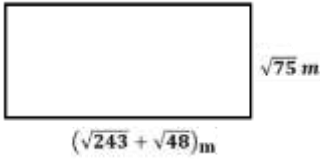


# SEMINAR SOLUTIONS AT UGANDA MARTYRS CENTINAR Y S.S KANGULUMIRA

| Item | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | comment |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1    | <p>Item 1 (a)</p> <p>First born = 40%</p> <p>2<sup>nd</sup> born = 0.24242424....</p> <p>3<sup>rd</sup> born = remainder</p> <p>Simplifying the fraction got by the second born</p> $y = 0.242424224 \dots \dots \dots (i)$ <p>Multiplying the equation by 100</p> $100y = 24.2424224 \dots \dots \dots (ii)$ <p>Eqn (ii) – eqn (i)</p> $99y = 24$ $y = \frac{24}{99} = \frac{8}{33}$ <p>Fraction got by the third boy = <math>1 - \left( \frac{40}{100} + \frac{8}{33} \right)</math></p> $= \frac{59}{165}$ <p>Let the total amount of money shared be A</p> <p>The second boy got 24,000</p> $\frac{8}{33} \times A = 24,000$ $A = \frac{33}{8} \times 24,000 = \text{shs. } 99,000$ <p>First child got 40%</p> $= \frac{40}{100} \times 99,000 = \text{shs. } 39,600$ <p>Third born got = <math>\frac{59}{165} \times 99,000 = \text{shs. } 35,400</math></p> <p>Or</p> <p>Amount got by 3<sup>rd</sup> born = <math>99000 - (24000 + 39,600)</math></p> $= 35,400$ <p>The first born got shs. 39,600 and the third born got shs. 35,400.</p> <p>Item 1 (b)</p> <p>Area of the corner = <math>2.5 \text{ m}^2</math></p> <p>Area in centimetres = <math>2.5 \times 10,000 = 25000 \text{ cm}^2</math></p>  <p>Area of the goat shed = length x width</p> $128 \text{ cm} \times (256)^{\frac{3}{4}} \text{ cm}$ <p>Simplifying the dimensions</p> |         |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|--------|------------|-------|------|---------|-------|-------|-------|--------|-------|---|---|---|---|--|---|--|
|       | <table><tr><td>2</td><td>256</td></tr><tr><td>2</td><td>128</td></tr><tr><td>2</td><td>64</td></tr><tr><td>2</td><td>32</td></tr><tr><td>2</td><td>16</td></tr><tr><td>2</td><td>8</td></tr><tr><td>2</td><td>4</td></tr><tr><td>2</td><td>2</td></tr><tr><td></td><td>1</td></tr></table> <p><math>128 = 2^7</math>; <math>256 = 2^8</math></p> <p>Area = <math>2^7 \times (2^8)^{\frac{3}{4}}</math></p> $2^7 \times (2^2)^3$ $= 2^{(7+6)}$ $Area = 2^{13}cm^2$ <p>The simplified area is <math>2^{13}</math>, <math>a = 2</math> and <math>n = 13</math></p> <p>Item 1(c)</p> <p>Area of the goat shed = <math>8,192cm^2</math></p> <p>Comparison in area = <math>25000cm^2 - 8,192cm^2 = 16,808cm^2</math></p> <p>since the area of the goat shed is smaller than that of the corner, it fits in the space provided</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2       | 256        | 2      | 128        | 2     | 64   | 2       | 32    | 2     | 16    | 2      | 8     | 2 | 4 | 2 | 2 |  | 1 |  |
| 2     | 256                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | 128                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | 64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | 32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
|       | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |            |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| 2     | <table><tr><td>Item</td><td>Quantity</td><td>Amount</td><td>Unit price</td></tr><tr><td>Flour</td><td>50kg</td><td>150,000</td><td>3,000</td></tr><tr><td>Sugar</td><td>25 kg</td><td>90,000</td><td>3,600</td></tr></table> <p>1 batch of bread = 0.5kg of sugar and 1.5 kg of flour</p> <p>8 bags of flour = <math>8 \times 150,000 = 1,200,000</math></p> <p>Discount allowed = 5%</p> <p>Cost price = <math>\frac{(100-5)}{100} \times 1200,000 = shs. 1140,000</math></p> <p>Cost of 1 batch of bread = <math>0.5 \times 3,600 + 1.5 \times 3,000</math></p> $= shs. 6,300$ <p>200 batches of bread = <math>6300 \times 200 = 1,260,000</math></p> <p>Other expenses = shs. 1000 each</p> $= 200 \times 1000 = shs. 200,000$ <p>Overall cost price = <math>200,000 + 1,260,000 = shs. 1,460,000</math></p> <p>Sugar required for 200 batches = <math>200 \times 0.5 = 100kg</math></p> <p>Flour required for 200 batches = <math>200 \times 1.5 = 300kg</math></p> <p>Number of bags of sugar required = <math>\frac{100kg}{25kg} = 4bags</math></p> <p>Number of bags of flour required = <math>\frac{300kg}{50kg} = 6bags</math></p> <p>Revenue got after selling = <math>7500 \times 200 = shs. 1,500,000</math></p> <p>Profit after selling = <math>shs. 1,500,000 - shs. 1,460,000</math></p> $= shs. 40,000$ <p>Percentage profit = <math>\frac{40,000}{1460,000} \times 100 = 2.7397260274</math></p> | Item    | Quantity   | Amount | Unit price | Flour | 50kg | 150,000 | 3,000 | Sugar | 25 kg | 90,000 | 3,600 |   |   |   |   |  |   |  |
| Item  | Quantity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Amount  | Unit price |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| Flour | 50kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 150,000 | 3,000      |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |
| Sugar | 25 kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 90,000  | 3,600      |        |            |       |      |         |       |       |       |        |       |   |   |   |   |  |   |  |

|                  | $\approx 2.74\%$<br>The percentage profit is 2.74%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                |        |                |                  |               |       |              |                 |              |       |               |  |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------|--------|----------------|------------------|---------------|-------|--------------|-----------------|--------------|-------|---------------|--|
| 3                | <p>The dimensions are <math>(\sqrt{243} + \sqrt{48})\text{m}</math> by <math>\sqrt{75}\text{m}</math></p> <div></div> <p>Perimeter = <math>2(l + w)</math></p> $= 2(\sqrt{243} + \sqrt{48} + \sqrt{75})$ $2(\sqrt{81 \times 3} + \sqrt{16 \times 3} + \sqrt{25 \times 3}) = 2(9\sqrt{3} + 4\sqrt{3} + 5\sqrt{3})$ $= 2(18\sqrt{3})$ $= 36\sqrt{3}$ <p>The Perimeter of the field is <math>36\sqrt{3}</math> metres</p> <p>(a) Area of the field = length <math>\times</math> width</p> $A = (\sqrt{243} + \sqrt{48}) \times \sqrt{75}$ $= 13\sqrt{3} \times 5\sqrt{3}$ $= 65 \times 3 = 195\text{m}^2$ <p>The area of the field is <math>195\text{m}^2</math></p> <p>(b) Cost of fencing = <i>perimeter</i> <math>\times</math> <i>cost per metre</i></p> $36\sqrt{3} \times 7500 = 467,653.718$ <p>The cost is Ugx. 467,653.718 (<i>mobile money</i>)</p> $\approx \text{UGX. } 467,700 \text{ (cash terms)}$ <p>The cost of fencing the maize field once is UGX. 467,700 to the nearest shillings</p> <p>(c) Ratio of eating : selling = 2:3</p> <p>Total ratio = <math>2 + 3 = 5</math></p> <p>Let w be the total expected harvest.</p> <p>Proportion for eating = <math>\frac{2}{5} \times w = 400</math></p> $w = 400 \times \frac{5}{2} = 1000\text{kg}$ <p>The farmer expects to harvest 1000kg of maize from the field</p> |            |                |        |                |                  |               |       |              |                 |              |       |               |  |
| 4                | <p>Let x represent the number of trips made by a coaster</p> <p>y –represent the number of trips made by a bus</p> $30x + 60y \geq 300$ <p>Simplifying the inequality : <math>x + 2y \geq 10</math></p> $x + y \leq 10$ $x \leq 5$ $y \geq 2x$ $y \geq 0, \quad x \geq 0$ <p>Plotting inequalities</p> <table><tr><th>Inequality</th><th>Line</th><th>Nature</th><th>Points to plot</th></tr><tr><td><math>x + 2y \geq 10</math></td><td><math>x + 2y = 10</math></td><td>Solid</td><td>(0,5),(10,0)</td></tr><tr><td><math>x + y \leq 10</math></td><td><math>x + y = 10</math></td><td>solid</td><td>(10,0) (0,10)</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Inequality | Line           | Nature | Points to plot | $x + 2y \geq 10$ | $x + 2y = 10$ | Solid | (0,5),(10,0) | $x + y \leq 10$ | $x + y = 10$ | solid | (10,0) (0,10) |  |
| Inequality       | Line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Nature     | Points to plot |        |                |                  |               |       |              |                 |              |       |               |  |
| $x + 2y \geq 10$ | $x + 2y = 10$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Solid      | (0,5),(10,0)   |        |                |                  |               |       |              |                 |              |       |               |  |
| $x + y \leq 10$  | $x + y = 10$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | solid      | (10,0) (0,10)  |        |                |                  |               |       |              |                 |              |       |               |  |

|             |          |       |              |
|-------------|----------|-------|--------------|
|             |          |       |              |
| $x \leq 5$  | $x = 5$  | Solid | (5,5) (5,15) |
| $y \geq 2x$ | $y = 2x$ | Solid | (0,0) (5,10) |

