

Solution to Board's Question Paper (March 2023)

प्र. क्र.
Q. No.

1 (A)

(i) (B)

(ii) (A)

(iii) (B)

(iv) (A)

(1 mark each)

Note : Answers with solutions are expected.

1 (B)

(i) Solution :

$$\begin{vmatrix} 4 & 3 \\ 2 & 7 \end{vmatrix} = 4 \times 7 - 3 \times 2$$

$$= 28 - 6 = 22$$

(½ mark)

(½ mark)

Ans : The value of the determinant is 22.

(ii) Solution :

The given A.P. is 2, 4, 6, 8, ...

$$a = t_1 = 2, t_2 = 4, t_3 = 6, t_4 = 8$$

(½ mark)

$$d = t_2 - t_1 = 4 - 2 = 2$$

(½ mark)

Ans : The common difference of the given A.P. is 2.

(iii) Solution :

The rate of CGST = 9%

The rate of SGST = the rate of CGST = 9%

(1 mark)

Ans : The rate of SGST is 9%.

(iv) Solution :

One coin is tossed.

$$\therefore S = \{H, T\}$$

(1 mark)

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Note : Any two out of three activities are to be attempted. Here, we have completed all the three activities for the guidance of the students.

(i) Activity :

$$5x + 3y = 9 \quad \text{(I)}$$

$$2x - 3y = 12 \quad \text{(II)}$$

Adding equations (I) and (II),

$$5x + 3y = 9 \quad \text{(I)}$$

$$2x - 3y = 12 \quad \text{(II)}$$

$$7x = 21$$

(½ mark)

$$\therefore x = \frac{21}{7}$$

(½ mark)

$$\therefore x = 3$$

(½ mark)

(ii) Activity :Comparing $x^2 + 2x - 9 = 0$ with $ax^2 + bx + c = 0$,

$$a = 1, b = 2, c = -9$$

(½ mark)

$$\therefore b^2 - 4ac = (2)^2 - 4 \times 1 \times -9$$

(1 mark)

$$= 4 + 36$$

(½ mark)

$$= 40$$

$$\therefore b^2 - 4ac > 0$$

$$\therefore \text{the roots of the equation are real and unequal}$$
(iii) Activity :

Sr. No.	FV	Share is at	MV
1.	₹ 100	Par	₹ 100
2.	₹ 75	Premium ₹ 500	₹ 575
3.	₹ 10	Discount ₹ 5	₹ 5
4.	₹ 200	Discount ₹ 50	₹ 150

(½ mark)

(½ mark)

(½ mark)

(½ mark)

Note : Any four out of five questions are to be solved. Answers with solutions are expected.

(i) Solution :

$$x + y = 4 \quad \dots (1)$$

$$2x - y = 2 \quad \dots (2)$$

Adding equations (1) and (2),

$$x + y = 4 \quad \dots (1)$$

$$2x - y = 2 \quad \dots (2)$$

$$3x = 6$$

($\frac{1}{2}$ mark)

$$\therefore x = 2$$

(Dividing both the sides by 3)

($\frac{1}{2}$ mark)

Substituting $x = 2$ in equation (1),

$$x + y = 4$$

$$\therefore 2 + y = 4$$

($\frac{1}{2}$ mark)

$$\therefore y = 4 - 2$$

$$\therefore y = 2$$

($\frac{1}{2}$ mark)

Ans. $(x, y) = (2, 2)$ is the solution.

(ii) Solution :

$$2y = 10 - y^2$$

$$\therefore y^2 + 2y - 10 = 0$$

(Standard form)

Comparing the equation $y^2 + 2y - 10 = 0$ with the standard form

$ax^2 + bx + c = 0$, we get,

($\frac{1}{2}$ mark)

$$a = 1,$$

($\frac{1}{2}$ mark)

$$b = 2,$$

($\frac{1}{2}$ mark)

$$c = -10.$$

($\frac{1}{2}$ mark)

Ans. The values of a , b and c are 1, 2 and -10 respectively

(iii)

Solution :

$$a = 10 \text{ and } d = 5$$

$$\text{Here, } a = t_1 = 10 \text{ and } d = 5$$

(½ mark)

$$t_2 = t_1 + d = 10 + 5 = 15$$

(½ mark)

$$t_3 = t_2 + d = 15 + 5 = 20$$

(½ mark)

$$t_4 = t_3 + d = 20 + 5 = 25$$

(½ mark)

Ans 10, 15, 20, 25, ... is the required A.P.

