

PROPOSED SCORING GUIDE
NEW LOWER SECONDARY SCHOOL CURRICULUM
S.4 MATHEMATICS SEMINAR
SLATED FOR 22/06/2024

ITEM 1

a)

Let's call the second digit "x". Since the first digit is 4 greater than the second, the first digit is $x + 4$. We know that the sum of the digits is 16, so we can write the equation:

$$x + (x + 4) = 17$$

$$2x + 4 = 17$$

$$2x = 13$$

$$x = 6$$

So, the second digit is 6, and the first digit is $6 + 4 = 10 = t$ in base eleven.

Therefore, the two-digit base eleven numeral is $t6$ (in base 11)

$$\begin{aligned} t6 \text{ (base 11)} &= 10 \times 11^1 + 6 \times 11^0 \\ &= 10 \times 11 + 6 \times 1 \\ &= 110 + 6 \\ &= 116 \text{ (in numeral base) (taking } x = 7 \text{ will not bring a valid soln)} \end{aligned}$$

b)

Total land area = x

Corn allocation = 14% of $x = 0.14x$

Wheat allocation = 30% of $x = 0.30x$

Soybeans allocation = remaining land = $x - (0.14x + 0.30x)$
 $= 0.56x$

Corn planting area = 42 acres

Farm workers' cultivation rate = 15 acres / 4 days

Since the farmer wants to plant corn on 42 acres, we can set up the equation: $0.14x = 42$

$$x = 42 / 0.14$$

$$x = 300 \text{ acres}$$

So, the farm has a total of 300 acres available for crop cultivation

Now, we can find the period for wheat and soybeans:

Wheat allocation = $0.30x = 0.30(300) = 90$ acres

Soybeans allocation = $0.56x = 0.56(300) = 168$ acres

c)

First, convert the cultivation rate to acres per day:

$$15 \text{ acres} / 4 \text{ days} = 3.75 \text{ acres} / \text{day}$$

Now, divide the total land area by the cultivation rate:

$$300 \text{ acres} / 3.75 \text{ acres/day} = 80 \text{ days}$$

Therefore, it would take the 12 farm **workers 80 days** to prepare the entire 300-acre land for plantation.

ITEM 2

a) The perimeter of a rectangle is given by: $P = 2(l + w)$

The problem states that the perimeter is $(14 + 6\sqrt{3})$ units, so we can set up the equation: $2(l + w) = 14 + 6\sqrt{3}$

Simplify the equation: $l + w = ((14 + 6\sqrt{3}) / 2)$

The problem also states that the length (l) is $\sqrt{3}$ times the width (w), so we can write: $l = \sqrt{3}w$

Substitute this expression for l into the equation $\sqrt{3}w + w = ((14 + 6\sqrt{3}) / 2)$

Combine like terms: $(\sqrt{3} + 1)w = ((14 + 6\sqrt{3}) / 2)$

Divide both sides by $(\sqrt{3} + 1)$ and simplify: $w = ((7 + 3\sqrt{3}) / (\sqrt{3} + 1))$

To find the length (l), multiply the width by $\sqrt{3}$: $l = \sqrt{3}w = (\sqrt{3}(7 + 3\sqrt{3}) / (\sqrt{3} + 1))$

(A) using: $A = lw$

$$A = (\sqrt{3}w)w = (\sqrt{3}(7 + 3\sqrt{3}) / (\sqrt{3} + 1)) \times ((7 + 3\sqrt{3}) / (\sqrt{3} + 1))$$

Simplify the expression to find the area.

$$A = (\sqrt{3}(49 + 42\sqrt{3} + 27) / ((3 + 2\sqrt{3} + 1)))$$

$$A = (\sqrt{3}(76 + 42\sqrt{3}) / ((4 + 2\sqrt{3})))$$

$$A = ((76\sqrt{3} + 126) / ((4 + 2\sqrt{3})))$$

$$A = ((38\sqrt{3} + 63) / ((2 + \sqrt{3})))$$

Multiply the numerators and denominators: $A = ((38\sqrt{3} + 63)(2 - \sqrt{3}) / ((2 + \sqrt{3})(2 - \sqrt{3})))$

Simplify the fraction: $A = ((76\sqrt{3} - 114 + 126 - 63\sqrt{3}) / ((4 - 3)))$

Combine like terms: $A = ((12 + 13\sqrt{3}) / 1)$

$$A = (12 + 13\sqrt{3}) \text{ square units}$$

So, the area of the rectangular hostel is $(12 + 13\sqrt{3})$ square units

Now, the school administration can use this result to plan the construction of the new hostels and address the shortage of dormitory space for students.

b) Let x be the total number of students in the school. Then:

Simplify the equation: $(2/3)x = (3/4)x - 100$

Subtract $(3/4)x$ from both sides:

$$(1/12)x = 100$$

Multiply both sides by 12:

$$x = 1200$$

So, there are 1200 students in the school.

c) Initial collection rate: $2/3$ of the school population (x)

Additional payments: 100 students paid their fees

Total collection by end of week two = $2x/3 + 100 = 3/4$ or 75%.

Required collection rate: 97% of school fees must be collected to undertake the construction.

Since the current collection rate is **75%**, which is still short of the **required 97%**, the administration should not yet undertake the construction. However, they are getting close, and with some additional efforts, they might reach the required threshold.

To bridge the gap, the administration could consider the following options:

- Intensify efforts to collect fees from the remaining students
- Offer incentives for prompt payment
- Communicate with parents and students to emphasize the importance of meeting the required collection rate

Once the collection rate reaches 97%, the administration can proceed with the construction, ensuring a stable financial foundation for the project.

ITEM 3

a) Shorter Route:

Average speed = Total distance / Total time

Total time = 2 hours 26 minutes = $2 \frac{26}{60} = 2 \frac{13}{30} = 2 \frac{26}{60} = (73)/30$ hours

1st x km; $T_1 = \frac{x}{54}$ hours

2nd y km; $T_2 = \frac{y}{37.5} = \frac{2y}{75}$ hours

But $T_1 + T_2 = \frac{73}{30}$

$\frac{x}{54} + \frac{2y}{75} = \frac{73}{30}$ LCM = 1350

$$25x + 36y = 3285 \dots\dots(i)$$

Longer route

Total time = $2 \frac{12}{60} = 11/5$ hours

Distance = (5 + x + y) km

Speed = distance / time

$$(5 + x + y)/(11/5) = 60$$

$$5 + x + y = 132$$

$$x + y = 127 \dots\dots(ii)$$

The two mathematical models are: $25x + 36y = 3285$ and $x + y = 127$

b) $25x + 36y = 3285$

$$\underline{25 : x + y = 127}$$

$$25x + 36y = 3285$$

$$- : 25x + 25y = 3175$$

$$\underline{11y = 110}$$

$$y = 10 \text{ km}$$

$$25x + 36(10) = 3285$$

$$25x = 2925$$

$$x = 117 \text{ km}$$

c) shorter route: distance = $x + y = 117 + 10 = 127 \text{ km}$ and total time = 2 hours and 26 minutes.

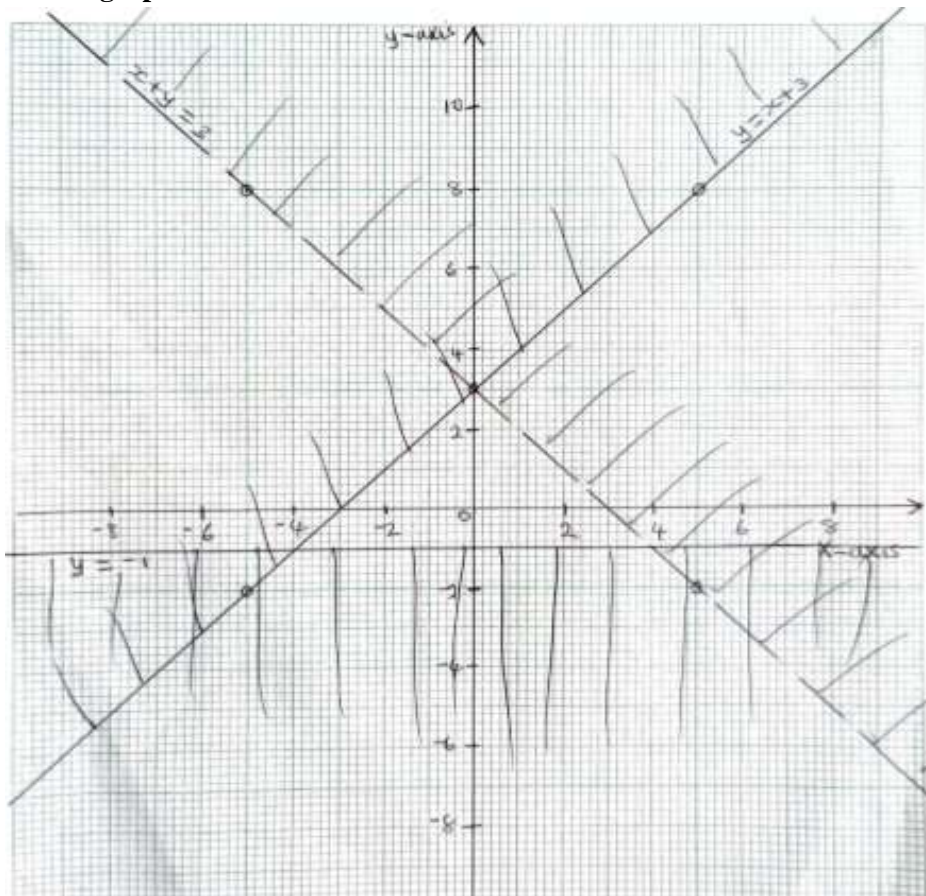
longer route: total distance = $127 + 5 = 132 \text{ km}$ and total time = 2 hours and 12 minutes. The advice is to use a longer route since it uses the least time.