**See the graph attached**

From the graph,

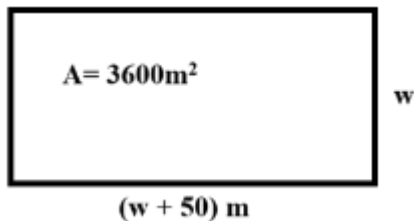
Optimal function  $P = 400,000x + 900,000y$

| Point | 400,000x  | 900,000y  | Total      |
|-------|-----------|-----------|------------|
| (2,4) | 800,000   | 3600,000  | 4,400,000* |
| (1,3) | 400,000   | 2,700,000 | 3,100,000* |
| (2,5) | 800,000   | 4500,000  | 5,300,000  |
| (3,6) | 1,200,000 | 5,400,000 | 6,600,000  |
| (3,7) | 1,200,000 | 6,300,000 | 7,500,000  |
| (1,6) | 400,000   | 5,400,000 | 5,800,000  |

To minimize the transport cost, they need to use 1 or 2 coasters and 3 or 4 buses to spend shs. 3,100,000 or shs. 4,400,000

(b) dimensions of the hall

Let w represent the width of the hall



*Area of the hall = length x width*

$$3600 = (w + 50)w$$

$$w^2 + 50w - 3600 = 0$$

Factors of -3600 are 90 and -40

$$w^2 - 40w + 90w - 3600 = 0$$

$$w(w - 40) + 90(w - 40) = 0$$

$$(w - 40)(w + 90) = 0$$

$$w = 40m$$

Length =  $w + 50$

$$\text{length} = 40 + 50 = 90m$$

The length of the hall is 90metres and its width is 40metres

**Alternatively**

Let L represent the length of the hall

A = 3600m<sup>2</sup>

(L - 50)m

L m

Area = length x width

$$L(L - 50) = 3600$$

$$L^2 - 50L - 3600 = 0$$

Using the quadratics formula

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

$$L = \frac{-(-50) \pm \sqrt{(-50)^2 - 4 \times 1 \times -3600}}{2 \times 1}$$

$$L = 90, L = -40$$

The length is 90metres and the width is 40metres

5

Let x be the number of Bajaj and y be the number of TVS motorcycles

$$x \geq 4 \dots \dots \dots (i)$$

$$y \geq 2 \dots \dots \dots (ii)$$

$$16,000x + 10,000y \leq 120,000 \dots \dots \dots (iii)$$

$$2,000,000x + 2,400,000y \leq 18,000,000 \dots \dots \dots (iv)$$

Simplifying inequality (iii) and (iv)

$$8x + 5y \leq 60 \dots \dots \dots (iii)$$

$$5x + 6y \leq 45 \dots \dots \dots (iv)$$

For none zero number of motorcycles,

$$y \geq 0$$

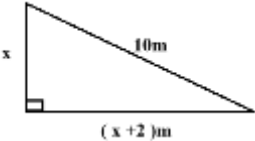
$$x \geq 0$$

| Inequality        | Line           | Nature | Points to plot |
|-------------------|----------------|--------|----------------|
| $5x + 6y \leq 45$ | $5x + 6y = 45$ | Solid  | (9,0),(3,5)    |
| $8x + 5y \leq 60$ | $8x + 5y = 60$ | solid  | (12,0) (5,4)   |
| $x \geq 2$        | $x = 2$        | solid  | (2,0) (2,10)   |
| $y \geq 4$        | $y = 4$        | solid  | (0,4) (10,4)   |

**See graph attached**

Objective function  $P = 16,000x + 10,000y$

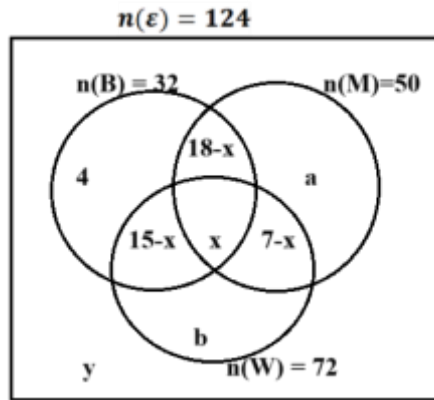
| Point | 16,000x | 10,000y | Total   |
|-------|---------|---------|---------|
| (4,2) | 64000   | 20,000  | 84,000* |
| (5,3) | 80,000  | 30,000  | 110,000 |
| (6,2) | 96,000  | 20,000  | 116,000 |
| (4,3) | 64,000  | 30,000  | 94,000  |
| (4,4) | 64,000  | 40,000  | 104,000 |

|        | The farm manager should buy 4 Bajaj motorcycles and 2 TVS motorcycles to minimize the cost of maintainance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |        |       |   |   |        |   |   |        |  |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|-------|---|---|--------|---|---|--------|--|
| 6      | <p>Let a be the cost of tin A and b be the cost of a box of tin B</p> <table border="1"> <thead> <tr> <th>Type A</th><th>Type B</th><th>Total</th></tr> </thead> <tbody> <tr> <td>2</td><td>3</td><td>50,000</td></tr> <tr> <td>2</td><td>1</td><td>35,000</td></tr> </tbody> </table> $2a + 3b = 50,000 \dots\dots\dots (i)$ $2a + b = 35,000 \dots\dots\dots (ii)$ <p>Equation (i) – (ii)</p> $2b = 15,000$ $\frac{2b}{2} = \frac{15,000}{2}$ $b = 7,500$ <p>Putting the value of b in equation (i); <math>2a + 3 \times 7,500 = 50,000</math></p> $2a = 50,000 - 22500$ $2a = 27,500$ $\frac{2a}{2} = \frac{27,500}{2}$ $a = 13,750$ <p>A tin of drug A costs shs 13,750 and a box of drug B costs shs. 7,500</p> <p>(a) The dimensions of the plot</p>  <p>Using Pythagoras' theorem</p> $a^2 + b^2 = c^2$ $x^2 + (x + 2)^2 = 10^2$ $x^2 + x^2 + 4x + 4 = 100$ $2x^2 + 4x - 96 = 0$ $x^2 + 2x - 48 = 0$ $x^2 + 8x - 6x - 48 = 0$ $(x + 8)(x - 6) = 0$ $x = -8 \text{ or } x = 6$ <p>The dimensions of the plot are 6m, 8m and 10metres</p> | Type A | Type B | Total | 2 | 3 | 50,000 | 2 | 1 | 35,000 |  |
| Type A | Type B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Total  |        |       |   |   |        |   |   |        |  |
| 2      | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 50,000 |        |       |   |   |        |   |   |        |  |
| 2      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 35,000 |        |       |   |   |        |   |   |        |  |
| 7      | <p>Let the number of males be m and n be the number of females</p> $m + n = 200 \dots\dots\dots (i)$ $\frac{2}{5}m + \frac{2}{7}n = 68$ <p>Lcm is 35</p> $14m + 10n = 2340 \dots\dots\dots (ii)$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |        |       |   |   |        |   |   |        |  |

