

# SOLUTIONS FOR VTEC 2024 P45611

Item ①

a) i)

Tablet 1: every 6 hours

Tablet 2: every 4 hours.

Finding the LCM of 6 and 4.

|   |   |   |
|---|---|---|
| 2 | 6 | 4 |
| 2 | 3 | 2 |
| 3 | 3 | 1 |
|   | 1 | 1 |

$$\text{LCM} = 2 \times 2 \times 3 \quad M=1$$

$$= 12 \text{ hours.} \quad I=1$$

$$\begin{aligned} \text{Required time} &= 9:00 \text{ AM} + 12:00 \text{ hrs.} \quad M=1 \\ &= 21:00 \text{ hrs.} \end{aligned}$$

They will take both tablets again at 21:00 hrs (9:00 PM). AP=1

ii)

$$\begin{aligned} \text{Purchasing price} &= 25 \times 3.6 \text{ million} \quad I=1 \\ &= \text{Chr. } 3,600,000. \quad \text{AP=1} \end{aligned}$$

$$\begin{aligned} \text{Markup} &= \frac{25}{100} \times \text{Chr. } 3,600,000 \quad I=1 \\ &= \text{Chr. } 900,000. \end{aligned}$$

$$\begin{aligned} \text{Total Sales} &= \text{Chr. } 3,600,000 + \text{Chr. } 900,000 \quad M=1 \\ &= \text{Chr. } 4,500,000. \end{aligned}$$

$$\begin{aligned} \text{Discount} &= \frac{10}{100} \times \text{Chr. } 4,500,000 \quad M=1 \\ &= \text{Chr. } 450,000. \end{aligned}$$

$$\begin{aligned} \text{Net sales} &= \text{Chr. } 4,500,000 - \text{Chr. } 450,000 \quad I=1 \\ &= \text{Chr. } 4,050,000. \quad M=1 \end{aligned}$$

$$\begin{aligned} \text{Profit} &= \text{Chr. } 4,050,000 - \text{Chr. } 3,600,000 \\ &= \text{Chr. } 450,000 \quad \text{AP=1} \end{aligned}$$

$$\begin{aligned} \text{Tax} &= \frac{15}{100} \times \text{Chr. } 450,000 \quad M=1 \\ &= \text{Chr. } 67,500 \quad \text{AP=1} \end{aligned}$$

$\therefore$  Profit after deducting tax and discount is totalling to Chr. 450,000.

$$\text{school Amount spent on school fees} \\ = \frac{30}{100} \times \text{shr. } 450,000$$

$$= \text{shr. } 135,000. \text{ AP} = 1$$

$$\text{Remaining amount paying school fees} \\ \text{and tax} = \text{shr. } 450,000 - (\text{shr. } 67,500 + \text{shr. } 135,000) \text{ M} = 1 \\ = \text{shr. } 247,500.$$

$$\text{Donation} = \frac{1}{5} \times \text{shr. } 247,500 \text{ M} = 1$$

$$= \text{shr. } 49,500. \text{ AP} = 1$$

$$\text{Amount re-invested} = \text{shr. } 247,500 - \text{shr. } 49,500 \\ = \text{shr. } 198,000. \text{ AP} = 1$$

$\therefore$  she spent shr. 135,000 on school fees, shr. 49,500 on donation and re-invested shr. 198,000.  $\text{AP} = 1$

b)

$$\text{Extra amount she needs to save to contribute} \\ \text{shr. } 500,000 \text{ to a Community project} \\ = \text{shr. } 500,000 - \text{shr. } 198,000. \text{ I} = 1 \\ = \text{shr. } 302,000.$$

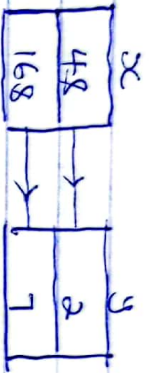
$\therefore$  she needs to save extra amount of shr. 302,000 in order to contribute shr. 500,000 to a Community project.  $\text{AP} = 1$



How (2)

a)

Let  $x$  be the number of Mandazi  
 $y$  be the number of wheat.



