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MATHEMATICS

PAPER 1

2 ¼ HOURS



**TESO SECONDARY SCHOOLS MOCK EXAMINATIONS
ASSOCIATION (TESSMEA) 2025**

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 Hours 15 Minutes

INSTRUCTIONS TO CANDIDATES:

- *Attempt both items in section A and one from each part in section B.*
- *Graph papers are provided.*
- *All working must be shown clearly.*
- *Silent non-programmable calculators may be used.*
- *Any additional item answered will not be scored.*

Turn Over

SECTION A

Attempt both items in this section

Item One

A mixed school has hired 4 barbers Ivan , Stephen, Jane and Tembo to cut the hair of their students termly. They always start working together at 1:25pm on gazetted days and they must take a break together when a student's hair is completely trimmed.

Ivan takes 15 minutes, Stephen takes 10 minutes, Jane takes 30 minutes and Tembo takes 20 minutes handling each student. The barbers wish to know when they will take a break together. The school charges school fees of Ugx 1,500,000 per term. A barber is paid Ugx 2,500 per haircut.

However, in the annual general meeting, parents and the school management resolved that one -two hundredth of the school fees will meet the cost of trimming hair four times in a term and 12% of the remainder to cater for the cost of food per student. In reality, the school is spending Ugx 320,000 for each student's feeding termly.

Task

- a)
 - (i) At what time will the barbers take a break together?
 - (ii) How many students will the barbers have trimmed their hair by then?
- b)
 - (i) How much money will the school spend on each student for hair cutting each term?
 - (ii) Is the school budgeting enough money for hair trimming? Justify
 - (iii) Is the amount set aside for food enough considering only one student? Give a reason.

Item Two

A district Agricultural Officer has secured 50 experimental gardens for the growing of cassava and sweet potatoes in the district. Each garden of cassava yields a profit of Ugx 10,500,000 while that of sweet potatoes yields a profit of Ugx 9,000,000.

The expert from the Ministry of Agriculture advised the agricultural officer to apply 20 litres of fertilizer in each garden of ^{Cassava} ~~groundnuts~~ and 10 litres of

fertilizer for each garden of sweet potatoes. However, the district has only 800 litres of fertilizer but the agricultural officer is not certain of the right number of gardens to plant cassava and sweet potatoes that will give him maximum profit. Your assistance as a student of mathematics is vital.

Task

- (a) Write down mathematical statements to represent the above information.
- (b) Show a feasible region for the same information above.
- (c) Determine the number of gardens to be allocated for each crop so as to maximise profits. Hence, determine the maximum profit.

SECTION B

Part 1

Answer one item from this part.

Item Three

The department of Health in Soroti City council is conducting a survey about the existence of three unique strains of malaria parasites in boarding schools.

A bylaw was arrived at, that schools be closed if a chance of a student testing positive with at least two strains of malaria parasites is above 45%. The local government selected a sample of students and tested them for the three parasite strains. The findings were that 50 students tested positive with Celin parasites. 60 students tested positive with Euglin parasites and 40 students tested positive with Tetrin parasites. Additionally, 20 tested positive with parasites of Celin and Euglin. 10 tested positive with Celin and Tetrin. 15 tested positive with Euglin and Tetrin parasites. 20 students tested positive with Tetrin parasites only. The correct data also show that 40 students tested negative for any of the parasite strains.

Task

- (a) Determine the number of students who were tested in the city.
- (b) Calculate the probability of a student testing positive with at least two strains of malaria parasites.
- (c) Advise the department of health in the city with a reason based on the calculation whether to close the schools or not.

Item Four

A poultry farm has been contracted to supply eggs for 40 days consecutively to an orphanage home. The data below are the actual number of eggs the farm supplied.

