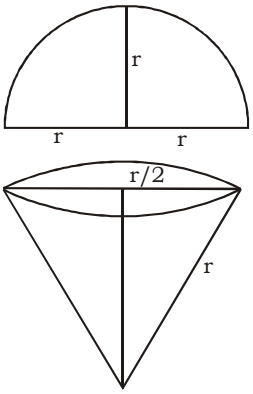
$39 + 7^2 =$ 88

$88 + 11^2 =$ 209

Add in each term of squence of prime number i.e.

$2^2, 3^2, 5^2, 7^2, 11^2, 13^2$.. and so on

100. (B)




Let the radius of semi-circle = r

So, radius of Cone

$= \frac{1}{2} \times$ Radius of sheet $= \frac{1}{2}$r

Slant height of Cone ($l$) = radius of sheet = r

total surface area of cone

$= \pi Rl + \pi R^2$

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

Ratio of surface area of sheet and cone

$= \frac{1}{2}\pi r^2 : \frac{3}{4}\pi r^2 = 2 : 3$

## SSC TIER II (MATHS) MOCK TEST - 38 (ANSWER KEY)

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