$(48, 2)$  and  $(168, 7)$

$$\text{Gradient, } m = \frac{7-2}{168-48} \quad M=1$$

$$= \frac{5}{120}$$

$$m = \frac{1}{24} \quad M=1$$

Using  $y = mx + c$

$$x = 48, y = 2, m = \frac{1}{24}$$

$$2 = \frac{1}{24} \times 48 + c \quad M=1$$

$$2 = 2 + c$$

$$c = 0$$

$$\therefore y = \frac{1}{24}x + 0$$

$$y = \frac{1}{24}x, M=1$$

The mathematical relationship between number of Mandazi, ( $x$ ) and amount of wheat ( $y$ ) is

$$x = 24y, \quad M=1$$

$$b) \quad x = 200, y = ??$$

$$y = \frac{1}{24} \times 200 \quad M=1$$

$$y = 8\frac{1}{3} \text{ kg}, \quad M=1$$

Therefore  $8\frac{1}{3}$  kg of wheat are required for 200 Mandazi.

c) i)

Let  $x$  be the number of polythene bags  
 $y$  be the number of paper bags.

Inequalities

i)  $x > y$   $F=1$

ii)  $x \leq 100$   $F=1$

iii)  $y > 60$   $F=1$

iv)  $x + y \leq 200$   $F=1$

v)  $x > 0$  ii) Equations of lines.