(iv)

Solution :

$$\text{Total GST} = \text{CGST} + \text{SGST}$$

(½ mark)

$$= ₹ 45 + ₹ 45 = ₹ 90$$

(½ mark)

$$\text{Rate of GST} = \frac{\text{The amount of GST}}{\text{Taxable value}} \times 100$$

$$= \frac{90}{500} \times 100$$

(½ mark)

$$= 18\%$$

(½ mark)

Ans The rate of GST charged by the courier service agent is 18%.

(v)

Solution :

$$\text{Assumed mean (A)} = 300 \quad (\text{Given})$$

$$\Sigma f_i = 50, \Sigma f_i d_i = 320$$

$$\bar{d} = \frac{\Sigma f_i d_i}{\Sigma f_i}$$

(½ mark)

$$= \frac{320}{50}$$

$$= 6.40$$

(½ mark)

$$\text{Mean } (\bar{X}) = A + \bar{d}$$

(½ mark)

$$= 300 + 6.40$$

$$= 306.40$$

(½ mark)

Ans The mean is 306.40

Note : Any one out of two activities are to be attempted. Here, we have completed both the activities for the guidance of the students.

(i) Activity :

(a) Committee of 2 boys = $\{B_1 B_2\}$ (½ mark)

(b) Committee of 2 girls = $\{G_1 G_2\}$ (½ mark)

(c) Committee of one boy and one girl
= $\{(B_1 G_1), (B_1 G_2), (B_2 G_1), (B_2 G_2)\}$ (1 mark)

(d) Sample space (S) = $\{(B_1 B_2), (B_1 G_1), (B_1 G_2), (B_2 G_1), (B_2 G_2), (G_1 G_2)\}$ (1 mark)

(ii) Activity :

SAC	Food Items	Qty	Rate (in ₹)	Taxable amount	CGST		SGST	
9963	Coffee	1	20	20.00	2.5%	₹0.50	2.5%	₹0.50
9963	Masala Tea	1	10	10.00	2.5%	₹0.25	2.5%	₹0.25
9963	Masala Dosa	2	60	120.00	2.5%	₹3.00	2.5%	₹3.00
			Total	150.00		₹3.75		₹3.75
					Grand Total = ₹ 157.50			

(½ mark for each correct answer)

Note : Any two out of four questions are to be solved. Here, we have solved all the four questions for the guidance of the students.

(i) Solution :

$$4m + 6n = 54 \quad (1)$$

$$3m + 2n = 28 \quad (2)$$

$$\text{Here, } a_1 = 4, b_1 = 6, c_1 = 54$$

$$\text{Here, } a_2 = 3, b_2 = 2, c_2 = 28$$

$$D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = \begin{vmatrix} 4 & 6 \\ 3 & 2 \end{vmatrix}$$

$$= 4 \times 2 - 6 \times 3$$

$$= 8 - 18 = -10$$

(1/2 mark)

$$D_m = \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix} = \begin{vmatrix} 54 & 6 \\ 28 & 2 \end{vmatrix}$$

$$= 54 \times 2 - 6 \times 28$$

$$= 108 - 168 = -60$$

(1/2 mark)

$$D_n = \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix} = \begin{vmatrix} 4 & 54 \\ 3 & 28 \end{vmatrix}$$

$$= 4 \times 28 - 54 \times 3$$

$$= 112 - 162 = -50$$

(1/2 mark)

By Cramer's rule,

$$m = \frac{D_m}{D} = \frac{-60}{-10} = 6$$

(1/2 mark)

$$n = \frac{D_n}{D} = \frac{-50}{-10} = 5$$

(1/2 mark)

Ans (m, n) = (6, 5) is the solution

(1/2 mark)

(ii)

