Mathematics Solutions

1. Answer. C

As, $\sqrt{\frac{0.064\times6.25}{0.081\times4.84}}$

$=\sqrt{\frac{\left(\frac{64}{1000}\right)\times\left(\frac{625}{100}\right)}{\left(\frac{81}{1000}\right)\times\left(\frac{484}{100}\right)}}$

$=\sqrt{\frac{64\times625}{81\times484}}$

$=\frac{8\times25}{9\times22}=\frac{100}{99}$

Hence option (c)

2. Answer. C

As $x+4$ is a factor

i.e. $x+4=0$

$=>x=-4$ is a root of equation.

Option (a)

$f(x)=x^2-7x+44$

$f(-4)=(-4)^2-7(-4)+44$

$=16+28+44$

$=88\neq0$

Option (b)

$f(x)=x^2+7x-44$

$=(-4)^2+7(-4)+44$

$=16-28+44$

$=32\neq0$

Option (c)

$f(x)=x^2-7x-44$

$=(-4)^2-7(-4)-44$

$=16+28-44$

$=0$

Hence $(x+4)$ is a factor of $x^2-7x-44$

Hence option (c)

3. Answer. B

As α and β are the roots of equation $2x^2+6x+k=0$, $k<0$ ………. (i)

Now, $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}=\frac{\alpha^2+\beta^2}{\alpha\beta}$………. (ii)

From (i)

Sum of roots $(\alpha+\beta)=-\frac{6}{2}=-3$

Products of roots $(\alpha\beta)=\frac{k}{2}$

Now, $(\alpha+\beta)^2=\alpha^2+\beta^2+2\alpha\beta$

⇨ $(-3)^2=\alpha^2+\beta^2+\frac{2k}{2}$

⇨ $\alpha^2+\beta^2=9-k$

From (ii)

$\frac{\alpha^2+\beta^2}{\alpha\beta}=\frac{9-k}{\frac{k}{2}}$

$=\frac{2(9-k)}{k}=\frac{18}{k}-2$ [As, $k<0$]

So, mean value be -2

$f'(k)=-\frac{18}{k^2}$

$f'(k)=0$

$=>-\frac{18}{k^2}=0$

$=>k=\infty$

So, maximum value of $f(k)=-2$

Hence option (b)

4. Answer. A

We can solve this question by taking arbitrary values

As $a=b\times c$

Let $a=6, b=2, c=3$

Statement 1:

HCF$(3,2\times6)$

$=HCF(3,12)=3$

$HCF(3,6)=3$

Hence statement 1 is correct.

Statement 2:

$LCM(6,6)=6$

$LCM(3,12)=12$

i.e. $LCM(6,6)\neq LCM(3,12)$

Hence statement 2 is incorrect.

Hence option (a)

5. Answer. A

$\frac{(0.35)^2+0.70+1}{2.25}+0.19$

$=\frac{0.1225+0.70+1}{2.25}+0.19$

$=\frac{1.8225}{2.25}+0.19$

$=0.81+0.19=1$

Hence option (a)

6. Answer. B

As, $x=2^{40}$

Taking log both sides

$\log x=\log(2^{40})$

⇨ $\log x=40\log2$

⇨ $\log x=40\times0.301$

⇨ $\log x=12.04$

As, $\log 13=12.04$

Then $x=13$

So, number of terms be 13

Hence option (b)

7. Answer. A

Given,

$(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$

Having roots $\alpha\ and\ \beta$ and $\beta = 2\alpha$ (Given)

Now,

Sum of roots $= \frac{-(3a-1)}{(a^2-5a+3)}$

⇨ $\alpha + 2\alpha = \frac{-(3a-1)}{(a^2-5a+3)}$

⇨ $3\alpha = \frac{-(3a-1)}{(a^2-5a+3)}$......... (i)

Products of roots $= \frac{2}{(a^2-5a+3)}$

⇨ $\alpha(2\alpha) = \frac{2}{(a^2-5a+3)}$

⇨ $2\alpha^2 = \frac{2}{(a^2-5a+3)}$

⇨ $\alpha^2 = \frac{1}{(a^2-5a+3)}$............. (ii)

From (i) and (ii)

$\frac{(3a-1)^2}{a(a^2-5a+3)^2} = \frac{1}{(a^2-5a+3)}$

⇨ $(3a - 1)^2 = a(a^2 - 5a + 3)$

⇨ $9a^2 + 1 - 6a = 9a^2 - 45a + 27$

⇨ $45a - 6a = 27 - 1$

⇨ $39a = 26$

⇨ $a = \frac{26}{39} = \frac{2}{3}$

Hence option (a)

8. Answer. C

$\frac{(4444)^{4444}}{9}$

$= \frac{(7)^{4444}}{9}$ [When 4444 is divided by 9]

$= \frac{(-2^4)^{1111}}{9}$ [Remainder will be 7]

$= \frac{(16)^{1111}}{9}$ [Or (-2) negative remainder]

$= \frac{(-2)^{1110}\times(-2)}{9}$ [-2 negative remainder]

$= \frac{(-2^6)^{185}\times(-2)}{9}$

$= \frac{(64)^{185}\times(-2)}{9}$

$= \frac{(1)^{185}\times(-2)}{9}$

$= \frac{1\times(-2)}{9}$

$= \frac{7}{9}$

Hence remainder be 7

Hence option (c)

9. Answer. A

As,

$x = \frac{\sqrt{a+b}-\sqrt{a-b}}{\sqrt{a+b}+\sqrt{a-b}}$

Rationing,

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

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

$= \frac{a+b+a-b-2\sqrt{(a+b)(a-b)}}{2b}$

$= \frac{2a-2\sqrt{a^2-b^2}}{2b}$

$= \frac{a}{b} - \frac{\sqrt{a^2-b^2}}{b}$

$bx^2 = b\left[\frac{a}{b} - \frac{\sqrt{a^2-b^2}}{b}\right]^2$

$= b\left[\frac{a^2}{b^2} + \frac{a^2-b^2}{b^2} - \frac{2a\sqrt{a^2-b^2}}{b^2}\right]$

$= \frac{a^2}{b} + \frac{a^2-b^2}{b} - \frac{2a\sqrt{a^2-b^2}}{b^2}$ .... (i)

$-2ax = -2a\left[\frac{a}{b} - \frac{\sqrt{a^2-b^2}}{b}\right]$

$= -\frac{2a^2}{b} + \frac{2a\sqrt{a^2-b^2}}{b}$

Now,

$bx^2 - 2ax + b = \frac{a^2}{b} + \frac{a^2-b^2}{b} - \frac{2a\sqrt{a^2-b^2}}{b} - \frac{2a^2}{b} + \frac{2a\sqrt{a^2-b^2}}{b} + b$

$= \frac{a^2}{b} + \frac{a^2}{b} - b - \frac{2a^2}{b} + b$

$= 0$

Hence option (a)

10. Answer. C

As,

$\frac{(443+547)^2+(443-547)^2}{(443\times443)+(547\times547)}$

Let $a = 443, b = 547$

Then,

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

$= \frac{2a^2+2b^2}{a^2+b^2}$

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

$= 2 \times 1 = 2$

Hence option (c)

11. Answer. C

As, $= t^{\frac{1}{t-1}}$, $y = t^{\frac{t}{t-1}}$

$y = (t^t)^{\frac{1}{t-1}}$

$=> y = (t)^{(t^{\frac{1}{t-1}})}$

$=> y = t^x$

$=> t = (y)^{\frac{1}{x}}$ .... (i)

$x = t^{\frac{t}{t-1}}$

$=> x^t = t^{\frac{t}{t-1}}$ .... (ii)

From (i) and (ii)

$x^{\frac{y}{x}} = y$

$(x^y)^{\frac{1}{x}} = y$

$=> x^y = y^x$

Hence option (c)

12. Answer. D

As, $A:B = 3:4$

Let $A = 3k$

$B = 4k$

Now,

$\frac{3A^2+4B}{3A-4B^2}$

$= \frac{3\times9k^2+4\times4k}{3\times3k-4\times(4k)^2}$

$= \frac{27k^2+16k}{9k-64k^2}$

$= \frac{27k+16}{9-64k}$

We can't determine the value.