$x = y$

$x = 100$

$y = 60$

$x = 0$

$x + y = 200$

$x = y$

|     |     |     |
|-----|-----|-----|
| $x$ | 100 | 50  |
| $y$ | 100 | 150 |

$(100, 100)$   $(50, 150)$

$M=1$

|     |   |   |
|-----|---|---|
| $x$ | 1 | 2 |
| $y$ | 1 | 2 |

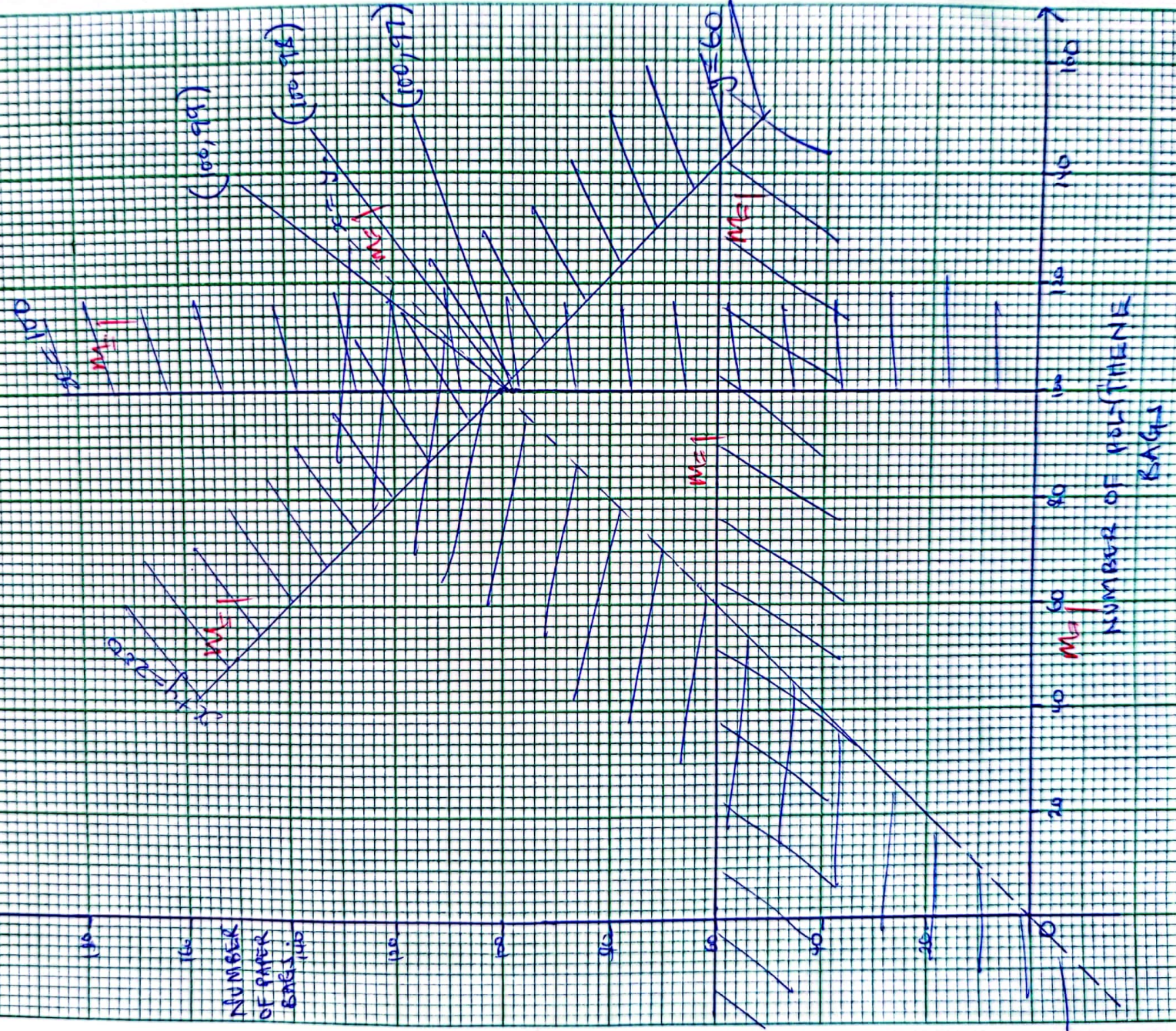
$(1, 1)$   $(2, 2)$

d)

The highest number of polythene bags is 100 and  
the highest number of paper bags is 99.  $AP=1$



GRAPH REPRESENTING THE NUMERICAL INEQUALITIES FOR  
THE NUMBER OF POLYTHENE AND PAPER BAGS





Q. 3 (a)

R - Romance A - Adventure M - Musical.

$$n(R) = 420$$

$$n(M) = 460$$

$$n(A) = 340$$

$$n(R \cap A) = 180$$

$$n(R \cap M) = 260$$

$$n(R \cap A) = 150$$

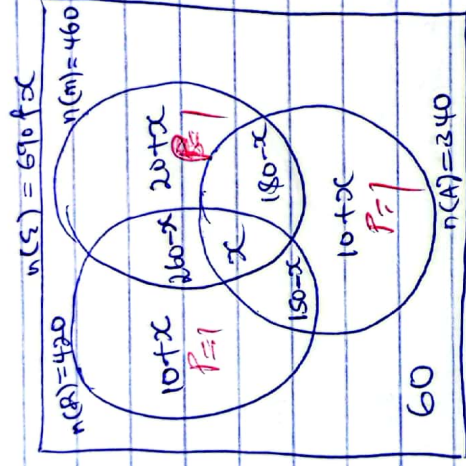
$$n(R \cap A \cap M) = 60$$

$$\text{Let } n(R \cap A \cap M) = x.$$

A VENN DIAGRAM REPRESENTING THE GIVEN

DATA

$$P = 1$$



Value of  $x$ .

$$2(150-x) = x \quad A = 1$$

$$300 - 2x = x$$

$$\frac{300}{3} = \frac{3x}{3} \quad A = 1$$

$$x = 100 \quad A = 1$$

$\therefore$  150 students like all the three types of movies.  $A = 1$

ii)

$$n(E) = 690 + x \quad A = 1$$

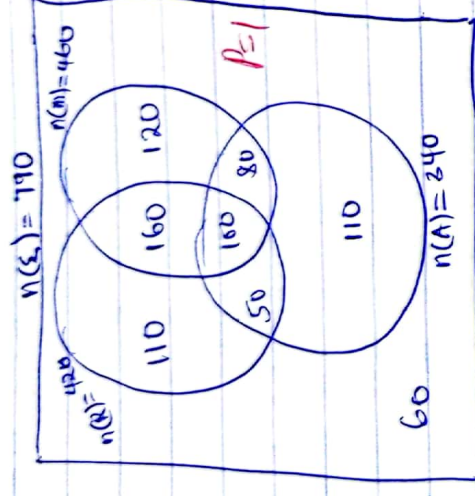
$$= 690 + 100$$

$$= 790 \quad A = 1$$

790 students were surveyed by the entertainment

preference.  $A = 1$

b)



