1.

$$\frac{54+58+60+y+2y}{5} = 56.$$

$$\frac{172+3y}{5} = 56.$$

$$172+3y = 280.$$

$$3y = 108$$

$$y = 36.$$

$\text{Mean} = \frac{\sum x_i}{n}.$

4.

$$(x^2+3x-10) - xy+2y.$$

$$(x^2+5x-2x-10) - y(x-2).$$

$$[x(x+5)-2(x+5)] - y(x-2).$$

$$(x-2)(x+5) - y(x-2)$$

$$(x-2)(x+5-y).$$

2.

$$\begin{array}{c|c} 3 & 2x+y=8 \\ 1 & x-3y=4 \end{array}$$

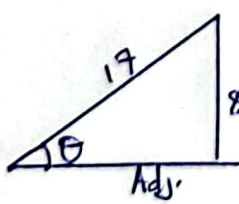$$\begin{array}{c|c} & 6x+3y = 24 \\ + & x-3y = 4 \end{array}$$

$$\overline{7x = 28}$$

$$x = 4$$

$$y = 0$$

5. $3, 5, 7.$

(a) $\{35, 37, 53, 57, 73, 75\}.$

(b) $P(M_5) = \frac{2}{6} = \frac{1}{3}.$

3.

$$Adj^2 = 17^2 - 8^2$$

$$Adj = \sqrt{225}$$

$$= 15.$$

$$\cos\theta = \frac{15}{17}$$

6.

$$\frac{m}{n} = \frac{x+r}{x-y}.$$

$$M(x-y) = n(x+r)$$

$$mx-ny = nx+nr$$

$$mx-nx = nr+ny.$$

$$x(m-n) = nr+ny.$$

$$x = \frac{nr+ny}{m-n}.$$

7.

$X = 2 \times 55$

$X = 110°.$

$y + 55 = 180°$

$y = 125°$

Alt.

$2y = (360 - 110).$

$2y = 250$

$y = 125°.$

9.

$Grad = \dfrac{3 - 0}{0 - 3} = -1.$ $(0, \overset{c}{3})$

$y = mx + c$

$y = -x + 3.$

Test point $(1, 1).$

$y \quad -x + 3.$

$1 < 2.$

$y \leq -x + 3.$

8.

$M = \begin{pmatrix} 2 & 2 \\ -6 & -5 \end{pmatrix}.$

$det\ M = (2x - 5) - (-6 \times 2)$

$= 2.$

$Adjoint\ M = \begin{pmatrix} -5 & -2 \\ 6 & 2 \end{pmatrix}.$

$M^{-1} = \dfrac{1}{2} \begin{pmatrix} -5 & -2 \\ 6 & 2 \end{pmatrix}$

$M^{-1} = \begin{pmatrix} -\frac{5}{2} & -1 \\ 3 & 1 \end{pmatrix}.$

10.

$M \times 0 = I.$

$\begin{pmatrix} 2 & 1 \\ 0 & 3 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ 2 & -4 \end{pmatrix} = \begin{pmatrix} 2+2 & 2-4 \\ 6 & -12 \end{pmatrix}$