Hence option (d)

13. Answer. D

According to question

$A = \{7,14,21,28,35,42 \dots\dots..\}$

$B = \{5,10,15,20,25.\dots\dots..\}$

$C = \{35,70,105 \dots\dots\dots\}$

Option (a):

$(A - B) \cup C = \{7,14,21,28,42 \dots..\} \cup \{35,70,105 \dots\dots\} \neq \emptyset$

Option (b):

$(A - B) - C = \{7,14,21,28,42 \dots..\} - \{35,70,105 \dots\dots\} \neq \emptyset$

Option (c):

$(A \cap B) \cap C = \{35,70 \dots..\}$

Option (d):

$(A \cap B) - C = \{35,70 \dots.\} - \{35,70 \dots\} = \emptyset$

Hence option (d)

14. Answer. B

As,

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

$=> (x - 2) = 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$ .... (i)

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

$=> x^3 - 8 - 6x^2 + 12x = 4 + 2 + 3 \times 2^{\frac{2}{3}} \times 2^{\frac{1}{3}}(2^{\frac{2}{3}} + 2^{\frac{1}{3}})$

$=> x^3 - 8 - 6x^2 + 12x = 6 + 3 \times 2^{\frac{2}{3}+\frac{1}{3}}(x - 2)$ [From (i)]

$=> x^3 - 8 - 6x^2 + 12x = 6 + 6(x - 2)$

$=> x^3 - 8 - 6x^2 + 12x = 6 + 6x - 12$

$=> x^3 - 8 - 6x^2 + 12x = 8 - 6$

$=> x^3 - 8 - 6x^2 + 12x = 2$

Hence option (b)

15. Answer. C

As,

$\sqrt{\frac{x}{y}} = \frac{24}{5} + \sqrt{\frac{y}{x}}$

⇨ $\sqrt{\frac{x}{y}} - \sqrt{\frac{y}{x}} = \frac{24}{5}$

⇨ $\frac{x-y}{\sqrt{xy}} = \frac{24}{5}$

Squaring both sides,

$\frac{(x-y)^2}{xy} = \frac{576}{25}$

⇨ $(x^2 + y^2 - 2xy) = \frac{576}{25}xy$............ (i)

Also,

$x + y = 26$

Squaring both sides,

$x^2 + y^2 + 2xy = 676$ .... (ii)

From (i) and (ii)

$\frac{576}{25}xy + 2xy = 676 - 2xy$

⇨ $\left(\frac{576}{25} + 2 + 2\right)xy = 676$

⇨ $\left(\frac{576+25\times4}{25}\right)xy = 676$

⇨ $xy = 25$

Hence option (c)

16. Answer. D

As,

$x\, log_{10}^{\left(\frac{10}{3}\right)} + log_{10}^{3} = log_{10}^{(2+3^x)} + x$

$=> x\, log_{10}^{10} - x\, log_{10}^{3} + log_{10}^{3} = log_{10}^{(2+3^x)} + x$

$=> x - log_{10}^{3^x} + log_{10}^{3} = log_{10}^{(2+3^x)} + x$

$=> log_{10}^{\left(\frac{3}{3^x}\right)} = log_{10}^{(2+3^x)}$

$=> 3^{1-x} = 2 + 3^x$

$=> 3^{1-x} - 3^x = 2$

$=> 3^{1-x} - 3^x = 3^1 - 3^0$

Comparing both sides,

$1 - x = 1$

$=> x = 1 - 1 = 0$

Hence option (d)

17. Answer. A

According to question,

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

So, $(\alpha + \beta) = -p$ .... (i)

Product of root $\left(\alpha\beta = \frac{c}{a}\right)$

$=>(\alpha\beta) = q$ .... (ii)
From (i)
$(\alpha + \beta) = -p$
$=>(\alpha + \beta)^2 = p^2$
$=>\alpha^2 + \beta^2 + 2\alpha\beta = p^2$
$=>\alpha^2 + \beta^2 = p^2 - 2q$ $[\alpha\beta = q]$
Hence $\alpha^2 + \beta^2 = p^2 - 2q$
Hence option (a)

18. Answer. B
As, $a^3 = 335 + 63$
$=>a^3 - b^3 = 335$ .... (i)
Also,
$a = 5 + b$
⇨ $a - b = 5$ .... (ii)
Cubing both sides
$a^3 - b^3 - 3ab(a - b) = 125$ .... (iii)
From (i) and (ii) we get,
$335 - 3ab(a - b) = 125$ .... (iv)
From (ii) and (iv) we get,
$335 - 3ab \times 5 = 125$
⇨ $15ab = 335 - 125$
⇨ $15ab = 210$
⇨ $ab = \frac{210}{15} = 14$
Also, $(a + b)^2 = (a - b)^2 + 4ab$
⇨ $(a - b)^2 = (5)^2 + 4 \times 14$
$= 25 + 56$
$= 81$
$\therefore a + b = 9$
Hence option (b)

19. Answer. C
As,
$a^x \times 3^y = 2187$
⇨ $3^{2x} \times 3^y = 2187$
⇨ $3^{2x+y} = 3^7$
So, $2x + y = 7$........ (i)
Also,
$2^{3x+2y} = 2^{2xy}$
$\therefore 3x + 2y = 2xy$ .... (ii)
From (i) and (ii) we get,
$3x + 2(7 - 2x) = 2xy$
$3x + 14 - 4x = 2x(7 - 2x)$
⇨ $-x + 14 = 14x - 4x^2$
⇨ $4x^2 - 15x + 14 = 0$
⇨ $(x - 2)(4x - 7) = 0$
⇨ $x - 2 = 0 \; or \; 4x - 7 = 0$
⇨ $x = 2 \; or \frac{7}{4}$
If $x = 2$
$y = 7 - 2x = 7 - 4 = 3$
$x + y = 5$
Hence option (c)

20. Answer. B
As,
$a_1x + b_1y + c_1 = 0$ .... (i)
$a_2x + b_2y + c_2 = 0$ .... (ii)
Line (i) and (ii) will intersect each other
If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
According to question
$a_1 = k, a_2 = 2, b_1 = 3, b_2 = 1$
So, $\frac{k}{2} \neq \frac{3}{1}$
⇨ $k \neq 6$
Hence option (b)

21. Answer. B
There are 25 prime numbers less than 100 are
2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53,59,61,71,73,79,83,97
Hence option (b)

22. Answer. A
Ratio of weights of broken diamond $= 1:2:3:4$
Net weight $= x + 2x + 3x + 4x = 10x$
Price $= 100\,x^2$
Price $= x^2 + 4x^2 + 9x^2 + 16x^2 = 30x^2$
Net loss $= 100x^2 - 30x^2 = 70x^2$
Now,
$70x^2 = 70000$
⇨ $x^2 = 1000$
Price of original diamond $= 100x^2$
$= 100 \times 1000$
$= 100000$
Hence option (a)

23. Answer. C
Time taken by A to cover 100 m
$= \frac{100}{5} \times 3$
$= 60\; sec$
Time taken by B to cover $(100 - 4)m = 60\,\text{sec} + 12\; sec$
Time taken by B to cover 96 meter = $72\; sec$
Speed of B $= \frac{96}{72}$
$= \frac{4}{3}$m/s
Hence option (c)

