BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY |CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL

MID-TERM EXAMINATION 2024-25

MARKING KEY MATHEMATICS (041)

Class: X — Duration: 3 Hrs
Date:21/09/24 — Max. Marks: **80**
Name: — Exam RNo:

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case-based integrated units of assessment (04 marks each) with sub-parts.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks have been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

SECTION A

1.	The HCF of the two numbers is 27 and their LCM is 162. If one of the numbers is 54, what is the other number?					1m
	(a) 36	(b) 45	(C) 9	**(d) 81**		
2.	Π (pie) is					1m
	(a) an integer	(b) a rational number	**(C) an irrational number**	(d) none of these		
3.	The distance of the point (-3,4) from the x-axis is					1m
	(a) 3	(b) -3	**(C) 4**	(d) 5		
4.	If A (1,3), B (-1,2), C (2,5) and D(x,4) are the vertices of a parallelogram ABCD then the value of x is					1m
	(a) 3	**(b) 4**	(C) 0	(d) 3/2		
5.	The pair of equations 2x + 3y = 5 and 4x + 6y = 15 has					1m
	(a) a unique solution	(b) exactly two solutions	(C) infinitely many solutions	**(d) no solutions**		
6.	If a pair of linear equations is inconsistent then the graph lines will be					1m
	(a) parallel	(b) always coincident	(C) always intersecting	(d) intersecting or coincident.		
7.	If one root of the equation $2x^2 + ax + 6 = 0$ is 2 the a is					1m
	(a) 7	**(b) -7**	(C) 7/2	(d) -7/2		
8.	The sum of roots of $x^2 – 6x + 2 = 0$ is					1m
	(a) 2	(b) -2	**(C) 6**	(d) -6		
9.	The sum of the first 20 odd natural numbers is					1m
	(a) 100	(b) 210	**(C) 400**	(d) 420		
10.	What is the common difference of an A.P. where $a_{18} – a_{14} = 32$?					1m
	(a) 8	(b) -8	(C) 4	(d) -4		
11.	If sin α = ½ then cot α =?					1m

(a) 1/√3 **(b) √3** (C) √3/2 (d) 1

12. If cos α = 4/5 then tan α =? 1m

(a) 4/3 (b) 3/5 **(C) 3/4** (d) none of these

13 If the height of the vertical pole is equal to the length of its shadow on the ground, the angle of elevation of the sun is 1m

(a) 0^0 (b) 30^0 **(C) 45^0** (d) 60^0

14 If the length of the shadow of a tower is √3 times its height then the angle of elevation of the sun is 1m

(a) 0^0 (b) 45^0 **(C) 30^0** (d) 60^0

15 The area of a sector of a circle with a radius of 6 cm if the angle of the sector is 60°. 1m

(a) 142/7 (b) 152/7 **(C) 132/7** (d) none of these

16 In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. The length of the arc is 1m

(a) 21 cm (b) 14 cm **(C) 22 cm** (d) none of these

17 The mode and mean are given by 7 and 8, respectively. Then the median is: 1m

(a) 2/23 (b) 3/23 **(C) 23/3** (d) none of these

18 The class interval of a given observation is 10 to 15, then the class mark for this interval will be: 1m

(a) 10 (b) 15 **(C) 12.5** (d) none of these

19 Assertion (A):- If the value of mode and mean is 60 and 66 respectively, then the value of median is 64. 1m

Reason (R):- Median = mode + 2 mean.

(a) Both Assertion (A) and Reason (R) are the true and Reason (R) is a correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

(c) Assertion (A) is true and Reason (R) is false.

(d) Assertion (A) is false and Reason (R) is true.

20 Assertion (A):- The point (a,0) lies on the y-axis. 1m

Reason (R):- Any point which lies on the y-axis is of the form (0,a).

(a) Both Assertion (A) and Reason (R) are the true and Reason (R) is a correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

(c) Assertion (A) is true and Reason (R) is false.

(d) Assertion (A) is false and Reason (R) is true.

