DIRECTORATE OF MINORITIES

VASANTH NAGAR, BENGALURU-560052

Education wing

10th STANDARD MID TERM EXAM KEY ANSWERS 2024-25

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MARKS: 80 **DATE: 27/09/2024** **DURATION: 3 hr 15min**

Question number	Value points	Marks
1	A) 1	1
2	C) P(x)=x	1
3	B)$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	1
4	D)$2x^2-3x+5=0$	1
5	B)-2	1
6	C)3cm	1
7	D) (3, 0)	1
8	A)$\sqrt{x^2+y^2}$	1
9	Every cubic polynomial has **degree 3**	1
10	Number of zeroes in this graph is **3**	1
11	Infinitely many solutions	1
12	$S_n=\frac{n}{2}(2a+(n-1)d$	1
13	One angle equal, two sides are in proportion. **SAS similarity criteria**.	1
14	x=0 or x=6	1
15	$\begin{array}{r\|l} 3 & 75 \\ \hline 5 & 25 \\ \hline & 5 \end{array}$ $\therefore 75 = 3\times5\times5$ or 3×5^2	1
16	$x-5=11-x \Rightarrow \quad \cancel{2}x=\cancel{1}6 \quad \therefore x=8$	1

17	Let $5 + \sqrt{2} = \frac{p}{q}$ be a rational number, where p and q are co-prime and $q \neq 0$. Then, $\sqrt{2} = \frac{p}{q} - 5 = \frac{p-5q}{q}$ $\Rightarrow \sqrt{2} = \frac{p-5q}{q}$ since $\frac{p-5q}{q}$ is a rational number, therefore, $\sqrt{2}$ is a rational number. But, it is a contradiction. Hence, $5 + \sqrt{2}$ is irrational. Hence, proved.	2
18	**Finding the HCF**: - From the prime factorizations: - Prime factors of 438: 2, 3, 73 - Prime factors of 606: 2, 3, 101 - The common prime factors are 2 and 3. - Multiply the common prime factors:. 2X3=6 Therefore, the largest number that divides both 438 and 606 without leaving a remainder is 6.	2
19	Let the zeroes be α and β which is equal to 5 and 3 respectively. sum of zeroes, $\alpha + \beta = 5+3 = 8$ product of zeroes, $\alpha\beta = 5x3 = 15$ x^2 – (sum of zeroes)x + (product of zeroes) = 0 $x^2 - (\alpha + \beta)x + \alpha\beta$ $x^2-8x+15$	2
20	Two equations are 2x+y=10 ---------(1) multiply by 1 x-y=2 --------(2) multiply by 2 We get 2x+y=10 2x-2y=4 After subtraction $\boxed{y=2}$ 1 mark Put y value in any one equation we get x Equation one becomes 2x+y=10 2x+2=10 2x=10-2 $\cancel{2}x=\cancel{8}$ $\boxed{x=4}$ 1 mark	2
21	Given equation is $x^2+7x+10=0$, by factorisation method $x^2+5x+2x+10=0$ $x(x+5)+2(x+5) = 0$ $x+5=0$ or $x+2=0$ $x=-5$ and $x=-2$	2

22 given $a=5$, $a_n=32$

To find sum of first n terms, $S_n=\frac{n}{2}(a+a_n)$

$S_{10}=\frac{\cancel{10}}{\cancel{2}}(5+32)$ — 1 mark — 2

$S_{10}=5(37)$

$=185$ — 1 mark

∴ **The sum of first 10 terms of this A.P is 185**

OR

Given $a=6$, $d=4$ and $n=20$

We know that $S_n=\frac{n}{2}(2a+(n-1)d$

$S_{20}=\frac{\cancel{20}}{\cancel{2}}(2\text{x}6+(20-1)\text{x}4)$ — 1 mark

$=10(12+19\text{x}4)$ — 2

$=10(12+76)$

$=10\text{x}88$

$=880$ — 1 mark

∴ **The sum of first 20 terms of this A.P is 880**

23 In ΔABC

DE || AC

BD/AD = BE/EC ....(i)