24. Answer. D

As, $3W = 2M$

$1W = \frac{2}{3}M$

$21W = \frac{2}{3} \times 21M$

$= 14M$

Now,

$15 \times 21 \times 8 = D \times 6 \times 14$

⇨ $D = \frac{15 \times 21 \times 8}{6 \times 14}$

⇨ $D = 30$

Hence number of days be 30

Hence option (d)

25. Answer. D

As

$\frac{27-x}{35-x} = \frac{2}{3}$

⇨ $3(27 - x) = 2(35 - x)$

⇨ $81 - 3x = 70 - 2x$

⇨ $81 - 70 = -2x + 3x$

⇨ $x = 11$

Hence option (d)

26. Answer. C

As,

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

$8400 = \frac{x}{\frac{11}{10}} + \frac{x}{\frac{121}{100}}$

⇨ $8400 = \frac{10x}{11} + \frac{100x}{121}$

⇨ $\frac{110x+100x}{121} = 8400$

⇨ $210x = 8400 \times 121$

⇨ $x = \frac{8400 \times 121}{210}$

⇨ $x = 4840$

Hence option (c)

27. Answer. C

Let age be x years at the time of marriage

$x + 6 = \frac{5}{4}x$

⇨ $4x + 24 = 5x$

⇨ $x = 24$

Her present age $= 24 + 6 = 30\ years$

Her son's age $= \frac{30}{10} = 3\ years$

Hence option (c)

28. Answer. B

As, A and B together can do the work in 12 days.

B alone can do the work in 30 days.

So, A can do the work in

$\frac{1}{12} - \frac{1}{30} = \frac{3}{60} = \frac{1}{20}$

i.e. A can do the work in 20 days.

Hence option (b)

29. Answer. A

We can solve by using options

Option (a):

Put $x = -1\ and\ x = 1$

As $5^{1+x} + 5^{1-x} = 26$

Let $x = -1$

LHS $= 5^{1-1} + 5^{1+1}$

$= 5^2 + 5^0$

$= 25 + 1$

$= 26$

$=$ RHS

Hence option (a)

30. Answer. A

As,

$5M \times 10 = 12W \times 15$

$M = \frac{12W \times 15}{5 \times 10}$

$M = \frac{18W}{5}$

Now,

$5W + 6W$

$= 5 \times \frac{18W}{5} + 6W$

$= 24W$

Again,

$12W \times 15\ days = 24W \times no\ of\ days$

⇨ No of days $= \frac{12 \times 15}{24}$

⇨ $7\frac{1}{2}$ days

Hence option (a)

31. Answer. D

Let time taken passenger train $= t$

Time taken by express train $= t + 3$

When distance $= 540\ Km$

Then according to question,

$\frac{540}{t} - \frac{540}{t+3} = 15$

$=> 540\left[\frac{t+3-t}{t(t+3)}\right] = 15$

$=> 540 \times 3 = 15(t^2 + 3t)$

$=> 108 = t^2 + 3t$

$=> t^2 + 3t - 108 = 0$

$=> t^2 + 12t - 9t - 108 = 0$

$=> (t - 9)(t + 12) = 0$

$=> t = 9\ hr\ or\ t = -12\ (Not\ possible)$

Hence expression train will take 9 hr

i.e. 9 Pm + 9 hr = 6 AM

Hence option (d)

32. Answer. B

Number of girls $= 49 \times \frac{4}{7} = 28$

Number of boys $= 49 \times \frac{3}{7} = 21$

Number of girls left after 4 girls leaves $= 28 - 4 = 24$

Ratio of girls to boys $= 24:21 = 8:7$

Hence option (b)

33. Answer. A

As,

$a + b = 5$ .... (i)

$ab = 6$ .... (ii)

Squaring both sides to (i)

$a^2 + b^2 + 2ab = 25$

⇨ $a^2 + b^2 + 2 \times b = 25$ [As, ab = b]

⇨ $a^2 + b^2 = 25 - 12 = 13$

Now,

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

$= 5(a^2 + b^2 - ab)$

$= 5(13 - 6)$

$= 5 \times 7 = 35$

Hence option (a)

34. Answer. C

Given % discount be 25%

i.e. $\frac{25}{100} = \frac{1}{4}$th part

As, marked price $= 4$

Then discount $= 4 \times \frac{1}{4} = 1$

Then cost of mobile $= 4 - 1 = 3$

As 3 ratio cost be 4875

∴ 1 ratio costs be $\frac{4875}{3} = 1625$

Thus, original price $= (1625 \times 4) = 6500$

Hence option (c)

35. Answer. B

As speed of train $= 30$ km/hr

Speed of man $= 3$ km/hr

Relative speed $= 27$ km/hr

$= 27 \times \frac{5}{18}$m/sec

$= \frac{15}{2}$m/sec

Time taken by train to passes the man $= \frac{225}{\frac{15}{2}}$

$= \frac{225 \times 2}{15}$

$= 15 \times 2$

$= 30\ sec$

Hence option (b)

36. Answer. B

As, $\frac{7}{9} = 0.77$

$\frac{11}{14} = 0.78$

$\frac{3}{4} = 0.75$

$\frac{10}{13} = 0.76$

Arrangement in descending order be

$0.78 > 0.77 > 0.76 > 0.75$

$\frac{11}{14} > \frac{7}{9} > \frac{10}{13} > \frac{3}{4}$

Hence option (b)

37. Answer. C

Let the sum be x

$C.I. = \left[x\left(1 + \frac{4}{100}\right)^2 - x\right]$

$= \left(\frac{676}{625}x - x\right)$

$= \frac{676x - 625x}{625x}$

$= \frac{51x}{625}$

$S.I. = \frac{x \times 4 \times 2}{100} = \frac{2x}{25}$

Now,

$\frac{51x}{625} - \frac{2x}{25} = 10$

$=> \frac{51x - 50x}{625} = 10$

$=> x = 625 \times 10$

$=> x = 6250$

Hence the sum be Rs. 6250

Hence option (c)

38. Answer. C

As, $a\%\ of\ a + b\%\ of b = 2\%\ of\ ab$

$\frac{a \times a}{100} = \frac{b \times b}{100} = \frac{2 \times ab}{100}$

⇨ $a^2 + b^2 = 2ab$

⇨ $a^2 + b^2 - 2ab = 0$

⇨ $(a - b)^2 = 0$

⇨ $a = b$

Thus a is 100% of b

Hence option (c)

39. Answer. C

Let male $= \frac{5x}{9}$

Female $= \frac{4x}{9}$

Unmarried females $= \frac{4x}{9} - \frac{5x}{9} \times \frac{30}{100}$

$= \frac{4x}{9} - \frac{x}{6}$

$= \frac{8x - 3x}{18}$

$= \frac{5x}{18}$

% of unmarried females $= \frac{\frac{5x}{18}\times 100}{\frac{5x}{9}+\frac{4x}{9}}$

$= \frac{5x\times 100}{18}\times\frac{9}{9x}$

$= 27\frac{7}{9}$

Hence option (c)

40. Answer. B

Possibility 1:

Number of sweets, costing Rs. 7 be 10

Then money speed $= Rs.(10\times 7) = Rs.70$

Money left $= 200 - 70$

$= Rs.130$

Number of sweets costing Rs. 10

$= \frac{130}{10} = 13$

Number of sweets $= 10 + 13 = 23$

In this possibility no money is left over.

Possibility 2:

Number of sweets, costing Rs. 7 be 20

Then money spend $= Rs.(7\times 20) = Rs.140$

Money left $= 200 - 140 = Rs.60$

Number of sweets costing Rs. 10

$= \frac{60}{10} = 6$

Number of sweets $= 20 + 6 = 26$

Here, also no money is left over.

Hence, maximum number of sweets Sunil can get 26. So that no money is left over.

