456/1
MATHEMATICS
Paper 1
2½ hours

EXTERNAL MOCK EXAMINATIONS 2022 (SET 1)

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** *questions in section* **A** *and any* **five** *questions from section* **B**.

Any additional question(s) answered will **not** *be marked.*

All *necessary calculations must be done in the answer booklet provided; therefore, no paper should be given for rough work.*

Squared paper is provided.

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

Neat work is a must!!

SECTION A: (40 MARKS)

Answer **all** *questions in this section.*

1. Factorize $1 - xy - x^2 - y$ completely. *(04 marks)*

2. Solve for x in the equation $\frac{x-3}{4} - \frac{x-5}{6} = 2$ *(04 marks)*

3. Given that matrix $A = \begin{pmatrix} 5 & 4 \\ 2 & 3 \end{pmatrix}$. Find the inverse of A^2. *(04 marks)*

4. The table below shows the ages of army recruits.

Age (years)	$20-22$	$23-25$	$26-28$	$29-31$	$32-34$
Number of recruits	3	x	12	9	2

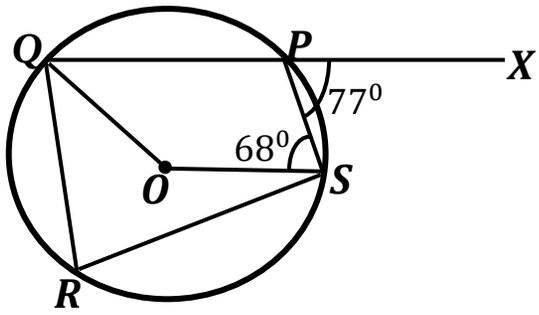
Given that the mode is 27.5 and modal class is $26-28$; find the value of x. *(04 marks)*

5. Make x the subject of the formula.

$$t = \sqrt{\frac{2(x-ut)}{a}}$$ *(04 marks)*

6. Given that $x * y = x(x+1) - y(y+1)$. Find the value of $(-4 * 2) * 3$ *(04 marks)*

7. The figure below shows points $PQRS$ on a circle centre O. QP is produced to X. Angle $XPS = 77^0$ and angle $PSO = 68^0$.



Find the size of angle PQO. *(04 marks)*

8. The area of an image is four times the area of the object under a transformation whose matrix is $\begin{pmatrix} p & p-4 \\ p+8 & p \end{pmatrix}$. Find the value of p. *(04 marks)*

9. Catherine is $(x+3)$ years old now; her sister Grace is 5 years younger but her bother John is twice as old as Catherine. The sum of the two girls is 29. Find John's age. *(04 marks)*

10. A metallic pipe 12m long is leaning against a vertical wall, with its foot 3m from the wall. Calculate the;

(a) height of the wall where the pipe reaches. *(02 marks)*
(b) angle of declination of the pipe to the wall. *(02 marks)*

SECTION B: (60 MARKS)

Answer any **five** *questions from this section.* **All** *questions carry equal marks.*

11. (a) The table below shows the number of children in 40 randomly chosen families.

Number of children(x)	0	1	2	3	4	5	Over 5	**Total**
Number of families(f)	6	8	12	5	3	6	0	40

State the probability that a family chosen at random has;

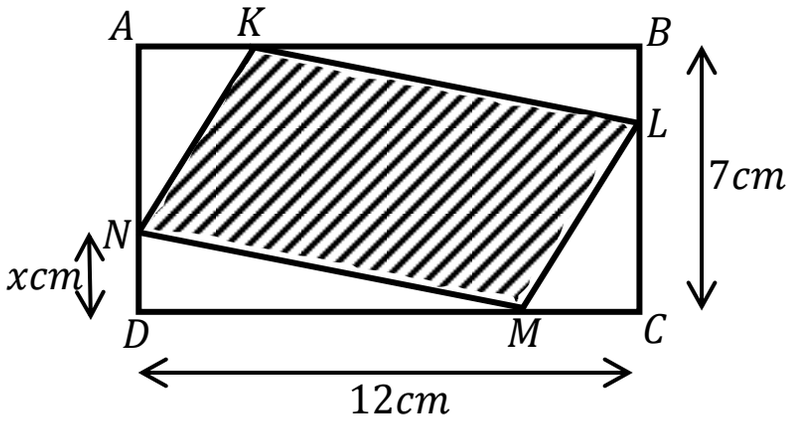
(i) more than 2 children (ii) $P(2 \leq x < 4)$ *(05 marks)*

(b) Two tetrahedral dice, with faces labelled 1, 2, 3 and 4, are thrown and the number on which each lands is noted. The 'score' is the sum of these two numbers. Find the probability that:

(i) atleast one die lands on a 3. (ii) the score is even. *(07 marks)*

12. (a) Simplify as far as possible. $\frac{x}{x-y} + \frac{y}{y+x} - \frac{2xy}{x^2-y^2}$ *(04 marks)*

(b) In the figure below, $ABCD$ is a rectangle with $AB = 12cm$ and $BC = 7cm$. $AK = CM = DN = xcm$. The area of the shaded part is $54cm^2$.



