456/1
MATHEMATICS
Paper 1
Oct./Nov. 2024
$2\frac{1}{4}$ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

This paper has **two** *Sections;* **A** *and* **B**. *It consists of* **six** *examination items.*

Section **A** *has* **two compulsory** *items.*

Section **B** *has* **two** *Parts;* **I** *and* **II**. *Answer* **one** *item from each part.*

Answer **four** *examination items in all.*

Any additional item(s) answered will **not** *be scored.*

All *answers* **must** *be written in the Answer booklet(s) provided.*

Graph Paper is provided.

Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

SECTION A

Answer **both** *items in this section.*

Item 1.
Two friends, Sarah and Moses, started a poultry project to which they contributed Shs4,000,000 and Shs6,000,000 respectively.

They agreed to share the profits in the ratio of their contributions and the project started with 2,000 birds.

After selling all the birds, they made a profit of one million five hundred thousand shillings. They re-invested the profit in the project and the number of birds increased to 2,500. However, Moses was not sure of the amount he re-invested as well as the percentage increase in the number of birds.

On 1st March 2024, they bought feeds and also balanced their books of accounts. On that very day, they had a meeting in which they agreed to buy feeds after every 7 days and balance their books of accounts after every 15 days. However, Sarah wondered if there would be another date in the future on which they would buy feeds and balance their books of accounts on the same day.

Task:

(a) How much of the profit did Moses re-invest in the business?

(b) What was the percentage increase in the number of birds?

(c) On what date in the future would they buy the feeds and also balance their books of accounts the same day?

Item 2.
A tailor makes school uniforms for boys and girls. The tailor makes at least 80 sets of uniforms for boys and not more than 100 sets of uniforms for girls. Each set of uniform for boys requires 4 m of material and each set of uniform for girls requires 3 m of material. The tailor has at most 600 m of material to use. The tailor makes a profit of Shs8,000 on each set of boy's uniform and Shs6,000 on each set of girl's uniform. The tailor is not sure of the number of sets of uniforms to make in order to maximise profit.

Task:

(a) Express the tailor's conditions as inequalities and equations.

(b) Show the feasible region of the tailor's conditions on a Cartesian plane.

(c) Help the tailor to determine the possible number of sets of boys' and girls' uniforms that should be made to maximise profit. Hence, state the maximum amount of money the tailor is likely to make.

SECTION B

This Section has **two** *Parts;* **I** *and* **II**

Part I

Answer **one** *item from this part*

Item 3.

James has been sent to a certain region to find out whether it is necessary to set up a new office for processing National Identity Cards, Driving Permits and Passports, if the probability of a person having only one document is less than 50%.

James randomly interviewed 75 people in that region. He found that 18 people did not have any of the three documents, 30 people had Driving Permits and 20 people had Passports. The number of people who had both National Identity Cards and Driving Permits only, was twice those who had Passports and Driving Permits but no National Identity Cards. 4 people had Passports only.

3 people had all the three documents and 12 people had Driving Permits only. James has to report about the number of people who have National Identity Cards but he has some missing information.

Task:

(a) Help James to find the total number of people with National Identity Cards.

(b) Determine if there is need for a new office in the region. Give a reason for your answer.

Item 4.

A farmers' cooperative society gave out fertilisers to a sample of maize farmers in the first season. The number of bags of maize harvested in the first season are given below.

20	40	60	55	36	69	59	78	47	66
59	70	53	24	63	50	46	38	68	57
30	65	58	61	57	86	77	54	29	88
62	44	89	45	87	65	47	49	52	69
41	80	37	56	74	27	76	58	79	39

The society wants;

(i) the data to be presented in a frequency distribution table with classes of interval 10 for easy interpretation.

(ii) to determine the number of bags of maize above which half of the farmers harvested so as to establish the real effect of the fertilizers.

(iii) to determine the number of farmers whose harvest is 44.5 bags of maize and below for re-training before the second season but they lack the information.

Task:

Help the society to;

(a) represent the data in a frequency distribution table.

(b) determine the number of bags of maize above which half of the farmers harvested.

(c) determine the number of farmers for re-training.

Part II

Answer **one** *item from this part.*

Item 5.

Your sister bakes cakes and has received an order for a cake from your friend, Joseph, who needs a cylindrical cake with a base area of 660.5 cm^2.