138 ✓ 145^s 145^s 149^s 150 ✓ 142 ✓ 154 ✓ 140 ✓
146^s 135^t 128 ✓ 157^t 164 ✓ 147^s 152 ✓ 138 ✓
168 ✓ 142 ✓ 135^x 125 ✓ 158^t 135^x 148 ✓ 176 ✓
146^s 150 ✓ 165 ✓ 144 ✓ 126 ✓ 153 ✓ 136^x 163 ✓
161 ✓ 156 ✓ 144 ✓ 132 ✓ 176 ✓ 140 ✓ 147 ✓ 130 ✓

To cater for all employees and the orphans well, the management of the orphanage home has agreed that on average 168 eggs be supplied, otherwise the supplier be changed.

Task

- Construct a tally chart with classes of the equal interval starting with 125-129
- Draw a suitable statistical graph and use it to estimate the median number of eggs supplied.
- Will the supplier be changed? Justify.

Part II

Answer one item from this part

Item Five

An air force sophisticated Mig with very many drones attached to it from USA left an army base in Israel on a bearing of 130° for a mission in Iran. After covering a distance of 300km, it changed course and flew on a bearing of $N30^\circ E$ to hit a nuclear power base in Iran. At exactly 07:30 hours a fleet of drones belonging to Israel government left Israel army base on a bearing of 070° to support the USA drones so as to destroy the same nuclear power base in Iran at the same time.

Task

- Draw to scale a diagram showing the routes followed by the USA drones and the Israel drones.
- How far is the Iran Nuclear power base from Israel using the direct route?
- At what time did the drones from USA and Israel hit the Nuclear power base in Iran if they were moving at 600km/h?

Item Six

Margret is a clinical officer working in a private secondary school in Teso sub-region. Her gross monthly income has allowances deducted before taxation is done. Her allowances include; medical allowance of Ugx. 55,000 per month, food relief of Ugx 360,000 per annum, insurance Ugx 20,000 per month, child monthly allowance of Ugx 6,000 for a child below 10 years and Ugx 10,000 for a child above 10 years but below 18 years.

Margret has 3 children aged 4,6 and 8 years and one aged 15 years. She pays Ugx 125,000 as income tax per month.

The tax structure below applies to all employees in the country.

Taxable Income (Ugx) Per Month	Tax rate (%)
0 – 120,000	5
120,001 - 200,000	10
200,001 – 350,000	15
350,001 – 500,000	25
Above 500,000	30

Margret wished to enrol in the evening classes for a course in financial management. The course needs Ugx 695,000 per month. She is worried whether she will be in position to realise tuition every month.

Task

- (a) Help the school bursar to determine the;
- Gross monthly income Margret earns
 - Take home Margret will enjoy monthly.
 - Percentage of Margret's gross income that goes to tax.
- (b) Will Margret be in position to enrol for studies? Give a reason for your answer.

