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Class : X

(1)

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Roll no : 05

Sub : Maths | Pg no : A-Das.

1) $x+y-3=0$

$$3x-2y=4$$

$$x = 3-y \quad \text{--- (i)}$$

$$3(3-y)-2y=4 \quad \text{(from -ii)}$$

$$9-3y-2y=4$$

$$\begin{aligned} -5y &= -5 \\ y &= 1 \quad \text{--- (ii)} \end{aligned}$$

$$x+1-3=0 \quad \text{(from -ii)}$$

$$x = 2$$

$$x = 2, y = 1$$

Answer = option (2) = (2, 1)

2) $x+2y=3$

$$5x+ky=-7$$

Condition for unique solution = $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$$\frac{1}{5} \neq \frac{2}{k}$$

$$k \neq 10$$

Answer = option (3) - k is not equal to 10.

3)



According to the question

or $DE \parallel BC$

by B.P.T

$$\frac{AD}{DB} = \frac{AE}{EC}$$

$$\frac{6}{9} = \frac{8}{EC}$$

$$\begin{aligned} \frac{2}{3} &= \frac{8}{EC} \\ 2EC &= 24 \\ EC &= 12 \end{aligned}$$

$$\begin{aligned} Now AC &= AE + EC \\ &= 8 + 12 \\ &= 20 \text{ cm} \quad (\text{option 3}) \end{aligned}$$

$$A) 9 \tan^2 A - 9 \sec^2 A = ?$$

$$9 (\tan^2 A - \sec^2 A)$$

$$9(-1)$$

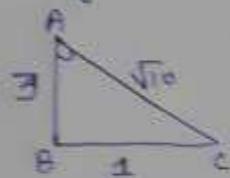
$$= -9 \cdot (\text{option} - 2)$$

$$\therefore \sec^2 A - \tan^2 A = 1$$

$$x(-1) = \tan^2 A - \sec^2 A = -1$$

Multiplying
(-1)
on both
sides.

5) According to the question:



By Pythagoras theorem $AB = 3$

$$\cos A = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \frac{3}{\sqrt{10}} \quad (\text{option} - 3)$$

$$6) \frac{1 + \cot \theta}{\sin \theta}$$

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

$$\Rightarrow \csc \theta + \cot \theta \quad (\text{option } 3).$$

$$7) 2x^2 - kx + 1 = 0$$

\Rightarrow condition for real and equal roots

$$b^2 - 4ac = 0$$

$$\Rightarrow (-k)^2 - 4(2)(1) = 0$$

$$\Rightarrow k^2 - 8 = 0$$

$$\Rightarrow k^2 = 8$$

$$\Rightarrow k = \sqrt{8}$$

$$\Rightarrow k = \pm 2\sqrt{2} \quad (\text{option} - 4)$$

$$8) \quad 3) \quad 2 + \frac{3}{x} = 4$$

(3)

$$9) \quad 3x^2 + x - 2 = 0$$

$$\begin{aligned} D &= b^2 - 4ac \\ &= (1)^2 - 4(3)(-2) \\ &= 1 + 12(-2) \\ &= 1 + 24 \\ &= 25 \end{aligned}$$

option (3) real and distinct roots

$$10) \quad x^2 + x - 2$$

$$\begin{aligned} D &= b^2 - 4ac \\ &= (1)^2 - 4(1)(-2) \\ &= 1 + 4(-2) \\ &= 1 + 8 \\ &= 9 \quad (\text{option 4}) \end{aligned}$$