Solution :

$$x^2 + 10x + 2 = 0$$

Comparing $x^2 + 10x + 2 = 0$ with $ax^2 + bx + c = 0$,

$$a = 1, b = 10, c = 2$$

(1/2 mark)

$$\Delta = b^2 - 4ac = (10)^2 - 4 \times (1) \times (2)$$

$$= 100 - 8 = 92$$

(1/2 mark)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(1/2 mark)

$$= \frac{-10 \pm \sqrt{92}}{2 \times 1}$$

(1/2 mark)

$$= \frac{-10 \pm \sqrt{4 \times 23}}{2}$$

$$= \frac{-10 \pm \sqrt{4} \times \sqrt{23}}{2}$$

$$= \frac{-10 \pm 2\sqrt{23}}{2}$$

$$= \frac{2(-5 \pm \sqrt{23})}{2}$$

(1/2 mark)

$$= -5 \pm \sqrt{23}$$

$$\therefore x = -5 + \sqrt{23} \text{ or } x = -5 - \sqrt{23}$$

(1/2 mark)

Ans. $-5 + \sqrt{23}, -5 - \sqrt{23}$ are the roots of the given quadratic equation.

(iii) Solution :

The sample space is

$$S = \{23, 25, 27, 29, 32, 35, 37, 39, 52, 53, 57, 59, 72, 73, 75, 79, 92, 93, 95, 97\} \quad (\frac{1}{2} \text{ mark})$$

$$\therefore n(S) = 20 \quad (\frac{1}{2} \text{ mark})$$

Let A be the event that two-digit odd numbers are formed.

$$\text{Then } A = \{23, 25, 27, 29, 35, 37, 39, 53, 57, 59, 73, 75, 79, 93, 95, 97\}$$

$$\therefore n(A) = 16 \quad (\frac{1}{2} \text{ mark})$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$\therefore P(A) = \frac{16}{20} = \frac{4}{5} \quad (\frac{1}{2} \text{ mark})$$

Let B be the event that the two-digit number is a multiple of 5.

$$\text{Then } B = \{25, 35, 75, 95\}$$

$$\therefore n(B) = 4 \quad (\frac{1}{2} \text{ mark})$$

$$P(B) = \frac{n(B)}{n(S)}$$

$$\therefore P(B) = \frac{4}{20} = \frac{1}{5} \quad (\frac{1}{2} \text{ mark})$$

$$\underline{\text{Ans. } P(A) = \frac{4}{5}, P(B) = \frac{1}{5}}$$

Q. No. 3 (B)

(iv) Solution :

Class	Frequency	Cumulative Frequency
Number of Mangoes	Number of Trees	(less than type)
50-100	33	33
100-150	30	63 $\rightarrow$ cf
150-200	90 $\rightarrow$ f	153
200-250	80	233
250-300	17	250
	$\Sigma f_i = 250$	

(1 mark)

Here, total frequency $N = \Sigma f_i = 250$

$$\frac{N}{2} = \frac{250}{2} = 125$$

Cumulative frequency which is just greater than 125 is 153.

150 - 200 is the median class.

$L = 150$, $f = 90$, $cf = 63$, $h = 50$ (1/2 mark)

$$\text{Median} = L + \left[\frac{\frac{N}{2} - cf}{f} \right] \times h \quad (1/2 \text{ mark})$$

$$= 150 + \left[\frac{125 - 63}{90} \right] \times 50 \quad (1/2 \text{ mark})$$

$$= 150 + \frac{62}{90} \times 50$$

$$= 150 + 34.4 = 184.4 \quad (1/2 \text{ mark})$$

Ans. The median of the data is 184.4 mangoes.



Note : Any two out of three questions are to be solved. Here, we have solved all the three questions for the guidance of the students.

(i) Proof :

Here, $a = t_1 = p$, $t_2 = q$ and $t_n = r$ (1) (½ mark)

The common difference $(d) = t_2 - t_1 = q - p$.

Let us find the total number of terms in the A.P.

$t_n = a + (n-1)d$... (Formula) (½ mark)

$\therefore r = p + (n-1)(q-p)$... (Substituting the values) (½ mark)

$\therefore r - p = (n-1)(q-p)$

$\therefore \frac{r-p}{q-p} = n-1$

i.e. $n-1 = \frac{r-p}{q-p}$

$\therefore n = \frac{r-p}{q-p} + 1$

$\therefore n = \frac{r-p+q-p}{q-p}$

$\therefore n = \frac{r+q-2p}{q-p}$... (2) (½ mark)

The sum of n terms of the A.P.