Hence option (b)

41. Answer. A

As, $x^3 + 8$

$= x^3 + 2^3$

$= (x+2)(x^2 - 2x + 2^2)$

$= (x+2)(x^2 - 2x + 4)$ .... (i)

$x^2 + 5x + 6$

$= x^2 + 2x + 3x + 6$

$= (x+2)(x+3)$ .... (ii)

$x^3 + 4x^2 + 4x$

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

$= x(x+2)^2$ .... (iii)

From (i), (ii) and (iii)

LCM $= x(x+2)^2(x+3)(x^2 - 2x + 4)$

Hence option (a)

42. Answer. D

As we know that,

The products of two numbers = LCM of two numbers × HCF of two numbers

⇨ $p\times q = LCM\times 1$

⇨ $LCM = pq$

⇨ $\frac{1}{LCM} = \frac{1}{pq} = (pq)^{-1}$

Hence option (d)

43. Answer. A

As

$\sqrt[3]{4\frac{12}{125}}$

$= \sqrt[3]{\frac{512}{125}}$

$= \sqrt[3]{\frac{8^3}{5^3}}$

$= \left(\frac{8}{5}\right)^3 \times \frac{1}{3}$

$= \frac{8}{5} = 1\frac{3}{5}$

Hence option (a)

44. Answer. C

As, relative speed of police and thief $= (10-8)km/hr$

$= 2\ km/hr$

$= 2\times\frac{5}{18}m/sec$

$= \frac{5}{9}m/sec$

Time taken by police to catch the thief $= \frac{100}{\frac{5}{9}}$

$= \frac{100\times 9}{5} = 180sec$

$= \frac{180}{60\times 60} = \frac{1}{20}\ hour$

Distance travelled by thief before he got caught $= 8\times\frac{1}{20}$

$= \frac{2}{5}\ km$

$= \frac{2}{5}\times 1000\ m$

$= 400\ m$

Hence option (c)

45. Answer. B

Roots of Aman be (4, 3)

So, equation be

$x^2 - (sum\ of\ roots)x + products\ of\ roots$ .... (i)

$= x^2 - (4+3)x + (4\times 3)$

$= x^2 - 7x + 12$

Here constant is 12 which is wrong

Roots of Alok be (3, 2)
So, equation be
$= x^2 - (3+2)x + (3 \times 2)$
[According to (i)]
$= x^2 - 5x + 6$
Here coefficient of $x = -5$ which is wrong.
So, the correct equation be $x^2 - 7x + 6$
$= x^2 - x - 6x + 6$
$= x(x-1) - 6(x-1)$
$= (x-1)(x-6)$
For roots,
$(x-1)(x-6) = 0$
$=> x = 1 \text{ or } x = 6$
Hence option (b)

46. Answer. C
Statement 1:
As we know that in two consecutive integers, the one is always odd then other is even.
Hence statement 1 is correct.
Statement 2:
By Euclid's division
$a = bq + r, 0 \leq r < b$
a and b are positive integers.
Take $b = 8$
Then $a = 8q + r$
Here, $r = 0,1,2 \ldots .7$
Case (i), if $r = 0$
$a = 8q$
Then $a^2 = 64q^2 = 8(8q^2)$
$=> a^2 = 8\,m$ $\quad [As\ m = 8q^2]$
Case (ii), if $r = 1$
$a = 8q + 1$ [Odd integer]
$a^2 = (8q+1)^2$
$=> a^2 = 64q^2 + 16q + 1$
$=> a^2 = 8(8q^2 + 2q) + 1$
$=> a^2 = 8m + 1$ [As, $m = 8q^2 + 2q$]
Clearly, square of an odd integer is of the term $8n + 1$
Hence statement 1 is correct.
Hence option (c)

47. Answer. C
As, $2x + 4y - 6 = 0$
$2(x + 2y - 3) = 0$
⇨ $x + 2y - 3 = 0$ .... (i)
And
$4x + 8y - 8 = 0$
$4(x + 2y - 2) = 0$
⇨ $x + 2y - 2 = 0$ .... (ii)
Here, $a_1 = 1, b_1 = 2, c_1 = -3$
$a_2 = 1, b_2 = 2, c_2 = -2$
Then,
$\frac{a_1}{a_2} = 1$
$\frac{b_1}{b_2} = 1$
$\frac{c_1}{c_2} = \frac{3}{2}$
As we know that if
$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
Then lines are parallel and inconsistent no solution.
Hence solution is in consistent.
Hence option (c)

48. Answer. A
Let $p = 5$
Then $N^{p-1} - 1$
$= N^{5-1} - 1$
$= N^4 - 1$ .... (i)
As, N is prime to p
So Let N = 3
Then from (i)
$N^4 - 1 = 3^4 - 1 = 81 - 1 = 80$
Here, $(N^{p-1} - 1)$ is a multiple of p
Here, given condition had satisfied when p is a prime number.
Hence option (a)

49. Answer. C
As ratio of numbers be $1:5$
Let numbers be $x, 5x$
Then,
$x \times 5x = 320$
⇨ $5x^2 = 320$
⇨ $x^2 = 64$
⇨ $x = 8$
Numbers be 8 and $8 \times 5 = 40$
Now, difference between their square $= (40)^2 - (8)^2$
$= 1600 - 64$
$= 1536$
Hence option (c)

50. Answer. D
As Lead : Tin
X:- 1 : 2

Y:- 2 : 3

Lead in 25 kg $= \frac{25}{1+2} = \frac{25}{3}$

Tin in 25 kg $= \frac{25\times2}{1+2} = \frac{50}{3}$

Now,

Lead in 125 kg $= \frac{125\times2}{2+3} = 50$

Tin in 125 kg $= 125 - 50 = 75$

Lead in mixture $= 50 + \frac{25}{3} = \frac{175}{3}$

Tin in mixture $= 75 + \frac{50}{3} = \frac{275}{3}$

Ratio of Lead : Tin

$= \frac{175}{3} : \frac{275}{3}$

$= 7 : 11$

Hence option (d)

51. Answer. D

As,

Mean $= \frac{sum\ of\ numbers}{Total\ numbers}$

⇨ $15 = \frac{sum\ of\ 5\ numbers}{5}$

⇨ $sum\ of\ 5\ numbers = 15 \times 5 = 75$ ………… (i)

$\frac{sum\ of\ 6\ numbers}{6} = 17$

⇨ $sum\ of\ 6\ numbers = 17 \times 6 = 102$ ………. (ii)

From (ii)

6^{th} number + sum of 5 numbers = 102

⇨ 6^{th} number + 75 = 102 [From (i)]

⇨ 6^{th} number = 102 – 75 = 27

Hence option (d)

52. Answer. D

As,

Mean of 300 numbers = 60

⇨ $\frac{sum\ of\ 300\ numbers}{300} = 60$

⇨ $sum\ of\ 300\ numbers = 300 \times 60 = 18000$

Sum of top 100 numbers + sum of last 100 numbers + sum of remaining numbers $= 18000$

Sum of remaining 100 numbers + 8000 + 5000 = 18000

⇨ Sum of remaining 100 numbers = $18000 - 13000 = 5000$

Mean of remaining 100 numbers = $\frac{5000}{100} = 50$

Hence option (d)

53. Answer. A

Class	Mid value (x_i)	Frequency (f_i)	$x_i \times f_i$
0-20	10	17	170
20-40	30	28	840
40-60	50	32	1600
60-80	70	f	70f
80-100	90	19	1710

Mean $= \frac{\sum x_i \times f_i}{\sum f_i} = \frac{170+840+1600+70f+1710}{17+28+32+f+19}$

$=> \frac{4320+70f}{96+f} = 50$

$=> 4320 + 70f = 50(96 + f)$

$=> 70f - 50f = 4800 - 4320$

$=> 20f = 480$

$=> f = 24$

Hence option (a)