$$11) \quad kx^2 + 2x - 3 = 0$$

$$\Rightarrow k(2)^2 + 2(2) - 3 = 0$$

$$\Rightarrow 4k + 4 = 3$$

$$\Rightarrow 4k = -1$$

$$\Rightarrow k = -\frac{1}{4}$$

$$12) \quad 1, 2, 3, \dots, 20$$

$$a = 1 \mid d = 1 \mid n = ? \mid a_n = 20$$

$$\Delta D = 1 + (n-1)1$$

$$19 = (n-1)1$$

$$n-1 = 19$$

$$n = 20$$

$$S_{20} = \frac{n}{2}(a + l)$$

$$= \frac{20}{2} (1 + 20)$$

$$= 10(21)$$

$$= 210$$

$$\begin{aligned} &\frac{1}{2} + \frac{1}{2}x - \frac{1}{2} \\ &\Rightarrow (-k)^2 - 4(1) \\ &\Rightarrow k^2 - 4 \\ &\Rightarrow k^2 = 8 \\ &\Rightarrow k = \pm \sqrt{8} \\ &\Rightarrow k = \pm 2\sqrt{2} \end{aligned}$$

$$\begin{aligned} &\frac{1}{2} + \frac{1}{2}x - \frac{1}{2} \\ &\Rightarrow (-k)^2 - 4(1) \\ &\Rightarrow k^2 - 4 \\ &\Rightarrow k^2 = 8 \\ &\Rightarrow k = \pm \sqrt{8} \\ &\Rightarrow k = \pm 2\sqrt{2} \end{aligned}$$

13) 3 median = Mode + 2 mean

A) 6, 7, 2, 8, $x, y, 14$

$$\text{mean} = 9$$

$$x+y = ?$$

$$\text{mean} = \frac{\text{Sum of all observations}}{\text{No. of observations}}$$

$$= \frac{6+7+2+8+x+y+14}{6} = 9$$

$$= 35+x+y+\cancel{2} = 54$$

$$= 35+x+y = 54$$

$$= x+y = 19.$$

14) Yes $\cos A = \cos B$

15) Let the ~~ratio~~ ratio of one pair = x .
Let the ratio of one pair = y .

According to the question,

$$37x + 53y = 320 \quad (\text{i})$$

$$53x + 37y = 400 \quad (\text{ii})$$

16) Given: $\angle A = \angle B$

$BC = AC$ (\because sides opposite to equal angles are equal).

$$BC = AC = x$$

Using Pythagoras theorem

$$AB^2 = AC^2 + BC^2$$

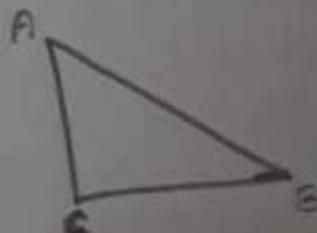
$$AB^2 = x^2 + x^2$$

$$AB = \sqrt{2}x$$

7) we have

$$\cos A = \frac{AC}{AB} = \frac{x}{\sqrt{2}x} = \frac{1}{\sqrt{2}}$$

$$\cos B = \frac{BC}{AB} = \frac{x}{\sqrt{2}x} = \frac{1}{\sqrt{2}} \quad \therefore \boxed{\cos A = \cos B}$$



17) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. ③

18) Given $a = 10$, $d = -3$.

$$a_2 = a + d = 10 - 3 = 7$$

$$a_3 = a_2 + d = 7 - 3 = 4$$

$$a_4 = a_3 + d = 4 - 3 = 1$$

$$a_5 = a_4 + d = 1 - 3 = -2$$

The A.o.P will be as follows

$$10, 7, 4, 1, -2 \dots$$

19) $\sqrt{2}, \sqrt{8}, \sqrt{18}$

$$\sqrt{2}, 2\sqrt{2}, 3\sqrt{2}$$

$$2\sqrt{2} - \sqrt{2} = \sqrt{2} \quad | 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$$

$$\begin{array}{r} 218 \\ 3 \overline{)9} \\ 3 \overline{)3} \\ 3 \end{array}$$

$$a_2 - a_1 = a_3 - a_2$$

The above one is a A.o.P.