In ΔABE — 2

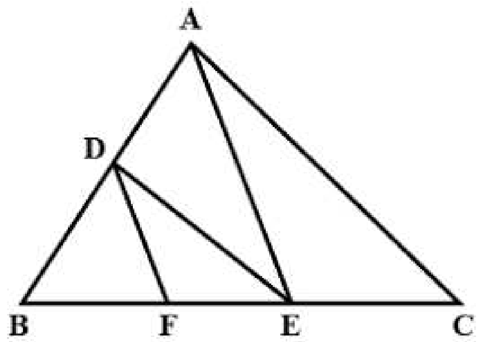
DF || AE

BD/AD = BF/FE ....(ii)

From (i) and (ii)

BD/AD = BE/EC = BF/FE

Thus, BE/EC = BF/FE



OR

Given, ABCD is a trapezium in which AB || DC in which diagonals AC and BD intersect each other at O.

To Prove that AOBO=CODO

Construction: Through O, draw EO || DC || AB

Proof:In ΔADC, we have OE || DC (By Construction)

∴AE/ED=AO/CO...(i) [By using Basic Proportionality Theorem] — 2

In ΔABD, we have OE || AB (By Construction)

∴AE/ED=BO/DO...(ii) [By using Basic Proportionality Theorem]

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

ΔAOB~ΔCOD

24	Given points are M(4, 6) and N(6, 8) By section formula at midpoint, $(x, y)=\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$ $=\left(\frac{6+4}{2}, \frac{6+8}{2}\right)$ 1 mark $=\left(\cancel{\frac{10}{2}}, \cancel{\frac{14}{2}}\right)$ The coordinates are (5, 7) 1 mark	2
25	Let us assume that is rational. ∴ There exists co-prime integers a and b ($b \neq 0$) such that $\sqrt{2} = a/b \Rightarrow \sqrt{2}b = a$ Squaring on both sides, we get $2b^2 = a^2$…… (i) $\Rightarrow$ 2 divides $a^2 \Rightarrow$ 2 divides a So, we can write a = 2c for some integer c. From (i) and (ii) $2b^2 = 4c^2$ $\Rightarrow b^2 = 2c^2 \quad \Rightarrow$ 2 divides b^2 $\Rightarrow$ 2 divides b ∴ 2 is a common factor of a and b. But this contradicts the fact that a and b are co-primes. This contradiction has arisen because of our incorrect assumption that $\sqrt{2}$ is rational. Hence, $\sqrt{2}$ is irrational.	3
	OR Given numbers are *26 and 91* $26 = 2 \times 13$ $91 = 7 \times 13$ *Hence,* $HCF(26, 91) = 13$ $LCM(26, 91) = 13 \times 2 \times 7 = 182$ *Verification :* $LCM \times HCF = 182 \times 13 = 2366$ *Product of given numbers* $= 26 \times 91$ $= 2366$	3

26	Given polynomial is $p(x)=x^2-5x+6$ by factorisation method Zeroes of polynomial is x^2-5x+6 $x^2-2x-3x+6$ $x(x-2) - 3(x-2)$ $(x-2)(x-3)$ Zeros are 2 and 3. 1.5 marks Verification: we have two zeroes $\alpha=2$ & $\beta=3$ sum of zeroes, $\alpha + \beta = \frac{-b}{a} = \frac{-(-5)}{1} = 5$ (2+3=5) product of zeroes, $\alpha\beta = \frac{c}{a} = \frac{6}{1} = 6$ (2x3=6) hence verified 1.5 marks	3
27	given quadratic equation is $3x(3x-2)=-1$ $9x^2-6x+1=0$ a=9, b=-6 and c=1 1 mark nature of the roots, $\Delta= b^2-4ac$ $= (-6)^2-4x9x1$ $= 36-36$ $= 0$ 1 mark If $\Delta=0$, then roots are real and equal. 1 mark	3
	OR given quadratic equation is $kx(x-2)+6=0$ has real and equal roots $kx^2-2kx+6=0$ a=k, b=-2k and c=6 1 mark nature of the roots of real and equal, $b^2-4ac = 0$ $(-2k)^2-4xkx6=0$ $4k^2-24k=0$ k=6 2 marks	3
28	Given: a3=4 and a9=-8 a+2d=4 and a+8d=-8 subtract above two equations we get d=-2 and a=8 1 mark we have an=0 a+(n-1)d=0 8+(n-1)-2=0 8+2-2n=0 2n=10 n=5 2 marks Thus 5th term of this A.P is zero. OR Given: a3=16, and a7=a5+12 a+2d=16------→(1) and a+6d=a+4d+12 ==➔ 2d=12 **d=6** a+2x6=16 **a=16-12 = 4**	3