54. Answer. C

Given four slices be 150^0, 90^0, 60^0 and 60^0

When 60^0 be deleted

Then, remaining slices be 150^0, 90^0, 60^0

Total angle = 300^0

While making pie chart where 300^0 is taken as 100%

Then,

$\frac{150}{300} \times 100 = 50\%$

$\frac{90}{300} \times 100 = 30\%$

$\frac{60}{300} \times 100 = 20\%$

Also, 50% of 360^0 will be 180^0

Hence, largest slice will be as angle 180^0

Hence option (c)

55. Answer. A

As we know that,

Mode = 3(Median) – 2(Mean)

=>Mode = 3 ×220 – 2 × 270 = 660 – 540 = 120

Hence option (a)

56. Answer. D

As, a, b, c, d, e, f, g are consecutive even numbers then numbers are

$d-6, d-4, d-2, d+2, d+4, d+6$

Total = $d-6+d-4+ d-2+ d+2+ d+4+d+6 = 7d$

Also, when j, k, l, m, n are consecutive odd numbers then numbers be

$l-4, l-2, l, l+2, l+4$

Total = $l-4+l-2+l+l+2+l+4=5l$

Average = $\frac{7d+5l}{12}$

Hence option (d)

57. Answer. B

Number of Type A pencil = $\frac{50}{1}=50$

Number of Type B pencil = $\frac{x}{1.50}$

Number of Type C pencil = $\frac{20}{2}=10$

Average = $\frac{Total\ money\ spent}{Total\ number\ of\ pencil}=\frac{50+x+20}{50+\frac{x}{1.50}+10}$

$=>\frac{50+x+20}{50+\frac{x}{1.50}+10}=1.25$

$=>70+x=1.25(60+\frac{x}{1.50})$

$=>70+x=75+\frac{1.25x}{1.50}$

$=>x-\frac{1.25x}{1.50}=5$

$=>0.25x=5\times1.50$

$=>x=30$

Hence option (b)

58. Answer. C

x	Frequency	Cumulative frequency
1	8	8
2	10	18
3	f_1	29
4	f_2	45

f_1 = 29 – 18 = 11

f_2 = 45 – 29 = 16

Hence f_1 and f_2 be 11 amd 16.

Hence option (c)

59. Answer. C

As, we know that

Π radian = 180 degree

As, R be number of radian and D be number of degree

Thus, πR = 180D

Hence option (c)

60. Answer. C

$9\tan^2\theta+4\cot^2\theta$

$=(3tan\theta)^2+(2cot\theta)^2-2(3tan\theta)(2cot\theta)+2(3tan\theta)(2cot\theta)$

$=(3tan\theta-2cot\theta)^2+12(tan\theta cot\theta)$

$=(3tan\theta-2cot\theta)^2+12$

$since\ (3tan\theta-2cot\theta)^2\geq0$

Thus, minimum value of $(3tan\theta-2cot\theta)^2+12\ be\ 12$

Hence minimum value of $9\tan^2\theta+4\cot^2\theta$ be 12

Hence option (c)

61. Answer. B

As given $xsin\theta=ycos\theta=\frac{2ztan\theta}{1-\tan^2\theta}$

Let $\theta=30^0$

Then,$xsin30^0=ycos30^0=\frac{2ztan30^0}{1-\tan^2 30^0}$

$=>\frac{x}{2}=\frac{\sqrt{3}y}{2}=\frac{2z\times\frac{1}{\sqrt{3}}}{1-\frac{1}{3}}$

$=>\frac{x}{2}=\frac{\sqrt{3}y}{2}=\sqrt{3}z=k(say)$

$=>x=2k, y=\frac{2k}{\sqrt{3}}, z=\frac{k}{\sqrt{3}}$

Putting the value of x, y and z in $4z^2(x^2+y^2)$

$4\left(\frac{k}{\sqrt{3}}\right)^2[(2k)^2+\left(\frac{2k}{\sqrt{3}}\right)^2]$

$=\frac{4}{3}k^2[4k^2+\frac{4k^2}{3}]$

$=\frac{4}{3}k^2\left(\frac{16k^2}{3}\right)=\frac{(4k^2)(16k^2)}{9}=\frac{64k^4}{9}$

Option (b):

$(x^2-y^2)^2$

$=\left((2k)^2-\frac{(2k)^2}{(\sqrt{3})^2}\right)=\left[4k^2-\frac{4k^2}{3}\right]^2=\left(\frac{8k^2}{3}\right)^2=\frac{64k^4}{9}$

Here value of $4z^2(x^2+y^2)$ = value of $(x^2-y^2)^2$

Hence option (b)

62. Answer. A

Given,

$cos\theta_1+cos\theta_2+cos\theta_3=3$

It is only possible when $\theta_1=\theta_2=\theta_3=0^0$

Now,

$sin\theta_1+sin\theta_2+sin\theta_3=sin0^0+sin0^0+sin0^0=0+0+0=0$

Hence option (a)

63. Answer. A

Given that,

$cos\theta+tan\theta=1$

We can check from the given options.

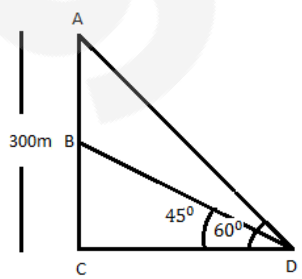
Option (a):

$\theta = 0^0$
LHS $= cos0^0 + tan0^0 = 1 + 0 = 1 =$ RHS
Hence option (a)

64. Answer. A
As,
$\sin\sqrt{\frac{1}{1+\cos x} + \frac{1}{1-\cos x}}$
$= \sin\sqrt{\frac{1-\cos x+1+\cos x}{(1+\cos x)(1-\cos x)}}$
$= \sin\sqrt{\frac{2}{1-\cos^2 x}}$
$= \sin\sqrt{\frac{2}{\sin^2 x}}$
$= \sin x \times \frac{\sqrt{2}}{\sin x} = \sqrt{2}$
Hence option (a)

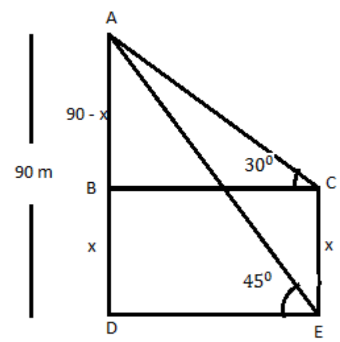
65. Answer. C
$\frac{\cos^4 A-\sin^4 A}{\cos^2 A-\sin^2 A}$
$= \frac{(\cos^2 A)^2-(\sin^2 A)^2}{(\cos^2 A-\sin^2 A)}$
$= \frac{(\cos^2 A-\sin^2 A)\times(\cos^2 A+\sin^2 A)}{(\cos^2 A-\sin^2 A)}$
$= (\cos^2 A + \sin^2 A)$
$= 1$
Hence option (c)

66. Answer. D
As,
$7\sin^2 x + 3\cos^2 x = 4$
⇨ $7\sin^2 x + 3(1-\sin^2 x) = 4$
⇨ $7\sin^2 x + 3 - 3\sin^2 x = 4$
⇨ $4\sin^2 x + 3 = 4 - 3 = 1$
⇨ $\sin^2 x = \frac{1}{4}$
⇨ $\sin x = \frac{1}{\sqrt{2}}$
⇨ $x = 30^0$
$\therefore \tan 30^0 = \frac{1}{\sqrt{3}}$
Hence option (d)

67. Answer. A


In ΔBCD:
$\tan 45^0 = \frac{BC}{CD}$
⇨ $1 \times CD = BC$
⇨ $CD = BC$ …….. (i)
In ΔACD:
$\tan 60^0 = \frac{AC}{CD}$
⇨ $\sqrt{3} = \frac{300}{CD}$
⇨ $CD = \frac{3\times100}{\sqrt{3}}$
⇨ $CD = 100\sqrt{3}$
So, $BC = CD = 100\sqrt{3}$
Hence option (a)