$$d = \sqrt{2}$$

20) 37, 31, 31

$$a = 37$$

$$d = 31 - 37 = -6$$

$$o = 37 + (n-1) - 6$$

$$-37 = (n-1) - 6$$

$$\frac{-37}{-5} = n-1$$

$$\frac{37}{5} = n-1$$

$$\frac{37+1}{5} = n$$

$$\frac{10}{3} = n$$

now 0 is not a term of the given A.o.P

Section - B

$$21) \quad x - y = -1 \quad (\text{I})$$

$$5y - 3x = 1 \quad (\text{II})$$

$$x = -1 + y \quad (\text{III}).$$

$$5y - 3(-1 + y) = 1 \quad (\text{From eq (III)})$$

$$5y + 3 - 3y = 1$$

$$2y = -2$$

$$y = -1$$

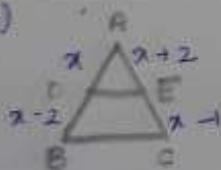
$$x - (-1) = -1$$

$$x + 1 = -1$$

$$x = -2$$

$$x = -2 \mid y = -1$$

22)

as $DE \parallel BC$

$$\frac{AD}{DB} = \frac{AE}{EC} \quad (\text{By BPT})$$

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

$$x(x-1) = (x+2)(x-2)$$

$$x^2 - x = x^2 - 4$$

$$x = 4$$

$$23) \quad 6x^2 + 11x = -3$$

$$6x^2 + 11x + 3 = 0$$

$$6x^2 + 9x + 2x + 3 = 0$$

$$3x(2x+3) + 1(2x+3) = 0$$

$$(3x+1)(2x+3) = 0$$

$$x = -\frac{1}{3} \quad \left| \begin{array}{l} x = -\frac{3}{2} \\ x = -\frac{1}{2} \end{array} \right.$$

$$24) 2x^2 - 4\sqrt{2}x - 5^2 = 0$$

$$b^2 - 4ac$$

$$\cancel{b^2 - 4ac}$$

$$(-4\sqrt{2})^2 - 4(2)(-\sqrt{2})$$

$$32 - (-8)\sqrt{2}$$

$$32 + 8\sqrt{2} > 0$$

So the roots of the above equation will be real and distinct.

$$25) a = 14 \mid d = 7 \mid a_n = 98$$

$$98 = 14 + (n-1)7$$

$$84 = (n-1)7$$

$$12 = n-1$$

$$13 = n$$

$$26) 12, 7, 2, \dots$$

$$a = 12 \mid d = -5 \mid n = 6$$

$$S_6 = \frac{6}{2} (2(12) + (6-1)-5)$$
$$= 3(24 - 25)$$

$$S_6 = -3$$

Section-C

$$27) \text{let father's age be } x \\ \text{son's age be } y$$

According to the question

$$x+2y = 90 - 8$$

$$2x+y = 95 - 8$$

$$y = 95 - 2x \quad (\text{iv})$$

$$x + 2(95 - 2x) = 70 \quad (\text{from - iii})$$

$$x + 190 - 4x = 70$$

$$-3x = -120$$

$$x = 40$$

$$y = 95 - 2(40)$$

$$y = 95 - 80$$

$$y = 15$$

$$28) \sqrt{3}x^2 + 10x + 7\sqrt{3}$$

$$\sqrt{3}x^2 + 7x + 3x + 7\sqrt{3}$$

$$x(\sqrt{3}x + 7) + \sqrt{3}(x + 7)$$

$$(x + 7)(\sqrt{3}x + 7)$$

$$x = -\sqrt{3}, -\frac{7}{\sqrt{3}}$$

$$29) a_{32} = ? \quad | \quad a_1 = 38 \quad | \quad a_{16} = 73$$

According to the question.

$a + 10d = 38$	$a + 10d = 38$
$a + 15d = 73$	$a + 15d = 73$
$-5d = -35$	$a + 70 = 38$
$d = 7$	$a = -32$

$$a_{32} \Rightarrow a + 31d$$

$$\Rightarrow -32 + 31(7)$$

$$\Rightarrow 185.$$

30) $(a+d)$, a , $a-d$ are the three numbers.
According to the question

$$(a+d) + (a) + (a-d) = -3$$

$$3a = -3$$

$$a = -1$$

$$\Rightarrow (-1+d)(-1)(-1-d) = 8$$

$$\Rightarrow (-1+d)(-1-d) = -8$$

$$\Rightarrow (-1)^2 - (d)^2$$

$$\Rightarrow 1 - d^2 = -8$$

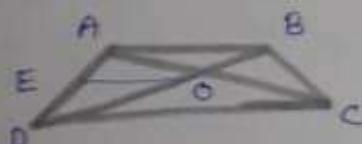
$$\Rightarrow -d^2 = -9$$

$$\Rightarrow d^2 = 9$$

$$\Rightarrow d = \pm 3$$

The numbers are $2, -1, -4$ in any order.