|                      | <div><math display="block">\frac{3}{5}m + \frac{5}{7}n = (200 - 68)</math><math display="block">21m + 25n = 4620 \dots \dots \dots (iii)</math><p>Solving equation (i) and (ii) simultaneously;</p><math display="block">m = 95, n = 105</math><p>The ratio of males to females = <math>\frac{m}{n} = \frac{95}{105}</math></p><p>Reducing the ratio, <math>m : n = 19 : 21</math></p></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------|--------|----------------|-------------------|----------------|-------|--------------|----------------------|-------------------|-------|--------------|------------------|---------------|-------|--------------|-------|------|-----|-------|--------|------|---|-------|-------|----|-----|-----|-------|-----|-----|------|--------|------|-----|-------|--------|------|----|-------|--|
|                      | <div>Item 7(b)<br/>Let x be the number of rocking chairs<br/>y be the number of tables<br/><math display="block">2x + 5y \leq 40</math><math display="block">15x + 45y \leq 315</math><math display="block">x + 3y \leq 21</math><math display="block">x \geq 0, y \geq 0</math><p>Plotting points</p><table><tr><th>Inequality</th><th>Line</th><th>Nature</th><th>Points to plot</th></tr><tr><td><math>2x + 5y \leq 40</math></td><td><math>2x + 5y = 40</math></td><td>Solid</td><td>(0,8),(20,0)</td></tr><tr><td><math>15x + 45y \leq 315</math></td><td><math>15x + 45y = 315</math></td><td>solid</td><td>(0,7) (21,0)</td></tr><tr><td><math>x + 3y \leq 21</math></td><td><math>x + 3y = 21</math></td><td>Solid</td><td>(0,7) (21,0)</td></tr></table><p><b>See the graph attached</b></p><p>Optimal function <math>P = 180x + 90y</math></p><table><tr><th>Point</th><th>180x</th><th>90y</th><th>Total</th></tr><tr><td>(20,0)</td><td>3600</td><td>0</td><td>3600*</td></tr><tr><td>(0,7)</td><td>0</td><td>630</td><td>630</td></tr><tr><td>(5,5)</td><td>900</td><td>450</td><td>1350</td></tr><tr><td>(15,2)</td><td>2700</td><td>180</td><td>2880*</td></tr><tr><td>(15,1)</td><td>2700</td><td>90</td><td>2790*</td></tr></table><p>He needs to manufacture 15 or 20 rocking chairs and 2 or 0 table respectively to make a maximum profit of £2,880 or £3,600</p></div> | Inequality | Line           | Nature | Points to plot | $2x + 5y \leq 40$ | $2x + 5y = 40$ | Solid | (0,8),(20,0) | $15x + 45y \leq 315$ | $15x + 45y = 315$ | solid | (0,7) (21,0) | $x + 3y \leq 21$ | $x + 3y = 21$ | Solid | (0,7) (21,0) | Point | 180x | 90y | Total | (20,0) | 3600 | 0 | 3600* | (0,7) | 0  | 630 | 630 | (5,5) | 900 | 450 | 1350 | (15,2) | 2700 | 180 | 2880* | (15,1) | 2700 | 90 | 2790* |  |
| Inequality           | Line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Nature     | Points to plot |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| $2x + 5y \leq 40$    | $2x + 5y = 40$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Solid      | (0,8),(20,0)   |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| $15x + 45y \leq 315$ | $15x + 45y = 315$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | solid      | (0,7) (21,0)   |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| $x + 3y \leq 21$     | $x + 3y = 21$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Solid      | (0,7) (21,0)   |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| Point                | 180x                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 90y        | Total          |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| (20,0)               | 3600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0          | 3600*          |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| (0,7)                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 630        | 630            |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| (5,5)                | 900                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 450        | 1350           |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| (15,2)               | 2700                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 180        | 2880*          |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| (15,1)               | 2700                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 90         | 2790*          |        |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| 8                    | <div>(a) The coin and a die</div> <table><tr><td colspan="2" rowspan="2"></td><td colspan="6">DIE</td></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td rowspan="2">COIN</td><td>H</td><td>H1</td><td>H2</td><td>H3</td><td>H4</td><td>H5</td><td>H6</td></tr><tr><td>T</td><td>T1</td><td>T2</td><td>T3</td><td>T4</td><td>T5</td><td>T6</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |                | DIE    |                |                   |                |       |              | 1                    | 2                 | 3     | 4            | 5                | 6             | COIN  | H            | H1    | H2   | H3  | H4    | H5     | H6   | T | T1    | T2    | T3 | T4  | T5  | T6    |     |     |      |        |      |     |       |        |      |    |       |  |
|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |                | DIE    |                |                   |                |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1          | 2              | 3      | 4              | 5                 | 6              |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
| COIN                 | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | H1         | H2             | H3     | H4             | H5                | H6             |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |
|                      | T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T1         | T2             | T3     | T4             | T5                | T6             |       |              |                      |                   |       |              |                  |               |       |              |       |      |     |       |        |      |   |       |       |    |     |     |       |     |     |      |        |      |     |       |        |      |    |       |  |

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |              |           |              |      |    |      |    |       |        |               |    |  |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|-----------|--------------|------|----|------|----|-------|--------|---------------|----|--|
|          | <p>Let W be the event that one wins and L be the event that one loses the game</p> $P(W) = \frac{2}{12} = \frac{1}{6}$ $P(L) = 1 - P(W)$ $= 1 - \frac{1}{6} = \frac{5}{6}$ $P(L) = \frac{5}{6}$ <p>(b) Since the probability of losing is bigger than that of winning, the game is too risky I do not advise him to bet.</p> <p>(c)</p> <table><tr><td></td><td>Rice (kg)</td><td>Sugar(kg)</td><td>Cooking(ltr)</td></tr><tr><td>Amos</td><td>3</td><td>2</td><td>1</td></tr><tr><td>Brian</td><td>4</td><td><math>\frac{5}{2}</math></td><td>0</td></tr></table> <p>A matrix of the quantities <math>\begin{pmatrix} 3 &amp; 2 &amp; 1 \\ 4 &amp; \frac{5}{2} &amp; 0 \end{pmatrix}</math></p> <p>A matrix for Prices</p> $\begin{matrix} \text{Rice} \\ \text{Sugar} \\ \text{cooking oil} \end{matrix} = \begin{pmatrix} 4000 \\ 5000 \\ 8000 \end{pmatrix}$ <p>To determine the difference in the expenditure</p> $\begin{pmatrix} 3 & 2 & 1 \\ 4 & \frac{5}{2} & 0 \end{pmatrix} \begin{pmatrix} 4000 \\ 5000 \\ 8000 \end{pmatrix} = \begin{pmatrix} 30,000 \\ 28500 \end{pmatrix}$ <p>Amos spent shs. 30,000 while Brian spent shs. 28,500<br/>The difference in the expenditure is shs.1,500</p> |               | Rice (kg)    | Sugar(kg) | Cooking(ltr) | Amos | 3  | 2    | 1  | Brian | 4      | $\frac{5}{2}$ | 0  |  |
|          | Rice (kg)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Sugar(kg)     | Cooking(ltr) |           |              |      |    |      |    |       |        |               |    |  |
| Amos     | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2             | 1            |           |              |      |    |      |    |       |        |               |    |  |
| Brian    | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | $\frac{5}{2}$ | 0            |           |              |      |    |      |    |       |        |               |    |  |
| 9        | <p>Item 9 (a)</p> <table><tr><td>Unit</td><td>Eggs</td><td>Broilers</td></tr><tr><td>Platinum</td><td>75</td><td>50</td></tr><tr><td>Gold</td><td>60</td><td>54</td></tr><tr><td>Bronze</td><td>50</td><td>24</td></tr></table> <p>A matrix for the farm output = <math>\begin{pmatrix} 75 &amp; 50 \\ 60 &amp; 54 \\ 50 &amp; 24 \end{pmatrix}</math></p> <p>The prices of a tray of eggs and a broiler are;</p> <p>(a) <math>\begin{matrix} 1 \text{ tray} \\ 1 \text{ Broiler} \end{matrix} = \begin{pmatrix} 8,500 \\ 10,000 \end{pmatrix}</math></p> <p>Using matrix multiplication,</p> $\begin{pmatrix} 75 & 50 \\ 60 & 54 \\ 50 & 24 \end{pmatrix} \begin{pmatrix} 8,500 \\ 10,000 \end{pmatrix} = \begin{pmatrix} 1,137,500 \\ 1,050,000 \\ 665,000 \end{pmatrix}$ <p>Overall sales = 1,137,500 + 1,050,000 + 665,000 = shs. 2,852,500</p>                                                                                                                                                                                                                                                                                                                                                       | Unit          | Eggs         | Broilers  | Platinum     | 75   | 50 | Gold | 60 | 54    | Bronze | 50            | 24 |  |
| Unit     | Eggs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Broilers      |              |           |              |      |    |      |    |       |        |               |    |  |
| Platinum | 75                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 50            |              |           |              |      |    |      |    |       |        |               |    |  |
| Gold     | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 54            |              |           |              |      |    |      |    |       |        |               |    |  |
| Bronze   | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 24            |              |           |              |      |    |      |    |       |        |               |    |  |

|              | <p>The sales from platinum were shs. 1,137,500, shs1,050,000 from Gold and shs. 665,000 from Bronze. The overall sales from all the three units were shs. 2,852,500</p> <p>(b) Consider the table below</p> <table border="1"> <thead> <tr> <th>Mass (g)</th><th>f</th><th>Class boundaries</th></tr> </thead> <tbody> <tr> <td>30 – 34</td><td>20</td><td>29.5 – 34.5</td></tr> <tr> <td>35 – 39</td><td>90</td><td>34.5 – 39.5</td></tr> <tr> <td>40 – 44</td><td>180</td><td>39.5 – 44.5</td></tr> <tr> <td>45 – 49</td><td>110</td><td>44.5 – 49.5</td></tr> <tr> <td>50 – 54</td><td>40</td><td>49.5 – 54.5</td></tr> <tr> <td>55 – 59</td><td>50</td><td>54.5 – 59.5</td></tr> <tr> <td>60 – 64</td><td>10</td><td>59.5 – 64.5</td></tr> <tr> <td><b>Total</b></td><td><b>500</b></td><td></td></tr> </tbody> </table> <p>(c) The mode = <math>L_o + \left( \frac{d_1}{d_1 + d_2} \right) \times c</math></p> $44.5 + \left( \frac{90}{90 + 70} \right) \times 5$ $= 44.5 + 2.8125 = 47.3125$ <p>The mode is 47.3125g</p> <p>From the graph, mode = <math>44.5 + 5.5 \times \frac{5}{10}</math></p> $47.25$ <p>The mass of the majority of the eggs is 47.25grams</p> <p>(d) Probability of the egg to weigh below 50 =</p> $\frac{\text{number of eggs less than 50g}}{\text{total sample space}} = \frac{180 + 90 + 20}{500}$ $= \frac{290}{500}$ $= \frac{29}{50}$ <p>The probability that an egg weighs below 50g is <math>\frac{29}{50}</math></p> | Mass (g)         | f | Class boundaries | 30 – 34 | 20 | 29.5 – 34.5 | 35 – 39 | 90 | 34.5 – 39.5 | 40 – 44 | 180 | 39.5 – 44.5 | 45 – 49 | 110 | 44.5 – 49.5 | 50 – 54 | 40 | 49.5 – 54.5 | 55 – 59 | 50 | 54.5 – 59.5 | 60 – 64 | 10 | 59.5 – 64.5 | <b>Total</b> | <b>500</b> |  |  |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---|------------------|---------|----|-------------|---------|----|-------------|---------|-----|-------------|---------|-----|-------------|---------|----|-------------|---------|----|-------------|---------|----|-------------|--------------|------------|--|--|
| Mass (g)     | f                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Class boundaries |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 30 – 34      | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 29.5 – 34.5      |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 35 – 39      | 90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 34.5 – 39.5      |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 40 – 44      | 180                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 39.5 – 44.5      |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 45 – 49      | 110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 44.5 – 49.5      |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 50 – 54      | 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 49.5 – 54.5      |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 55 – 59      | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 54.5 – 59.5      |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 60 – 64      | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 59.5 – 64.5      |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| <b>Total</b> | <b>500</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |
| 10           | <p>Item 10</p> <p>(a) <u>The venn diagram showing the data</u></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |   |                  |         |    |             |         |    |             |         |     |             |         |     |             |         |    |             |         |    |             |         |    |             |              |            |  |  |