ITEM 4 (a)

Inequality	Line	Nature	Points
$x - y \geq -3$	$x - y = -3$	—	(0, 3), (5, 8), (-5, -2)
$x + y < 3$	$x + y = 3$	-----	(-5, 8), (0, 3), (5, -2)

$y \geq -1$	$y = -1$	---	$(0, -1), (5, -1), (-5, -1)$
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Check graph



- a) The vertices are $(0, 3)$, $(-4, -1)$ and $(4, 1)$

$$\begin{aligned}
 \text{Area of triangular parking} &= \frac{1}{2} \times \text{base} \times \text{height} \\
 &= \frac{1}{2} \times 8 \times 4 \\
 &= 16 \text{ square units}
 \end{aligned}$$

- b) Since the given area (12.4 square units) < the actual area of the parking (16 square units), then it will accommodate the anticipated number of cars.

$$\begin{aligned}
 \text{Maximum Number of cars} &= \frac{\text{Area of parking lot specified}}{\text{Area of each car}} \\
 &= \frac{12.2}{0.2} \\
 &= 62 \text{ cars}
 \end{aligned}$$

- c) The mall's daily highest revenue on a peak day

$$\begin{aligned}
 &= \text{charge per car} \times \text{maximum no. of cars} \\
 &= \text{Shs: } 2500 \times 62 \\
 &= \text{Shs } 155,000
 \end{aligned}$$

ITEM 5

a) 31 to base three

3	31	1
3	10	1
3	3	0
	1	

1011_{three}

The code to the safe was 1011_{three}

b) Three hundred forty-nine million shillings

= 349,000,000

Wife 40% = $\frac{40}{100} \times 349,000,000$

= 139,600,000

Remaider = 349,000,000 – 139,600,000

= 209,400,000

Eldest son $\frac{1}{3} \times 209,400,000 = 69,800,000$

209,400,000 – 69,800,000

= 139,600,000

Sharing in the ratio 2:3 3+2 = 5

= $\frac{2}{5} \times 139,600,000 = 55,840,000$

Youngest child will get 139,600,000 – 55,840,000
= 83,760,000

ITEM 6

Let the number of trips be made by the bus be x

Let the number of trips to be made by the van be y

$$57x + 19y \geq 171 \text{ -----(i)}$$

$$80,000x + 50,000y \leq 400,000$$

$$8x + 5y \leq 40 \text{ ----- (ii)}$$

$$y > x \text{ ----- (iii)}$$

$$y \geq 0 \quad x \geq 0$$

Lines

For $57x + 19y = 171$

for $8x + 5y = 40$

X	0	3
y	9	0
	(0,9)	(3,0)

X	0	5
y	8	0
	(0,8)	(5,0)

y = x

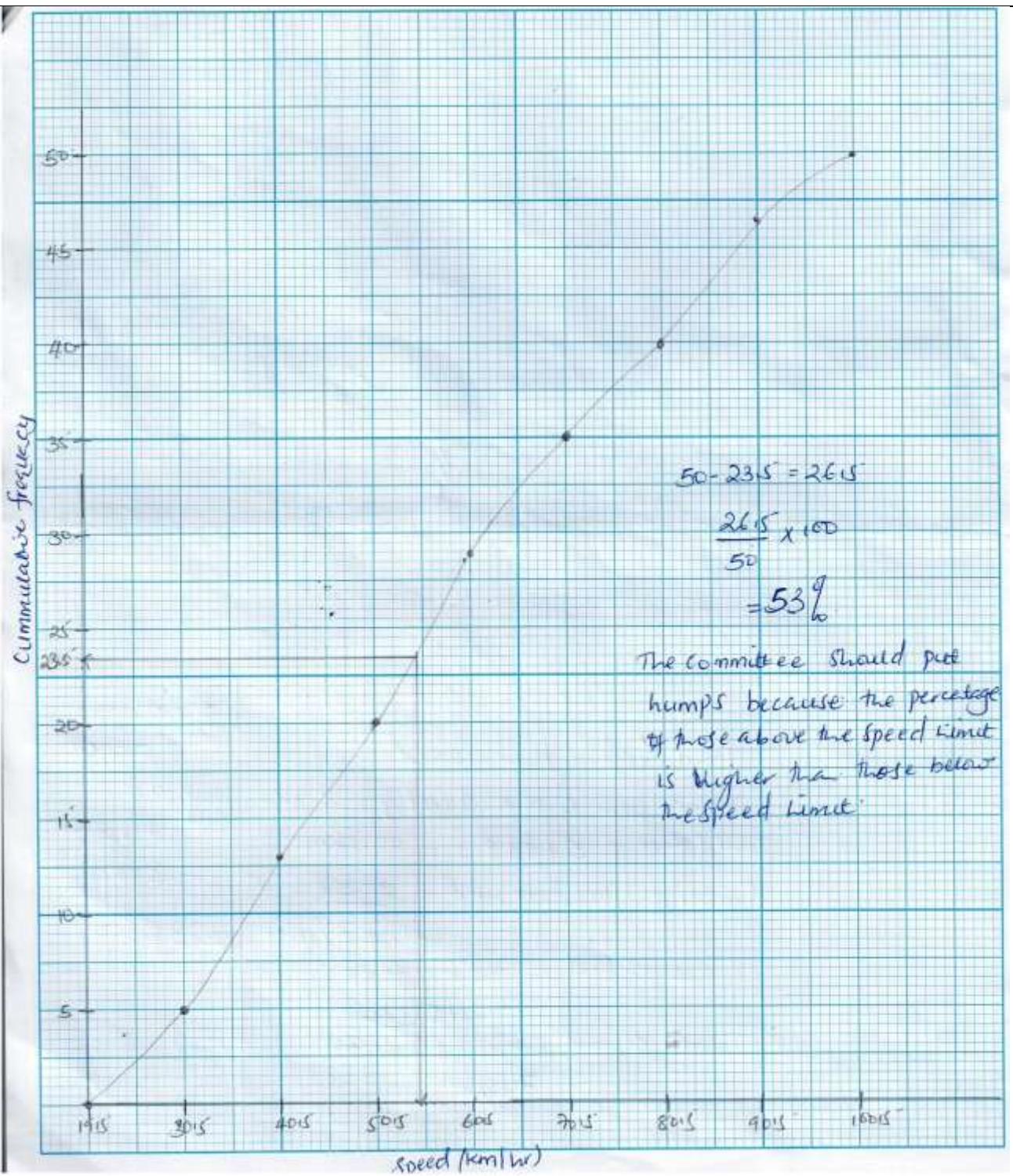
X	0	2	3
y	0	2	3

(x,y) (2,3) (2,4) (1,6)

(2,3) $80,000 \times 2 + 50,000 \times 3 = 310,000$

(2,4) $80,000 \times 2 + 50,000 \times 4 = 360,000$

(1,6) $80,000 \times 2 + 50,000 \times 6 = 380,000$



The bus should make 2 trips and the van should make 3 trips.

ITEM 7

a) (i)

Profits = Ugx.1, 500,000 (I = 1)

Profits to re-invest = $\frac{20}{100} \times 1,500,000$ (I = 1)

UGX.300, 000 (m=1)

a (ii)

Total ratio = 1+3 = 4 (I=1)

Fraction for $\frac{3}{4}$ (I = 1)

Personal expenses

Personal Expenses = $\frac{3}{4} \times (1,500,000 - 300,000)$ (I=1)

$\frac{3}{4} \times 1,200,000$ (I=1)

UGX. 900,000 (m=1)

Expected personal expenses = 300,000 + 200,000 + 100,000 (I = 1)

Ugx.600, 000 (m=1)

Conclusion: Yes because the amount she plans to spend on her personal expenses can cover all of them.

A=2
C=1
R=1

(c)

2	18	36	(I = 1)
3	9	18	
3	3	6	(m = 1)
2	1	2	
	1	1	

$$\text{H.C.F} = 2 \times 3 \times 3 \text{ (M=1)} \\ = 18$$

The worker was able to make 18 packages out of the items bought. (A=1)

Note: Where you see the following letters below is the meaning.

I = Identification

M = Manipulation

A = Application

ITEM 8

Let x profit from each cake (F = 1)

y = Profit from each cake.

$$40x + 30y = 29000$$

$$\Rightarrow 4x + 3y = 2900 \dots\dots\dots(1)$$

$$50x + 20y = 31000$$

$$\Rightarrow 5x + 2y = 3100 \dots\dots\dots (m = 1) \dots\dots\dots(2)$$

$$(4x + 6y = 2900) \times 2$$

$$(5x + 2y = 3100) \times 3 \quad (m = 1)$$

$$8x + 6y = 5800$$

$$15x + 6y = 9300$$

$$-7x / -7 = -3500 / -7 \quad (m=1)$$

$$X = \text{ugx.500} \quad (m-1)$$

Using $4x + 3y = 2900$

$$(4 \times 500) + 3y = 2900 \quad (m = 1)$$

$$3y = 2900 - 2000$$

$$3y/3 = 900/3 \quad (m-1)$$

$$Y = \text{UGX. } 300 \quad (m=1)$$

He can expect UGX 500 as profit from each cake and UGX 300 as profit from each cookie (A= 1)

(b) (ii)

Let x = Number of cakes (F-1)