(i) Show that the area of the unshaded part is $(19 - 2x)\ cm^2$.

(ii) Find the possible values of x. *(08 marks)*

13. A business man who deals in an agricultural produce business visited four markets in a certain week. He bought 3 bags of beans, 5 bags of maize, 10 bags of potatoes and 3 bags of millet from Nakasero market, then 1 bag of beans, 4 bags of potatoes and 2 bags of millet from Nakawa market while 5 bags of beans and 1 bag of maize from Kalerwe market and lastly 4 bags of beans, 3 bags of maize, 6 bags of potatoes and 1 bag of millet from Busega market. He bought each bag of beans at sh. 45,000, a bag of maize at sh. 30,000, a bag of potatoes at sh. 15,000 and a bag of millet at sh. 50,000.

He later sold all the produce he had bought at sh. 50,000 per bag of beans, sh. 35,000 per bag of maize, sh. 18,000 per bag of potatoes sh. 55,000 per bag of millet.

(a) Write down a: (i) 4×4 matrix for the quantity of items bought.

(ii) 4×1 matrix for the price of the produce *(02 marks)*

(b) By matrix multiplication, calculate the total amount of money spent on the produce in all the markets. *(04 marks)*

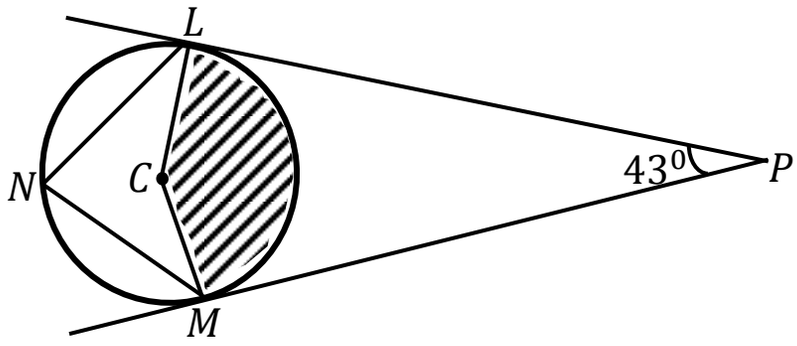
(c) Find the profit made by the business man after the sale of the produce. *(06 marks)*

Turn Over

14. (a) Draw a graph of $y = (x-1)(x+5)$ for $-6 \leq x \leq 2$. Use a scale of $1cm : 1unit$ on both axes. *(07 marks)*

(b) Use your graph to solve the equations
(i) $x^2 - 6x - 5 = 0$ (ii) $x^2 - x - 6 = 0$ *(05 marks)*

15. In the figure below, PL and PM are tangents from P to the circle with centre, C and radius 5cm.



Calculate:
(a) (i) angle LCM (ii) length CP *(06 marks)*

(b) the area of the shaded part, correct to 2sf. *(03 marks)*

(c) the area of the quadrilateral $LCMN$ to the nearest cm^2. *(03 marks)*

16. A triangle ABC with vertices $A(2,1)$, $B(4,1)$ and $C(3,4)$ is mapped onto triangle $A'B'C'$ by an enlargement with centre $(0,0)$ and scale factor 2. When ABC is enlarged by scale factor -2, centre $(0,0)$, it is mapped onto triangle $A''B''C''$.

(a) Use a scale of 1cm to represent 1unit on both axes to plot triangle ABC and its images on the same axes. *(10 marks)*

(b) Determine the coordinates of the vertices:
(i) A', B' and C' (ii) A'', B'' and C'' *(02 marks)*

17. According to the Ministry of Disaster Preparedness, a depot for vulnerable poor relief should have at most 20 bags of beans and 35 bags of flour. The mass, volume and number of meal ratios per bag are as shown in the table below.

Bag of:	**Mass (kg)**	**Volume (m^3)**	**Number of meals**
Beans	25	0.05	800
Flour	10	0.05	160

A delivery van is to carry the largest possible number of bags. It can carry a mass of up to 600kg occupying 2m^3.

(a) If a load is made up of x bags of beans and y bags of flour, write down six inequalities for the given information. *(05 marks)*

(b) Represent the inequalities on a graph paper by shading the unwanted regions. *(Use a scale of 2cm to represent 5 units on both axes*) *(04 marks)*

(c) Determine the number of bags of beans and flour that should be delivered to make the total number of meal ratios the largest. *(03 marks)*

END