$$n(B' \cap M' \cap W') = n(M \cap W)_{\text{only}} + 3$$

$$y = (7 - x) + 3$$

But  $n(B)=32$

$$x + 18 - x + 4 + 15 - x = 32$$

$$37 - x = 32$$

$$x = 5$$

$$a = 50 - (18 - x + x + 7 - x)$$

$$a = 50 - 20$$

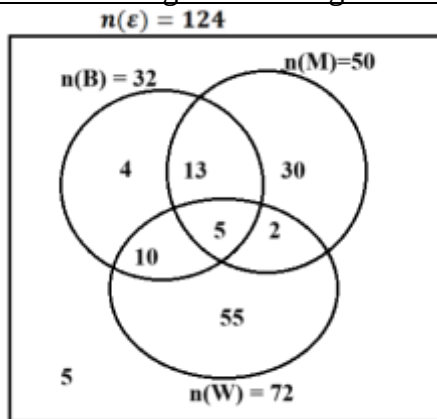
$$b = 30$$

$$b = 72 - (15 - x + x + 7 - x)$$

$$b = 72 - 17$$

$$b = 55$$

The venn diagram showing workers and their transport means



(a) The workers who use all the three means

$$n(B \cap M \cap W) = 5$$

The number of worker who use all the types are 5

(b)

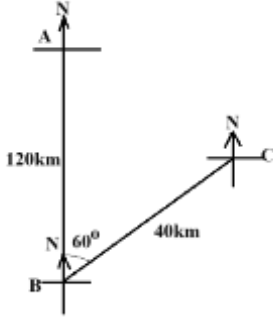
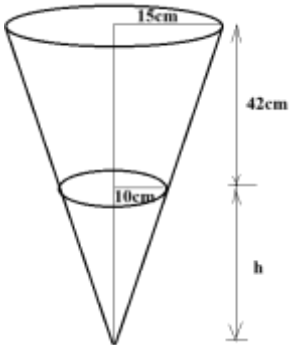
$$P(\text{at least two}) = \frac{7-x+x+18-x+15-x}{124}$$

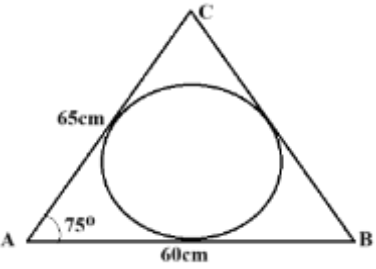
$$= \frac{30}{124}$$

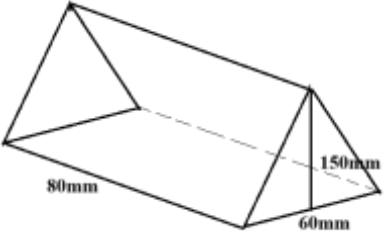
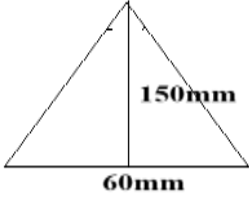
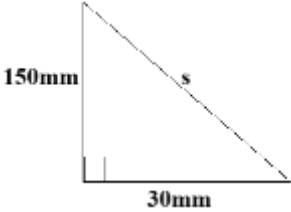
$$= \frac{15}{62}$$