Y = Number of cookie

Inequalities: $X \geq 0$

$$Y \geq 0$$

$$X + Y \geq 120 \quad (F = 3)$$

$$X \leq 80$$

$$Y \leq 60$$

Linear equations $x = 0$

$$Y = 0$$

$$X + y = 120 \quad (F = 1)$$

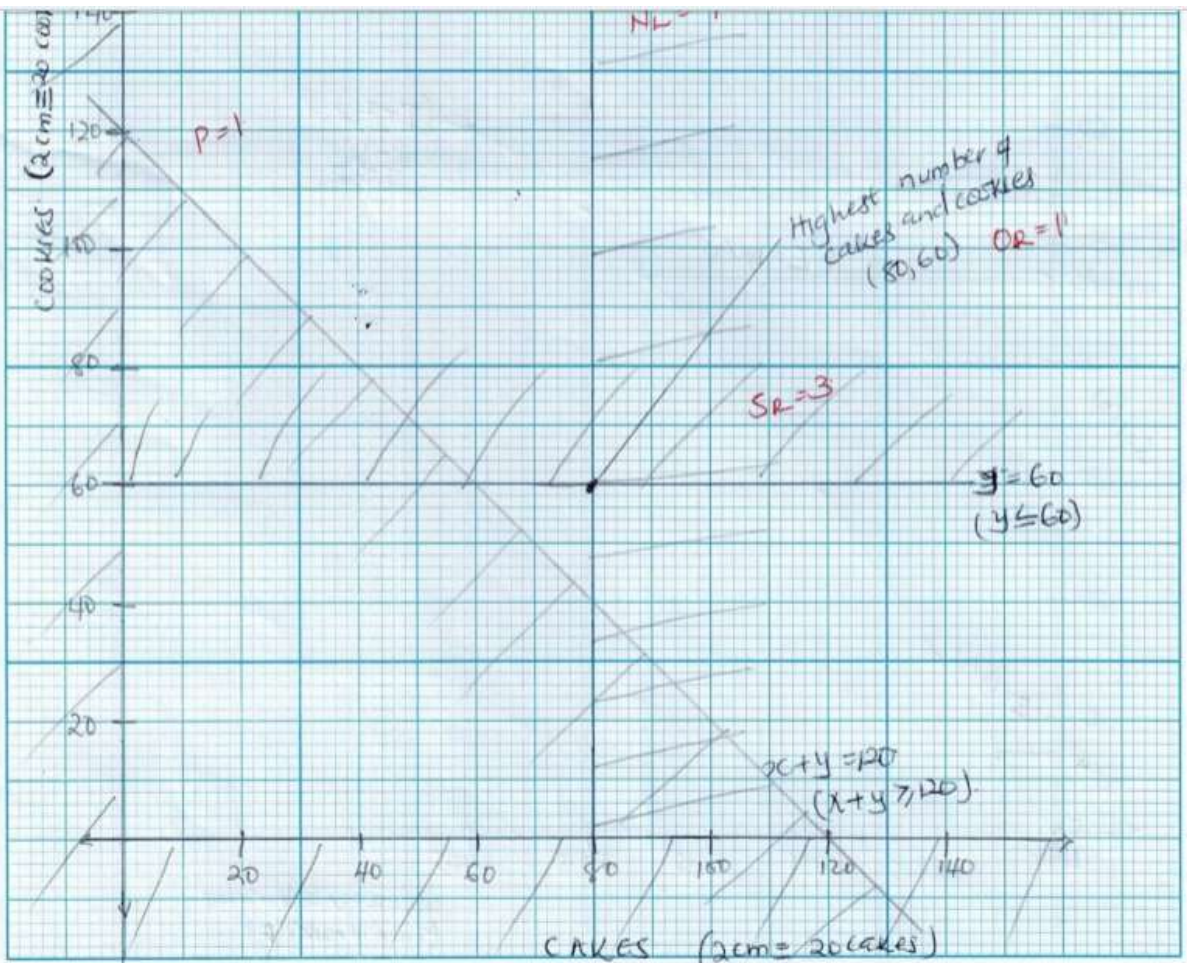
$$X = 80$$

$$Y = 60$$

Coordinates: $x + y = 120 \quad (M = 1)$

X	120	0
Y	0	120

(120, 0) and (0, 120)



Conclusion

He can make 60 cookies and 80 cakes

$$(A= 2) \quad R_c = 1$$

$$Op = 1$$

MEANING OF USED LETTERS

F =Formation of algebraic equations and inequalities

M = Manipulation

A = Application

Rc = Reading coordinate

OP = Optimal region

SECTION B: PART 1

ITEM 9

Let $x \equiv$ number of farmers that grow all the four crops:

$$45 + x + x - 5 + 5 + 5 = 80$$

$$2x = 30$$

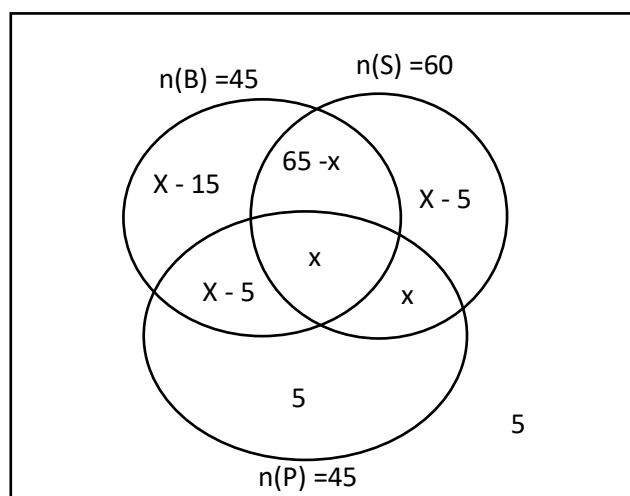
$$x = 15$$

Number of farmers that plant all four crops = 15

$$\begin{aligned} \text{Number of farmers that plant only three crops} &= (x - 5) + (65 - 3x) + x \\ &= 10 + 20 + 15 = 45 \end{aligned}$$

$$\text{Chance of selecting a farmer that plants only two crops} = \frac{0+10+5}{80} = \frac{3}{16}$$

$$\text{chance of selecting a farmer that does not plant Peas} = \frac{80-45}{80} = \frac{35}{80} = \frac{7}{16}$$



category of crops planted	number of tractors	Extra money given to farmers
4	$4 \times 15 = 60$	$15 \times 3m = 45m$
3	$3 \times 45 = 135$	$45 \times 2m = 90m$
2	$2 \times 15 = 30$	$30 \times 1.5 = 45m$
1	$1 \times 5 = 5$	$5 \times 1m = 5m$
total	230 tractors	shs 185,000,000

budget for tractors $230 \times 68m = \text{shs } 15,640,000,000$

budget for money shs 185,000,000

total = Shs 1.5825billion

ITEM 10

a) (i)

Battery life	tally	f	X	fx	CF	CB
360 - 369	IIII	4	364.5	1458	4	359.5 - 369.5
370 - 379	IIII	5	374.5	1872.5	9	369.5 - 379.5
380 - 389	IIII I	6	384.5	2307	15	-389.5
390 - 399	IIII IIII III	13	394.5	5128.5	28	-399.5
400 - 409	IIII IIII	10	404.5	4045	38	-409.5
410 - 419	IIII	5	414.5	2072.5	43	-419.5
420 - 429	IIII	4	424.5	1698	47	-429.5
430 - 439	III	3	434.5	1303.5	50	-439.5
		50		19885		

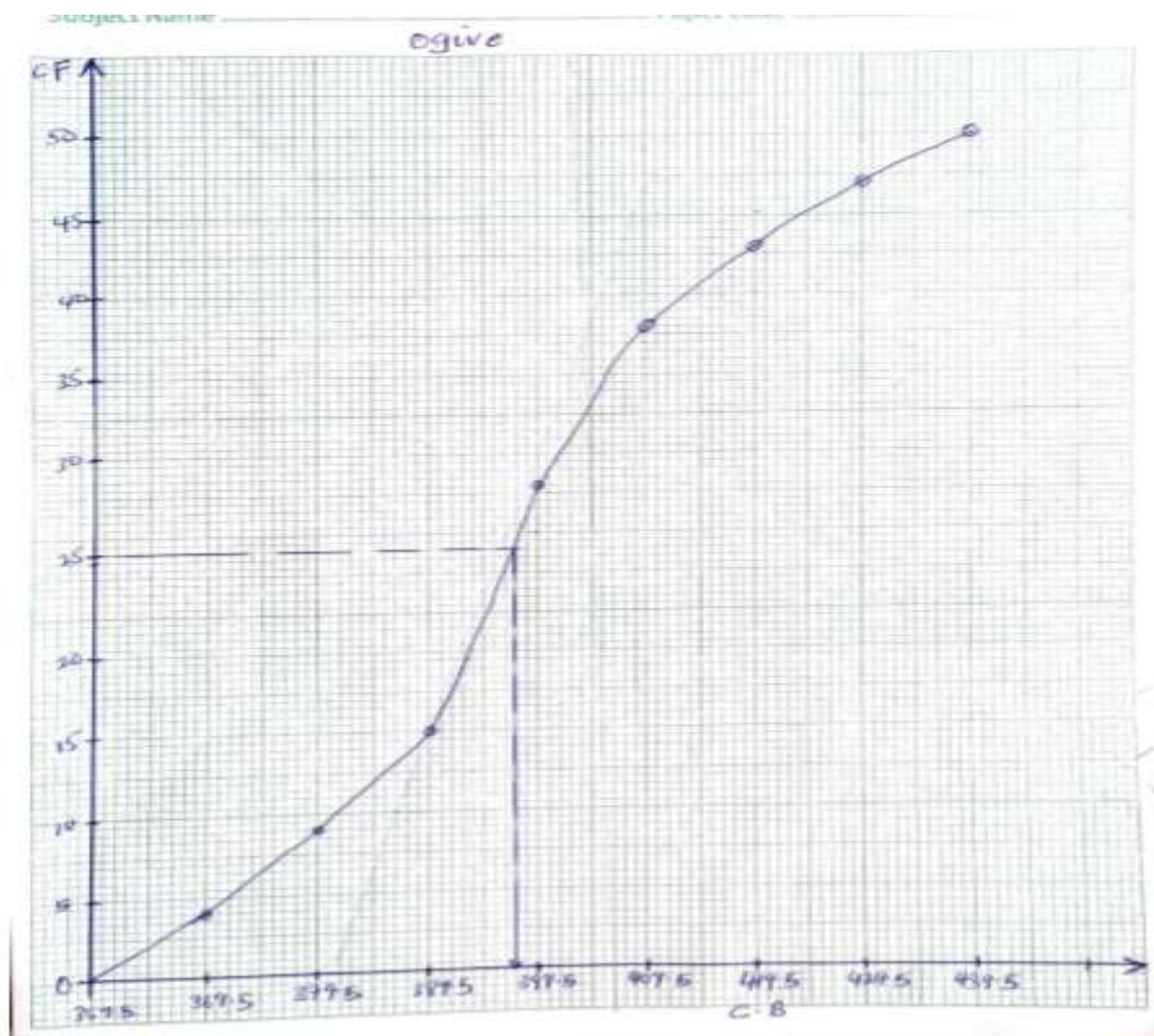
$$\text{Average} = \frac{\sum fx}{\sum f} = \frac{19885}{50} = \mathbf{397.7}$$

All batteries with battery life equal or less than **397.7** should be replaced.

(ii) they have life span less than or equal to the one specified by the director

b)