Your sister has suggested two payment plans to Joseph. He can pay Shs400,000 cash or pay a deposit of Shs200,000 and 2 equal instalments of Shs110,000 each. However, Joseph has found it hard to decide on the payment plan.

Your sister has a triangular board that she wants to use to cut out the circular tray on which the base of the cake will sit. The two sides of the triangular board measure 60 cm and 48 cm, and the angle between these sides is 60°.

Your sister is not sure whether the largest circular tray (inscribed circle) she can cut out of the triangular board will be enough for the base of the cake.

Task:

(a) Which of the two payment plans will you recommend to Joseph? Give a reason for your answer.

(b) Determine whether the largest circular tray she plans to cut out of the triangular board will be enough for the base of the cake.

Item 6.

Your brother wants to design a children's playground. The playground will have a triangular garden and a circular fence around the garden. The two sides of the triangular garden will measure 50 m and 70 m, and the angle between them will be 45^{o}.

Your brother also wants to construct a circular fence around the garden such that the circular fence perfectly touches the three vertices of the triangular garden.

Your brother intends to put pavers in the region outside the triangular garden but inside the circular fence. Each square metre of pavers costs Shs35,000.

Your brother needs help in identifying the type of triangle represented by the triangular garden, coming up with an accurate design of the playground as well as the cost of buying the pavers.

Task:

Help your brother to;

(a) construct an accurate design of the children's playground.

(b) identify the type of triangle represented by the triangular garden and give a reason for your answer.

(c) determine the amount of money needed to buy the pavers.

END

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PROPOSED MARKING (SCORING) GUIDE:

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ITEM 1:

(a) Total ratio = 4000000 + 6000000
= shs. 10,000,000.

Profit re-invested by Moses.
$= \frac{6,000,000}{10,000,000} \times 1,500,000$

$= 60,000 \times 15$
$=$ shs. 900,000

∴ Moses reinvested shs. 900,000

(b) Let the percentage increase be x

$\frac{100+x}{100} \times 2000 = 2500$

$200000 + 2000x = 250000$
$2000x = 50000$
$x = 25\%$

∴ The percentage increase in the number of birds was 25%

(c) h.c.m = 15 × 7 = 105 days

$\frac{105 \text{ days}}{7 \text{ days}} = 15$ weeks.

15 weeks = 3 months and 3 weeks.
4 weeks

⇒ 14th, June, 2024

∴ They will buy the feeds and also balance their books of accounts simultaneously on 14th, June, 2024:

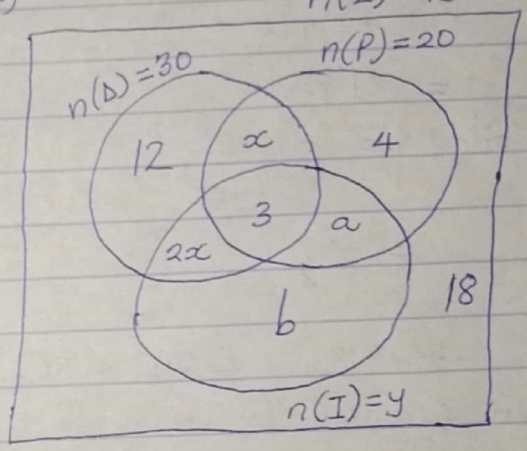
ITEM 2: See graph

SECTION B:

Part I:

ITEM 3:

(a)



for set D; $12 + x + 2x + 3 = 30$
$3x + 15 = 30$
$3x = 30 - 15$
$3x = 15$
$x = 5$ people

for set P;
$3 + 4 + a + x = 20$
$3 + 4 + 5 + a = 20$
$12 + a = 20$
$a = 8$ people

for set I; $y = a + 2x + 3 + b$
$y = 8 + 2 \times 5 + 3 + b$
$y = 8 + 10 + 3 + b$
$y = 21 + b$ ----- ①

for universal set (ξ):

$a+b+2x+3+x+12+4+18=75$

$b+8+2x5+3+5+12+4+18=75$

$b+60=75$

$b=15$ people.

$y=21+b=21+15=36$ people.

∴ 36 people have National Identity Cards.

(b) People with only one document

$= b+4+12$

$= 15+4+12$

$= 31$ people.