$S_n = \frac{n}{2} (t_1 + t_n)$... (Formula) (½ mark)

$= \frac{r+q-2p}{2} \times (p+r)$... [From (1) and (2)] (1 mark)

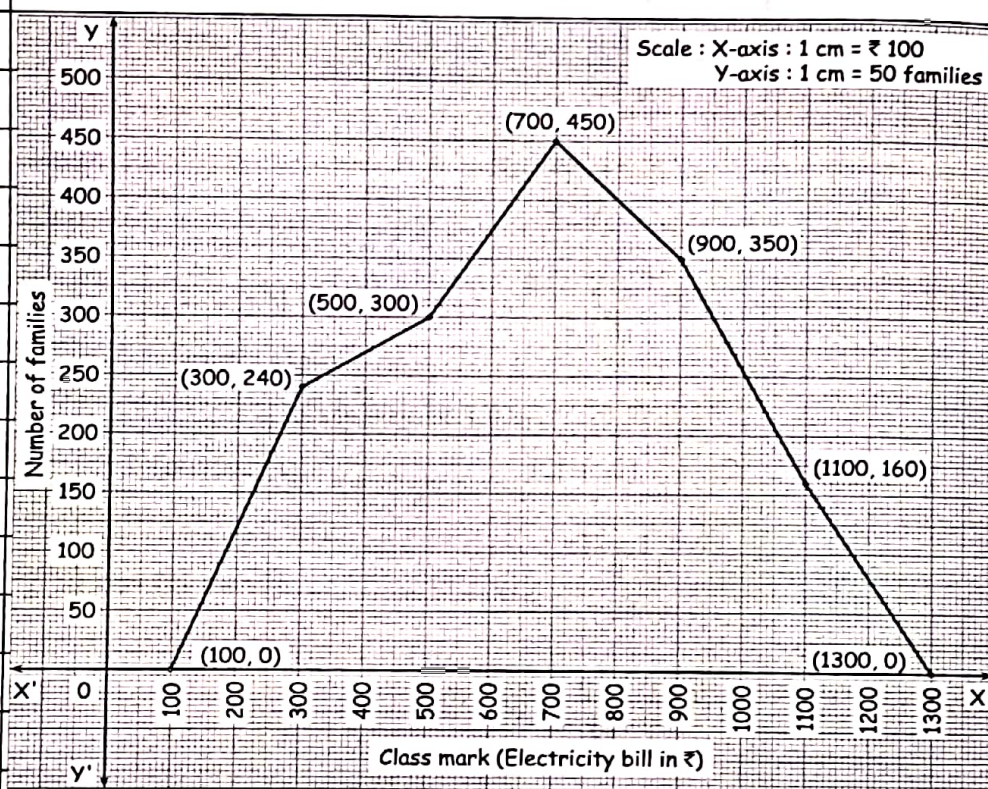
$= \frac{q+r-2p}{2(q-p)} \times (p+r)$

$\therefore S_n = (q+r-2p) \times \frac{(p+r)}{2(q-p)}$ (½ mark)

(ii) Solution :

Class Electricity Bill (₹)	Class mark	Frequency (Families)	Coordinates of points
0-200	100	0	(100, 0)
200-400	300	240	(300, 240)
400-600	500	300	(500, 300)
600-800	700	450	(700, 450)
800-1000	900	350	(900, 350)
1000-1200	1100	160	(1100, 160)
1200-1400	1300	0	(1300, 0)

Frequency Polygon :



[Scheme of marking :

- (1) For preparing the table : (2 marks)
- (2) For correct scale and axes : (½ mark)
- (3) For drawing correct frequency polygon : (1½ marks)]

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(iii)

Solution :

Let the five consecutive natural numbers be

$(x-2), (x-1), x, (x+1)$ and $(x+2) \dots (x > 2)$ ($\frac{1}{2}$ mark)

From the given condition,

$$(x-2)^2 + (x-1)^2 + x^2 + (x+1)^2 + (x+2)^2 = 1455 \quad \left(\frac{1}{2} \text{ mark}\right)$$

$$\therefore x^2 - 4x + 4 + x^2 - 2x + 1 + x^2 + x^2 + 2x + 1 + x^2 + 4x + 4 = 1455$$