(i) Graph paper



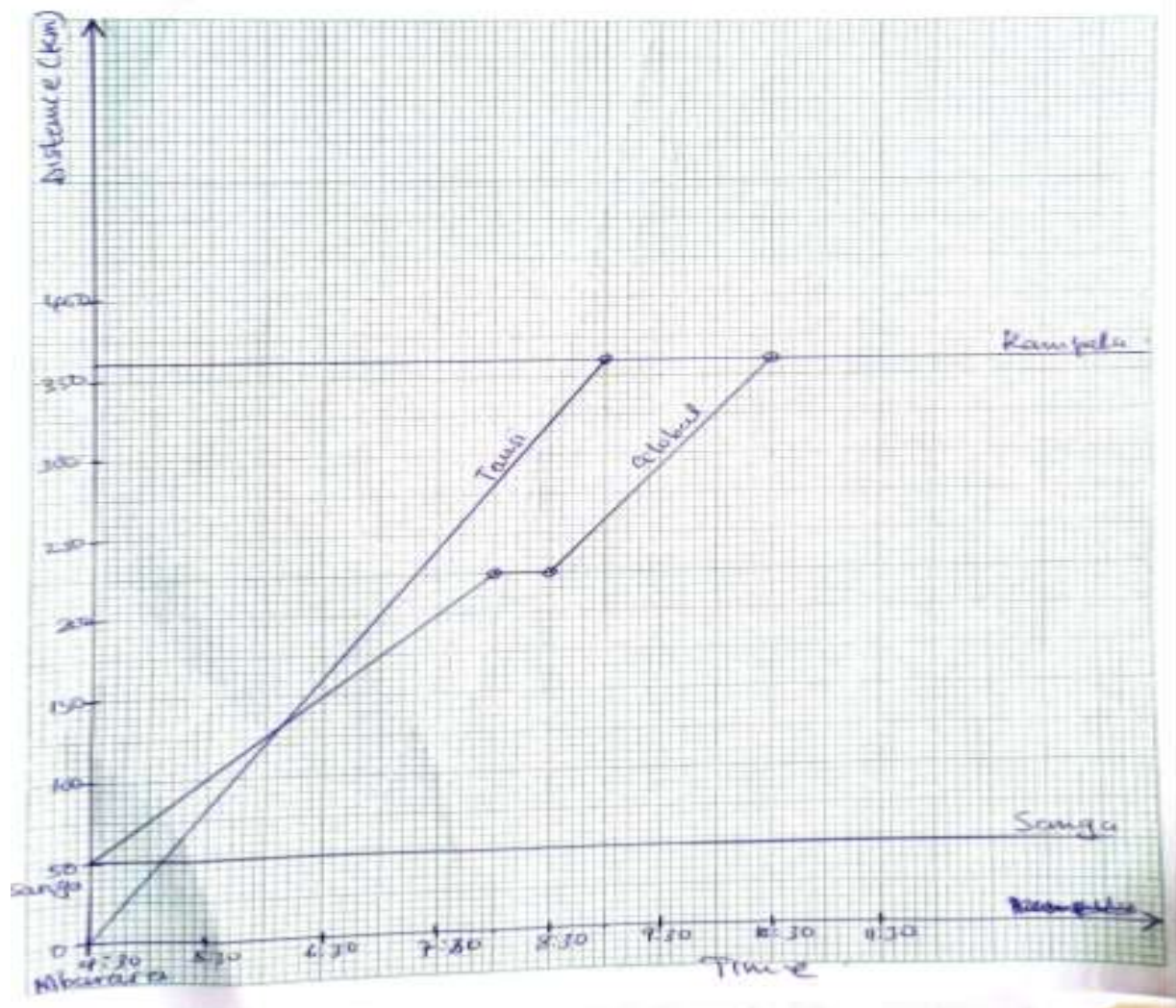
From ogive, median = $(\frac{\Sigma f}{2})^{th}$ position

$$= (\frac{50}{2})^{th} \text{ position} = 25^{th} \text{ position} = 389.5 + 8 = 397.5$$

- (ii) the target battery lifespan for manufacturing, as recommended by the director $\geq \frac{99}{100} \times 397.5 = 393.525$
- (iii) I don't advise the director to consider this value (393.525) since its less than the mean
- c) Number batteries with life greater than or equal to the median = 25
 Probability $\frac{25}{50} = 0.5$

ITEM 11

a) (i) Graph



(ii) Each school's transportation expenditure

$$\text{Tausi: } 24,000 \times 360 = \text{Shs. } 8,640,000$$

$$\text{Each school: } \frac{8,640,000}{2} = \text{Shs. } 4,320,000$$

thus : **Fort Porto** got Shs. 4,320,000

And **Tororo** got Shs. 4,320,000

$$\text{Global : } 28,000 \times 310 = \text{Shs. } 8,680,000$$

$$\text{Each school: } \frac{8,680,000}{2} = \text{Shs. } 4,340,000$$

thus : **Kogera** got Shs. 4,340,000

And **Nyakasura** got Shs. 4,340,000

(iii) Tausi bus arrived first

Time difference was $10:30 - 9:00 = 1$ hour and 30 minutes

b) let $A = \begin{pmatrix} 1 & 3 & 2 \\ 2 & 2 & 2 \\ 3 & 2 & 1 \\ 0 & 2 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 2 & 1 & 3 \\ 1 & 4 & 1 \end{pmatrix}$ represent the

First-round and 2nd round performance

for the two rounds ; $A + B = \begin{pmatrix} 2 & 5 & 5 \\ 4 & 3 & 5 \\ 5 & 5 & 2 \\ 1 & 6 & 5 \end{pmatrix}$

let $C = \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix}$ represent the possible points

Determining the total number points by each team;

$\begin{pmatrix} 2 & 5 & 5 \\ 4 & 3 & 5 \\ 5 & 5 & 2 \\ 1 & 6 & 5 \end{pmatrix} \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 11 \\ 15 \\ 20 \\ 9 \end{pmatrix}$ Nyakasura was the winner and Kyogera last

the financial prizes awarded;

total number of points collected by all the teams = $11+15+20+9 = 85$

Nyakasura: $\frac{20}{85} \times 24,000,000 = \text{Shs } 5,647,058.824$

Tororo: $\frac{15}{85} \times 24,000,000 = \text{Shs } 4,235,294.118$

Fortpoto: $\frac{11}{85} \times 24,000,000 = \text{Shs } 3,105,882.353$

Kyogera: $\frac{9}{85} \times 24,000,000 = \text{Shs } 2,541,176.471$

ITEM 12

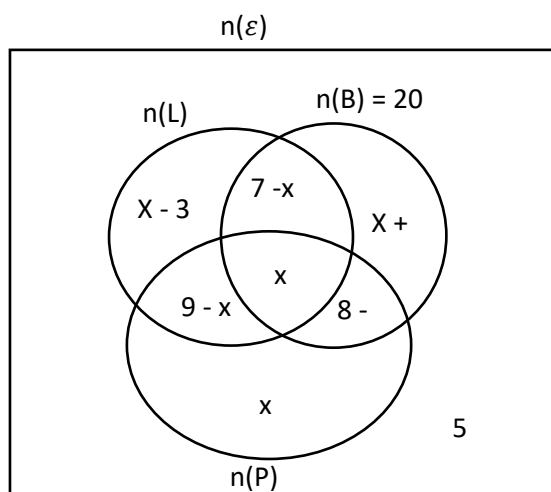
a) Determining class average for **E.T.1** this year;

Class	tally	f	X	fx
20 - 29	III	4	24.5	98
30 - 39	IIII II	7	34.5	241.5
40 - 49	IIII III	8	44.5	356
50 - 59	IIII IIII	10	54.5	545
60 - 69	IIII III	8	64.5	516
70 - 79	III	4	74.5	298
80 - 89	IIII	5	84.5	422.5
90 - 99	III	4	94.5	378
		50		2,855

$$\text{Average} = \frac{\sum fx}{\sum f} = \frac{2855}{50} = 57.1\%$$

They must add a **teacher and buy more books**, since the calculated current class average (57.1%) is less than the last year's average of 64%

b) (i)



$$20 + x - 3 + 9 - x + x + 5 = 35$$

$$31 + x = 35$$

$$x = 4$$

required number of text books to be bought = $4 \times 2 = 8$

ii) I recommend the purchase of the 8 text books and some text books from different authors to cater for those who do not read any.

ITEM 13

Those who can teach 3

$$x = 29 - (7+5+4)$$

$$= 29 - 16$$

$$= 13$$

Those who can teach Germany and English only

$$30 - (5 + 11+13)$$

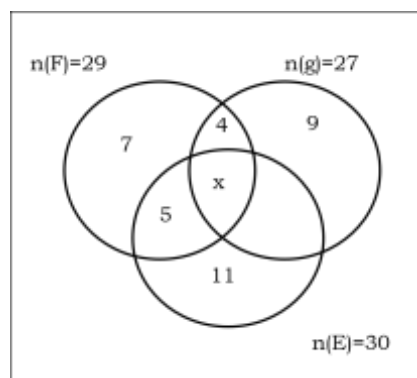
$$30 - 29 = 1$$

a) Those who will be interviewed orally are

$$= 4+5+13+1 = \mathbf{23}$$

b) Total number of applicants

$$= 7+9+11+4+13+5+1 = \mathbf{50}$$



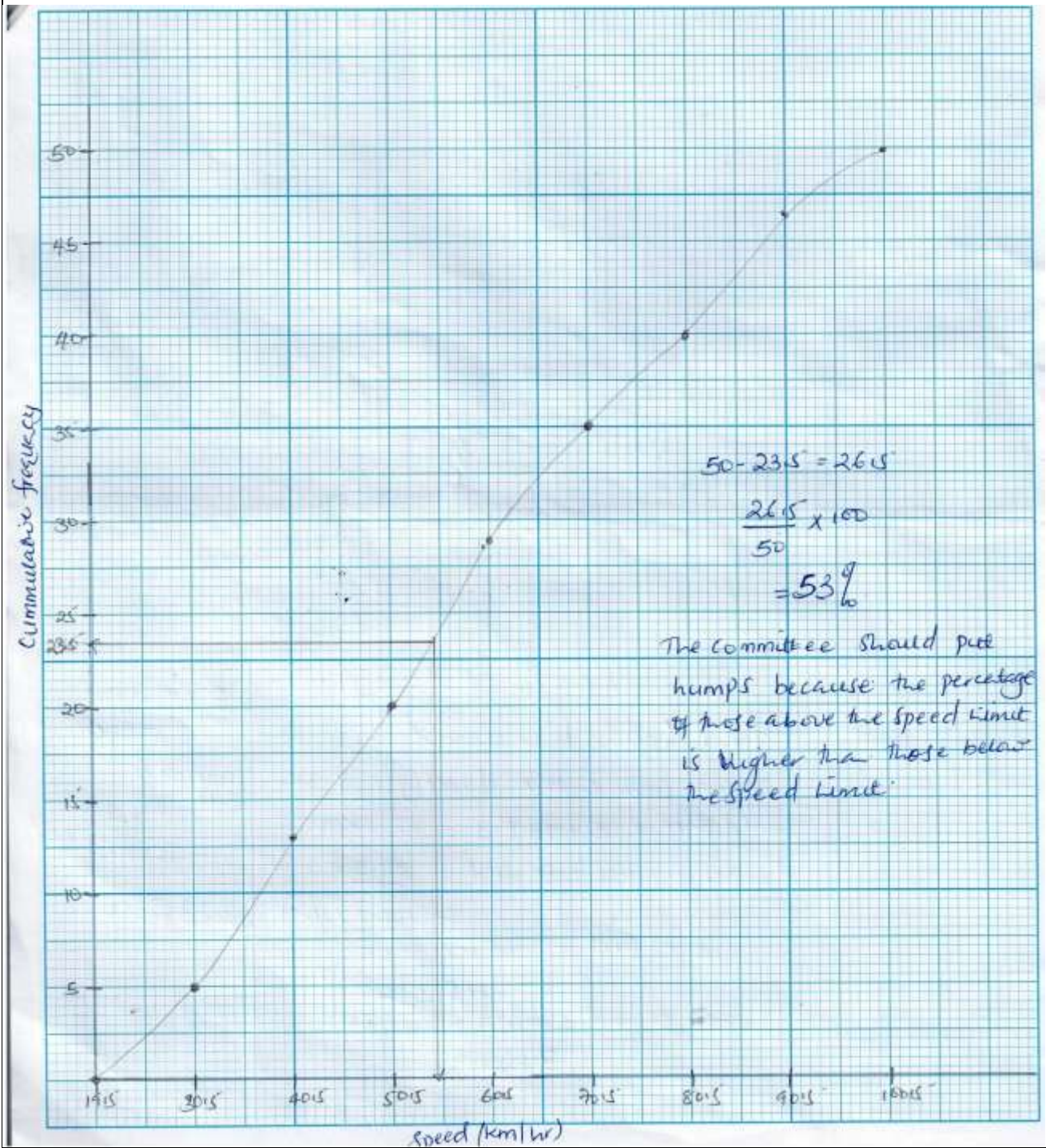
$$\text{Probability} = \frac{13}{50}$$

ITEM 14

Speed km/hr	Number of vehicles	Mid speed x	Class boundaries	cf	fx
20 – 30	5	25	19.5 – 30.5	5	125
30 – 40	8	35	30.5 – 40.5	13	280
40 – 50	7	45	40.5 – 50.5	20	315
50 -60	9	55	50.5 – 60.5	29	495
60 – 70	6	65	60.5 – 70.5	35	390