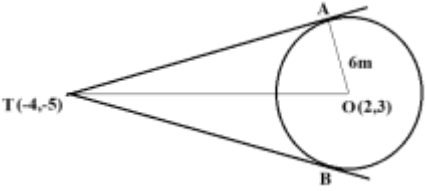
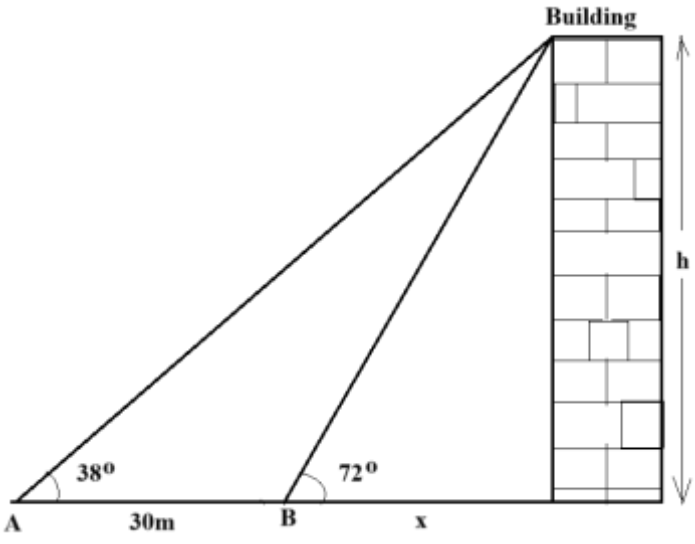
|              | <p>The probability that a worker uses at least two means of transport is <math>\frac{15}{62}</math></p> <p>(c) <math>P(W)_{\text{only}} = \frac{55}{124}</math></p> <p>Percentage of those who walk only <math>= \frac{55}{124} \times 100 = 44.35\%</math></p> <p>Since the probability of those who walk only are 44.4% which is greater than 40% I advise them to put traffic lights.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |       |    |      |                  |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|----|------|------------------|----|------------------|---------|--|---|---|----|----|-------------|---------|--|---|---|----|-----|-------------|---------|--|---|----|----|-----|-------------|---------|--|----|----|----|-----|-------------|---------|--|---|----|----|-----|-------------|---------|--|---|----|----|----|-------------|---------|--|---|----|----|-----|-------------|---------|--|---|----|----|-----|-------------|--------------|--|-----------|--|--|------|--|--|
| 11           | <p>Item 11</p> <p>Consider the table below</p> <table><tr><th>weight</th><th>Tally</th><th>f</th><th>c.f</th><th>x</th><th>fx</th><th>Class boundaries</th></tr><tr><td>30 – 34</td><td></td><td>2</td><td>2</td><td>32</td><td>64</td><td>29.5 – 34.5</td></tr><tr><td>35 – 39</td><td></td><td>4</td><td>6</td><td>37</td><td>148</td><td>34.5 – 39.5</td></tr><tr><td>40 – 44</td><td></td><td>8</td><td>14</td><td>42</td><td>336</td><td>39.5 – 44.5</td></tr><tr><td>45 – 49</td><td></td><td>15</td><td>29</td><td>47</td><td>705</td><td>44.5 – 49.5</td></tr><tr><td>50 – 54</td><td></td><td>6</td><td>35</td><td>52</td><td>312</td><td>49.5 – 54.5</td></tr><tr><td>55 – 59</td><td></td><td>1</td><td>36</td><td>57</td><td>57</td><td>54.5 – 59.5</td></tr><tr><td>60 – 64</td><td></td><td>2</td><td>38</td><td>62</td><td>124</td><td>59.5 – 64.5</td></tr><tr><td>65 – 69</td><td></td><td>2</td><td>40</td><td>67</td><td>134</td><td>64.5 – 69.5</td></tr><tr><td><b>Total</b></td><td></td><td><b>40</b></td><td></td><td></td><td>1880</td><td></td></tr></table> <p>Mean <math>\bar{x} = \frac{1880}{40} = 47</math></p> <p>The average mass = 47grams</p> <p>Median <math>= L_o + \left( \frac{\frac{N}{2} - cfb}{f_m} \right) \times c</math></p> $44.5 + \left( \frac{20 - 14}{15} \right) \times 5$ $= 46.5$ <p>The median weight = 46.5g</p> <p><b>Alternatively;</b></p> <p>Using the graph: median = <math>44.5 + 4 \times 0.5 = 46.5g</math></p> <p>(a) The mode of the data <math>= L_o + \left( \frac{d_1}{d_1 + d_2} \right) \times c</math></p> $44.5 + \left( \frac{7}{9 + 7} \right) \times 5$ $= 46.6875$ <p>Modal mark is 46.675grams</p> <p><b>Alternatively;</b></p> <p><b>Using the graph: mode = <math>44.5 + 4 \times 0.5 = 46.5g</math></b></p> <p>Mode</p> <p>For more than 40% = <math>40 - 16 = 24</math></p> <p>24 packets exceed 40%</p> | weight    | Tally | f  | c.f  | x                | fx | Class boundaries | 30 – 34 |  | 2 | 2 | 32 | 64 | 29.5 – 34.5 | 35 – 39 |  | 4 | 6 | 37 | 148 | 34.5 – 39.5 | 40 – 44 |  | 8 | 14 | 42 | 336 | 39.5 – 44.5 | 45 – 49 |  | 15 | 29 | 47 | 705 | 44.5 – 49.5 | 50 – 54 |  | 6 | 35 | 52 | 312 | 49.5 – 54.5 | 55 – 59 |  | 1 | 36 | 57 | 57 | 54.5 – 59.5 | 60 – 64 |  | 2 | 38 | 62 | 124 | 59.5 – 64.5 | 65 – 69 |  | 2 | 40 | 67 | 134 | 64.5 – 69.5 | <b>Total</b> |  | <b>40</b> |  |  | 1880 |  |  |
| weight       | Tally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | f         | c.f   | x  | fx   | Class boundaries |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 30 – 34      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2         | 2     | 32 | 64   | 29.5 – 34.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 35 – 39      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4         | 6     | 37 | 148  | 34.5 – 39.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 40 – 44      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 8         | 14    | 42 | 336  | 39.5 – 44.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 45 – 49      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 15        | 29    | 47 | 705  | 44.5 – 49.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 50 – 54      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 6         | 35    | 52 | 312  | 49.5 – 54.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 55 – 59      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1         | 36    | 57 | 57   | 54.5 – 59.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 60 – 64      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2         | 38    | 62 | 124  | 59.5 – 64.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| 65 – 69      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2         | 40    | 67 | 134  | 64.5 – 69.5      |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |
| <b>Total</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>40</b> |       |    | 1880 |                  |    |                  |         |  |   |   |    |    |             |         |  |   |   |    |     |             |         |  |   |    |    |     |             |         |  |    |    |    |     |             |         |  |   |    |    |     |             |         |  |   |    |    |    |             |         |  |   |    |    |     |             |         |  |   |    |    |     |             |              |  |           |  |  |      |  |  |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|    | The new packaging system should be introduced since the mean is greater than the median                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
| 12 | <p>(a) Coordinates of image points<br/>For reflection in the x – axis</p> $T_1 = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} 1 & 4 & 1 \\ 1 & 1 & 5 \end{pmatrix} = \begin{pmatrix} 1 & 4 & 1 \\ -1 & -1 & -5 \end{pmatrix}$ $A'(1, -1)B'(4, -1)C'(1, -5)$ <p>Coordinates of the second image after enlargement<br/>Using the matrix <math>T_2 = \begin{pmatrix} -2 &amp; 0 \\ 0 &amp; -2 \end{pmatrix}</math></p> $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix} \begin{pmatrix} 1 & 4 & 1 \\ -1 & -1 & -5 \end{pmatrix} = \begin{pmatrix} -2 & -8 & -2 \\ 2 & 2 & 10 \end{pmatrix}$ <p>The images <math>A''(-2, 2)B''(-8, 2)C''(-2, 10)</math></p> <p>(b) Single transformation that takes objects to final image</p> $T = T_1 T_2$ $T = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix} = \begin{pmatrix} -2 & 0 \\ 0 & 2 \end{pmatrix}$ <p>A single matrix which takes the object to final image is <math>\begin{pmatrix} -2 &amp; 0 \\ 0 &amp; 2 \end{pmatrix}</math></p> <p>(c) Amount of money from the design<br/>Amount = Area x cost per sq cm<br/>= <math>24 \times 240 = \text{shs. } 5760</math><br/>She got shs. 5760 from the design of <math>A''B''C''</math></p> |  |
| 13 | <p><b>item 13</b><br/>total distance 160km<br/>time = 2 hours<br/>speed = 60km/hr<br/>distance from A to B<br/>Distance = Speed X Time<br/>= <math>60 \times 2 = 120\text{km}</math><br/>Remaining distance from B to C = <math>160 - 120 = 40\text{km}</math><br/>Time for resting = 1 hour<br/>Remaining time after resting = 30 minutes<br/>Speed = <math>\frac{\text{distance}}{\text{time}} = \frac{40}{1/2} = 80\text{kmh}^{-1}</math><br/>The doctor must use a speed of 80km/hr to reach at exactly 10:30am<br/>Sketch</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
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|    |  <p>Scale<br/>Let 1cm represent 10km<br/> <math>AB = \frac{120}{10} = 12cm</math><br/> <math>BC = \frac{40}{10} = 4cm</math></p> <p>Accurate drawing<br/><b>Attached</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| 14 | <p>Consider the figure below</p> <p>(a) Number of buckets</p>  <p>From similarity</p> $\frac{H}{h} = \frac{R}{r}$ $\frac{h + 42}{h} = \frac{15}{10}$ $10(h + 42) = 15h$ $10h + 420 = 15h$ $h = 84cm$ <p>Volume of the bucket <math>= \frac{1}{3}\pi(R^2H - r^2h)</math></p> $= \frac{1}{3}\pi(15^2 \times 126 - 10^2 \times 84)$ <p>volume of the bucket <math>= 20900cm^2</math></p> <p>Volume of the tank <math>v = \pi r^2 h</math></p> $v = \frac{22}{7} \times 150^2 \times 150$ $= 10602875.205cm^3$ <p>The volume of the tank is <math>10,602,875.205cm^3</math> or <math>10,602.875 litres</math></p> <p>Number of buckets required to fill the tank <math>= \frac{\text{volume of the tank}}{\text{Volume of the bucket}}</math></p> $= \frac{10,602,875.205}{20,900} = 507.3$ <p>Number of buckets <math>\approx 508</math></p> <p>We need 508 buckets to fill the tank</p> <p>(b) Cost of water</p> <p>1 litre of water = shs.2000</p> <p>Amount of water needed <math>= 60 \times 7 \times 3</math></p> $= 1260 litres$ <p>Cost of water <math>= 1260 \times 2000</math></p> $= shs. 2,520,000$ |  |