$$P(R \cap M) = \frac{260}{790}$$

$$= 0.3$$

$$P(M \cap A) = \frac{180}{790}$$

$$A=1$$

$$= 0.2$$

$$P(R \cap A) = \frac{150}{790}$$

$$= 0.2$$

There is no two movie type to be selected since all the probabilities are not in the given range of 0.5 to 1.  $AP=1$



Item 4.  
THE FREQUENCY DISTRIBUTION BELOW SHOWS PDATA.

(i)

| Classes | f                 | x    | fx                  | Cf   | C.B       |
|---------|-------------------|------|---------------------|------|-----------|
| 20-29   | 10                | 24.5 | 245                 | 10   | 19.5-29.5 |
| 30-39   | 130               | 34.5 | 4485                | 140  | 29.5-39.5 |
| 40-49   | 230               | 44.5 | 10235               | 430  | 39.5-49.5 |
| 50-59   | 300               | 54.5 | 16350               | 730  | 49.5-59.5 |
| 60-69   | 190               | 64.5 | 12255               | 920  | 59.5-69.5 |
| 70-79   | 80                | 74.5 | 5960                | 1000 | 69.5-79.5 |
| 80-89   | 20                | 84.5 | 1690                | 1020 | 79.5-89.5 |
|         | $\Sigma f = 1020$ |      | $\Sigma fx = 59890$ |      |           |

$A=1$   $A=1$   $P=1$

ii Average time =  $\frac{\Sigma fx}{\Sigma f}$

$$= \frac{59890}{1020} A=1$$

$$= 52.83$$

$$\approx 53 \text{ hrs } AP=1$$

iii The average time taken was 53 hrs  $AP=1$   
Refer to graph.