$= \begin{pmatrix} 4 & -2 \\ 6 & -12 \end{pmatrix}$

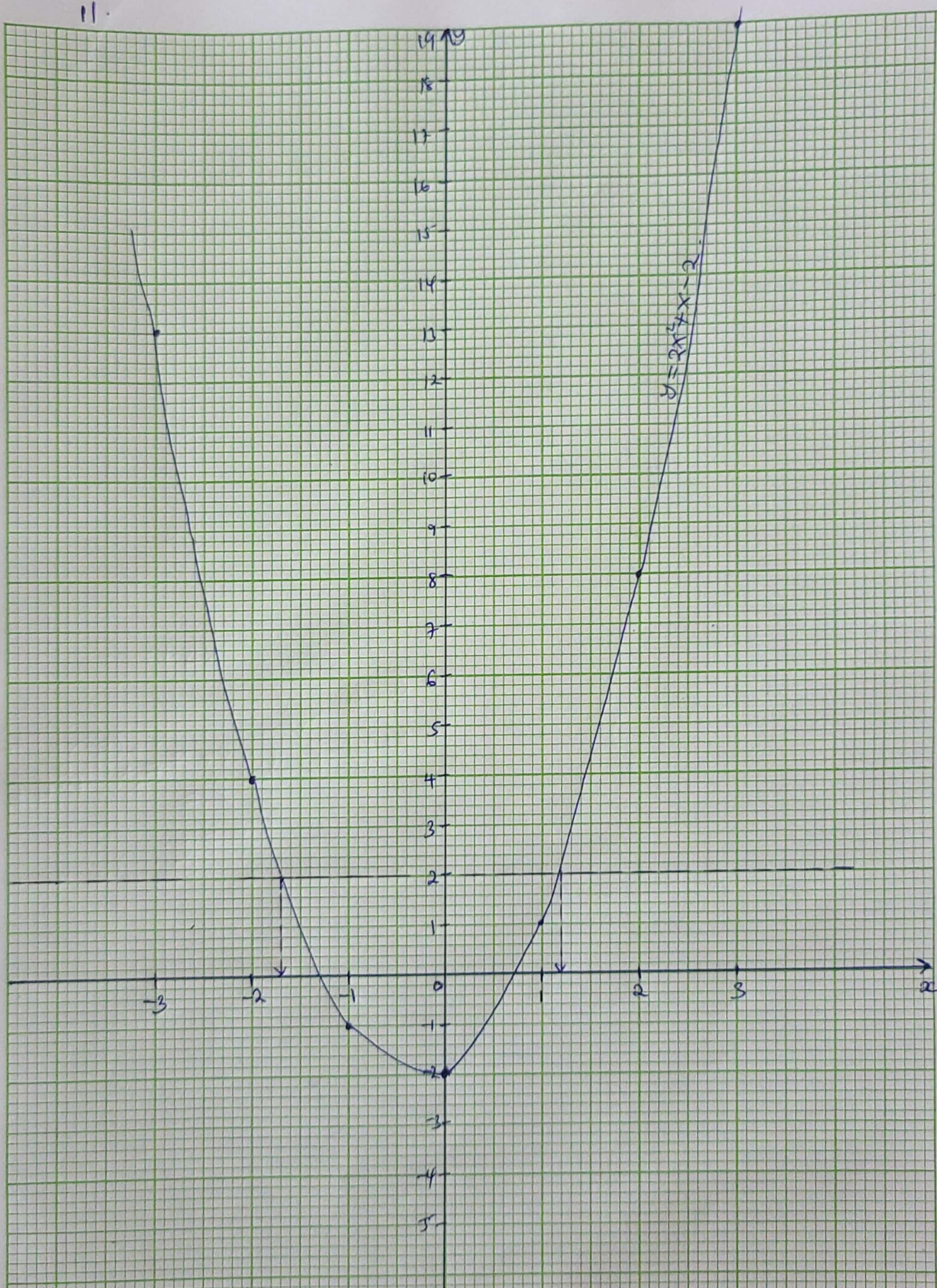$P'(4, 6) \quad Q'(-2, -12).$

Visit the youtube for the videos.

(a)

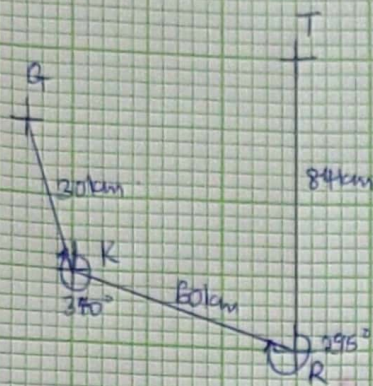| x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$2x^2$	18	8	2	0	2	8	18
x	-3	-2	-1	0	1	2	3
-2	-2	-2	-2	-2	-2	-2	-2
y	13	4	-1	-2	1	8	11.

b (i)

$y =$ (Original) $-$ (New)

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

$y = 0$

$x_1 = 0.7, \ x_2 = -1.3.$

(ii) $y = (2x^2+x-2) - (2x^2+x-4)$

$y = 2.$

$x_1 = -1.7, \ x_2 = 1.2.$

11.

$y = 2x^2 + x - 2$

No.12.

(a) Sketch.