Probability $= \frac{31 \text{ people}}{75 \text{ people}}$

$= \frac{31}{75}$

$= 0.4133 \quad \angle 0.5$ or 50%.

∴ There is a need for a new office in the region since the probability of a person having only one document was 0.4133 which is less than 0.5 ∴

ITEM 4:

(i)

Classes	Tallies	f	x	fx	Cf	CBs
20-29	////	4	24.5	98	4	19.5-29.5
30-39	###	5	34.5	172.5	9	29.5-39.5
40-49	###///	8	44.5	356	17	39.5-49.5
50-59	###### //	12	54.5	654	29	49.5-59.5
60-69	### ###	10	64.5	645	39	59.5-69.5
70-79	### /	6	74.5	447	45	69.5-79.5
80-89	###	5	84.5	422.5	50	79.5-89.5
		$\Sigma f = 50$		$\Sigma fx = 2795$		

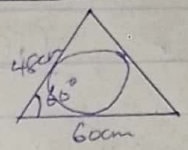
(ii) and (iii)

See graph.

PART II:

ITEM 5:

Sketch:



Accurate diagram:

Radius, r = 16cm

Area of ~~triangular~~ circular tray to be cut out $= \pi r^2$

$= \frac{22}{7} \times 16 \times 16$

$= 804.5714 \text{ cm}^2$

Extra area $= 804.5714 - 660.5$

$= 144.0714 \text{ cm}^2$

∴ The triangular board she plans to cut out will be enough for the base of the cake since there will be extra unused area of 144.0714cm^2.

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(To be fastened together with other answers to paper)

UACE

Candidate's Name .....

Signature .....

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

Random No.					
Personal Number					

ITEM 2:

(a) Let the sets of boy's uniform be x

Let the sets of girl's uniform be y.

$x \geq 80$ ----① $x = 80$ (solid line)

$y \leq 100$ ----② $y = 100$ (solid line)

$4x + 3y \leq 600$ ---③ $4x + 3y = 600$ (solid line)