SECTION B

21 Prove that 2 + 3√5 is an irrational number. 2m

A:- Let us assume, to the contrary, that $2 + 3\sqrt{5}$ is rational.
So that we can find integers a and b ($b \neq 0$).
Such that $2 + 3\sqrt{5} = \frac{a}{b}$, where a and b are coprime.
Rearranging the above equation, we get

$$3\sqrt{5} = \frac{a}{b} - 2$$

$$3\sqrt{5} = \frac{a - 2b}{b}$$ 1m

$$\sqrt{5} = \frac{a - 2b}{3b} = \frac{a}{3b} - \frac{2b}{3b}$$

$$\sqrt{5} = \frac{a}{3b} - \frac{2}{3}$$

Since a and b are integers, we get $\frac{a}{3b} - \frac{2}{3}$ is rational and so $\sqrt{5}$ is rational.
But this contradicts the fact that $\sqrt{5}$ is irrational.
So, we conclude that $2 + 3\sqrt{5}$ is irrational. 1m

OR

Prove that $\sqrt{5}$ is irrational. 2m

A:- Let us assume, to the contrary, that $\sqrt{5}$ is rational.
So, we can find integers p and q ($q \neq 0$), such that
$\sqrt{5} = \frac{p}{q}$, where p and q are coprime.
Squaring both sides, we get
$5 = \frac{p^2}{q^2}$
$\Rightarrow 5q^2 = p^2$ ...(i)
$\Rightarrow$ 5 divides p^2 1m
5 divides p
So, let $p = 5r$
Putting the value of p in (i), we get
$5q^2 = (5r)^2$
$\Rightarrow 5q^2 = 25r^2$
$\Rightarrow q^2 = 5r^2$
$\Rightarrow$ 5 divides q^2
5 divides q
So, p and q have atleast 5 as a common factor.
But this contradicts the fact that p and q have no common factor. 1m
So, our assumption is wrong, is irrational.

22 For what value of k, the pair of equations $4x - 3y = 9$, $2x + ky = 11$ has no solution? 2m

A:- We have, $4x - 3y = 9$ and $2x + ky = 11$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \text{ (No solution)}$$ 1m

$$\frac{4}{2} = \frac{-3}{k} \neq \frac{9}{11} \quad \Rightarrow \quad 2 = \frac{-3}{k}$$

$$2k = -3 \quad \therefore \quad k = \frac{-3}{2}$$ 1m

23 Solve the following quadratic equation for x: $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$ 2m

A:- Solution:
$4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$
$4\sqrt{3}x^2 + 8x - 3x - 2\sqrt{3} = 0$
$4x(\sqrt{3}x + 2) - \sqrt{3}(\sqrt{3}x + 2) = 0$
$(\sqrt{3}x + 2)(4x - \sqrt{3}) = 0$ 1m
$\sqrt{3}x + 2 = 0$ or $4x - \sqrt{3} = 0$

$$\sqrt{3}x + 2 = 0 \quad \text{or} \quad 4x - \sqrt{3} = 0$$

$$x = \frac{-2\sqrt{3}}{3} \quad \text{or} \quad x = \frac{\sqrt{3}}{4}$$

$$\therefore \quad x = \frac{-2}{\sqrt{3}} \quad \text{or} \quad x = \frac{\sqrt{3}}{4}$$ 1m

24 Which term of the progression 4, 9, 14, 19, … is 109? 2m

A:- Solution:

Here, d = 9 -4 = 14 -9 = 19 − 14 = 5

∴ Difference between consecutive terms is constant.

Hence it is an A.P.

Given: First term, a = 4, d = 5, a_n = 109 (Let) 1m

∴ $a_n = a + (n - 1)d$ … [General term of A.P.

∴ 109 = 4 + (n − 1) 5

⇒ 109 − 4 = (n − 1) 5

⇒ 105 = 5(n − 1) ⇒ n − 1 = $\frac{105}{5}$ = 21

⇒ n = 21 + 1 = 22 ∴ 109 is the 22nd term

1m

OR

Find the 9th term from the end (towards the first term) of the A.P. 5,9,13, …, 185. 2m

A:- Here First term, a = 5

Common difference, d = 9 − 5 = 4

Last term, 1 = 185 1m

n^{th} term from the end = l − (n − 1)d

9^{th} term from the end = 185 − (9 − 1)4

= 185 − 8 × 4 = 185 − 32 = 153 1m

25 The circumference of a circle is 22 cm. Calculate the area of its quadrant. 2m

A:- Solution:

Circumference of a circle = 22 cm 2πr = 22 cm

$$2 \times \frac{22}{7} \times r = 22 \text{ cm}$$

$$r = \frac{22 \times 7}{22 \times 2} = \frac{7}{2} \text{ cm}$$ 1m

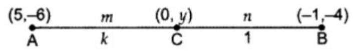
$$\therefore \quad \text{Area of quadrant} = \frac{1}{4}\pi r^2$$

$$= \frac{1}{4} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{8} \text{cm}^2$$ 1m