20th term of this A.P is a+19d

=4+19(6) 3

= 4+76

= 80

29 Given, S20=670 and **d=3**

$\frac{\cancel{20}}{\cancel{2}}(2a+19d)=670$

$\cancel{10}(2a+19(3))=67\cancel{0}$

2a+57=67 3

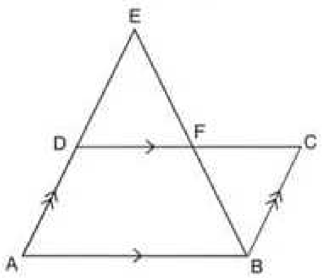
2a=67-57

$\cancel{2}a=\cancel{10}$ **a=5** 2 marks

A.P is a, a+d, a+2d……..

5, 8, 11………….. 1 mark

30



If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar.

This is referred to as the AA similarity criterion for two triangles.

In ΔABE and ΔCFB, 3

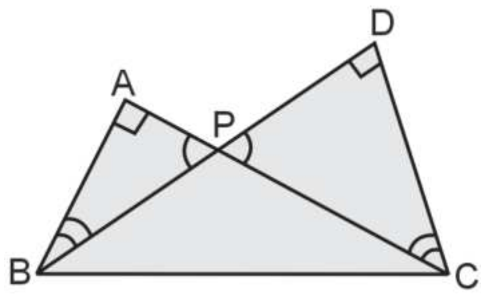
∠BAE = ∠FCB (opposite angles of a parallelogram)

∠AEB = ∠FBC [AE ∥ BC and EB is a transversal, alternate interior angles]

Thus, ΔABE ~ ΔCFB (AA criterion)

Then $\frac{AB}{BE}=\frac{CF}{FB}$

31



In the figure,

$CD^2 = CP^2 - DP^2$

$\quad = (CA + AP)^2 - (DB + BP)^2$

$\quad = CA^2 + AP^2 + 2\ CA\ AP - DB^2 - BP^2 - 2\ DB\ BP$ 3

$\Rightarrow CD^2 + DB^2 = CA^2 - (BP^2 - AP^2) + 2\ CA * AP - 2\ DB\ BP$

$\Rightarrow CB^2 = CA^2 - AB^2 + 2\ CA\ AP - 2\ DB\ BP$

$\Rightarrow 2\ AB^2 = 2\ CA * AP - 2\ DB * BP$ as $CB^2 = CA^2 + AB^2$

$\Rightarrow AB^2 = (PC - AP)\ AP - (DP - BP)\ BP$

$\quad = AP * PC - \boldsymbol{AP^2} - DP * BP + \boldsymbol{BP^2}$

$\quad = AP\ PC - DP * BP + AB^2$

$\Rightarrow$ $\boldsymbol{AP * PC = DP * BP}$

32 Here, $m1 = 2, m2 = 3,\ x_1 = -1,\ y_1 = 7,\ x_2 = 4\ and\ y_2 = -3$

W.K.T, $(x,\ y) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$ 1 mark

$= \left(\frac{2(4) + 3(-1)}{2 + 3}, \frac{2(-3) + 3(7)}{2 + 3}\right)$ 3

$= \left(\frac{8-3}{5}, \frac{-6 + 21}{5}\right)$

$= (1, 3)$ 2 marks

OR

The distance between any two points can be measured using the distance formula which is given by $\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$

Let point P (x, y) be equidistant from points A (3, 6) and B (- 3, 4).