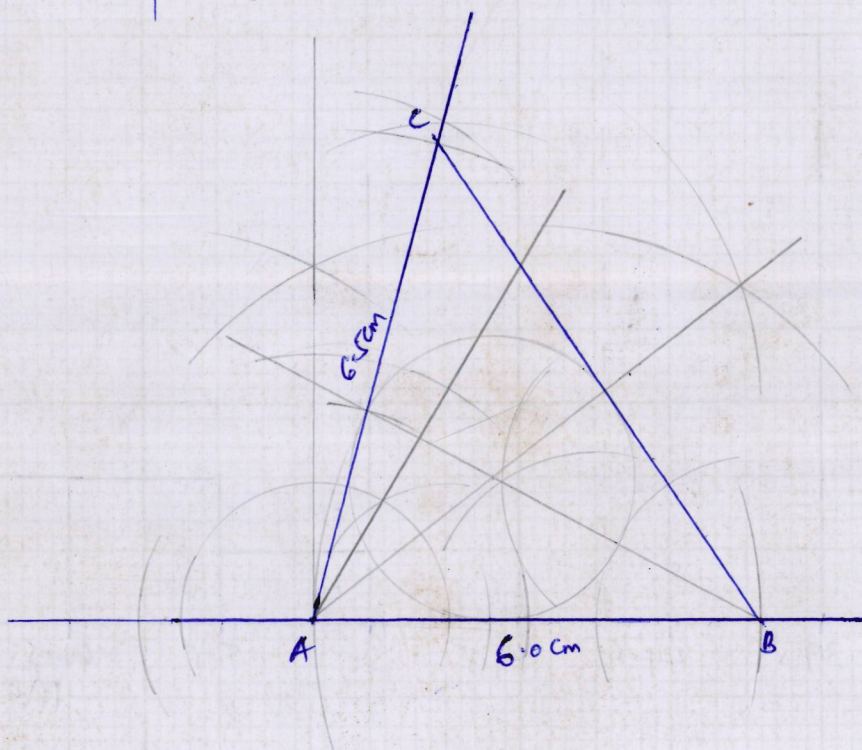
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|    | <p>Number of buckets of water collected = <math>\frac{1260}{20.9}</math><br/> <math>= 60.287081 \approx 61</math></p> <p>Cost of carrying the buckets of water = <math>61 \times 500</math><br/> <math>= \text{shs. } 30,500</math></p> <p>Amount of money required = <math>30,500 + 2,520,000</math><br/> <math>= \text{shs. } 2,550,500</math></p> <p>It requires shs 2,550,500 to maintain the water for 3 weeks</p> <p>(c) Cash price = shs. 960,000<br/> Hire purchase terms = deposit + installments<br/> <math>\frac{50}{100} \times 960,000 + 180,000 \times 3</math><br/> <math>= \text{shs. } 1,020,000</math></p> <p>The cost of a tank on hire purchase terms is shs 1,020,000<br/> Savings = Amount on HP – Amount on cash terms<br/> <math>= 1,020,000 - 960,000 = \text{shs. } 60,000</math></p> <p>The manager would make a savings of shs.60,000</p>                                                                                                                                                                                                                                                                                                               |  |
| 15 | <p><b>Sketch</b><br/> Radius of the circle = 0.2m<br/> Converting to centimeters = 20cm<br/> Using a scale of 1cm to represent 10cm</p>  <p><math>AB = \frac{60}{10} = 6.0\text{cm}</math><br/> <math>AC = \frac{65}{10} = 6.5\text{cm}</math><br/> Radius = <math>\frac{20}{10} = 2.0\text{cm}</math></p> <p>Accurate drawing<br/> <b>See attached</b></p> <p>15(b)<br/> Allowances = <math>30,000 + 30 \times 15000 + 200,000</math><br/> <math>= \text{shs. } 680,000</math></p> <p>Total allowances = shs. 680,000<br/> Gross income = shs. 900,000<br/> Taxable income = <i>gross income – total allowances</i><br/> <math>900,000 - 680,000</math><br/> <math>= \text{shs. } 220,000</math></p> <p>Taxable income is shs. 220,000<br/> Income tax = <math>0 + \frac{10}{100} \times 50,000 + \frac{20}{100} \times 70,000</math><br/> <math>= \text{shs. } 19,000</math></p> <p>Net income = gross income – income tax<br/> <math>900,000 - 19,000</math><br/> <math>= \text{shs. } 881,000</math></p> <p>The take home pay is shs. 881,000<br/> 15(c) percentage of salary paid as tax</p> |  |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
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|    | $= \frac{\text{income tax}}{\text{gross income}} \times 100$ $\frac{19,000}{900,000} \times 100 = 2.111111111$ $\approx 2.1\%$ <p>The percentage of the manager's income that goes to tax is 2.1%</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| 16 | <div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  </div> <div style="flex: 1;"> <p>(a) Angle at the vertex from the cross sectional side,</p>  </div> </div> $\tan \alpha = \frac{30}{150}$ $\alpha = \tan^{-1}\left(\frac{1}{5}\right)$ $\alpha = 11.309$ <p>Angle between two faces = <math>2\alpha</math></p> $= 22.6^\circ$ <p>(b) Volume of the paper container</p> $= \text{crosssectional area} \times \text{length} = \frac{1}{2}bhl$ $= \frac{1}{2} \times 60 \times 150 \times 80 = 360,000 \text{mm}^3$ $\text{volume in cm}^3 = \frac{360,000}{1000} = 360 \text{cm}^3$ <p>The volume of the paper container for the food prism is <math>360 \text{cm}^3</math></p> <p>(c) Total surface area of the container = <math>2 \times \frac{1}{2}bh + 2ls + lb</math></p> <div style="display: flex; align-items: center;">  </div> <p>Using Pythagoras' theorem</p> $s^2 = 30^2 + 150^2$ $s^2 = 900 + 22500$ $s = \sqrt{23400} = 30\sqrt{26}$ $\text{TSA} = 2 \times \frac{1}{2} \times 60 \times 150 + 2 \times 80 \times 30\sqrt{26} + 80 \times 60$ |  |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|    | $= 38275.2936 \text{ mm}^2$ <p>The surface area in square centimeter is <math>\frac{38275.2936}{100}</math></p> <p>The amount of material that can be used to make the container is <math>382.75 \text{ cm}^2</math></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| 17 | <p>(a) Length of the roads</p>  <p>Length of the line OT</p> $(OT)^2 = (2 - -4)^2 + (3 - -5)^2$ $(OT)^2 = 6^2 + 8^2$ $OT = \sqrt{36 + 64}$ <p>OT = 10m</p> <p>Length of tangent TA = <math>\sqrt{10^2 - 6^2}</math></p> $\sqrt{64} = 8 \text{ m}$ <p>The tangents are 8 metres each</p> <p>The roads are of length 8metres</p> <p>(b) Amount of money = <math>2 \times 8 \times 890,000 = 14,240,000</math></p> <p>The amount of money required to construct both roads is shs. 14,240,000</p> <p>(c) Height of the building</p>  <p>Let x be the distance from the foot of the building to point B</p> $\tan 38^\circ = \frac{h}{x + 30}$ $h = (x + 30)\tan 30 \dots \dots (i)$ $\tan 72^\circ = \frac{h}{x}$ |  |

|  |                                                                                                                                                                                                                                                                                    |  |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | $h = x \tan 72 \dots \dots \dots (ii)$ <p>solving (i) and (ii) simultaneously,</p> $x \tan 72 = (x + 30) \tan 30$ $3.0777x = 0.781x + 23.439$ $x = 10.206m$ <p>Putting into equation (ii)</p> $h = 10.206 \times \tan 72 = 31.409$ <p>The height of the building is 31.4metres</p> |  |
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Item 15



Candidate's Name: ..... Class: .....

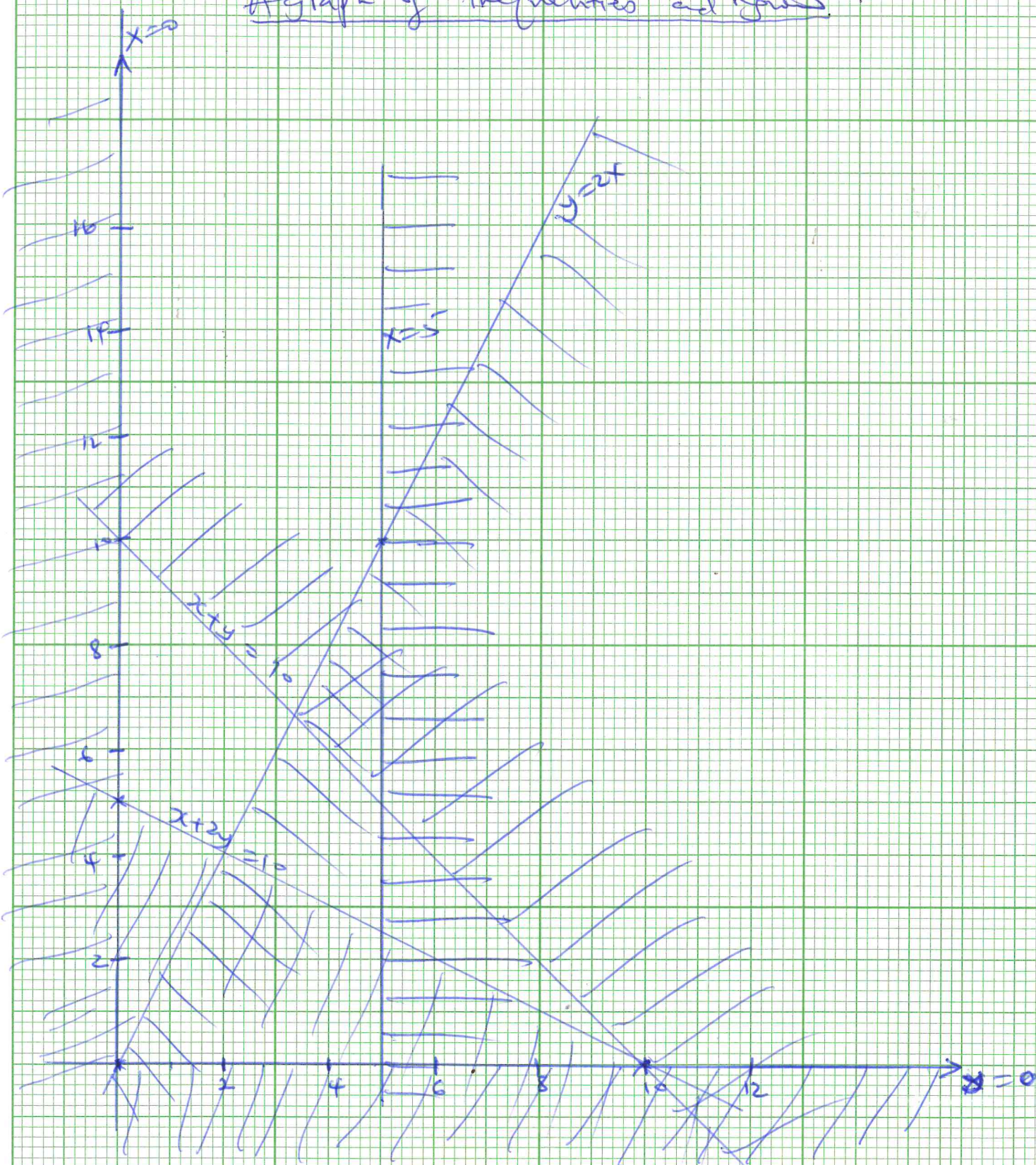
Signature: .....