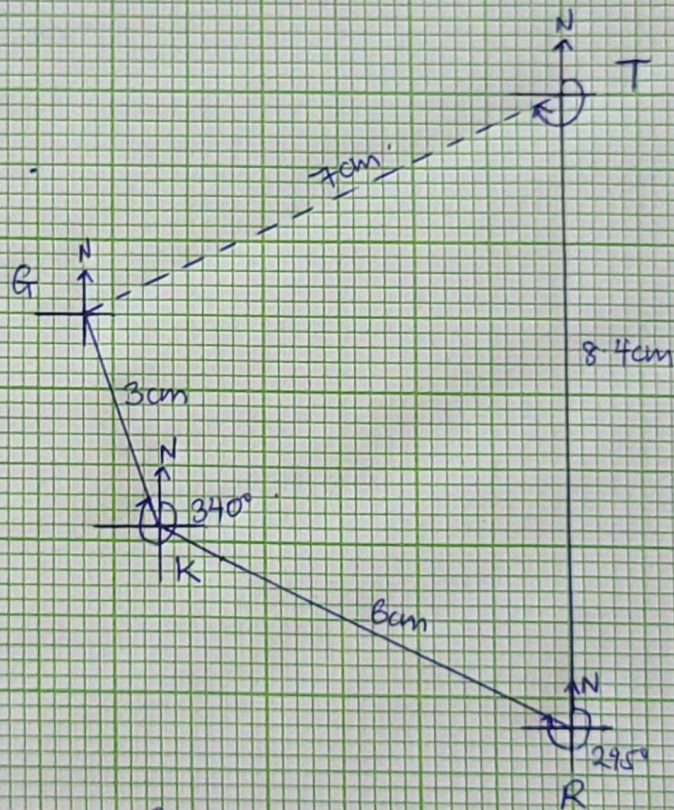

Conversions.

$$\overline{TR} = \frac{84}{10} = 8.4\,cm.$$

$$\overline{RK} = \frac{60}{10} = 6\,cm.$$

$$\overline{KG} = \frac{30}{10} = 3\,cm.$$

Accurate drawing.

(b) G from T = 7cm = 7×10   Bearing = 180 + 65
             = 70 km   = 245°

(c) Average = Total distance
    speed   Total time

$$= \frac{70}{\left(\frac{55}{60}\right)}$$

$$= 76.36 \, kmh^{-1}$$

13. (a)

Marks.	f	x	f(x)	C.B .
11 − 15	4	13	52	10·5 − 15·5
16 − 20	5	18	90	15·5 − 20·5
21 − 25	6	23	138	20·5 − 25·5
26 − 30	10	28	280	25·5 − 30·5
31 − 35	8	33	264	30·5 − 34·5