Since they are equidistant, PA = PB

Hence by applying the distance formula for PA = PB, we get

$\sqrt{(x - 3)^2 + (y - 6)^2} = \sqrt{(x - (- 3))^2 + (y - 4)^2}$

$\sqrt{(x - 3)^2 + (y - 6)^2} = \sqrt{(x + 3)^2 + (y - 4)^2}$

By squaring, we get

$PA^2 = PB^2$

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

$x^2 + 9 - 6x + y^2 + 36 - 12y = x^2 + 9 + 6x + y^2 + 16 - 8y$

$6x + 6x + 12y - 8y = 36 - 16$ [On further simplifying]

$12x + 4y = 20$

$3x + y = 5$

$3x + y - 5 = 0$

Thus, the relation between x and y is given by $3x + y - 5 = 0$

33 In a parallelogram, the diagonals bisect each other. This means that the midpoint (M) of diagonal (AC) is also the midpoint of diagonal (BD).

Let's denote the coordinates of points C(x1, y1) and D(x2, y2). We know the coordinates of points A(-4, -2), B(1, -2), and (M), the midpoint of both diagonals. Then to find Coordinates of C, which is a line of AMC.

The formula for the midpoint (M) of a segment with endpoints ((x_1, y_1) and (x_2, y_2) is: 3

$$(x, y) = \left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$$

$$\left(-\frac{-1}{2}, 0\right) = \left(\frac{x_2-4}{2}, \frac{y_2-2}{2}\right)$$

$$\frac{y_2-2}{2}=0 \Longrightarrow y_2=2 \quad \text{and} \quad \frac{x_2-4}{2}=-\frac{1}{2} \Longrightarrow x_2=3$$

Thus the coordinates of Cis (3, 2)

Similarly, to find Coordinates of C, which is a line of BMD

The formula for the midpoint (M) of a segment with endpoints ((x_1, y_1) and (x_2, y_2) is:

$$(x, y) = \left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$$

$$\left(-\frac{-1}{2}, 0\right) = \left(\frac{x_2+1}{2}, \frac{y_2-2}{2}\right)$$

$$\frac{y_2-2}{2}=0 \Longrightarrow y_2=2 \quad \text{and} \quad \frac{x_2+1}{2}=-\frac{1}{2} \Longrightarrow x_2=-2$$

Thus the coordinates of Cis (-2, 2)