$x \geq 0$ ---④

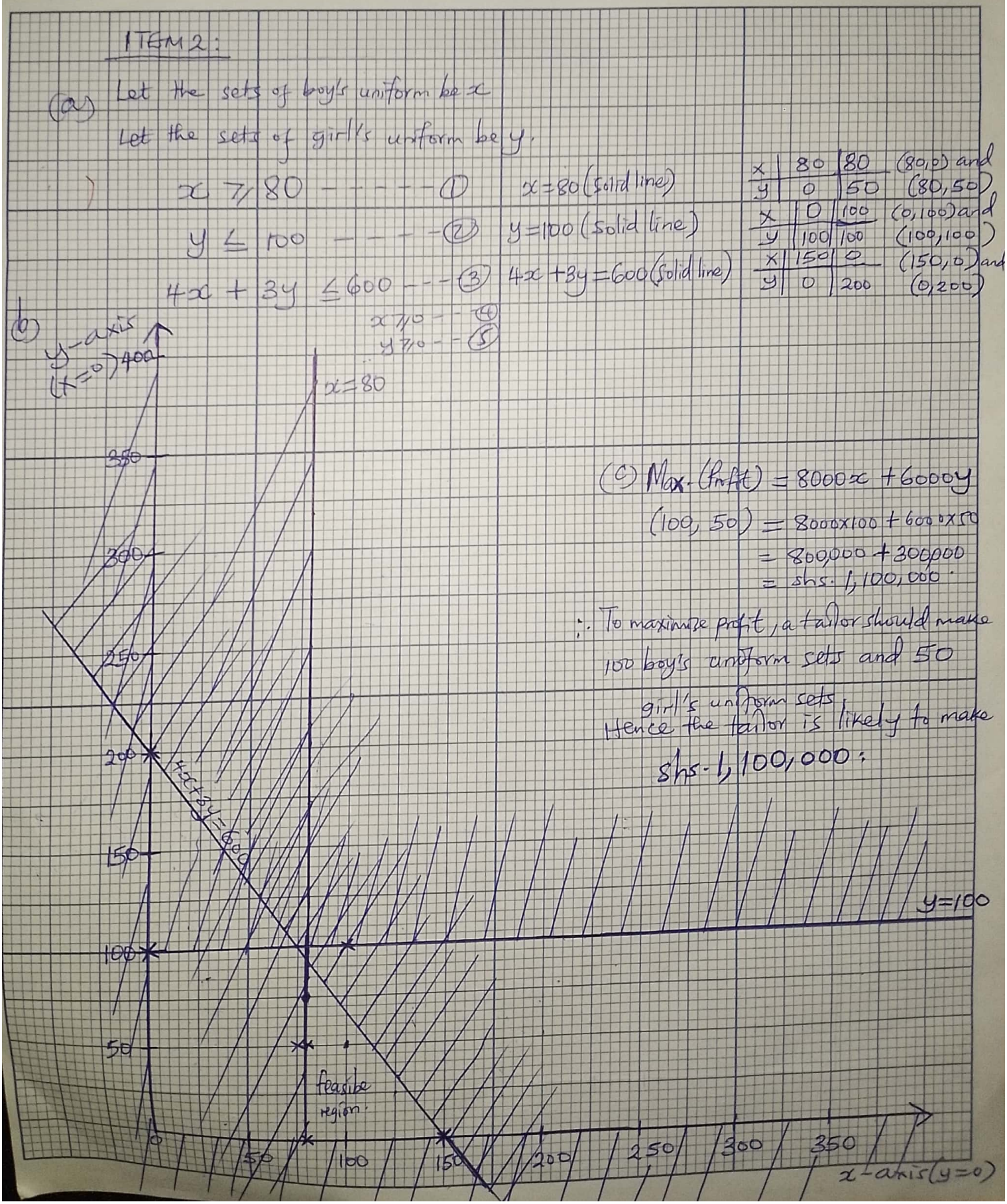
$y \geq 0$ ---⑤

x	80	80	(80,0) and
y	0	50	(80,50)

x	0	100	(0,100) and
y	100	100	(100,100)

x	150	0	(150,0) and
y	0	200	(0,200)

(b)



(c) Max. (Profit) $= 8000x + 6000y$

$(100, 50) = 8000 \times 100 + 6000 \times 50$

$= 800{,}000 + 300{,}000$

$=$ shs. 1,100,000.

∴ To maximize profit, a tailor should make 100 boy's uniform sets and 50 girl's uniform sets

Hence the tailor is likely to make shs. 1,100,000:

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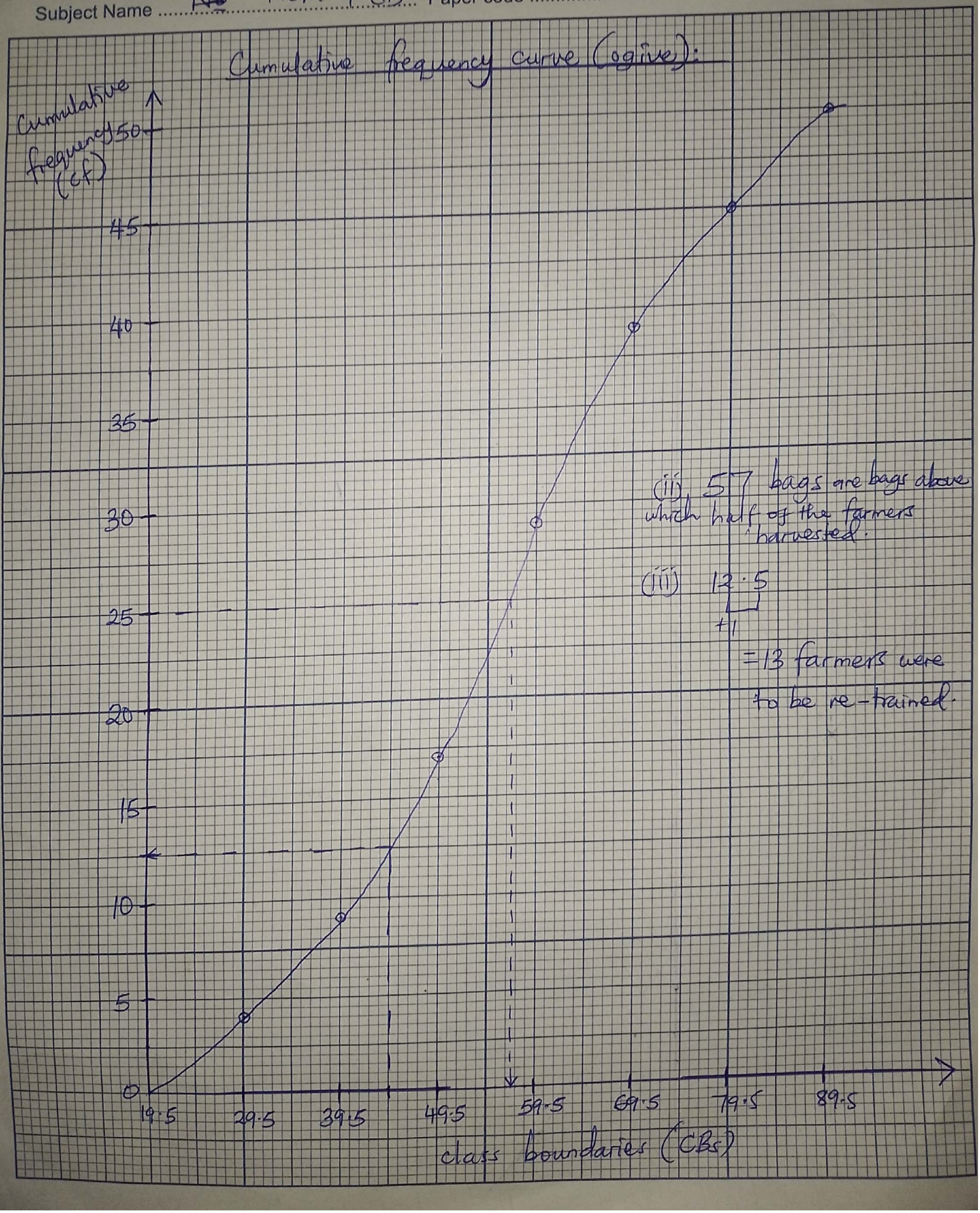
UACE