END

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TESSMÉA 2025



**TESO SECONDARY SCHOOLS MOCK EXAMINATION
ASSOCIATION (TESSMEA) 2025.**

SCORING GUIDE FOR UCE MATHEMATICS

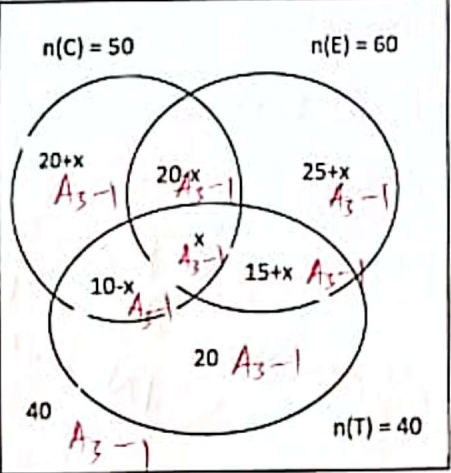
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Item	Solution	Competence	Score
1a	$\begin{array}{ccccc} 2 & 15 & 10 & 30 & 20 \\ 2 & 15 & 5 & 15 & 10 \\ 3 & 15 & 5 & 15 & 5 \\ 5 & 5 & 5 & 5 & 5 \\ & 1 & 1 & 1 & 1 \end{array}$		
(i)	$\begin{aligned} \text{LCM} &= 2 \times 2 \times 3 \times 5 & I-1 \\ &= 60 \text{ minutes} & M_1-1 \\ &= 60/60 \text{ hours} & I-1 \\ &= 1 \text{ hour} & M_1-1 \end{aligned}$	Computing LCM in minutes	1
	$\begin{aligned} \text{Starting time} &= 1:25 \text{ pm} \\ \text{First break} &= 1:25\text{pm} + 1\text{hr} & I-1 \\ &= 2:25 \text{ pm} & M_1-1 \end{aligned}$	Changing minutes to hours	1
	$\begin{aligned} \text{Starting time} &= 1:25 \text{ pm} \\ \text{First break} &= 1:25\text{pm} + 1\text{hr} & I-1 \\ &= 2:25 \text{ pm} & M_1-1 \end{aligned}$	Adding LCM to starting time computing correct time Responding to the task	1 1 1
	$\therefore \text{The barbers will take first break at } 2:25 \text{ pm}$		1
ii)	$\begin{aligned} \text{Ivan} &= \frac{60}{15} \text{ students} & I-1 \\ &= 4 \text{ students} \\ \text{Stephen} &= \frac{60}{10} \text{ students} & I-1 \\ &= 6 \text{ students} \\ \text{Jane} &= \frac{60}{30} \text{ students} & I-1 \\ &= 2 \text{ students} \\ \text{Tembo} &= \frac{60}{20} \text{ students} & I-1 \\ &= 3 \text{ students} \end{aligned}$	Computing students trimmed by Ivan	1
	$\begin{aligned} \text{Total number of students} &= 4 + 6 + 2 + 3 & I-1 \\ &= 15 & M_1-1 \end{aligned}$	Getting students trimmed by Stephen	1
	$\therefore \text{The barbers will have trimmed } 15 \text{ students by the break}$	Getting students trimmed by Jane	1
		Getting students trimmed by Tembo	1
		Computing total number of students by adding correct total.	1
		Responding to the task	1

b (i)	<p>1 student = Ugx 2,500 Per trimming</p> <p>1 student = Ugx (4x2,500) I-1 4 times = Ugx 10,000 M₁-1 ∴ The school will spend AP-1 Ugx. 10,000 per term</p>	<p>Computing total amount for trimming one student</p> <p>1</p> <p>1</p> <p>1</p> <p>Responding to the task</p>	
ii).	<p>Budgeted amount for one student Per term = Ugx (1/200 x 1,500,000) I-1 = Ugx 7,500 M₁-1</p> <p>Hence, the school is not budgeting enough because there is a deficit of AP-1 Ugx 2,500</p>	<p>Computing the budgeting figure</p> <p>1</p> <p>1</p> <p>Responding to the task</p>	<p>I-13</p> <p>M₁-08</p> <p>AP-6</p>
iii)	<p>Remaining = Ugx (1,500,000-7,500) = Ugx 1,492,500</p> <p>Money budgeted for food = Ugx $\frac{12}{100} \times 1,492,500$ = Ugx 179,100</p> <p>Actual expenditure = Ugx 320,000 ∴ The amount set aside for food is Not enough because there is a deficit of Ugx. 140,900</p>	<p>Getting the remaining amount</p> <p>2-1</p> <p>Calculating amount budgeted for food.</p> <p>M₁-1</p> <p>I-1</p> <p>M₁-1</p> <p>AP-1</p> <p>1</p> <p>(21)-1</p> <p>Responding to the task with a reason.</p>	
2(a)	<p>Let x : number of gardens for cassava y: number of gardens for sweet potatoes</p> <p>$x+y \leq 50$(1)</p> <p>profit = 10,500,000x + 9,000,000y.....(2)</p> <p>$2x + y \leq 80$(3) + 10y ≤ 50</p> <p>$x \geq 0$(4)</p> <p>$y \geq 0$(5)</p> <p>} any of one condition</p>	<p>Defining both variables</p> <p>Getting objective function</p> <p>Inequality from fertilizers</p> <p>Possibility of cassava gardens</p> <p>Possibility of sweet potatoes gardens.</p>	<p>F-1</p> <p>1</p> <p>F-1</p> <p>1</p> <p>F-1</p> <p>F-1</p> <p>F-1</p>
b).	<p>Boundary lines intercepts</p> <p>$X + y = 50$ (50, 0), (0,50) E₁</p> <p>$2x + y = 80$ (0,80), (40,0) M₂-1</p> <p>Scale M₂-1 consistent set</p> <p>Labelling axes M₂-1</p> <p>Using scale M₂-1 plotting and joining</p> <p>Naming lines M₂-1 direct one line</p> <p>Shading regions M₂-1</p> <p>Title</p> <p>Feasible region M₂-1</p> <p>Drawing lines</p>	<p>For any correct boundary line for any correct pair of intercepts</p>	<p>F-1 - any eqn.</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