From the graph

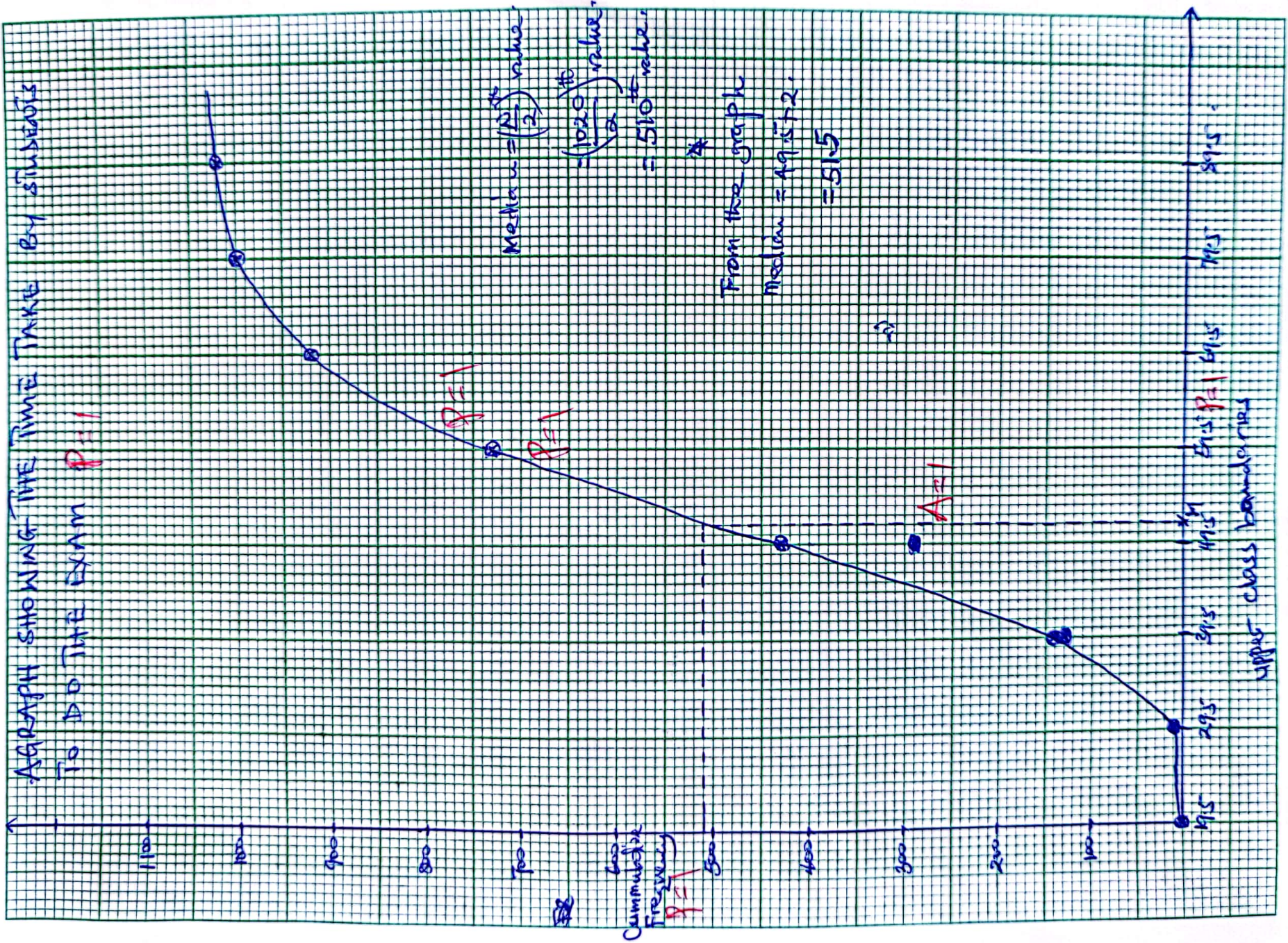
$$\text{Median} = 51.5 \pm 0.1 A=1$$

$\therefore$  The median is  $51.5 \pm 0.1 AP=1$

Note: Accept frequencies from 10 and an deviation.



AGGRAPH SHOWING THE TIME TAKE BY STUDENTS  
TO DO THE EXAM  $P=1$





$$4b. \text{ Ratio} = 2:4:5$$

$$\text{Total Ratio} = 2 + 4 + 5 \\ = 11. \quad AP = 1$$

In the No. of students who did exam in;

$$\text{One hour} = \frac{2}{11} \times 1020$$

$$= 185.45$$

$$\approx 185 \text{ students } AP = 1$$

$$\text{In two hours} = \frac{4}{11} \times 1020 \quad AP = 2$$

$$= 371 \text{ students } AP = 1$$

$$\text{In } 2\frac{1}{2} \text{ hours} = \frac{5}{11} \times 1020$$

$$= 464 \text{ students } AP = 1$$

Note: Accept those who used 300 as total,



Hom 5 a)

Using  $T + O = T'$

$$T = \begin{pmatrix} 2 \\ 5 \end{pmatrix} - \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

$$T = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad m=1$$

Also

$$T' = \begin{pmatrix} 4 \\ 2 \end{pmatrix} - \begin{pmatrix} 3 \\ 0 \end{pmatrix}$$

$$T = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad m=1$$

A is transformed to A' using a translation vector  $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$   $AP=1$

(i)

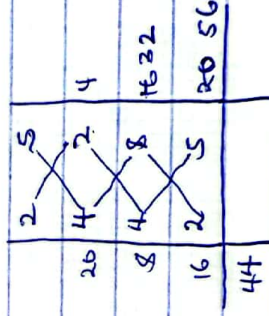
$$\text{Area of } A'B'C' = \frac{1 \times 6 \times 2}{2} \quad m=1$$

$$= 6 \text{ square units. } m=1$$

or

By Coordinate Geometry.