SECTION C

26 Find the ratio in which the y-axis divides the line segment joining the points A (5, -6), and B (-1, -4). Also, find the coordinates of the point of division. 3m

A: -



Let AC: CB = m : n = k : 1. 1m

$$\text{Coordinates of C} = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$$

$$= \left(\frac{-k+5}{k+1}, \frac{-4k-6}{k+1}\right) \quad \ldots(i)$$

Point C lies on y-axis ∴ $\frac{-m+5}{m+1} = 0$ 1m

⇒ $-k + 5 = 0$ or $k = 5$

∴ **Required ratio** = $k : 1$ = **5 : 1**

From (*i*), required point C,

$$\Rightarrow \left(\frac{-5+5}{5+1}, \frac{-20-6}{5+1}\right) = \left(0, \frac{-26}{6}\right) = \left(0, \frac{-13}{3}\right)$$ 1m

27 Solve the following pair of equations: 3m

49x + 51y = 499

51x + 49 y = 501

A :-

$$\begin{array}{l} 49x + 51y = 499 \\ 51x + 49y = 501 \\ \hline 100x + 100y = 1000 \end{array}$$ ...[By addition

$x + y = 10$ ...(i) ...[Dividing both sides by 100

$$\begin{array}{l} 49x + 51y = 499 \\ 51x + 49y = 501 \\ \hline -2x + 2y = -2 \end{array}$$ ...[By subtracting

$-x + y = -1$ ...(ii) ...[Dividing both sides by 2 1m

Solving (i) & (ii), we get

$$\begin{array}{l} x + y = 10 \\ -x + y = -1 \\ \hline 2y = 9 \end{array}$$ ...[By adding 1m

$\therefore\ y = \frac{9}{2}$

Putting the value of y in (i),

$x + \frac{9}{2} = 10$

$x = 10 - \frac{9}{2} = \frac{20-9}{2} = \frac{11}{2}$

$\therefore\ \mathbf{x = \frac{11}{2}, y = \frac{9}{2}}$ 1m

OR

Solve the following pair of linear equations for x and y: 3m

bx/a+ay/b = $a^2 + b^2$; x + y = 2ab

$\frac{b}{a}x + \frac{a}{b}y = a^2 + b^2$ ...(i)

$x + y = 2ab$ ...(ii)

Multiplying (i) by 1 and (ii) by $^b/_a$, we get

$$\begin{array}{l} \frac{b}{a}x + \frac{a}{b}y = a^2 + b^2 \\ \frac{b}{a}x + \frac{b}{a}y = \quad + 2b^2 \\ \hline \frac{a}{b}y - \frac{b}{a}y = a^2 + b^2 - 2b^2 \end{array}$$ ...[by subtracting 1m

$\left(\frac{a}{b} - \frac{b}{a}\right)y = a^2 - b^2$

$\left(\frac{a^2 - b^2}{ab}\right)y = (a^2 - b^2)$

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

$\Rightarrow\ \mathbf{y = ab}$

Putting the value of y in (ii), we get

$x + ab = 2ab \quad \Rightarrow \quad x = 2ab - ab$

$x = ab \quad \therefore \quad \mathbf{x = ab, y = ab}$ 2m

28 Find the number of all three-digit natural numbers which are divisible by 9. 3m

A: - To find: Number of terms of A.P., i.e., n.

A.P. = 108 + 117 + 126 + ... + 999

1st term, a = 108

Common difference, d = 117 − 108 = 9 1m

$a_n = 999$

$a + (n - 1)d = a_n$

$\therefore 108 + (n - 1)\,9 = 999$

$\Rightarrow (n - 1)\,9 = 999 - 108 = 891$

$\Rightarrow (n - 1) = \frac{891}{9} = 99$

$\therefore n = 99 + 1 = 100$ 2m

29 Prove that: 3m

$$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$$

A:- L.H.S. $= \frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta}$

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

$= \frac{\sin\theta(1-2\sin^2\theta)}{\cos\theta[2(1-\sin^2\theta)-1]}$ ...[$\because \cos^2\theta = 1 - \sin^2\theta$ 2m

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

$= \tan\theta =$ **R.H.S.** ...**(Hence proved)** 1m

30 In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find: 3m

(i) the length of the arc

(ii) area of the sector formed by the arc.