Subject Name: ..... Paper code ...../.....

|                 |  |  |  |  |  |
|-----------------|--|--|--|--|--|
| Random No.      |  |  |  |  |  |
| Personal Number |  |  |  |  |  |

Item 4

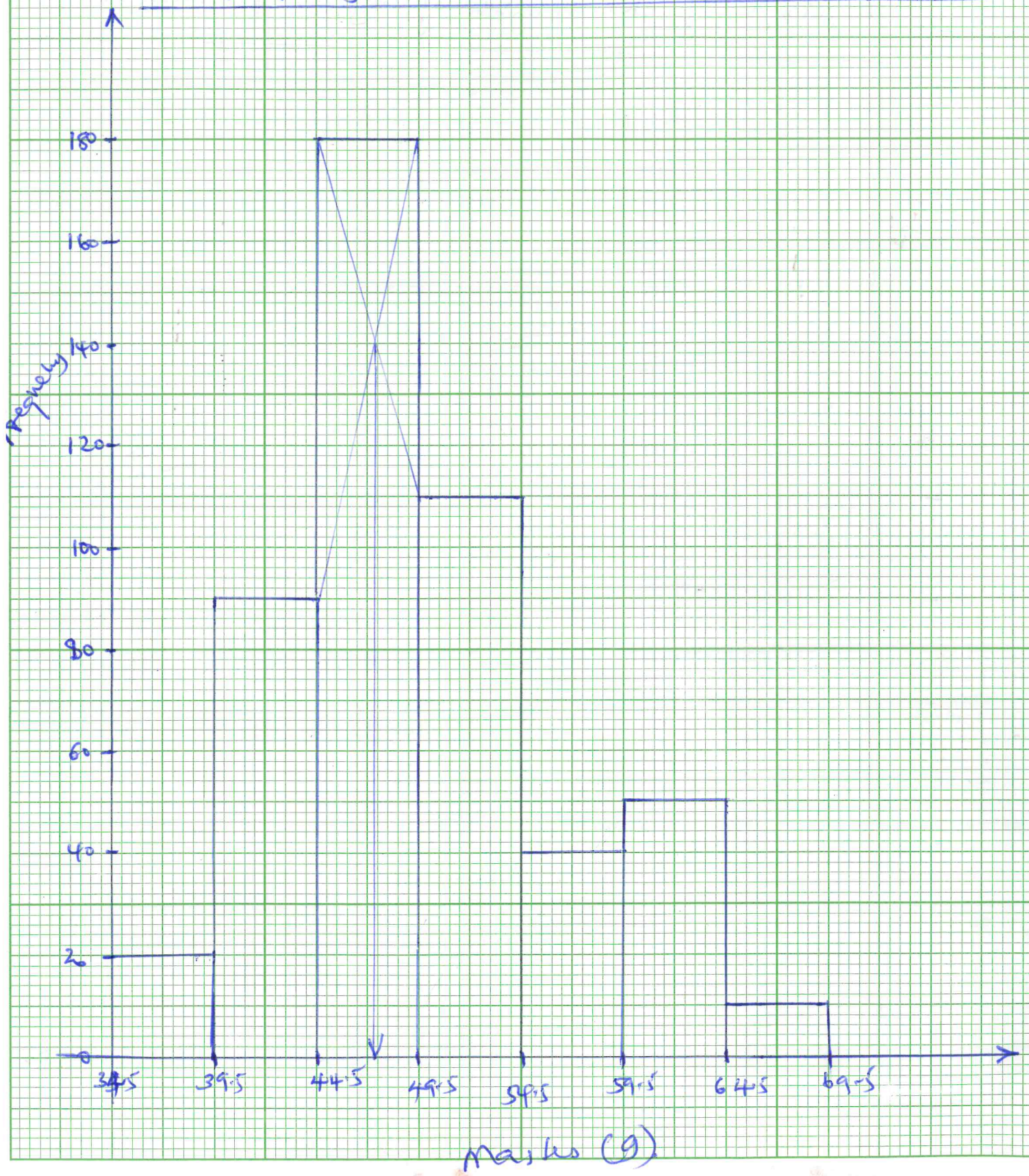
A graph of inequalities and region



Candidate's Name: ..... Class: .....  
 Signature: .....  
 Subject Name: Item 8(b) Paper code ...../.....

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|-----------------|--|--|--|--|--|
| Random No.      |  |  |  |  |  |
| Personal Number |  |  |  |  |  |

A graph of the Masses and number of eggs in a farm



Candidate's Name: ..... Class: .....

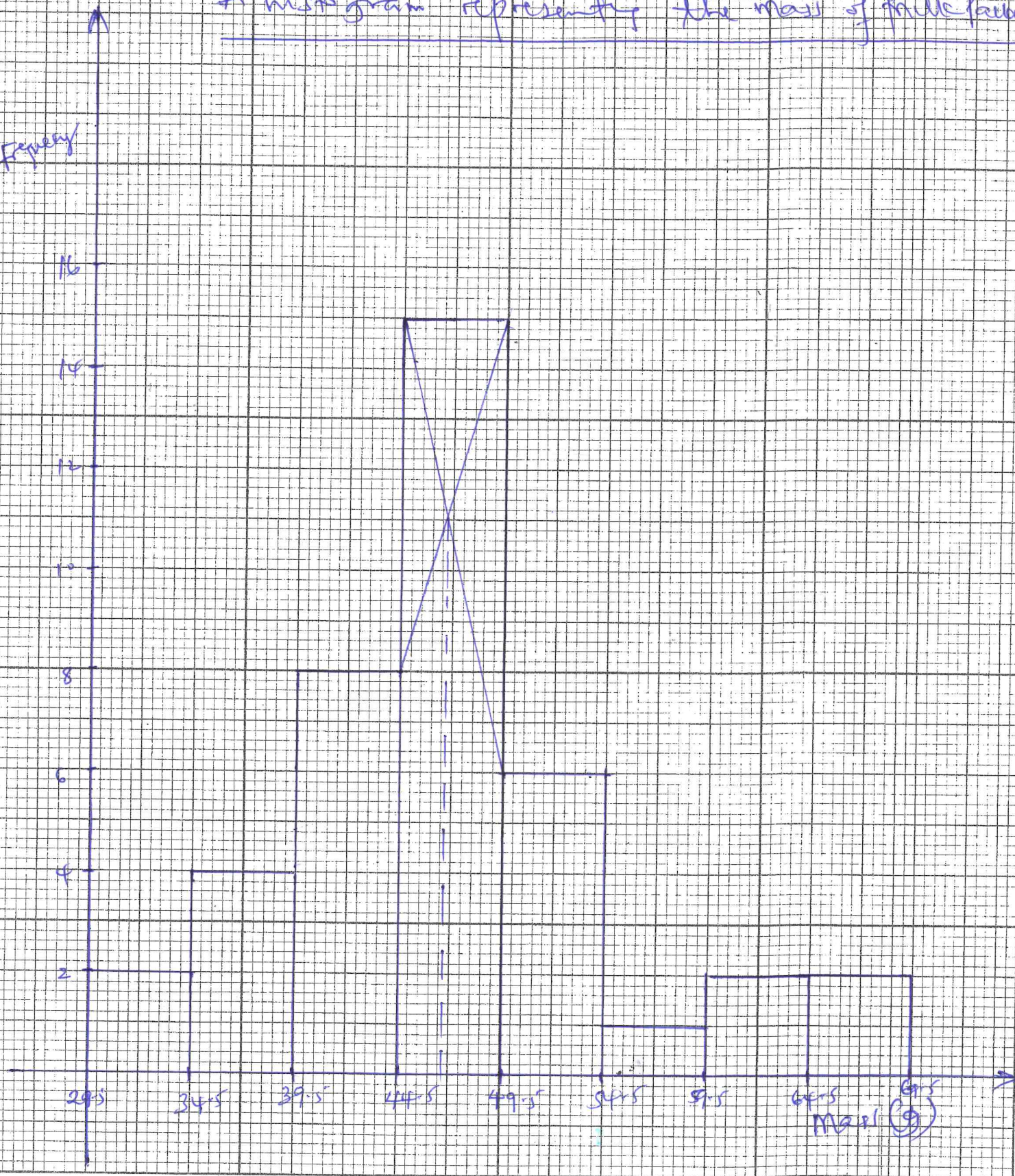
Signature: .....

Subject Name: ..... Paper code ...../.....

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| Random No.      |  |  |  |  |  |
| Personal Number |  |  |  |  |  |