Candidate's Name .....

Signature .....

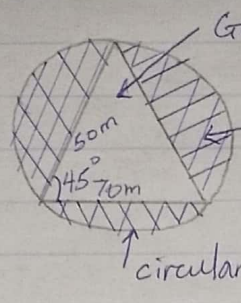
Subject Name ~~No~~ ITEM 4 (ii) and (iii) Paper code ...../.....

Random No.					
Personal Number					



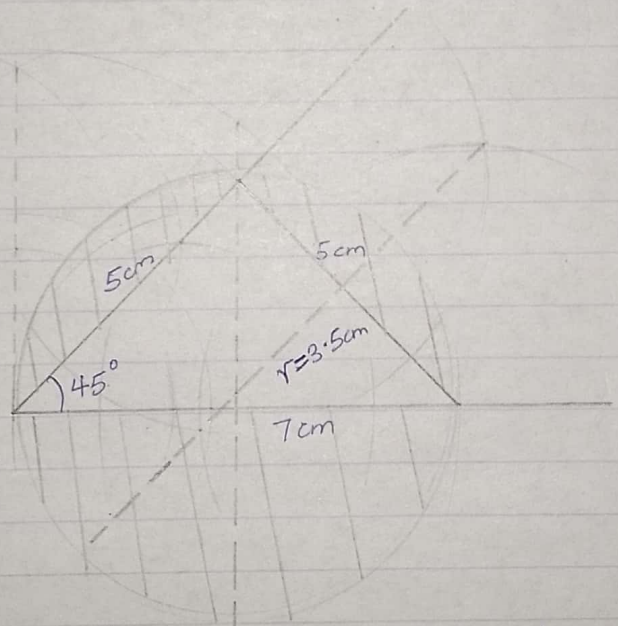
ITEM 6:

(a) Sketch



Accurate diagram:

Scale: 1cm on paper represents 10m on land.



(b) Isosceles triangle Reason: It has two equal sides of 50m each.

(c) Area of the circular fence $= \pi r^2 = \frac{22}{7} \times 35 \times 35 = 3850m^2$

Area of the triangular garden $= \frac{1}{2}bc\sin A = \frac{1}{2} \times 50 \times 70 \times \sin 45^\circ$

$= 1237.4369m^2$

Area to be paved (shaded area) $= 3850 - 1237.4369 = 2612.5631m^2$

Amount of money to buy the pavers = ~~Number of pavers X~~

$= (35000 \times 2612.5631)$ shs.

$=$ shs. 91,439,709

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← END → ← GOOD LUCK → ← ALUTA CONTINUA →

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