70 - 80	5	75	70.5 - 80.5	40	375
80 - 90	4	85	80.5 - 90.5	44	340
90 - 100	6	95	90.5 - 100.5	50	570
	$\Sigma f = 50$				$\Sigma fx = 2890$

Average speed $\approx \frac{2890}{50} = 57.8 \approx 58 \text{ km/hr}$



ITEM 15

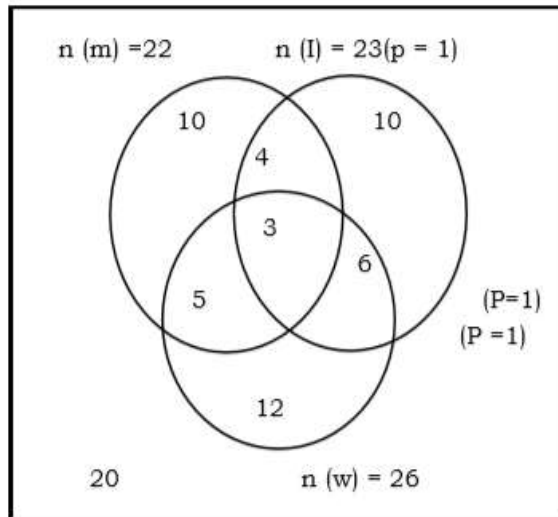
AVENN -DIAGRAM REPRESENTING THE DATA (p=1)

Let M = Teachers that attend on Monday

T = Teachers that attend on Tuesday (P =1)

W= Teachers that come on Wednesday

N= (Σ) 70 (p=1)



Teachers who attend on none of the days

$$70 - (10 + 4 + 10 + 5 + 3 + 6 + 12) \quad (A = 1)$$

$$70 - 50$$

20 teachers.

P (some teachers will not attend $20/70$ (A=1)

$$= 0.3 \quad (A = 1)$$

Conclusion: Yes the headteacher can hold a meeting on one of the days he has I mind because the probability that some teachers will not attend is < 0.5 (AP=2)

$$n(m) = 10 + 5 + 4 + 3 = 22$$

$$n(T) = 4 + 3 + 6 + 10 = 23 \quad (A = 1)$$

$$n(w) = 5 + 3 + 6 + 12 = 26$$

The head teacher can hold the meeting on Wednesday because that is one that has the highest number of teachers. (AP=1)

MEANING OF LETTERS

P – Data presentation

A - Data Analysis

Ap - Application

ITEM 16

A FREQUENCY TABLE OF SUMMARISED DATA

Finish time (mins)	Number of people	c.f	Class boundaries
120 - 124	15	15	119.5 - 124.5
125 - 129	14	29	124.5 - 129.5
130 - 134	13	42	129.5 - 134.5
135 - 139	11	53	134.5 - 139.5
140 - 144	7	60	139.5 - 144.5
		(P=1)	(P=1)

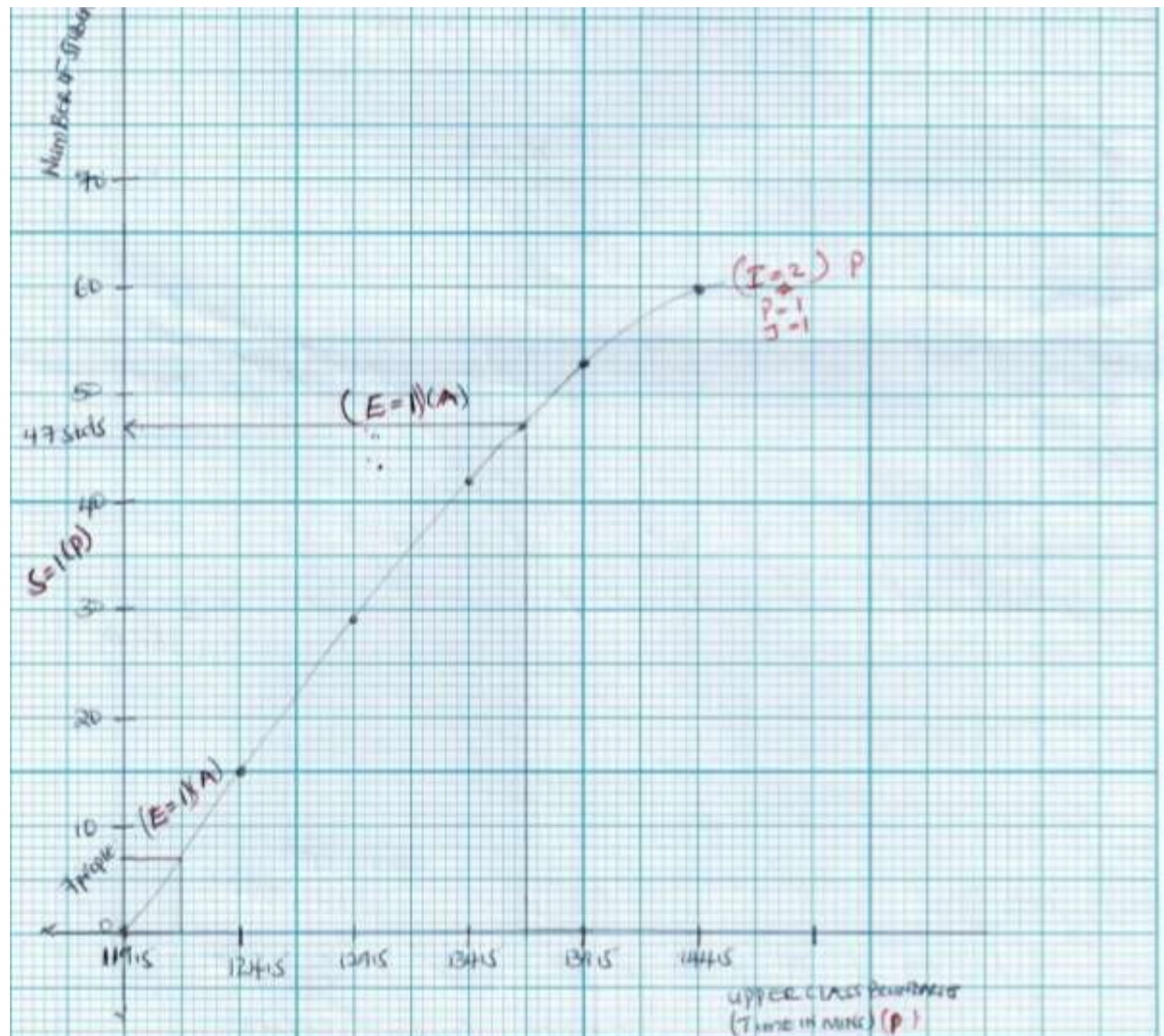
a (i)

47 people qualified for phase two (AP=1)

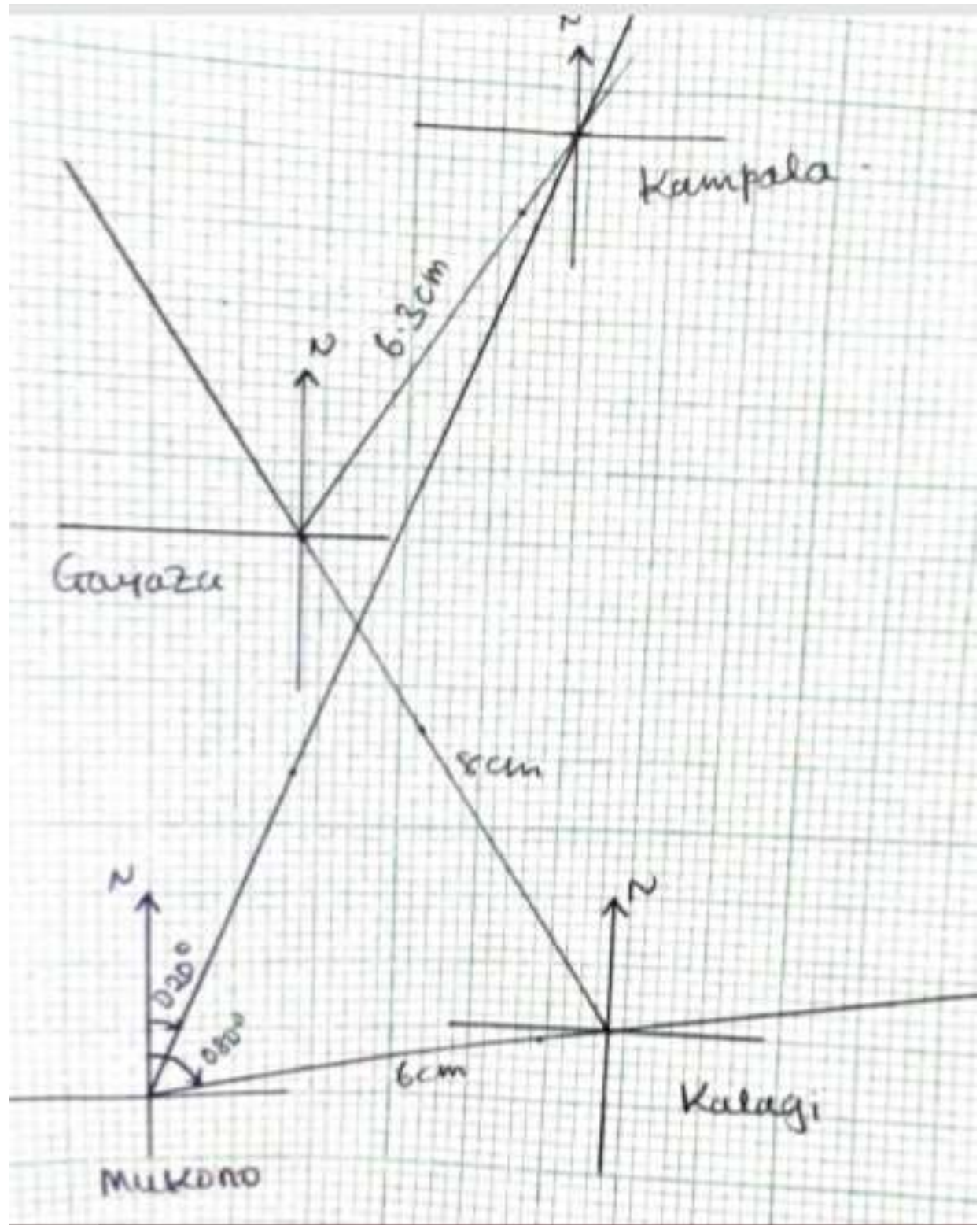
(ii) P (organization will get those who will participate) = $\frac{7}{47}$ (A=1)