36 − 40	6	38	228	34·5 − 40·5
41 − 45	4	43	172	40·5 − 50·−
46 − 50	2	48	96	45·5 − 50·5
	$\Sigma f = 45$		$\Sigma fx = 1320$	

Mean mark $= \dfrac{\Sigma fx}{\Sigma f}$

$\qquad = \dfrac{1320}{45}$

$\qquad = 29.3333 \ (4dp) \ marks.$

The Histogram.

frequency

Marks

$$\text{Modal marks} = (25.5) + (6.5 \times 0.5)$$

$$= \underline{28.75 \text{ m}}$$

x-axis labels: 10.5, 15.5, 20.5, 25.5, Modal, 30.5, 35.5, 40.5, 45.5, 50.5

y-axis labels: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
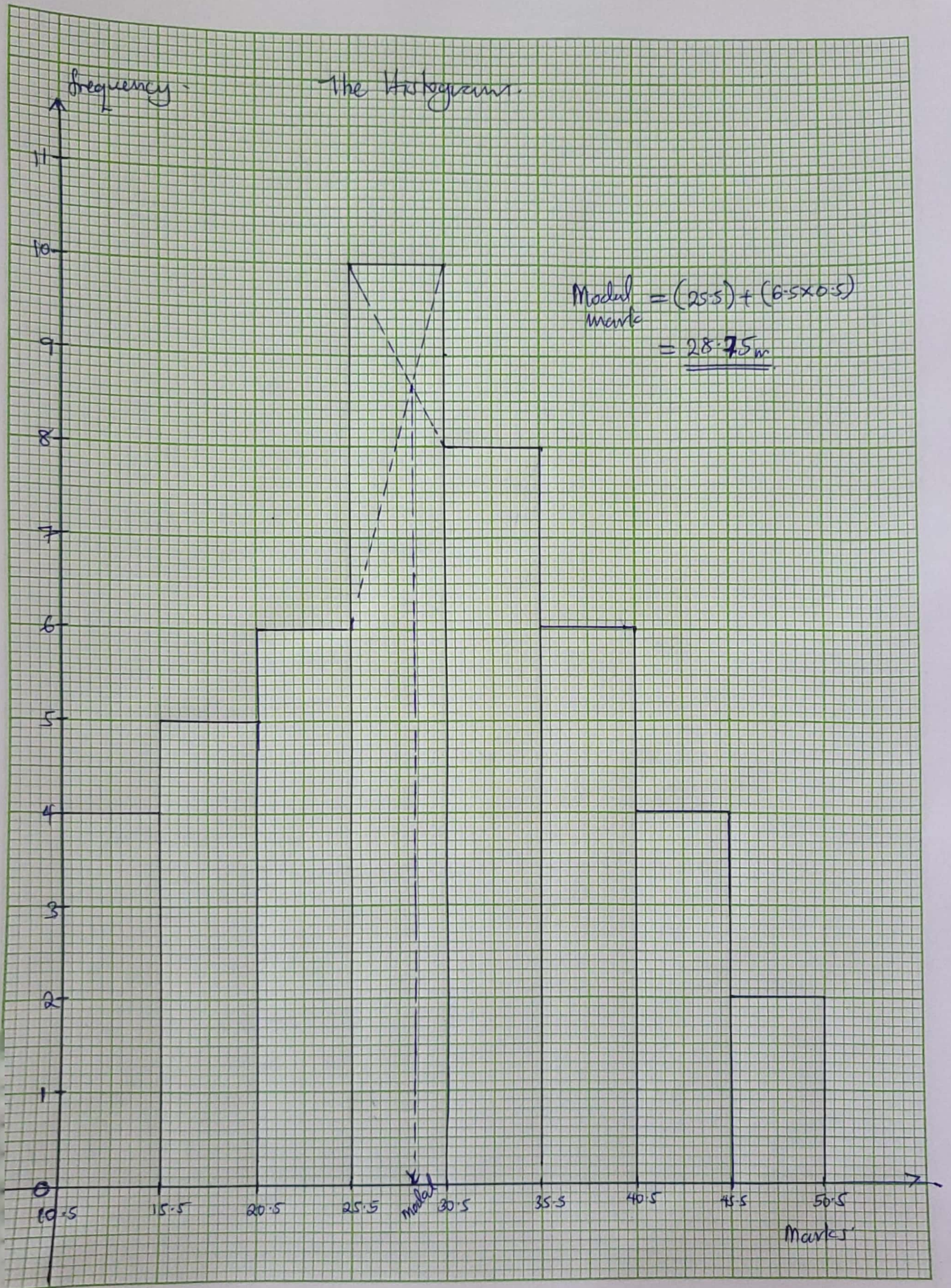
x – cost for 1kg of sugar
y – cost for 1ky of flour