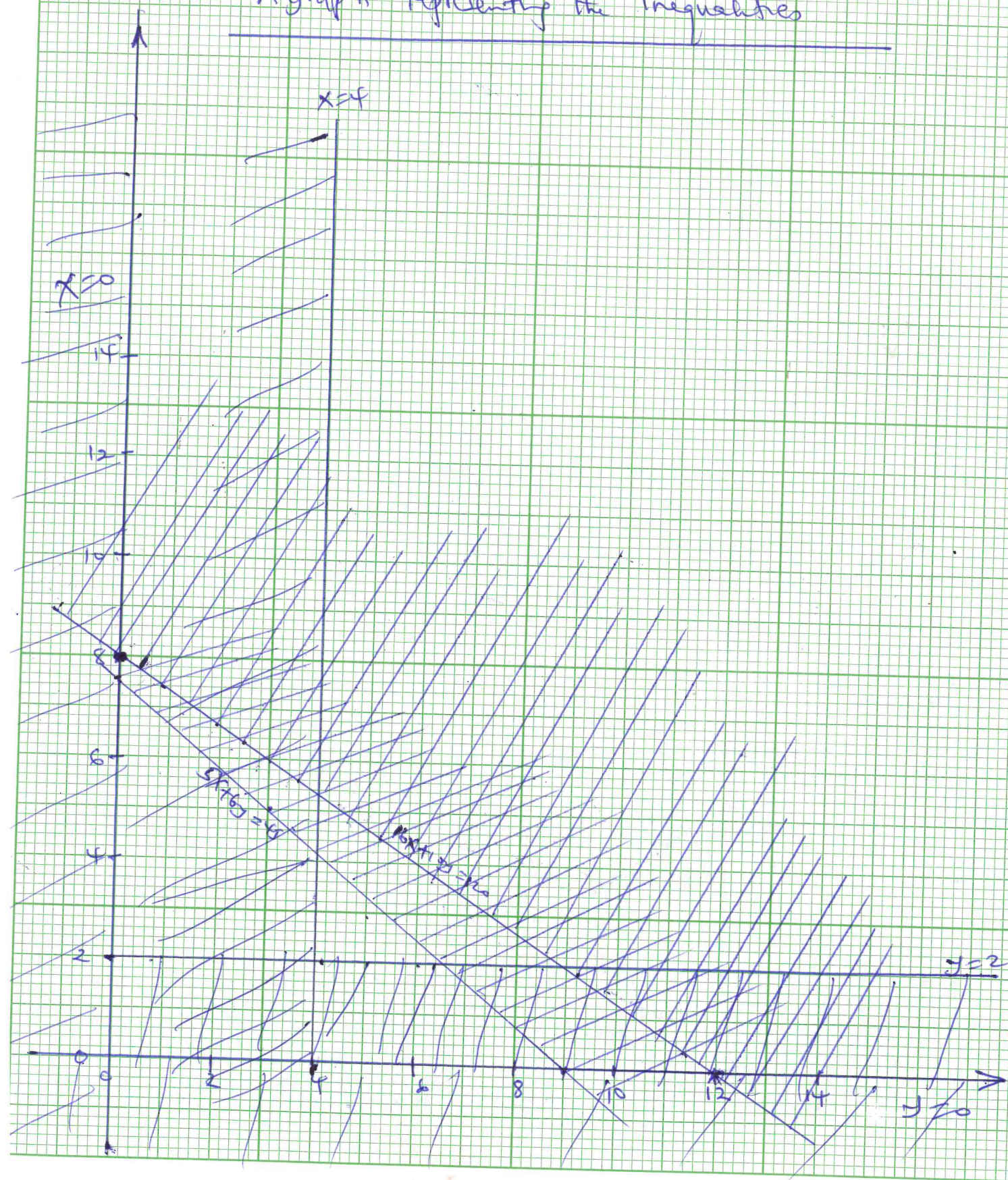
A histogram representing the mass of milk packets

Frequency



Mass (g)  
Max (9)

A graph representing the inequalities



Candidate's Name: ..... Class: .....

Signature: .....

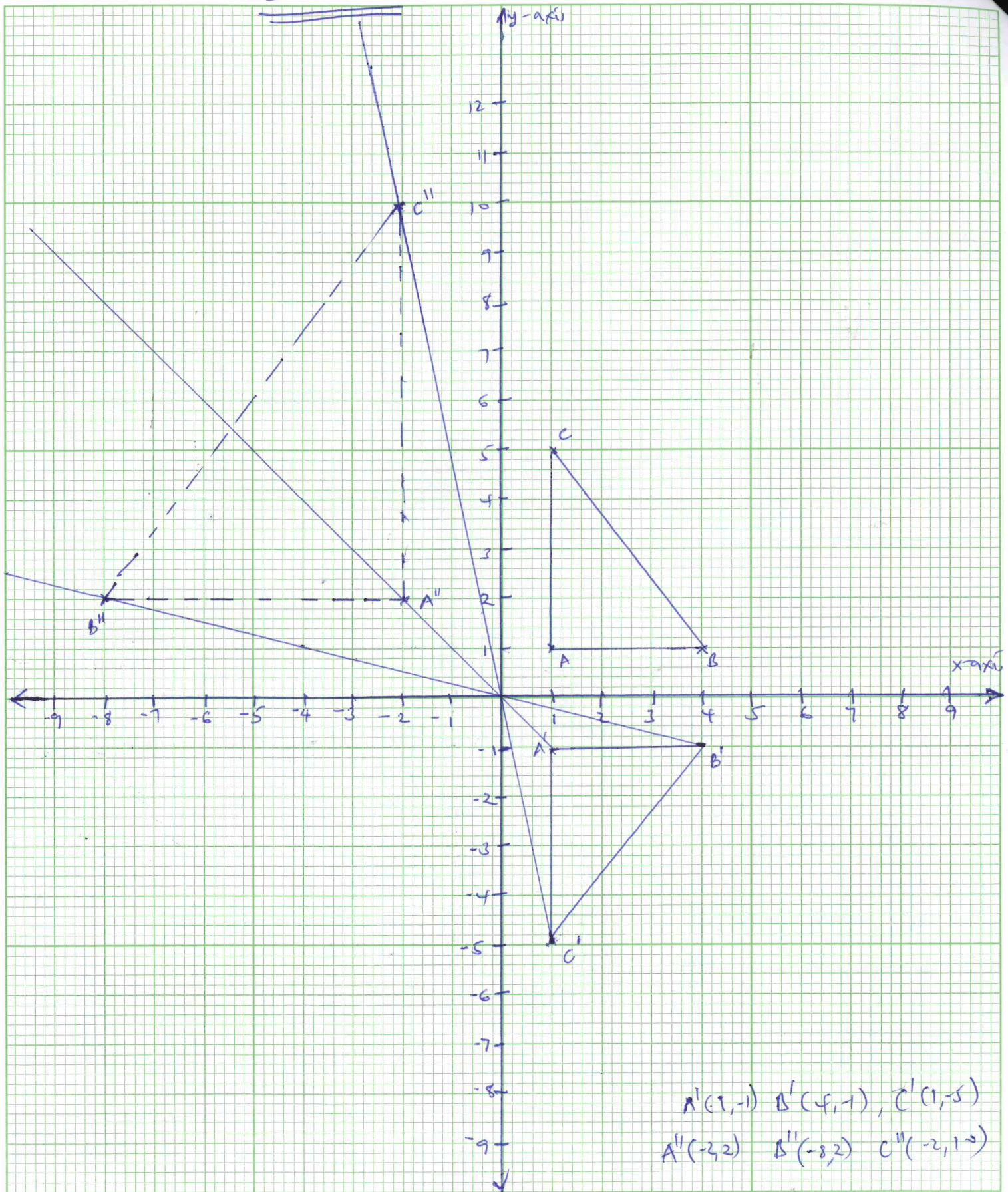
Subject Name: Item 12 Paper code: ..... / .....

Random No. 

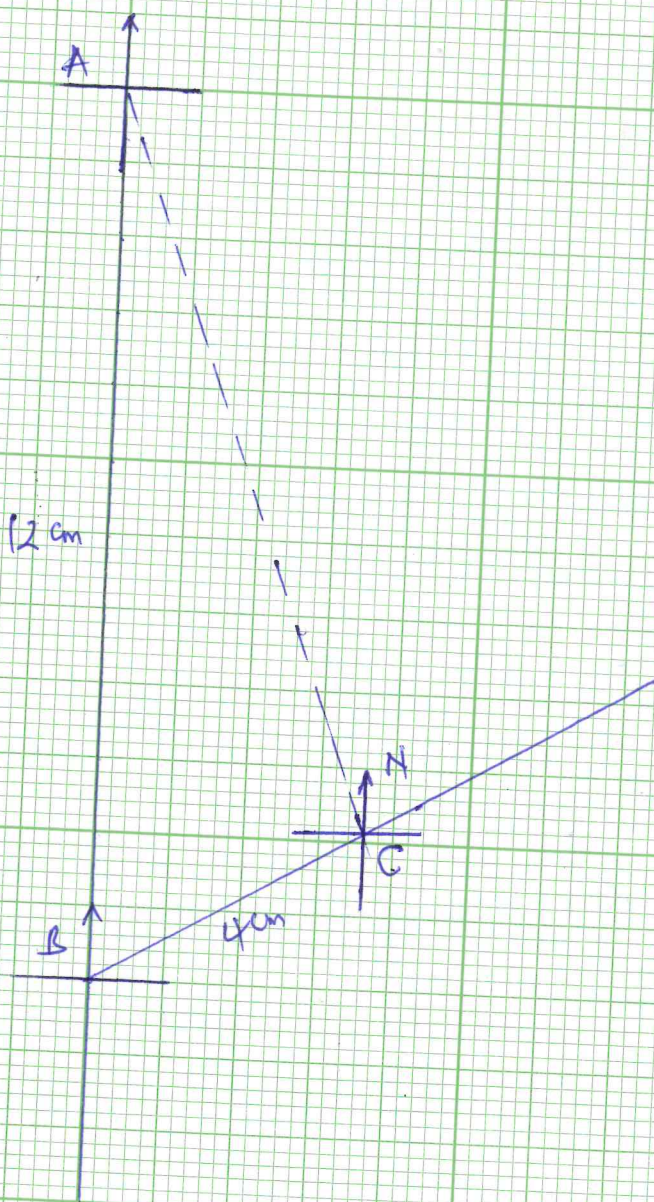
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Personal Number 

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$A'(1, -1)$   $B'(4, -1)$   $C'(1, -5)$   
 $A''(-2, 2)$   $B''(-8, 2)$   $C''(-2, 10)$

Item 13An Accurate drawing of the three points

Candidate's Name:.....Class:.....

Signature:.....

Subject Name:..... Paper code ...../.....

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|-----------------|--|--|--|--|--|
| Random No.      |  |  |  |  |  |
| Personal Number |  |  |  |  |  |

An ogive showing the masses of milk packets