68. Answer. C
As,
$x = a\cos\theta + b\sin\theta$ ……….. (i)
$y = a\sin\theta - b\cos\theta$ ………… (ii)
Squaring and adding (i) and (ii)
$x^2 + y^2 = (a\cos\theta + b\sin\theta)^2 + (a\cos\theta - b\sin\theta)^2$
$= a^2\cos^2\theta + b^2\sin^2\theta + 2ab\sin\theta.\cos\theta + a^2\sin^2\theta + b^2\cos^2\theta - 2ab\sin\theta.\cos\theta$
$= a^2(\cos^2\theta + \sin^2\theta) + b^2(\sin^2\theta + \cos^2\theta)$
$= a^2 \times 1 + b^2 \times 1$
$= a^2 + b^2$
Hence option (c)

69. Answer. B


In ΔADE:
$\tan 45^0 = \frac{AD}{DE} = \frac{90}{DE}$
⇨ $1 = \frac{90}{DE}$
⇨ $DE = 90$
In ΔABC:
$\tan 30^0 = \frac{AB}{BC}$
⇨ $\frac{1}{\sqrt{3}} = \frac{90-x}{DE}$
⇨ $\frac{1}{\sqrt{3}} = \frac{90-x}{90}$
⇨ $\frac{90}{\sqrt{3}} = 90 - x$
⇨ $x = 90 - \frac{90}{\sqrt{3}}$

⇨ $x = 90 - \frac{3\times30}{\sqrt{3}}$

⇨ $x = 90 - 30\sqrt{3}$

Hence height of tree be $(90 - 30\sqrt{3})m$

Hence option (b)

70. Answer. D

In a triangle, Sum of two sides must be greater than the 3rd side.

But in option (d)

As $3 + 2 \ngtr 6$

Thus, (2,3,6) is not a triplet.

Hence option (d)

71. Answer. D

As, $2(a + b) = 10\ cm$

$=> a + b = \frac{10}{2} = 5$ .... (i)

$l + b = 5$ .... (ii)

Also, $lb = 4\ cm^2$

⇨ $b = \frac{4}{l}$ .... (iii)

From (ii) and (iii)

$l + \frac{4}{l} = 5$

⇨ $l^2 + 4 = 5l$

⇨ $l^2 - 5l + 4 = 0$

⇨ $(l - 4)(l - 1) = 0$

⇨ $l = 4\ or\ l = 1$

$According\ to\ option, l = 4\ cm$

Hence $l = 4\ cm$

Hence option (d)

72. Answer. B

According to question,

$smallest\ angle = 180^0 \times \frac{2}{9} = \left(\frac{180^0}{9}\right) \times 2$

$= 20^0 \times 2 = 40^0$

Hence option (b)

73. Answer. C

Radius of cylinder (r) = 1 cm

Height of cylinder (h) = 14 cm

$= 14 \times 100$

$= 1400\ cm$

Surface area of cylinder $= 2\pi rh + 2\pi r^2$

$= 2\pi(1 \times 1400 + 1^2)$

$= 2\pi(1400 + 1)$

$= 2 \times \frac{22}{7} \times 1401$

$\approx 8800\ cm^2$

Hence option (c)

74. Answer. B

According to question,

$\frac{\pi r_1^2}{\pi r_2^2} = \frac{16}{49}$

⇨ $\frac{r_1^2}{14\times14} = \frac{16}{49}$

⇨ $r_1^2 = \frac{16\times14\times14}{49}$

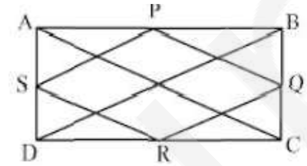
⇨ $r_1^2 = \left(\frac{4\times14}{7}\right)^2$

⇨ $r_1^2 = (4 \times 2)^2$

⇨ $r_1 = 4 \times 2 = 8\ cm$

Hence option (b)

75. Answer. C



$PQ = \frac{1}{2}AC, SR = \frac{1}{2}AC$ [From Mid point theorem]

Similarly,

$PS = \frac{1}{2}BD, QR = \frac{1}{2}BD$

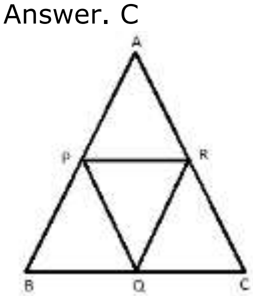
So, BD = AC [Diagonal of rectangle]

Thus, PQ = QR = RS = SP

Hence, PQRS is a Rhombus but need not be a square.

Hence option (c)

76. Answer. C



Area of $\Delta ABC = 5\ square\ units.$

Area of $\Delta PQR = \frac{1}{4} \times Area\ of\ \Delta ABC$

$= \frac{1}{4} \times 5$

$= \frac{5}{4}\ square\ units.$

Hence option (c)

77. Answer. D

According to question,

Percentage change $= 200 + 200 + \frac{200\times200}{100}$

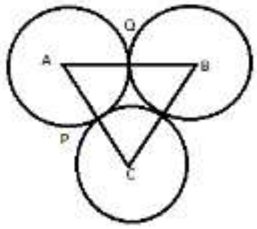
$= 400 + 200 \times 2$

$= 400 + 400$

$= 800\ \%$

Hence option (d)

78. Answer. C



Given radius of circle be $3.5\ cm$

Area enclosed = Area of equilateral triangle – 3 × Area of sector APQ

$= \frac{\sqrt{3}}{4} \times (7)^2 - 3 \times \pi \times (3.5)^2 \times \frac{60}{360}$

$= \frac{\sqrt{3}}{4} \times 49 - 3 \times \pi \times 3.5 \times 3.5 \times \frac{1}{6}$

$= \frac{49}{8}(2\sqrt{3} - \pi)$

Hence area enclosed be = $\frac{49}{8}(2\sqrt{3} - \pi) square\ unit.$

Hence option (c)

79. Answer. B

Area of regular hexagon of side a be $= \frac{3\sqrt{3}}{2}.a^2$

Hence option (b)

80. Answer. B

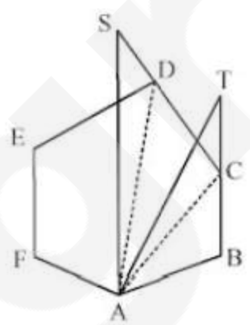
$\angle$ABC = 120^0 [Angle of regular hexagon]

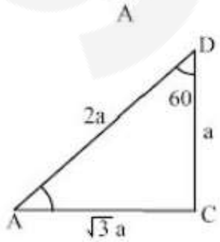
$\angle BAC = \angle BCA = \frac{180^0 - 120^0}{2} = 30^0$

$\angle$DCA = $120^0 - 30^0 = 90^0$

Thus, ⊿ ADCA is a right triangle.