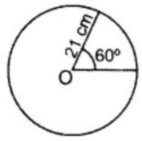
A:- Solution:

(i) Length of the arc: r = 21 cm, θ = 60°

Length of the arc 1m

$= \frac{\theta}{360}(2\pi r) = \frac{\theta}{180}\pi r$

$= \frac{60}{180} \times \frac{22}{7} \times 21 = \mathbf{22\ cm}$



(*ii*) **Area of the sector formed by the arc:**

Area of minor sector $= \frac{\theta}{360}\pi r^2$

$= \frac{60}{360} \times \frac{22}{7} \times 21 \times 21 = \mathbf{231\ cm^2}$

2m

OR

The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes. 3m

A:- Here $\theta = \frac{360^\circ}{60\text{ m}} \times 5\text{ m} = 30^\circ$ ...[$\because$ **1 hour = 60 minutes**

r(radius) = 14 cm

$\therefore$ **Required area** $= \frac{\theta}{360}\pi r^2$ 1m

$= \frac{30}{360} \times \frac{22}{7} \times 14 \times 14$

$= \mathbf{\frac{154}{3}\ cm^2}$ or $\mathbf{51.\bar{3}\ cm^2}$ 2m

31 If the mean of the following distribution is 50, find the value of p. 3m

Class	*Frequency*
0–20	17
20–40	*p*
40–60	32
60–80	24
80–100	19

A:-

Class	Frequency (f_i)	X_i	f_iX_i
0–20	17	10	170
20–40	p	30	$30p$
40–60	32	50	1600
60–80	24	70	1680
80–100	19	90	1710
	$\Sigma f_i = 92+p$		$\Sigma f_iX_i = 5160 + 30p$

2m

$\therefore$ Mean $= \dfrac{\Sigma f_iX_i}{\Sigma f_i}$

$50 = \dfrac{5160 + 30p}{92 + p}$

$\Rightarrow$ $4600 + 50p = 5160 + 30p$

$\Rightarrow$ $50p - 30p = 5160 - 4600$

$\Rightarrow$ $20p = 560$

$\Rightarrow$ $p = \dfrac{560}{20} = 28$ $\quad\therefore\quad$ $p = 28$

1m

SECTION D

32 The sum of the areas of two squares is 468 m^2. If their perimeters differ from 24 m, find the sides of the two squares. 5m

A:- Sum of the areas of two squares is 468 m^2.

$\because x^2 + y^2 = 468$ . ...(1) [$\because$ area of square = side^2]

→ The difference of their perimeters is 24 m.

$\because 4x - 4y = 24$ [$\because$ Perimeter of square = 4 × side] $\Rightarrow 4(x - y) = 24$

$\Rightarrow x - y = 24/4$

$\Rightarrow x - y = 6$

$\therefore y = x - 6$ ....(2) 2m

From equation (1) and (2),

$\because x^2 + (x - 6)^2 = 468$

$\Rightarrow x^2 + x^2 - 12x + 36 = 468$

$\Rightarrow 2x^2 - 12x + 36 - 468 = 0$

$\Rightarrow 2x^2 - 12x - 432 = 0$

$\Rightarrow 2(x^2 - 6x - 216) = 0$

$\Rightarrow x^2 - 6x - 216 = 0$

$\Rightarrow x^2 - 18x + 12x - 216 = 0$

$\Rightarrow x(x - 18) + 12(x - 18) = 0$

$\Rightarrow (x + 12)(x - 18) = 0$

$\Rightarrow x + 12 = 0$ and $x - 18 = 0$

$\Rightarrow x = -12$m [rejected] and $x = 18$m

$\therefore x = 18$ m 2m

Put the value of 'x' in equation (2),

$\because y = x - 6$

$\Rightarrow y = 18 - 6$

$\therefore y = 12$ m 1m

OR

Solve the following quadratic equation for x: $9x^2 - 6b^2x - (a^4 - b^4) = 0$

A:- The given quadratic equation can be written as

$(9x^2 - 6b^2x + b^4) - a^4 = 0$

$\Rightarrow (3x - b^2)^2 - (a^2)^2 = 0$

$\Rightarrow (3x - b^2 + a^2)(3x - b^2 - a^2) = 0$ ...[$\because x^2 - y^2 = (x + y)(x - y)$

$\Rightarrow 3x - b^2 + a^2 = 0$ or $3x - b^2 - a^2 = 0$ 3m

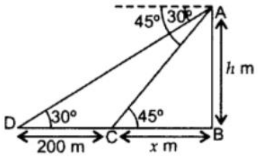
$\Rightarrow 3x = b^2 - a^2$ or $3x = b^2 + a^2$