31) According to the question.



Construct EO such that $EO \parallel DC \parallel AB$.

$$\text{To prove : } \frac{AO}{BO} = \frac{CO}{DO}$$

In $\triangle ADC$ we have.

$OE \parallel DC$ (by construction)

$$\therefore \frac{AE}{ED} = \frac{AO}{CO} \quad (\text{by BPT})$$

In $\triangle ABD$, we have

$OE \parallel AB$ (by construction)

$$\therefore \frac{DE}{EB} = \frac{CO}{DO} \quad (\text{by BPT})$$

From (i) and (ii)

$$\Rightarrow \frac{AO}{CO} = \frac{BO}{DO}$$

$$\Rightarrow \frac{AO}{BO} = \frac{CO}{DO}$$

(Hence proved)

$$32) \frac{2\cos^3\theta - 1080}{\sin\theta - 2\sin^3\theta} = 1080$$

$$= \frac{1080(2\cos^2\theta - 1)}{1080(1 - 2\sin^2\theta)}$$

$$= \frac{1080(\cos^2\theta - \sin^2\theta - \cos^2\theta)}{\sin\theta(\sin^2\theta + \cos^2\theta - 2\sin^2\theta)}$$

$$= \frac{1080(\cos^2\theta - \sin^2\theta)}{\sin\theta(\cos^2\theta - \sin^2\theta)}$$

$$= \frac{1080}{\sin\theta}$$

= 1080 (Hence proved)

$$\therefore \sin^2\theta + \cos^2\theta = 1$$

$$33) 2\lambda n^2 30 \times 10045 - 3\lambda n^2 60 \times 100745$$

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

$$= \frac{1}{2} - \frac{3}{2}$$

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

34) here model class.

12 - 16	17
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$$\frac{12}{13}$$

$$l_1 = 12$$

$$12 + \left(\frac{17 - 9}{34 - 9 - 12} \right) \times 4$$

$$l_1 = 17$$

$$l_0 = 9$$

$$l_2 = 12$$

$$l_3 = 1$$

$$\Rightarrow 12 + \left(\frac{0.32}{13} \right)$$

$$\Rightarrow \frac{156 + 32}{13} = \frac{188}{13} = 14.46$$

Section - D

(e)

35) let the digit at unit place be = x .

let the digit at tens place be = y

According to the question

$$xy = 20$$

originally the number is $10y + x$

After interchanging the digit the number becomes $10x + y$.

According to the question

$$(10y + x) + 9 = 10x + y$$

$$10y + x + 9 = 10x + y$$

$$9 = 10x - x + y - 10y$$

$$9 = 9x - 9y$$

$$x - y = 1 \quad \text{--- (i)} \quad \Rightarrow x = 1 + y \quad \text{--- (ii)}$$

$$xy = 20$$

$$(1 + y)(y) = 20$$

$$y + y^2 = 20$$

$$y^2 + 8y - 20 = 0$$

$$(y + 5)(y - 4) = 0$$

$$y = -5, 4$$

y cannot be -5 as a digit of a number can't be negative. so $y = 4$
now $x = 5$ (From - (i))

so the number is 45

$$36) 36x^2 - 12ax + (a^2 - b^2) = 0$$

$$\Rightarrow [36x^2 - 12ax + a^2] - b^2 = 0$$

$$\Rightarrow [(6x)^2 - (2)(6x)(a) + a^2] - b^2 = 0$$

$$\Rightarrow [(6x - a)^2 - (b)^2] = 0$$

$$\Rightarrow (6x - a + b)(6x - a - b) = 0$$

$$\Rightarrow 6x - a + b = 0 \quad (\text{or}) \quad 6x - a - b = 0$$

$$6x = a - b$$

$$x = \frac{a-b}{6}$$

$$6x = a + b$$

$$x = \frac{a+b}{6}$$

$$\therefore x = \frac{a-b}{6}, \frac{a+b}{6}$$

$$37) 1 + 6 + 11 + 16 + \dots + x = 148 \quad | \quad a = 1, |a_n| = 5, n = 148, d = 5$$