Let side DC = a



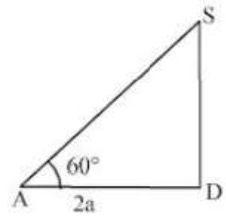


$\frac{AC}{a} = cot30^0 => AC = \sqrt{3}a$

$\frac{AD}{a} = cosec30^0 => AD = 2a$

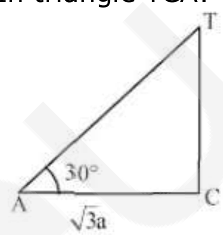
Now taking triangle ASD:

Let S is the vertex of pole



$\frac{DS}{AD} = tan60^0 => DS = 2\sqrt{3}$

In triangle TCA:



$\frac{TC}{AC} = tan30^0 => TC = \frac{\sqrt{3}a}{\sqrt{3}} = a$

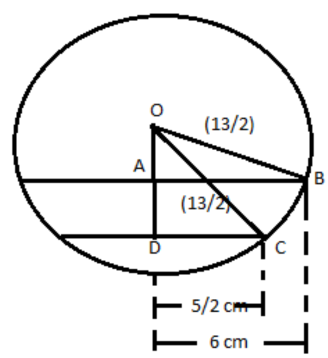
Thus, ratio ∅

$\frac{CT}{DS} = \frac{a}{2\sqrt{3}a} = \frac{1}{2\sqrt{3}}$

Hence CT : DS = 1 : $2\sqrt{3}$

Hence option (b)

81. Answer. C



In ΔOAB:

$OA = \sqrt{\left(\frac{13}{2}\right)^2 - (6)^2}$

$= \sqrt{\frac{169}{4} - 36}$

$= \sqrt{\frac{169-144}{4}}$

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

$= \frac{5}{2} = 2.5\ cm$

In ΔODC:

$OD = \sqrt{\left(\frac{13}{2}\right)^2 - \left(\frac{5}{2}\right)^2}$

$= \sqrt{\frac{169}{4} - \frac{25}{4}}$

$= \sqrt{\frac{144}{4}}$

$= \frac{12}{2} = 6\ cm$

Distance between two chords $= OD - OA$

$= 6 - 2.5$

$= 3.5\ cm$

Hence option (c)

82. Answer. D

As,

Volume of cone $= \frac{1}{3}\pi r^2 h$ [As, r be radius h be height]

Increased radius $= r\left(\frac{100+p}{100}\right)$

Increased volume $= \frac{1}{3}\pi\left[r\left(\frac{100+p}{100}\right)\right]^2 h$

$= \frac{1}{3}\pi r^2\left(1+\frac{p}{100}\right)^2 h$

$= \frac{1}{3}\pi r^2 h\left[1+\left(\frac{p}{100}\right)^2+\frac{2p}{100}\right]$

$= \frac{1}{3}\pi r^2 h + \frac{1}{3}\pi r^2 h\left[\left(\frac{p}{100}\right)^2+\frac{2p}{100}\right]$

%change $=$

$\frac{\left[\frac{1}{3}\pi r^2 h+\frac{1}{3}\pi r^2 h\times\left\{\left(\frac{p}{100}\right)^2+\frac{2p}{100}\right\}-\frac{1}{3}\pi r^2 h\right]}{\frac{1}{3}\pi r^2 h}\times 100$

$= \frac{p}{100}\left[\frac{p}{100}+2\right]\times 100$

$= p\left(2+\frac{p}{100}\right)$

Hence option (d)

83. Answer. C

Area of square be a^2 and $a^2 = 121$ [Given]

So, $a = \sqrt{121} = 11$

i.e. side of square be 11 cm

Perimeter of square $= 4a$

So, perimeter of circle $= 44$

⇨ $2\pi r = 44$

⇨ $2 \times \frac{22}{7} \times r = 44$

⇨ $r = \frac{44\times 7}{44} = 7$

Area of circle $= \pi r^2$

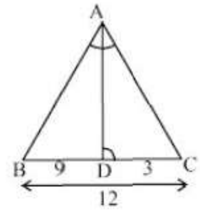
$= \frac{22}{7} \times 7^2$

$= 22 \times 7$

$= 154\ cm^2$

Hence option (c)

84. Answer. B



In triangle ABC and triangle DAC

∠BAC = ∠ADC

∠ACB = ∠DCA (Common angle)

So, ⊿ABC~⊿DAC

Thus, $\frac{BC}{AC} = \frac{AC}{DC}$

=> $12 \times 3 = AC \times AC$

=> $AC^2 = 36$ => $AC = 6$

Hence length of AC be 6 cm

Hence option (b)

85. Answer. B

As,

Surface area of sphere $= 4\pi r^2$

$s_1 = 4\pi r_1^2$ .... (i)

$\frac{s_1}{a} = 4\pi r_2^2$ .... (ii)

From (i) and (ii)

$4\pi r_1^2 = 36\pi r_2^2$

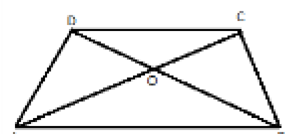
⇨ $\frac{r_1^2}{r_2^2} = \frac{36\pi}{4\pi} = \frac{9}{1}$

⇨ $\frac{r_1}{r_2} = \sqrt{\frac{9}{1}} = \frac{3}{1}$

So, radius is reduced to one third.

Hence option (b)

86. Answer. A



As we know that diagonal of trapezium intersect each other in the equal ratio.

⇨ $\frac{AO}{OC} = \frac{BO}{OD} = \frac{AB}{DC}$

Hence option (a)

87. Answer. C

According to question $\pi r_1^2 h_1 = n \times \frac{1}{3}\pi r_2^2 h_2$

=>$\left(\frac{35}{2}\right)^2 \times 32 = n \times \frac{1}{3}(2)^2 \times 7$

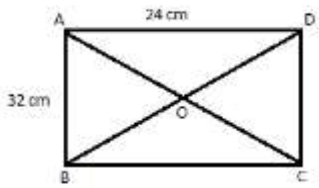
[As, $r_1 = \frac{35}{2}, r_2 = 2, h_1 = 32, h_2 = 7$]

=>$n = \frac{35\times 35\times 323}{2\times 2\times 2\times 2\times 7}$

=>$n = 35 \times 10 \times 3$
=>$n = 1050$ Persons
Hence option (c)

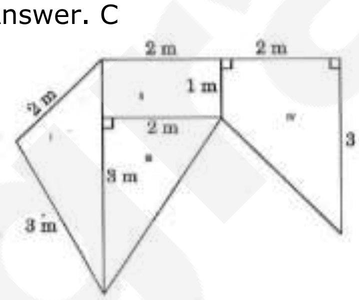
88. Answer. B
As,
% change in circumference = % change in radius
⇨ 15% change in circumference = 15 % change in radius
Area of circle increased $= 15 + 15 + \frac{15\times15}{100}$
$= 30 + 2.25$
$= 32.25\%$
Hence option (b)

89. Answer. B

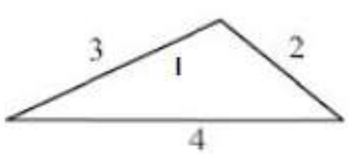


In ΔBCD:
$BD = \sqrt{(24)^2 + (32)^2}$
$= \sqrt{1600} = 40\ cm$
Diagonals of rectangle are equal and bisect each other.
So, $OD = \frac{BD}{2} = \frac{40}{2} = 20\ cm$
Hence option (b)

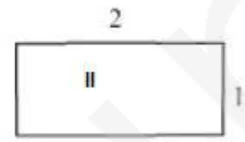
90. Answer. C



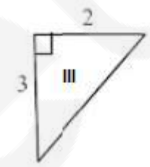
First of all whole part divides into 4 parts viz. I, II, III and IV
Part I:



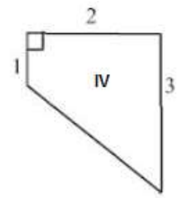
Semi perimeter (S) $= \frac{2+3+4}{2} = \frac{9}{2}$
According to Heron's formula
Area $= \sqrt{S(S-a)(S-b)(S-c)}$
$= \sqrt{\frac{9}{2}\left(\frac{9}{2}-2\right)\left(\frac{9}{2}-3\right)\left(\frac{9}{2}-4\right)}$
$= \sqrt{\frac{9}{2}\times\frac{5}{2}\times\frac{3}{2}\times\frac{1}{2}}$
$=\frac{3\sqrt{15}}{4}$ sq. meter
Part II:



Area of rectangle = 2×1 = 2 sq. meter
Part III:

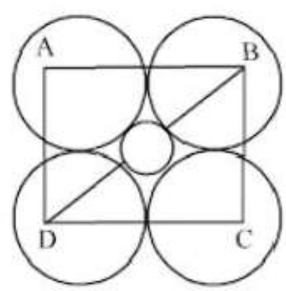


Area of triangle $= \frac{1}{2}\times 2\times 3 = 3\ sq.meter$
Part IV:



$Area = \frac{1}{2}\times(1+3)\times 2 = 4\ sq.meter$
Total Area $= \frac{3\sqrt{15}}{4} + 2 + 3 + 4 = \frac{3\sqrt{15}}{4} + 9\ sq.meter$
Hence option (c)

91. Answer. A



Let D is diameter of each circle.