= 0.15 (A=1)

(iii) Conclusion: it's very unlikely for the organization to get those who will participate from the group. (C=1) (Ap = 1)



ITEM 17

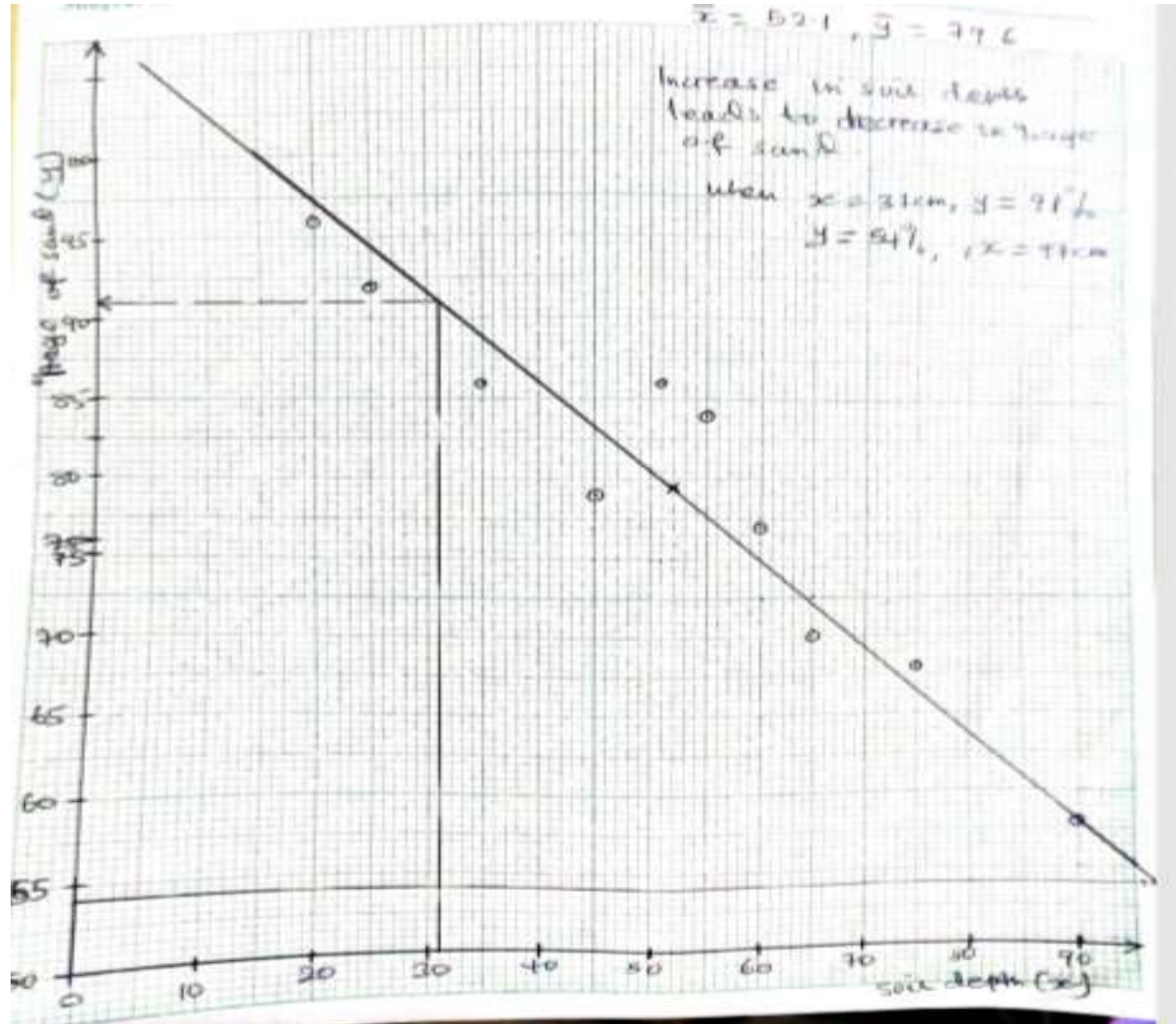


$$\bar{x} = 50.1, \bar{y} = 79.6$$

Increase in depths decreases the percentage of sand

When $x = 31$ cm, $y = 91\%$

When $y = 54\%$, $x = 97$ cm



c) Total distance = $6 + 8 + 6.3 = 20.3$ cm = $20.3 \times 5 = 101.5$ km

Measuring tape = Shs. 10,000

Sampling tape = Shs. 20×5000 = Shs. 100,000

Fuel = Shs. 600×101.5 = Shs. 60900

Total = Shs. 719,000

SECTION B: PART II

ITEM 18

- a) Number of slices that can be loaded into each container:

First, calculate the volume of a single slice:

Volume of a slice = (Area of the slice) x (Thickness of the chapatti)

Area of the slice = (Area of the chapatti) / 6

Area of the chapatti = $\pi \times (\text{Diameter}/2)^2 = (22/7) \times (14/2)^2$

= **approximately 153.86 cm²**

Area of the slice = $153.86 \text{ cm}^2 / 6 = \text{approximately } 25.64 \text{ cm}^2$

Volume of a slice = $25.64 \text{ cm}^2 \times 6 \text{ cm} = \text{approximately } 153.84 \text{ cm}^3$

Container capacity = $14,784 \text{ cm}^3$

Number of slices per container = Container capacity / Volume of a slice

$$= 14,784 \text{ cm}^3 / 153.84 \text{ cm}^3$$

= **approximately 96 slices**

- (ii) Number of containers needed to pack the entire batch of slices:

Total number of slices sold = 2,000 chapattis x 6 slices per chapatti

= 12,000 slices

Number of containers needed = Total number of slices / Number of slices per container

$$= 12,000 \text{ slices} / 96 \text{ slices per container}$$

= **approximately 125 containers**

- b) (i) **Amount generated from the fundraising**

each slice is sold at: Shs 400

$$12000 \text{ slices are sold at : } 400 \times 12000 = \text{Shs. } 4,800,000$$

- (ii) calculating the expenses

Cost price of making each slice = Shs. 140

$$12000 \text{ slices cost: } 140 \times 12000 = \text{Shs } 1,680,000$$

Buying price of containers

Considering a discount of 10%

$$\text{Buying Price } \frac{90}{100} \times 1000 \times 125 = \text{Shs. } 112,500$$

$$\text{Total expenses : } 112,500 + 1,680,000 = \text{Shs. } 1,792,500$$

$$\begin{aligned} \text{Profit} &= \text{Total revenue} - \text{Total cost} \\ &= \text{UGX } 4,800,000 - \text{UGX } 1,792,500 \\ &= \text{UGX } 3,007,500 \end{aligned}$$

Recommendation:

The club made a significant profit of UGX 3,007,500. Considering the success of the event and the profit margin, it is recommended that the club continue this business venture in the future.

ITEM 19

a) (i) Graph

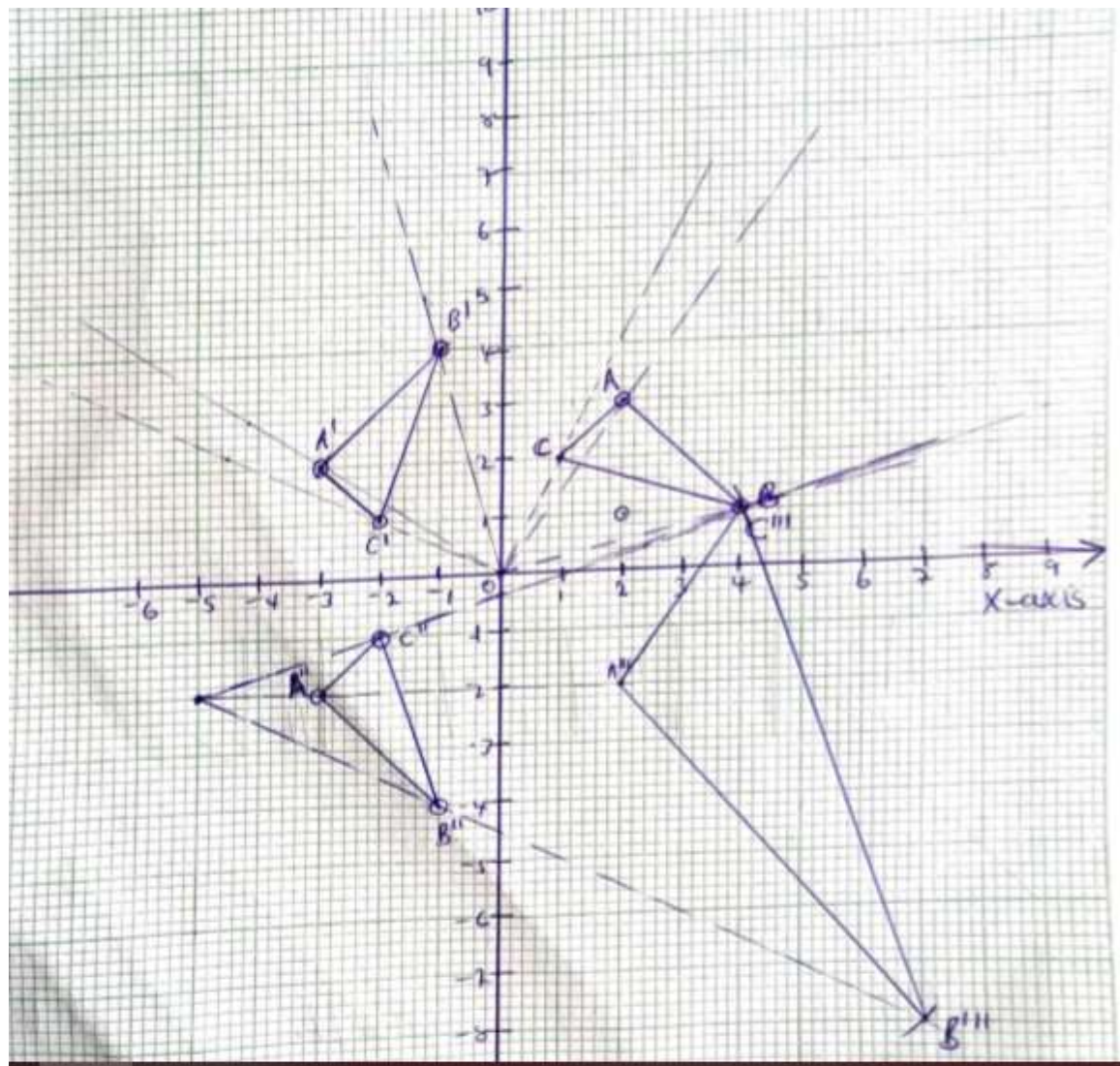
(ii) Original triangle: A(2, 3), B(4, 1), C(1, 2)