Area of  $A'B'C'$



$$\text{Area} = \frac{A \cdot V - S \cdot V}{2}$$

$$= \frac{56 - 44}{2}$$

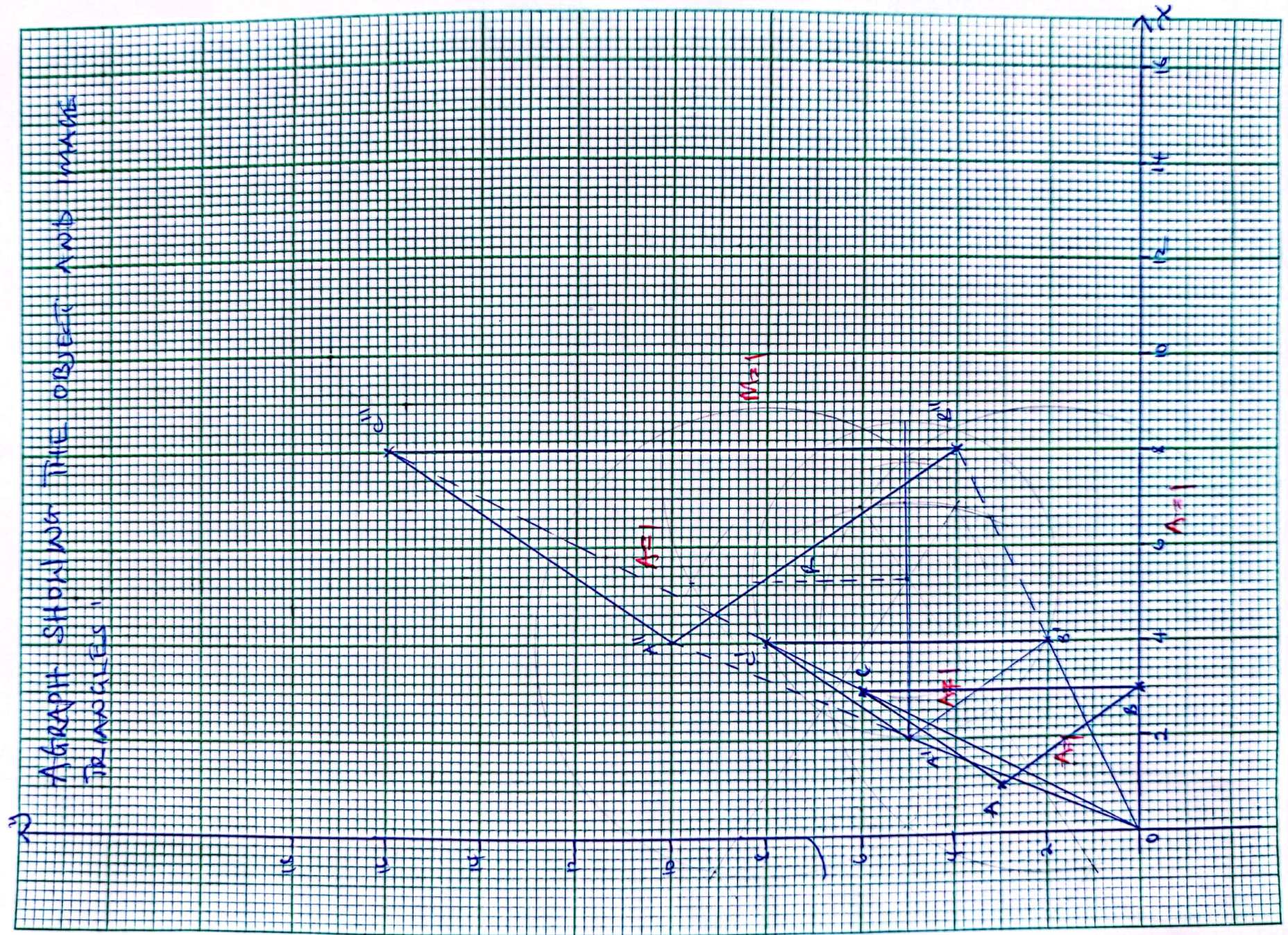
$$\text{Area} = 6 \text{ square units.}$$