34 Let the fraction be $\frac{x}{y}$

According to question, $\frac{x+1}{y} = \frac{4}{5}$

5x+5=4y

5x-4y=-5 ---------→(1) 1 mark

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

4x=3y-3

4x-3y=-3 ---------→(2) 1 mark

Solve above two equations by elimination method,

We get 20x-16y= -20

20x-15y= -15

-y=-5 **y=5**

Put this y value in equation (1) we get 5x-4(5)= - 5

5x-20= - 5

5x=20-5

5x=15

x=3 4

The original fraction is $\frac{x}{y} = \frac{3}{5}$ 2 marks

35 Let the breadth =b m

length = l =(2b+1)m

area =528m²

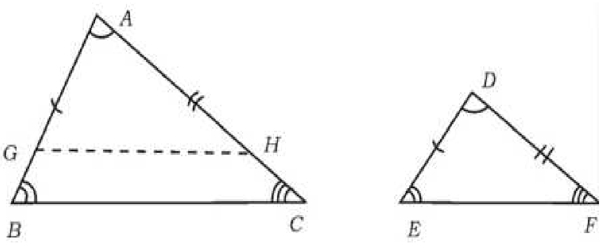
lxb= 528

(2b+1)b-528=0

	$2b^2+b-528=0$ $2b^2+33b-32b-528=0$ $b(2b+33)-16(2b+33)=0$ $(2b+33)(b-16)=0$ $2b+33=0$ or $b-16=0$ 2 marks b should not be zero therefore $b-16=0$ $b=16$ **breadth = 16m** **length =l= 2b+1=2x16+1=32+1=33m** 2 marks OR let the two consecutive number be x and x+1 then according to question $x^2+(x+1)^2=365$ $2x^2+2x-364=0$ $x^2+x-182=0$ 2 marks by factorisation method, $x^2+14x-13x-182=0$ $(x+14)(x-13)=0$ That gives x=13 and x=-14, Avoiding as a negative value. **One number is 13 and other one 14** 2 marks	4 4
36	Given: $S_{10}=185$, and $a_{21}=15+a_{16}$ $\frac{\cancel{10}}{\cancel{2}}(2a+9d)=185$, $\cancel{a}+20d=15+\cancel{a}+15d$ $2a+9d=37 \dashrightarrow (1)$ $20d-15d=15$ $5d=15$ **d=3** Then equation (1) becomes $2a+9(3)=37$ $2a+27=37$ $2a=10$ **a=5** 2 mark Now we have to find S_{30}, $S_n=\frac{n}{2}(2a+(n-1)d$ $S_{30}=\frac{\cancel{30}}{\cancel{2}}(2x5+(30-1)x3)$ 1 mark $= 15(10+29x3)$ $= 15(10+87)$ $= 15x97$ $= 1445$ 1 mark **∴ The sum of 30 terms of this A.P is 1445**	4

37

Given: ∠BAC=∠EDF
∠ABC=∠DEF
To prove: ΔABC ~ ΔDEF
Construction: Mark points G and H on the side AB and AC such that AG=DE , AH=DF
proof: in triangle AGH and DEF
AG=DE.....by construction
AH=DF ..... by contsruction
∠GAH=∠EDF...Given
therefore , ΔAGH ≡ ΔFED
by SAS congruency thus
∠AGH=∠DEF ....by CPCT
but
∠ABC=∠DEF
∠AGH=∠ABC
thus
GH ∥ BC



Now , In triangle ABC $\frac{AB}{AG} = \frac{BC}{GH} = \frac{CA}{AH}$ also $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{DF}$
Hence, ΔABC ~ ΔDEF
hence proved .

4

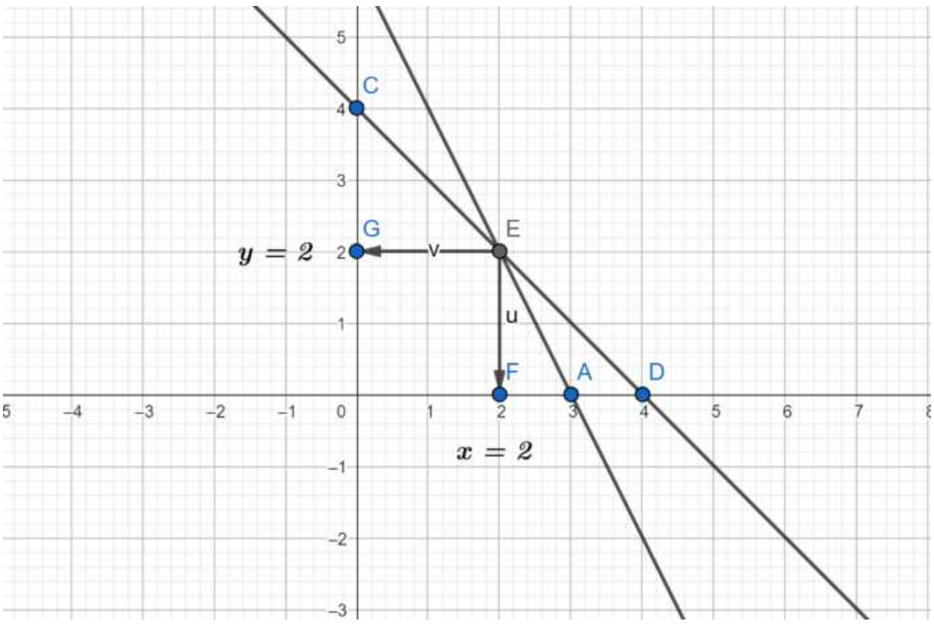
38

Given equations are 2x+y=6

x	0	3
y	6	0

And x+y=4

x	0	4
y	4	0



For Table 2 marks and graph 3 marks

5