B	S	0
F	0	1
	1-3	10
	4-6	12
	7-9	1

Item	0	1	2	3	4	5	6
B	0	1	2	3	4	5	6
F	0	1	2	3	4	5	6
	M ₂						

c)	<p>Lattice points: $(0,50), (30,20), (40,0)$ Point profit $(0,50)$ 450,000,000 $(30,20)$ 495,000,000 $(40,0)$ 420,000,000</p> <p>\therefore 30 gardens of cassava and 20 Gardens of sweet potatoes give Maximum profit of Ugx.495,000,000</p>	<p>Correct lattice points <i>Reading any points</i> Computing maxi profit <i>Substituting into the expression</i></p> <p>Responding to the task quorig gardens and given max. profit. for maximum <i>for 495,000 seen</i></p>	<p>1 1 1 1 1 (20)</p> <p><i>F-6</i> <i>M₂-9</i> <i>AP₂-3</i></p>
3(a)	<p>Let set C : Celin parasites E: Euglin parasites T : Tetrin parasites</p> <p>$n(C) = 50$ $n(E) = 60$ $n(T) = 40$ $n(C \cap T) = 20$ $n(E \cap T) = 15$ $n(C \cup E \cup T)' = 40$ $n(T \cap C' \cap E') = 20$ let $n(C \cap E \cap T)$ be x</p>	<p>Defining sets Analysing data Defining a region of three sets</p>	<p>1 1 1</p> <p><i>P-3</i></p>
	<p>Venn diagram showing students tested with possibility of having parasites</p>  <p>$n(T) = 40$ $10-x+x+15-x+20 = 40$ $45-x = 40$ $x = 5$</p>	<p>Title Labelling sets Entering data into correct region Summing elements in set C Computing value of x</p>	<p>1 1 1 1 1</p>