Rotate 90 degrees counterclockwise: A(-3, 2), B(-1, 4), C(-2, 1)

Mirror across the horizontal axis: A(-3, -2), B(-1, -4), C(-2, -1)

4. Scale up by a factor of 3 about the (-5, -2); new coordinates are:

$$A(2, -2), B(7, -8), C(4, 1)$$



b)

$$\text{Enlarged triangle area} = \frac{1}{2}ac \sin B = \frac{1}{2} \times 7.8 \times 9.5 \times \sin 21^\circ = 13.2775 \text{ square units}$$

$$\text{Red area} = \left(\frac{3}{8}\right) \times 13.2775 = 4.9791 \text{ square centimeters}$$

$$\text{White area} = \left(\frac{5}{8}\right) \times 13.2775 = 8.2984 \text{ square units}$$

$$\text{Red paint cost} = 4.9791 \text{ sq units} \times \text{UGX } 20,000/\text{sq unit} = \text{UGX } 99,582$$

$$\text{White paint cost} = 8.2984 \text{ sq unit} \times \text{UGX } 15,000/\text{sq unit} = \text{UGX } 124,476$$

$$\text{Total paint cost} = \text{UGX } 99,582 + \text{UGX } 124,476 = \text{UGX } 224,058$$

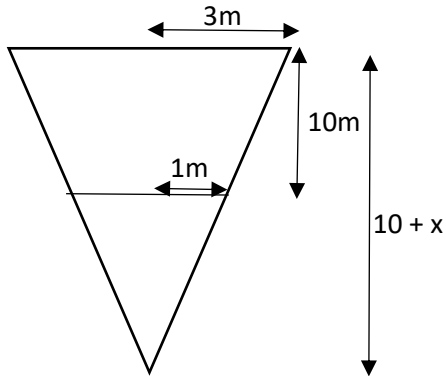
This exceeds the bank's budget limit of UGX 205,000 per logo.

Recommendation:

Based on the calculations, the bank should adjust their allocation for logo painting expenses. The current budget limit is insufficient to cover the total paint cost. Consider increasing the budget or exploring cost-effective alternatives to stay within the allocated amount.

ITEM 20

a) Volume of a tank = $\pi \times \text{Radius}^2 \times \text{Height}$
 $= \pi \times (4 \text{ m})^2 \times 15 \text{ m}$
 $= (22/7) \times (4 \text{ m})^2 \times 15 \text{ m}$
 $= 754.2857 \text{ m}^3$



$$V_{\text{small}} = \frac{1}{3} \times \frac{22}{7} \times 1^2 \times 5$$

$$V_{\text{small}} = 5.2381 \text{ m}^3$$

$$\frac{3}{1} = \frac{(10+x)}{x}$$

$$3x = 10 + x$$

$$x = 5 \text{ m}$$

Volume of the cone from which the

bucket is part = $\frac{1}{3} \pi r^2 h$

$$V_B = \frac{1}{3} \times \frac{22}{7} \times 3^2 \times 15$$

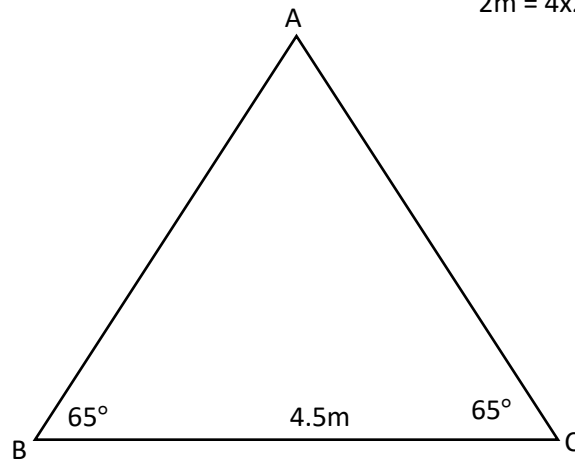
$$V_B = 141.4286 \text{ m}^3$$

ITEM 21

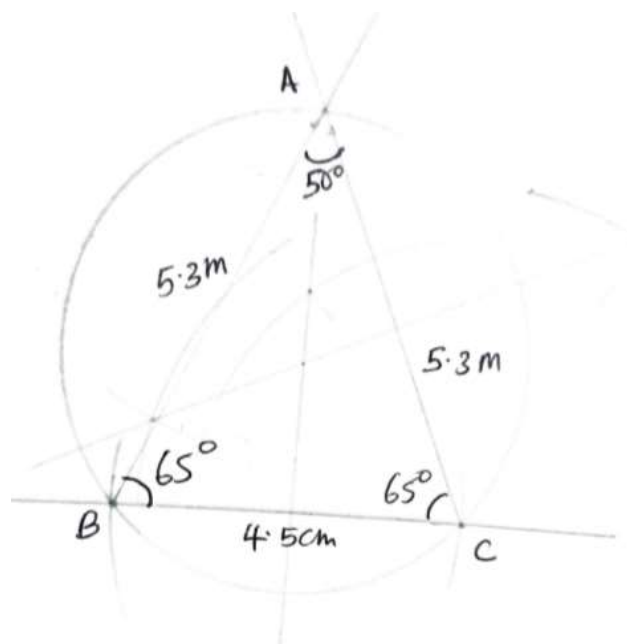
Sketch.

Let 1 metre \equiv 4 cm

2m = 4x2 = 8cm



ACCURATE DIAGRAM



b) 1 table costs = $\frac{95}{100} \times 300,000$
 = Shs 285,000

3 tables cost = Shs 285,000 \times 4
 = Shs. 1,140,000

c) From 7 : 30 am to 4: 00 pm = 8 hours 30 minutes

Less 30 minutes for lunch break = $8\frac{1}{2} - \frac{1}{2} = 8$ *working hours in a day*

On Monday 1 table can be made (= 5 hours) with another table (3 hours)

On Tuesday 2nd table will be completed at 9: 30 am (with the addition of 2 hrs)

On Tuesday 3rd table is to be completed at 9: 30 am + 5 : 30 = 3:00 pm

On Wednesday 4th table is to be completed at **11: 30 am**

d) Minimum radius = 2.9 cm = 2.9 m

ITEM 22

a) (i)

Income (shs) per annum	taxable income	Tax rate (%)	income tax
1 st Shs 80,000	1st 80,000	7.5	$\frac{7.5}{100} \times 80,000 = \text{Shs } 6,000$
Next Shs 80,000 (80,001 - 160,000)	Next 80,000	12.5	$\frac{12.5}{100} \times 80,000 = \text{Shs } 10,000$
160,001 - 240,000	Next 80,000	20	$\frac{20}{100} \times 80,000 = \text{Shs } 16,000$
240,001 - 320,000	Next 80,000	30	$\frac{30}{100} \times 80,000 = \text{Shs } 24,000$
320,001 - 400,000	Next 80,000	36.5	$\frac{36.5}{100} \times 80,000 = \text{Shs } 29,000$
400,001 - 480,000	(x - 400,000)	45	$\frac{7.5}{100} \times (x - 400,000) =$ Shs15,120

$$100,320 - (6000 + 10,000 + 16,000 + 24,000 + 29,200) = 100,320 - 85,200$$

$$= \text{Shs. } 15,120$$

$$\frac{7.5}{100} \times (x - 400,000) = \text{Shs } 15,120$$

$$x - 400,000 = 33,600$$

$$x = \text{Shs. } 433,600$$

$$\text{Taxable income} = \text{Shs. } 433,600$$

$$\text{(ii) Tax-free income} = \frac{124}{100} \times 433,600$$

$$= \text{Shs. } 537,664$$

$$\text{Gross income} = \text{Taxable income} + \text{Tax-free income}$$

$$= 433,600 + 537,664 = \text{Shs. } 971, 264$$

Housing	$= 14,000 \times 12 = \text{Shs. } 168,000$
Marriage	$= y$
Medical	$= \text{Shs. } 50,700$
Transport	$= 10,000 \times 12 = \text{Shs. } 120,000$
Insurance	$= \text{Shs. } 68,900$

$$\text{Family allowance; } 3 \times 5400 + 1 \times 4,200 = \text{Shs. } 20,400$$

$$\text{Tax free income} = \text{Shs } 428,000 + y = \text{Shs } 537,664$$

$$y = \text{Shs } . 109,664$$

marriage allowance is Shs 109,664

$$\begin{aligned} \text{(iii) Annual take-home pay} &= \text{Gross income} - \text{income tax} \\ &= 971,264 - 100,320 \\ &= \text{Shs } 870,944 \end{aligned}$$

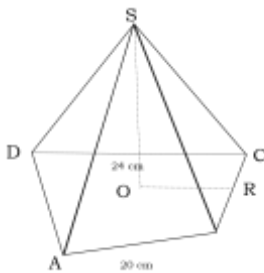
$$\begin{aligned} \text{b) Amount James should set aside} &= \frac{1}{2} \times 870,944 \times 10 \\ &= \text{Shs } 4,354,720 \end{aligned}$$

$$\text{Area of plot of Land} = 40 \times 22 = 880\text{m}^2$$

$$\text{Cost of land} = 4000 \times 880 = \text{Shs } 3,520,000$$

Since the amount to be saved in the next 10 years exceeds the cost of the land, then he will be able to reach his set target.