$\Rightarrow x = \dfrac{b^2 - a^2}{3}$ $\qquad x = \dfrac{b^2 + a^2}{3}$

$\Rightarrow x = \dfrac{b^2 - a^2}{3}, \dfrac{b^2 + a^2}{3}$ 2m

33	The angles of depression of two ships from the top of a lighthouse and on the same side of it are found to be 45° and 30°. If the ships are 200 m apart, find the height of the lighthouse.	5m

A:-



$\tan 45^\circ = \frac{AB}{BC}$

$1 = \frac{h}{x}$

$x = h \quad ...(i)$

2m

In rt. ΔABD, $\tan 30^\circ = \frac{AB}{BD}$

$\frac{1}{\sqrt{3}} = \frac{h}{x+200}$

$\sqrt{3}h = x + 200$

$\sqrt{3}h = h + 200 \quad$ ...[From (i)

$\sqrt{3}h - h = 200$

$(\sqrt{3}-1)h = 200$

$h = \frac{200}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{200(1.73+1)}{3-1} = 100(2.73)$

...[$\because \sqrt{3} = 1.73$

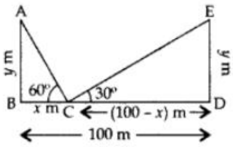
$h = 273$ m

3m

OR

Two poles of equal heights are standing opposite to each other on either side of the road, which is 100 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles.

A:-



2m

$\tan 60^\circ = \frac{AB}{BC}$

$\Rightarrow \frac{\sqrt{3}}{1} = \frac{y}{x}$

$\Rightarrow y = \sqrt{3}x \quad \Rightarrow \quad x = \frac{y}{\sqrt{3}} \quad ...(i)$

In rt. ΔCDE, $\tan 30^\circ = \frac{DE}{CD}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{y}{100-x}$

1m

$\Rightarrow \sqrt{3}y = (100 - x)$

$\Rightarrow \sqrt{3}y = 100 - \frac{y}{\sqrt{3}} \quad$ ...[From (i)

$\Rightarrow \sqrt{3}y = \frac{100\sqrt{3} - y}{\sqrt{3}}$

$\Rightarrow 3y = 100\sqrt{3} - y$

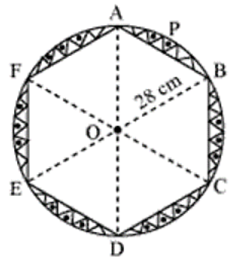
$\Rightarrow 4y = 100\sqrt{3}$

$\therefore$ Height of the poles,

$y = \frac{100\sqrt{3}}{4} = 25\sqrt{3}$ m = 25(1.73) = 43.25 m

2m

34 A round table cover has six equal designs as shown in Figure If the radius of the cover is 28 cm, find the cost of making the designs at the rate of Rs. 0.35 per cm^2. (Use $\sqrt{3} = 1.7$) 5m



A:- Designs are segments of circle.
Consider segment APB. Chord AB is a side of hexagon. Each chord will substitute $\frac{360°}{6} = 60°$ at centre of circle.

In ΔOAB
∠OAB = ∠OBA (as OA = OB)
∠AOB = 60°
∠OAB + ∠OBA + ∠AOB = 180°
2∠OAB = 180° − 60° = 120°
∠OAB = 60°
So ΔOAB is an equilateral triangle 1m

Area of ΔOAB $= \frac{\sqrt{3}}{4} \times (\text{side})^2$

$= \frac{\sqrt{3}}{4} \times (28)^2 = 196\sqrt{3}\ cm^2 = 333.2\ cm^2.$

Area of sector OAPB $= \frac{60°}{360°} \times \pi r^2$

1m

$= \frac{1}{6} \times \frac{22}{7} \times 28 \times 28$

$= \frac{1232}{3} = 410.6667 cm^2$ 1m

Area of segment APB = Area of sector OAPB − Area of ΔOAB
= 410.6667 − 333.2
= 77.4667 cm^2
So, area of designs = 6 × 77.46 = 464.8 cm^2

Cost occurred in making 1 cm^2 designs = Rs.0.35
Cost occurred in making 464.8 cm^2 designs = 464.8 x 0.35 = 162.68
So, cost of making such designs is Rs.162.68.