$$\begin{aligned} \text{Area of circle} &= \pi r^2, \quad \pi = \frac{22}{7}, \quad r = 3.2 \text{ cm} \\ &= \frac{22 \times 3.2^2}{7} \quad \text{AF} \end{aligned}$$

$$= 32.1829 \text{ square units. } m=1$$

Area of the remaining part cut off by the triangle = 32.1829 square units - 6 sq. units.  $\text{AF}$   
 = 26.1829 square units.  $AP=1$







b)

Taking the centre of enlargement be  $(0,0)$ .  
from the graph;  $A''(4,10)$   $B''(8,4)$   $C''(8,16)$

Method II

Matrix of matrix transformation =  $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$

$$I = M \times O$$

$$= \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 2 & 4 & 4 \\ 5 & 2 & 8 \end{pmatrix} \quad \text{Area} = 1$$

$$= \begin{pmatrix} 2+0 & 8+0 & 8+0 \\ 0+10 & 0+4 & 0+16 \end{pmatrix}$$

$$= \begin{pmatrix} 2 & 8 & 8 \\ 10 & 4 & 16 \end{pmatrix} \quad \text{Area} = 1$$

=  $A''(4,10)$   $B''(8,4)$   $C''(8,16)$   $\text{Area} = 1$   
Then plot coordinates and join them to form triangle  $A''B''C''$ .

ii)

By Coordinate geometry.

$$\begin{array}{r|rrrr} 4 & 10 & & & \\ 80 & 8 & 4 & 16 & \\ 32 & 8 & 16 & 128 & \\ 64 & 4 & 10 & 80 & \\ \hline & 176 & & & 224 \end{array}$$

$$\text{Area} = \frac{224 - 176}{2} \quad \text{Area} = 24$$

$$= \frac{48}{2}$$

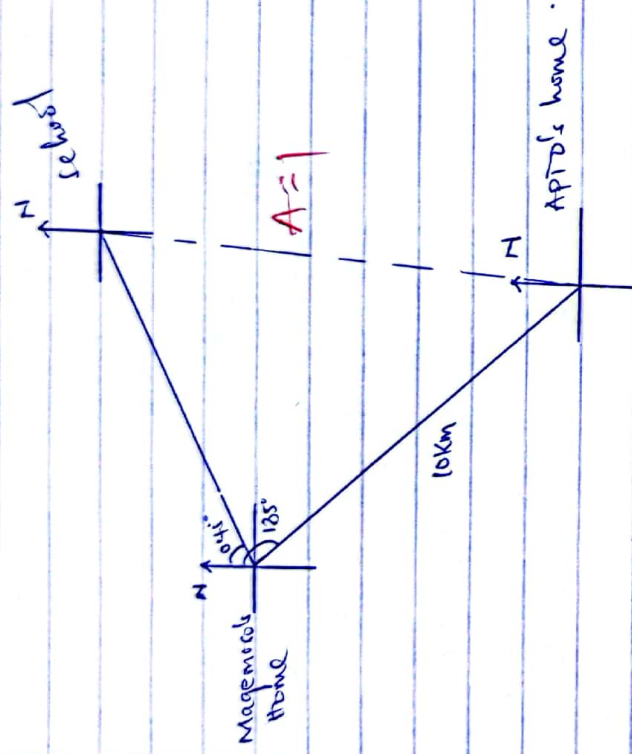
$$= 24 \text{ square units.}$$

Area of  $A''B''C''$  is 24 square units.  $\text{Area} = 1$



Item 6.

i)



$$D = 5 \times 2$$

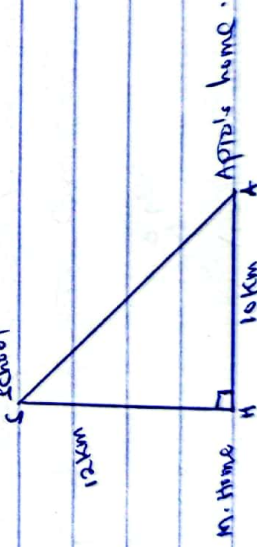
$$= 24 \times \frac{1}{2} A=1$$

$$= 12 \text{ km. } M=1$$

$\therefore$  The distance from Maged's home to the school is 12 km.  $AP=1$

ii)

From the sketch.