ITEM 23



$$OR = \frac{1}{2}AB = 10\text{cm}$$

$$SR^2 = OS^2 + OR^2$$

$$SR^2 = 24^2 + 10^2$$

$$= 676$$

$$SR = 26\text{cm}$$

$$\text{Surface area of one slant side} = \frac{1}{2} \text{ base} \times \text{height} = \frac{1}{2} \times 20 \times 26 = 260 \text{ cm}^2$$

$$\text{Total surface area of slant surfaces} = 4 \times 260 = 1040\text{cm}^2$$

$$\text{Base area} = L \times W$$

$$= 20 \times 20$$

$$= 400\text{cm}^2$$

$$\text{Total surface area} = 1040 + 400$$

$$= 1440\text{cm}^2$$

$$= 0.144\text{m}^2$$

Each pack will need 0.144m^2 of material.

$$\text{b). Taxable income} = \text{Gross} - \text{Allowances}$$

$$= 1,500,000 - (200,000 + 6,000 \times 5 \times 4) = 1,500,000 - 320,000 = \mathbf{1,180,000}$$

	Rate	Tax
0 – 235,000	0%	0
235,000 – 335,000	100,000 x 10%	10,000
335,000 – 410,000	75,000 x 10%	15,000
410,000 - 935,000	525,000 x 30%	157,000
	Total tax	182,500/=

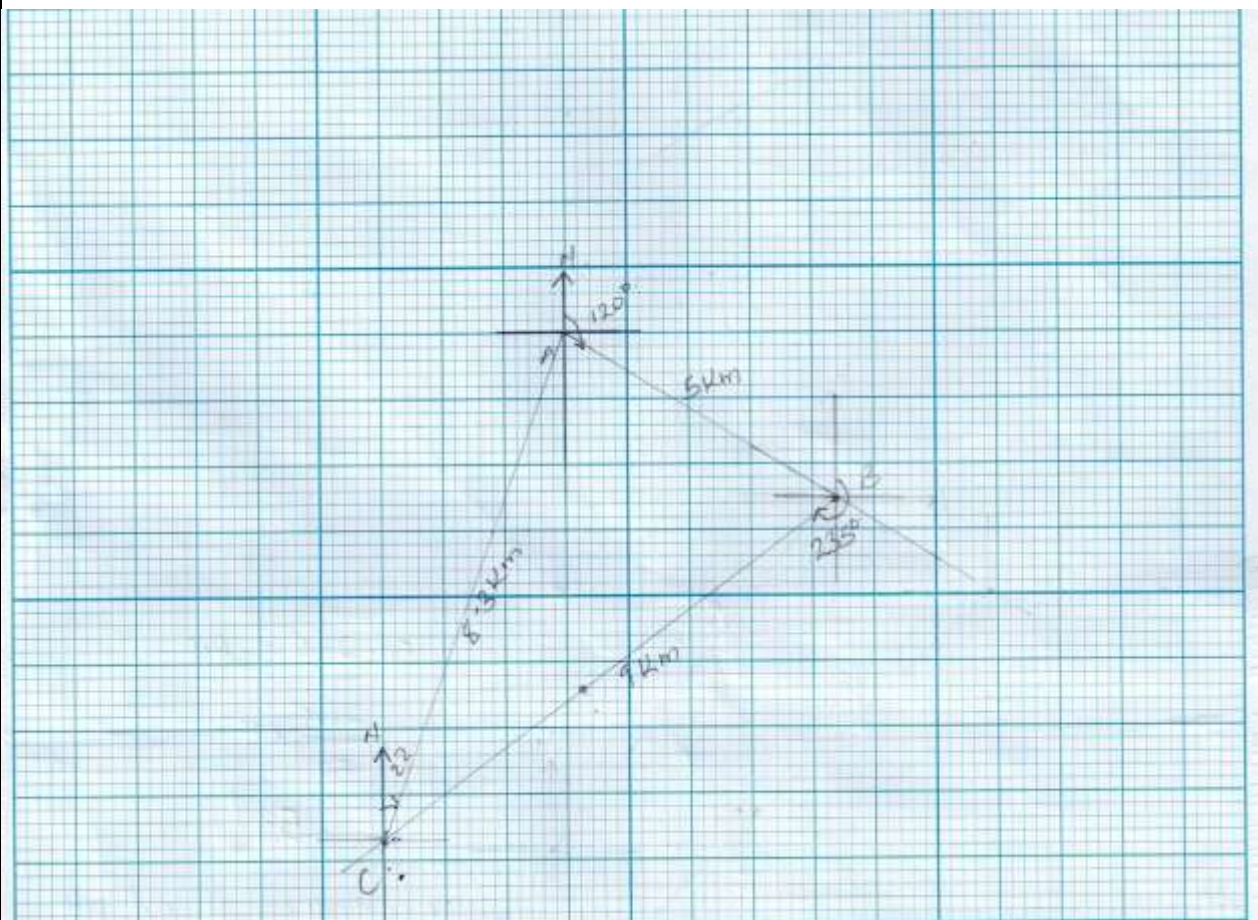
After tax $935,000 - 182,500 = 752,500$

After upkeep $752,500 - 400,000$

$= 352,500$

Yes she will be able to pay the insurance premium because the money remaining is more than the amount she wants to pay.

ITEM 24



Direction of A from C = 022°

Total distance to be covered

Distance from C to A directly = 8.3km

Total distance = $5 + 9 + 8.3 = 22.3\text{km}$

Number of litres to be used = 22.3×2

$= 44.6\text{litres}$

Cost of fuel = 44.6×5500

$= 245,300$

Total cost = $500,000 + 245,300$

$= 754,300$

$$= \frac{5}{100} \times 100,000 = 5000$$

$$\begin{aligned} \text{Total cost of fuel} &= 245,300 - (5000 \times 2) \\ &= \text{ugx}235,300 \end{aligned}$$

He will save ugx10,000 on fuel

ITEM 25

$$\begin{aligned} \text{a (i) Amount} &= P \left[1 + \frac{r}{100} \right]^t \quad (A = 1) \\ &= 5,000,000 \left[1 + \frac{20}{100} \right]^3 \quad (A = 1) \\ &= \text{Ugx } 8,640,000 \quad (m = 1) \end{aligned}$$

$$\text{a (ii) Amount} = \text{Ugx } 14,000,000$$

$$\begin{aligned} \text{Customer is to pay} &= (100 - 10) \% \times 14,000,000 \quad (A = 1) \\ &= 12,600,000 \text{ Ugx} \quad (m = 1) \end{aligned}$$

$$\begin{aligned} \text{Broker's commission} &= \frac{5 \times 12,600,000}{100} \quad (A = 1) \\ &= \text{Ugx } 630,000 \quad (m = 1) \end{aligned}$$

$$\begin{aligned} \text{Total expenses} &= \text{Broker's commission} + \text{LC 1 Amount} \\ &= 630,000 + 350,000 \quad (A = 1) \\ &= \text{Ugx } 980,000 \quad (m = 1) \end{aligned}$$

$$\begin{aligned} \text{Amount he will remain with} &= \text{amount customer is to pay} - \text{total expenses} \\ &= 12,600,000 - 980,000 \quad (A = 1) \\ &= 11,620,000 \quad (A = 1) \end{aligned}$$

Conclusion: yes he will be able to pay the loan amount if he sells the land because the amount he is to get is greater than the lower amount. Ap=2

$$\begin{aligned} \text{(b) Time now} &= 16 : 45 \quad (A = 1) \\ &\quad - \underline{12 : 00} \\ &\quad \quad 4 : 45 \text{pm} \quad (m = 1) \end{aligned}$$

$$\begin{aligned} \text{Time he has} &= 4 : 60 \quad (A = 1) \\ &\quad - \underline{4 : 45} \\ &\quad \quad 15 \text{minutes} \quad (m = 1) \end{aligned}$$

$$\begin{aligned} \text{Distance} &= \begin{pmatrix} 12 \\ 8 \end{pmatrix} - \begin{pmatrix} 4 \\ 2 \end{pmatrix} = \begin{pmatrix} 8 \\ 6 \end{pmatrix} \quad (A = 1) \\ &= \sqrt{8^2 + 6^2} \quad (A = 1) \\ &= 10 \text{km} \quad (m = 1) \end{aligned}$$

$$\begin{aligned} \text{Time} &= \frac{\text{Distance}}{\text{Speed}} \quad (A=1) = \frac{10}{50} \text{ hours} \quad (A=1) \\ &= (0.2 \times 60) \text{ minutes} \quad (A=1) \\ &= 12 \text{ minutes} \quad (m=1) \end{aligned}$$

Conclusion: Yes because the time he can use to reach school is less than the time he has. (Ap=2)

ITEM 26

a (i) capacity (volume) = 2744cm^3

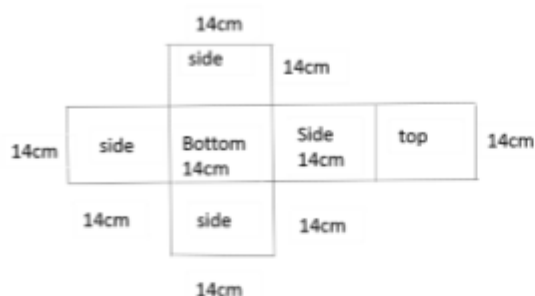
Volume = $S \times S \times S$ (since it is to be made of squares) (A=1)

$$S^3 = 2744 (m=1)$$

$$\sqrt[3]{S^3} = \sqrt[3]{2744} \quad (M = 1)$$

$$S = 14\text{cm} (m = 1)$$

S fetch he will follow to arrange all the faces such that the box folds and closes.



$$(A = 1)$$

$$(Ap = 1)$$

$$(b) \text{ Income tax: } \frac{0}{100} \times 100,000 = \text{Ugx } 0 \quad (A = 1)$$

$$\frac{5}{100} \times 100,000 = \text{Ugx } 5,000$$

$$\frac{10}{100} \times 100,000 = \text{Ugx } 10,000$$

$$\text{Ugx } 15,000 (m = 1)$$

His new salary will be: $300,000 - 15,000$ (A = 1)

$$\text{Ugx } 285,000 (m = 1)$$

$$(c) 20\text{m/s} \longrightarrow \text{km/hr} (A = 1)$$

$$\frac{20}{100} \times \frac{3600}{1} = 72\text{km/hr} (m = 1)$$

$$45\text{mins} \longrightarrow \text{Hours}$$

$$\left[\frac{45}{60} \right] \text{ hours} \quad (A = 1)$$

$$= 0.75\text{hours} (m = 1)$$

$$D = S \times T = 72 \times 0.75 \text{ (A = 1)} = 54\text{km (m = 1)}$$

$$1\text{km} = 0.035\text{litres}$$

$$54\text{km} = 54 \times 0.035 \text{ (A = 1)}$$

$$= 1.89 \text{ litres (M = 1)}$$

$$1 \text{ litre} = \text{UGX } 5,000$$

$$1.89\text{litres} = 1.89 \times 5,000 \text{ (A=1)}$$

$$= \text{UGX } 9,450 \text{ (m = 1)}$$

He will ask for Ugx 9,450 from the customer (Ap = 1)

A = Analysis

M = Manipulation

Ap = Application

END