($\frac{1}{2}$ mark)

$$\therefore 5x^2 + 10 = 1455$$

($\frac{1}{2}$ mark)

$$\therefore x^2 + 2 = 291$$

(Dividing both the sides by 5) ($\frac{1}{2}$ mark)

$$\therefore x^2 = 291 - 2$$

$$\therefore x^2 = 289$$

($\frac{1}{2}$ mark)

$$\therefore x = \pm 17$$

(Taking square roots of both the sides) ($\frac{1}{2}$ mark)

$$\therefore x = 17 \text{ or } x = -17$$

But a natural number cannot be negative.

$$\therefore x = -17 \text{ is unacceptable.}$$

$$\therefore x = 17$$

$$x-2 = 17-2 = 15, \quad x-1 = 17-1 = 16,$$

$$x+1 = 17+1 = 18, \quad x+2 = 17+2 = 19$$

Ans The five consecutive natural numbers are 15, 16, 17, 18, 19

($\frac{1}{2}$ mark)

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Note : Any one out of two questions are to be solved. Here, we have solved both the questions for the guidance of the students.

(i)

Solution :

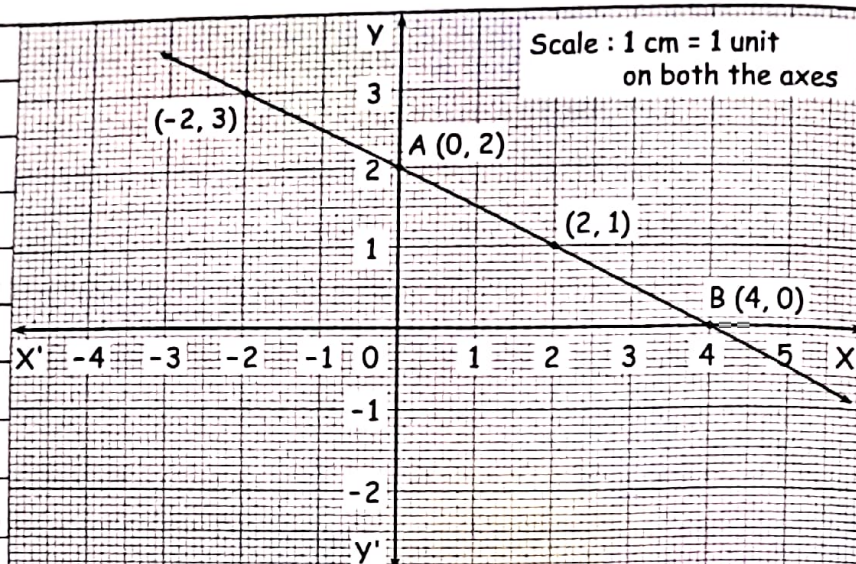
$$x + 2y = 4$$

$$\therefore 2y = 4 - x$$

$$\therefore y = \frac{4-x}{2}$$

x	-2	0	2	4
y	3	2	1	0
(x, y)	(-2, 3)	(0, 2)	(2, 1)	(4, 0)

youVA



Here, height (OA) = 2 units, base (OB) = 4 units

$$A(\Delta AOB) = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times OB \times OA = \frac{1}{2} \times 4 \times 2 = 4 \text{ cm}^2$$

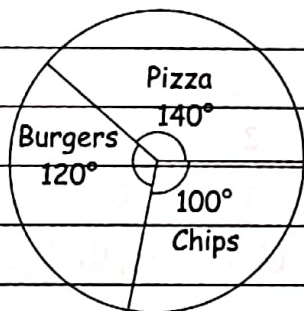
Ans. The area of the triangle is 4 cm^2 .

[Scheme of marking : $\frac{1}{2}$ mark for preparing table, 1 mark for drawing correct line, 1 mark for finding the area of the triangle, $\frac{1}{2}$ mark for writing the area of the triangle.]

(ii) Solution :

Food Items	Number of People	Measure of Central Angle	
Pizza	70	$\frac{70}{180} \times 360^\circ = 140^\circ$	($\frac{1}{2}$ mark)
Burgers	60	$\frac{60}{180} \times 360^\circ = 120^\circ$	($\frac{1}{2}$ mark)
Chips	50	$\frac{50}{180} \times 360^\circ = 100^\circ$	($\frac{1}{2}$ mark)
Total	180	360°	

On the basis of the table, the pie diagram is drawn :



(For drawing pie diagram : $1\frac{1}{2}$ marks)