Using

$$SH^2 + HA^2 = AC^2$$

$$AS^2 = 12^2 + 10^2 \quad M=1$$

$$AS = \sqrt{144 + 100} \quad A=1$$

$$= \sqrt{244}$$

$$= 2\sqrt{61} \quad M=1$$

$$AS = 15.6 \text{ km.}$$

$\therefore$  The distance between Mr. APD's home to school is 15.6 km.  $AP=1$



b)

$$\begin{aligned} \text{Total distance} &= 10 \text{ km} + 15.6 \text{ km} \\ &= 25.6 \text{ km} \end{aligned}$$

$$\text{Total time taken} = \frac{25.6}{25} \text{ hr} \quad \text{Ans}$$

$$= \frac{16}{15} \text{ hours} = 1 \text{ hr} \text{ and } 4 \text{ minutes}$$

$$= 1 \text{ hour and 4 minutes}$$

$$\text{Required time} = 7:30 \text{ AM} - 1:54 \text{ hours} = 6:26 \text{ AM} \quad \text{Ans}$$

$$= 6:26 \text{ AM} \quad \text{Ans}$$

Mr. Magemoro is supposed to leave home at 6:26 AM ~~Ans~~ to reach school at 7:30 AM.

c)

Total sale

$$\text{Each sweet cost} = \text{sh. } 500$$

$$\text{Number of sweets sold} = 100$$

$$\text{Commission} = 10\%$$

$$\text{Total sales} = \text{sh. } (500 \times 100) \quad \text{Ans}$$

$$= \text{sh. } 50,000$$

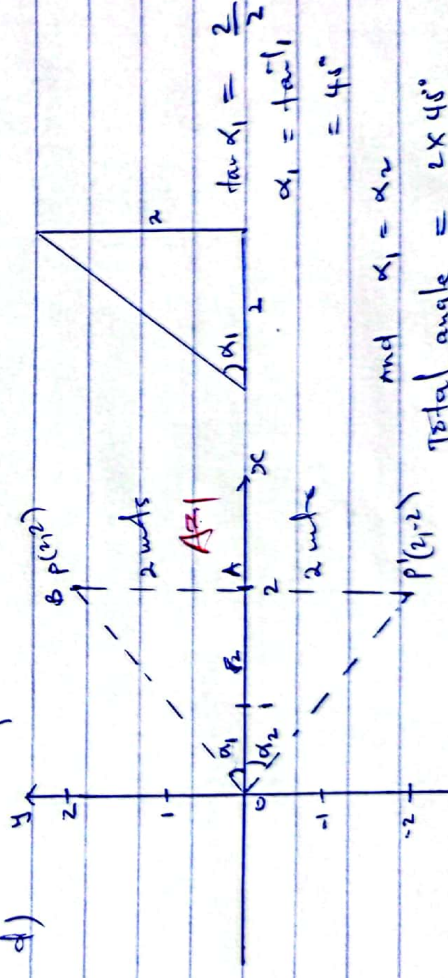
$$\text{Commission} = \frac{10 \times \text{sh. } 50,000}{100}$$

$$= \text{sh. } 5,000 \quad \text{Ans}$$

$$\begin{aligned} \text{Required amount} &= \text{sh. } 50,000 - \text{sh. } 5,000 \quad \text{Ans} \\ &= \text{sh. } 45,000 \end{aligned}$$

$\therefore$  Mr. Magemoro should give Mr. Apio sh. 45,000 after taking his commission. ~~Ans~~

d)



$$= 90^\circ$$

Mr. Magemoro should turn 90° clockwise to P in order to pass the available space. ~~Ans~~