$$3x + 2y = 10,400 \cdot$$
$$3x + 2(2y) = 13,600 \cdot$$

$$-\left|\begin{array}{l} 3x + 2y = 10,400 \\ 3x + 4y = 13,600 \end{array}\right.$$
$$\overline{ -2y = -3200}$$
$$y = 1600 \, \text{Rhs}.$$

$$x = 2400 \text{ shs} \cdot$$

1 kg of flour costs 1600shs
1 ky of sugar costs 2400shs.

(b).

x girls = 180,000 – $2x$ boys = 180,000
1 girl = $\dfrac{180,000}{x}$ 1 boy = $\dfrac{90,000}{x}$.

1 girl = 1 boy + 9000   or 1 girl – 9000 = 1 boy

$$\dfrac{180,000}{x} = \dfrac{90,000}{x} + 9000 \cdot$$

$$\dfrac{20}{x} = \dfrac{10}{x} + 1$$

$$20 = 10 + x$$

$$x = 10 \cdot$$

Boys = $2x$
$= 20$

15.

(a) (i)

Cost matrix.

$$\begin{pmatrix} 4500 \\ 5800 \\ 5200 \end{pmatrix}_{3\times 1}$$

(ii) Sales matrix.

$$\begin{pmatrix} 10 & 4 & 12 \\ 30 & 0 & 5 \\ 5 & 2 & 8 \\ 0 & 1 & 6 \end{pmatrix}_{4\times 3}$$
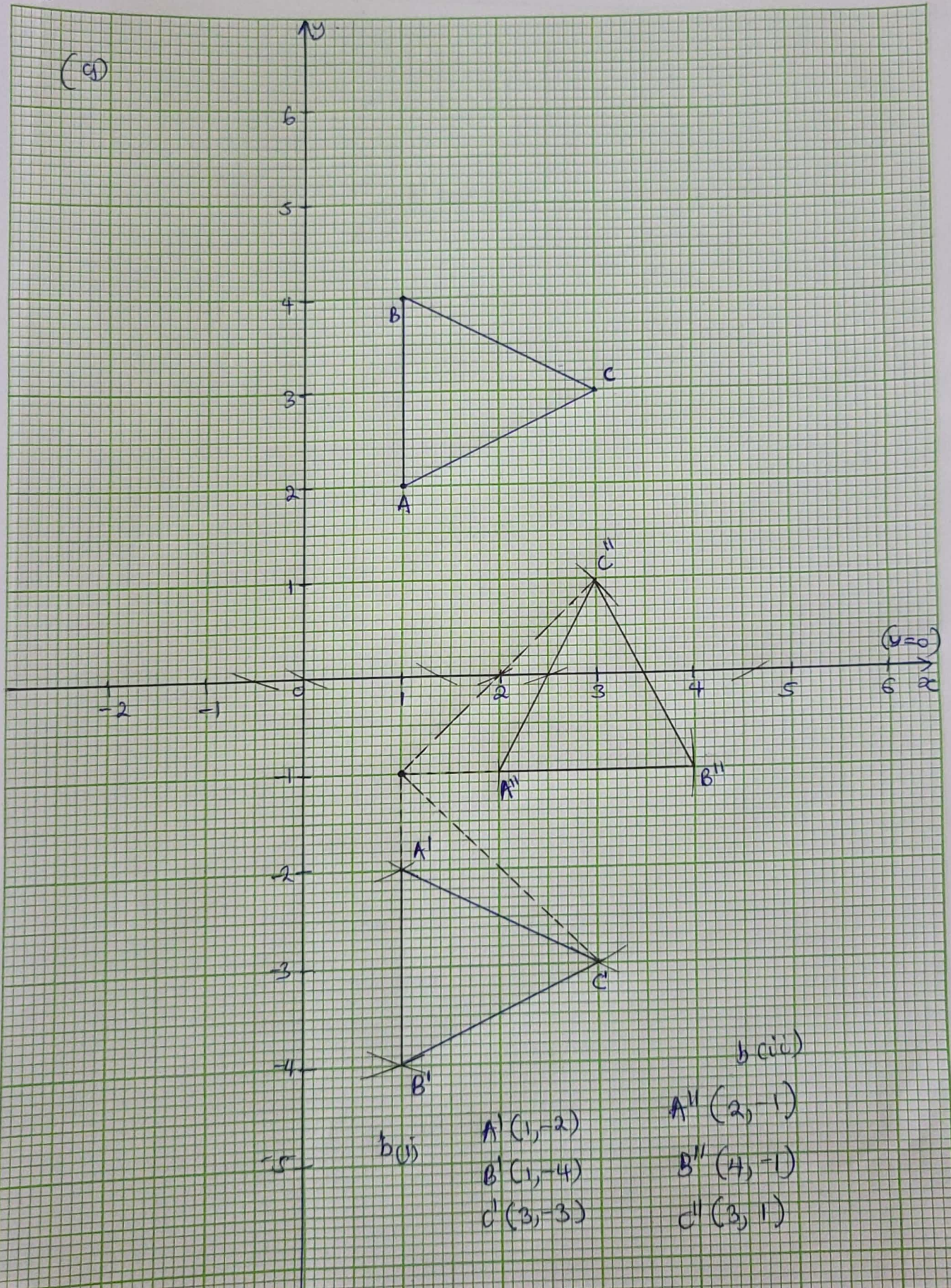
(b)

$$\begin{pmatrix} 10 & 4 & 12 \\ 30 & 0 & 5 \\ 5 & 2 & 8 \\ 0 & 1 & 6 \end{pmatrix} \begin{pmatrix} 4500 \\ 5800 \\ 5200 \end{pmatrix} = \begin{pmatrix} 45000 + 23,200 + 62400 \\ 135,000 + 0 + 26000 \\ 0 + 5800 + 31200 \end{pmatrix}$$

$$= \begin{pmatrix} 130,600 \\ 161,000 \\ 37,000 \end{pmatrix}$$

Total sales = 130,600 + 161,000 + 37,000

= $ 328,600.

16.

(d)

$(y=0)$

b (i)

b (iii)

A′ (1,−2)
B′ (1,−4)
C′ (3,−3)

A″ (2,−1)
B″ (4,−1)
C″ (3, 1)

(a) x - trips by bus.
     y - trips by taxi

$42x + 14y \geq 154$; $3x + y \geq 11$

$30,000x + 20,000y \leq 200,000$; $3x + 2y \leq 20$

$y > x + 3$.   ; $y > x + 3$

$x \geq 0$ $x \geq 0$

$y \geq 0$. $y \geq 0$.

(b)(i) Boundary lines.

$3x + y = 11$

x	0	3·7
y	11	0

(0,11) (3·7,0).

$3x + 2y = 20$

x	0	6·7
y	10	0

(0,10) (6·7,0).

$y = x + 3$

x	0	-3
y	3	0

(0,3) (-3,0).

(c)
$f(x,y) = 30,000x + 20,000y$ (1,8)
                              (2,6)
$f(2,6) = 30,000(2) + 20,000(6)$ (2,7).

$= 180,000$ shs.

∴ To spend least amount, they should make;

2 trips by bus
6 trips by taxi