	Scale Let 1cm : 50 km $\frac{300}{50} = 6\text{cm}$	Coming up with a scale Manipulating the scale	1 1																				
b)	Distance = 9 cm = (9 x 50) km = 450 km ∴ Iran nuclear power base is 450km from Israel	Measuring distance computing distance in km responding to the task	1 1 1																				
c)	Time = D/S = $\frac{450}{600}$ hours = $\frac{3}{4}$ hours = ($\frac{3}{4} \times 60$) minutes = 45 minutes Departure time = 7:30 am Arrival time = 7:30am + 45mins = 8:15am ∴ The drones from Israel and USA hit Iran nuclear power base at 8:15am	Getting time in hours Changing time to minutes Computing time correct time of hitting Responding to the task	1 1 1 1 1 (20)																				
6	Allowances are: (i) ➤ Medical = Ugx . 55,000 ➤ Food relief = Ugx. $\frac{360,000}{12}$ = Ugx. 30,000 ➤ Insurance = 20,000 ➤ Child = Ugx (3x6000+1x10,000) Allowance = Ugx 28,000 Total allowance = Ugx. 133,000	Computing allowance Correct total	1 1																				
	<table border="1"> <thead> <tr> <th>Taxable monthly income</th> <th>Tax rate %</th> <th>amount</th> <th>Income tax</th> </tr> </thead> <tbody> <tr> <td>00-120,000</td> <td>5</td> <td>120,000</td> <td>$\frac{5}{100} \times 120,000$ = 6,000</td> </tr> <tr> <td>120,001-200000</td> <td>10</td> <td>80,000</td> <td>$\frac{10}{100} \times 80,000$ = 8,000</td> </tr> <tr> <td>200,001-350,000</td> <td>15</td> <td>150,000</td> <td>$\frac{15}{100} \times 150,000$ = 22,500</td> </tr> <tr> <td>350,001-500,000</td> <td>25</td> <td>150,000</td> <td>$\frac{25}{100} \times 150,000$ = 37,500</td> </tr> </tbody> </table>	Taxable monthly income	Tax rate %	amount	Income tax	00-120,000	5	120,000	$\frac{5}{100} \times 120,000$ = 6,000	120,001-200000	10	80,000	$\frac{10}{100} \times 80,000$ = 8,000	200,001-350,000	15	150,000	$\frac{15}{100} \times 150,000$ = 22,500	350,001-500,000	25	150,000	$\frac{25}{100} \times 150,000$ = 37,500	Correct column of amount Computing income tax	1 1
Taxable monthly income	Tax rate %	amount	Income tax																				
00-120,000	5	120,000	$\frac{5}{100} \times 120,000$ = 6,000																				
120,001-200000	10	80,000	$\frac{10}{100} \times 80,000$ = 8,000																				
200,001-350,000	15	150,000	$\frac{15}{100} \times 150,000$ = 22,500																				
350,001-500,000	25	150,000	$\frac{25}{100} \times 150,000$ = 37,500																				

$24,000 + 30x$
100

30 ← 6 TES: $\frac{30}{100} \times 50,000$
 $\frac{30}{100} \times = 51,000$

Number Of eggs	Tally	f	x	fx	Class boundary	cf
125-129		3	127	381	124.5-129.5	3
130-134		2	132	264	129.5-134.5	5
135-139		6	137	822	134.5-139.5	11
140-144		6	142	852	139.5-144.5	17
145-149		8	147	1176	144.5-149.5	25
150-154		5	152	760	149.5-154.5	30
155-159		3	157	471	154.5-159.5	33
160-169		3	162	486	159.5-164.5	36
170-174		2	167	334	164.5-169.5	38
175-179		2	172	344	169.5-174.5	40
		$\sum f$ = 40		$\sum fx$ = 5909		

Mean = $\frac{\sum fx}{\sum f}$
 = $\frac{5909}{40}$
 = 147.725

Labelling colours P-1
 Correct/consistent A3-1
 Classes 1
 Computing frequency 1
 Correct $\sum f$ 1
 correct $\sum fx$ 1

b)

Median position = $\left(\frac{N}{2}\right)^{th}$
 = $\left(\frac{40}{2}\right)^{th}$
 = 20th
 Median = 146.5
 \therefore Median number of eggs is 146.5
 Drawing the curve
 Reading off the median using the position

P-1 - Title for
 A3-1 scale
 A3-1 - labelling
 A3 - plotting
 A3 - smooth curve
 A3 - Median position

Computing median position 1
 Correct median 1
 Responding to the task 1

c)

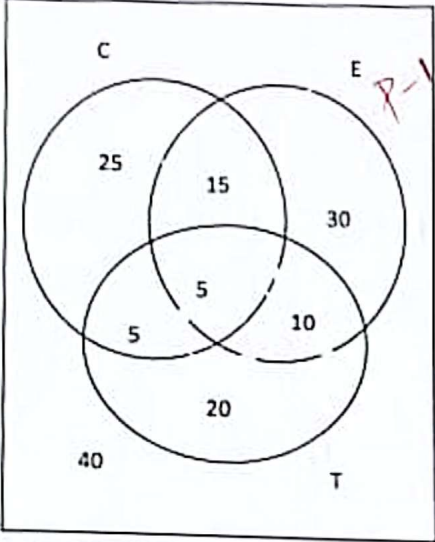
Since mean = $\frac{\sum fx}{\sum f}$
 = $\frac{5909}{40}$
 = 147.725
 Actual average supply of eggs is 147.725
 Planned average supply is 168 eggs
 \therefore The supplier should be changed because the poultry farm supplies eggs less by 20.275 on average