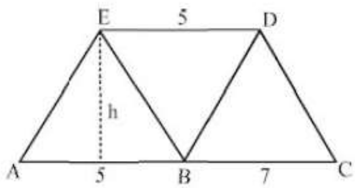
Thus, side of square = D

$Diagonal\ of\ square = \sqrt{D^2 + D^2} = D\sqrt{2}$

Diameter of shaded circle = $\sqrt{2}D - D = D(\sqrt{2} - 1)$

Hence option (a)

92. Answer. A



Here, AC parallel to ED.

So, height of all triangle be same.

Let height of triangle be h

$area\ of\ ABDE = 5 \times h$

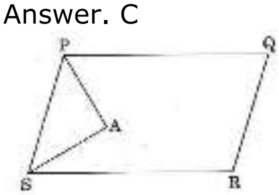
$area\ of\ triangle\ BDE = \frac{1}{2} \times 5 \times h$

$area\ of\ triangle\ BCD = \frac{1}{2} \times 7 \times h$

Required ratio = $5h : \frac{5h}{2} : \frac{7h}{2} = 10h : 5h : 7h = 10 : 5 : 7$

Hence option (a)

93. Answer. C



∠P + ∠S = 180^0 [Sum of adjacent angles of parallelogram]

$\frac{\angle P}{2} + \frac{\angle S}{2} = 90^0$ ....(i)

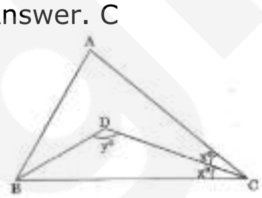
$\frac{\angle P}{2} + \frac{\angle S}{2} + \angle A = 180^0$ (Triangle law) ...(ii)

From (i) and (ii)

∠A = 180^0 – 90^0 = 90^0

Hence option (c)

94. Answer. C



In triangle ABC:

∠A + ∠ABC + ∠BCA = 180^0

=>80^0 + 60^0 + 2x^0 = 180^0

=>2x^0 = 180^0 - 140^0

=>x^0 = $\frac{40^0}{2} = 20^0$

∠CBD = $\frac{60^0}{2} = 30^0$ [As, BD is angle bisector of ∠ABC]

In triangle BCD:

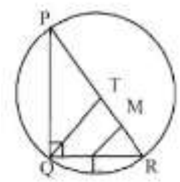
∠CBD + y^0 + x^0 = 180^0

=>y^0 = 180^0 – 30^0 – 20^0 = 130^0

Hence, x^0 = 20^0 and y^0 = 130^0

Hence option (c)

95. Answer. B



Assuming right angled triangle be in a circle, where PR is diameter of circle.

PT = QT = TR [Radii of circle]

QT = TR

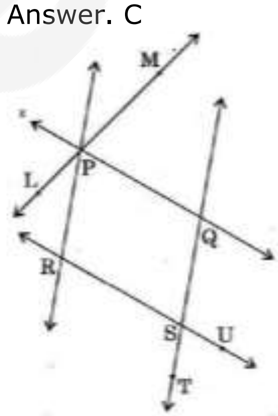
∠TQR = ∠TRQ

∠TQR = ∠RLM [Corresponding angles]

∠RLM = ∠LRM

Hence option (b)

96. Answer. C



∠UST = ∠QSR = 70^0 [vertically opposite angle]

∠PQS + ∠QSR = 180^0 [As, PQ parallel to RS]

∠PQS = 180^0 – 70^0 = 110^0 [As, ∠QSR = 70^0]

Now,

∠PQS + ∠QPR = 180^0 [As, PR parallel to QS]

∠QPR = 180^0 – 110^0 = 70^0

Again,

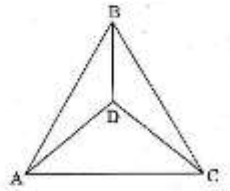
∠XPL + ∠LPR + ∠RPQ = 180^0

=>∠XPL = 180^0 – 35^0 – 70^0 = 75^0 [As, ∠LPR = 35^0]

Hence, ∠MPQ = ∠XPL = 75^0 [Vertically opposite angle]

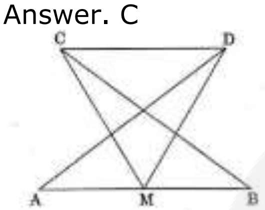
Hence option (c)

97. Answer. C



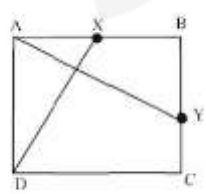
As, ∠DAC = ∠DCA
So, DA = DC
Hence triangle ADC is an isosceles triangle
Hence statement 1 is correct.
Statement 2:
As, we know that, the centroid of a triangle is the point where the three medians of the triangle meet.
Hence statement 2 is incorrect.
Statement 3:
AB = CB
AD = DC
BD = BD
Thus, triangle ABD ≅ triangle CBD
[By, SSS congruence criteria]
Hence statement 3 is correct.
Hence option (c)

98. Answer. C



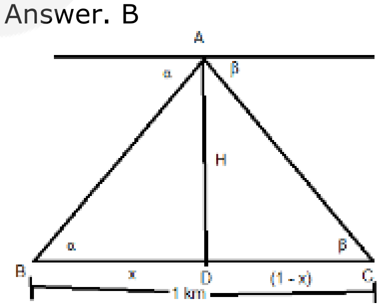
∠AMC = ∠BMD ....(i)
∠CMD = ∠CMD (common angle).......(ii)
Adding (i) and (ii), we get
∠AMC + ∠CMD = ∠BMD + ∠CMD
∠AMD = ∠BMC
∠DAM = ∠CBM
AM = BM
By, ASA
Triangle ADM ≅triangle BCM
Hence option (c)

99. Answer. D



Statement 1:
In triangle ADC and triangle BAY
∠A = ∠B = 90^0
AX = BY [Half of the side of squre]
AD = AB
By SAS,
Triangle ABY ≅ triangle DAX
Hence statement 1 is correct.
Statement 2:
By CPCT,
Clearly, ∠DXA = ∠AYB
Hence statement 2 is correct.
Statement 3:
We can say anything about inclination of DX with AY.
Hence statement 3 is incorrect.
Statement 4:
Clearly, DX is not perpendicular to AY.
Hence statement 4 is incorrect.
Hence only statement 1 and 2 are correct.
Hence option (d)

100. Answer. B



In triangle ABD:
$tan \propto = \frac{h}{x} => x = \frac{h}{tan\propto}$
In triangle ACD:
$tan\beta = \frac{h}{1-x}$
$=> 1 - x = \frac{h}{tan\beta}$
$=> 1 - \frac{h}{tan\propto} = \frac{h}{tan\beta}$ [As, x = $\frac{h}{tan\propto}$]
$=> h\left(\frac{1}{tan\propto} + \frac{1}{tan\beta}\right) = 1$
$=> h\frac{tan\propto + tan\beta}{tan\alpha tan\beta} = 1$
$=> h = \frac{tan\alpha tan\beta}{tan\alpha + tan\beta}$
Hence height of aero plane be $\frac{tan\alpha tan\beta}{tan\alpha + tan\beta}$
Hence option (b)

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