$$x = 1 + (n-1)5 \quad -(i)$$

$$148 = \frac{n}{2}(a + a_n)$$

$$148 = \frac{n}{2}(1 + 1 + 5n - 5) \quad (\text{from eq (i)})$$

$$296 = n(5n - 3)$$

$$0 = 5n^2 - 3n - 296$$

$$5n^2 - 10n + 37n - 296$$

$$5n(n-8) + 32(n-8)$$

$$1 (n-8)(5n+32)$$

$$n=8$$

$\therefore n, n$ cannot be a
part of

$$\begin{aligned} \text{now } x &= 1 + (8-1)5 \\ &= 1 + 35 \\ &= 36 \end{aligned}$$

$$38) \frac{\cos A}{1-\sin A} + \frac{\sin A}{1-\cos A} = \cot A + \operatorname{cosec} A$$

$$\Rightarrow \frac{\cos A}{1-\frac{\sin A}{\cos A}} + \frac{\sin A}{1-\frac{\cos A}{\sin A}}$$

$$\Rightarrow \frac{\cos A}{\cos A - \sin A} + \frac{\sin A}{\sin A - \cos A}$$

$$\Rightarrow \frac{\cos^2 A}{\cos A - \sin A} + \frac{\sin^2 A}{\sin A - \cos A}$$

$$\Rightarrow \frac{\cos^2 A - \sin^2 A}{\cos A - \sin A}$$

$$\Rightarrow \frac{\cos^2 A - \sin^2 A}{(\cos A - \sin A) 0}$$

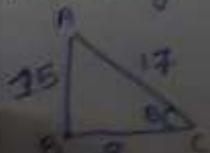
$$\Rightarrow \frac{(\cos A + \sin A)(\cos A - \sin A)}{(\cos A - \sin A)}$$

$$\Rightarrow \cos A + \sin A \quad (\text{Hence proved})$$

$$39) 17 \times 1010 = ?$$

$$1010 = \frac{?}{17}$$

According to the question



By Pythagoras theorem $\Rightarrow AB^2 = AC^2 + BC^2$

"Multiplying terms with both numerator and denominator"

$$a^2 \cdot a^2 \cdot b^2 = (a \cdot b) \cdot (a \cdot b)$$

$$\Rightarrow (17^2 - 8^2)$$

$$\Rightarrow 289 - 64$$

$$\Rightarrow 225$$

$$\Rightarrow AB = \boxed{15}$$

$$\text{Now sine} = \frac{\text{opp}}{\text{hyp}} = \frac{15}{17}$$

$$\text{cosine} = \frac{\text{hyp}}{\text{adj}} = \frac{17}{15}$$

$$\text{Tan} = \frac{\text{opp}}{\text{adj}} = \frac{15}{8}$$

$$\text{cosec} = \frac{\text{adj}}{\text{opp}} = \frac{8}{15}$$

$$\sec = \frac{\text{adj}}{\text{hyp}} = \frac{17}{8}$$

Age	No % people	No % house (P)	x_i	$f(x_i)$
0 - 2	1	1	1	1
2 - 4	2	3	3	6
4 - 6	1	5	5	5
6 - 8	5	7	7	35
8 - 10	9	9	9	9P
10 - 12	2	11	11	22
12 - 14	3	13	13	39
		14 + P		108 + 9P

$$\frac{\sum f_i x_i}{\sum f_i} \Rightarrow \frac{108 + 9P}{14 + P} = 8.01$$

$$\Rightarrow 108 + 9P = 113.4 + 8.01P$$

$$\Rightarrow 0.9P = 5.4 \quad | \boxed{P = 6}$$