A3-1 median = 146.5 \pm 0.5
 146.5
 147.725
 168
 20.275
 146.5
 147.725
 168
 20.275

Computing mean 1
 Correct mean 1
 Responding to the task with a reason 1

5(a) Sketch drawing

Location of Israel 1
 Location of Iran 1
 showing bearings 1
 showing 300km 1

	 <p> $n(\epsilon) = 40 + 25 + 30 + 20 + 5 + 15 + 10 + 5$ $= 150$ $\therefore 150$ students were tested in the city </p>	<p>Entering correct numeric data into correct regions.</p> <p>Summing element for universal set correct total</p> <p>responding to the task</p>	<p>1</p> <p>1</p> <p>1</p>
<p>b)</p>	<p>At least 2 parasites</p> <p>$= 5 + 15 + 10 + 5$</p> <p>$= 35$</p> <p>Probability $= \frac{35}{150}$</p> <p>$= \frac{7}{30}$</p> <p>\therefore Probability of a student testing positive with at least 2 parasites is $\frac{7}{30}$</p>	<p>Total right values</p> <p>Use of right formula</p> <p>Correct probability</p> <p>Responding to the task</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>c)</p>	<p>Percentage of students tested positive with at least 2 parasites</p> <p>$= \frac{7}{30} \times 100$</p> <p>$= 23.3\%$</p> <p>$\therefore$ Schools won't be closed because The percentage of those with at least 2 parasites is less than 45% by 21.7%</p>	<p>Getting correct percentage</p> <p>Responding to the task with a justification</p>	<p>1</p> <p>1</p>
<p>4(a)</p>	<p>A tally chart showing number of eggs supplied by a poultry farm to an orphanage home</p>	<p>Title</p>	<p>1</p>

	Above 500,000	X			
	$\frac{3x}{10} = 51,000$ AY-1				Computing value of x
	X = 170,000 MY-1				1
	Taxable income = Ugx (500,000 + 170,000) AY-1				Computing taxable income
	= Ugx. 670,000 MY-1				1
	Gross monthly income = allowances + taxable income AY-1				Adding allowances to taxable income
	= Ugx. (133,000 + 670,000) MY-1				Correct gross income
	= Ugx. 803,000				1
	∴ Margret earns gross monthly income of Ugx. 803,000 APY-1				Responding to the tax
					1
ii)	Net income = Gross - tax				Correct x set income
	= Ugx. (803,000 - 125,000) AY-1				1
	= Ugx. 678,000 MY-1				
	∴ Margret enjoys take home of Ugx. 678,000 monthly. APY-1				
iii)	% of gross income that goes to tax				Correct %
	$\frac{125,000}{803,000} \times 100$ AY-1				1
	= 15.5% MY-1				Responding to the task
	∴ Margret's gross income that goes to tax is 15.5% APY-1				1
b)	Tuition = Ugx 695,000 per month				Responding to the task with a reason
	Margret's take home = Ugx 678,000 per month				1
	∴ Margret <u>can't</u> enrol for studies because she has a deficit of Ugx 17,000 APY-1				(15)

$$AY-1 \quad 74,000 + \frac{3}{10}(X - 500,000) = 125,000 \text{ END}$$

$$\frac{3}{10}(X - 500,000) = 51,000 \text{ AY-1}$$

$$\frac{3X}{10} = 201,000$$

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670,000

Home

	B	S	W
16	AY	$\frac{0}{5-11}$	
11	MY		
4	APY		