2m

35 Find the values of x and y if the median for the following data is 31. 5m

Class	Frequency
0-10	5
10-20	x
20-30	6
30-40	y
40-50	6
50-60	5
Total	**40**

A:-

Class	f	c.f.
0–10	5	5
10–20	x	$5 + x$
20–30	6	$11 + x$
30–40	y	$11 + x + y$
40–50	6	$17 + x + y$
50–60	5	$22 + x + y$
Total	40	

2m

$\therefore$ $x + y + 22 = 40$

$x + y = 40 - 22 = 18$

$y = 18 - x$ ...(i)

$\frac{n}{2} = \frac{40}{2} = 20$

Median is 31 ...[Given

$\therefore$ Median class is 30 – 40

$$\text{Median} = l + \left(\frac{\left(\frac{n}{2} - c.f.\right)}{f} \times h\right)$$

$$31 = 30 + \left(\frac{20 - (11 + x)}{y} \times 10\right)$$

2m

$$\Rightarrow \quad 31 - 30 = \frac{(20 - 11 - x)}{18 - x} \times 10 \quad \text{...[From (i)}$$

$\Rightarrow 18 - x = (9 - x)10$

$\Rightarrow 18 - x = 90 - 10x$

$\Rightarrow -x + 10x = 90 - 18$

$\Rightarrow 9x = 72$

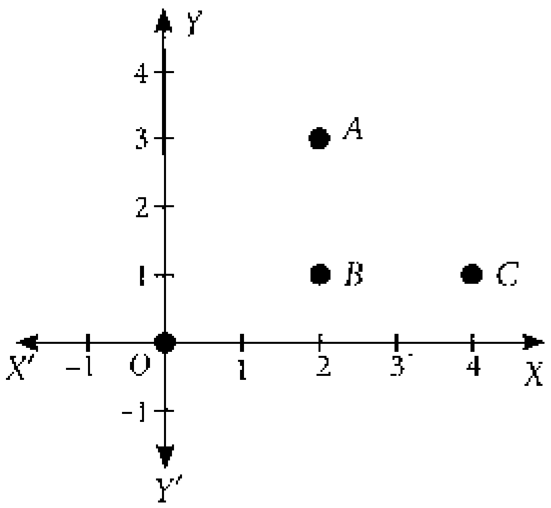
$\Rightarrow x = 8$

Putting the value of x in (i), we have 1m

$y = 18 - 8 = 10$

SECTION E

36 Alia and Shagun are friends living on the same street in Patel Nagar. Shagun's house is at the intersection of one street with another street on which there is a library. They both study in the same school and that is not far from Shagun's house. Suppose the school is situated at the point 0, i.e., the origin, Alia's house is at A. Shagun's house is at B and the library is at C. Based on the above information, answer the following questions. 4m



1. How far is Alia's house from Shagun's house?

2. How far is the library from Shagun's house?

3. How far is the library from Alia's house?

Or

How far is Shagun's house from school?

A:-

1. 2 units 1m
2. 2 units 1m
3. $2\sqrt{2}$ units or square root of 5 2m

37 The owner of a taxi company decides to run all the taxis on CNG fuel instead of petrol/diesel. The taxi charges in the city are comprised of fixed charges together with the charge for the distance covered. For a journey of 12 km, the charge paid is Rs. 89; for a journey of 20 km, the charge is Rs.145. 4m

1. What are the equations formed for both conditions? 2m
2. What will a person have to pay for travelling a distance of 30 km? 1m
3. Why did he decide to use CNG for his taxi as fuel? 1m

A:- 1. $x + 12y = 89$ 2m
$x + 20y = 145$
2. 215 1m
3. Environment friendly. 1m

38 Accumulating plastics in the environment creates problems for wildlife, their habitats, and humans. Plastics are a threat to the environment. The children of Avantipur decided that they would contribute their service to end the usage of plastics in their village. They fixed posters and hoisted placards depicting plastics' ill effects on human health and the environment. They started their work in June **15th** They started collecting the thrown-off plastic bottles in their locality and started counting them. To their astonishment, they found that the number of plastic bottles that they collected each day was in Arithmetic Progression which went like this: 417,404,391, …… 4m

1. What is the common difference? 1m
2. How many bottles did they collect on June 25th? 1m
3. The children of Avantipur wanted to make their village a plastic-free zone. Identify the day on which they got 1 bottle which was their dream day. 2m

A:- 1. $d = -13$ 1m
2. 287 1m
3. July 17^{th} 2m

***************BEST OF LUCK*****************