

456/2
MATHEMATICS
Paper 2
June/July 2022
2½ hours

MWALIMU EXAMINATIONS BUREAU

UCE RESOURCE MOCK EXAMINATIONS – 2022

MATHEMATICS

Paper 2

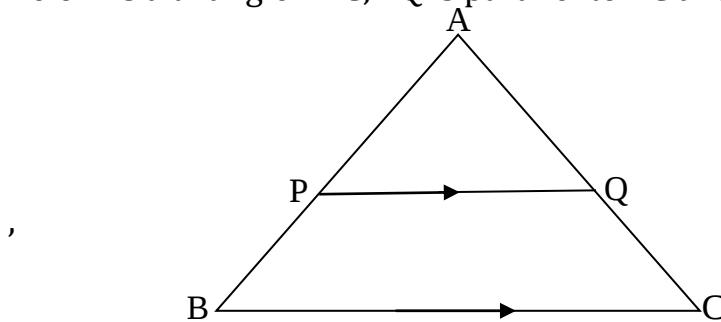
2 hours 30 minutes

Instructions:

- *Attempt all questions in section A and NOT more than five questions from Section B.*
- *All section B questions carry equal marks.*
- *All the necessary calculations must be done on the same sheet of paper as the rest of the answer. Therefore, no paper shall be given for rough work.*
- *Graph paper shall be provided.*
- *Silent, non-programmable calculators may be used*

Section A (40 marks)

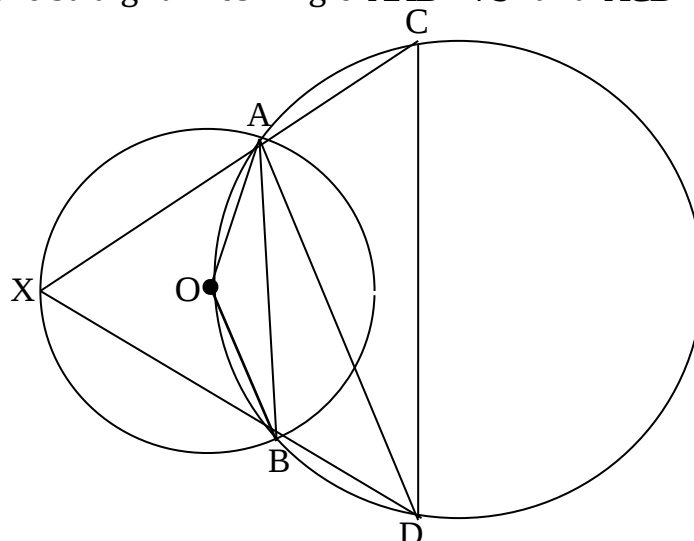
1. Given the point M (4,-2) is the midpoint of AB and that B is (1,3). How far is point A from the Origin? (4 marks)
2. If $f^{-1}(x) = 2x^2 - 3$, Find (i) an expression for $f(x)$ (ii) $f(15)$. (4 marks)
3. Two sets P and Q are such that $n(P) = 12$, $n(Q) = 11$, $n(P' \cup Q) = 17$ and $n(\epsilon) = 24$ where ϵ is the universal set. Draw a Venn diagram to represent the given information hence find $n(P' \cap Q) = 12$. (4 marks)
4. Below is a triangle ABC, PQ is parallel to BC and BP: PA=3:2.



What is the ratio for the area of triangle APQ to the quadrilateral BPQC?

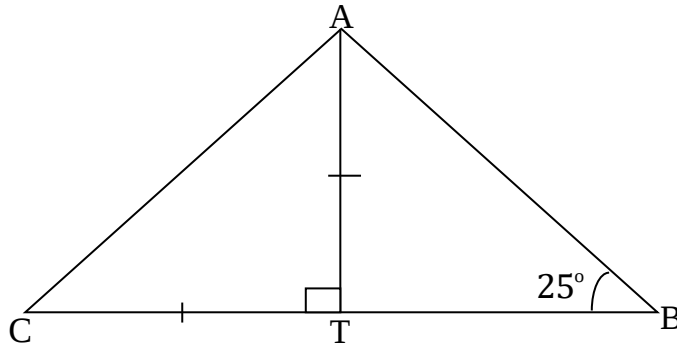
(4 marks)

5. Express; $\frac{\sqrt{18} + \sqrt{3}}{\sqrt{3} + \sqrt{2}}$ in the form $a + b\sqrt{c}$ a , b and c are integers. (4 marks)
6. Solve the equation; $\frac{3x-1}{2} - \frac{2x-1}{3} = \frac{5-x}{4}$. (4 marks)
7. Below are two intersecting circles, with O is the center of the smaller circle. XAC and XBD are straight lines. Angle AXB = 75° and ACD = 70°



Find the value of the angles (i) AOB(ii) ABD (iii) BAD (4 marks)

8. In the triangle ABC below, AT is perpendicular to BC, angle ABT = 25° . AT=TC and AC= 10cm Find the length of $\overline{AB}$. (4 marks)



9. Peter borrowed Shs. 2.5 million for two years at a simple interest and paid back shs. 3.7 Million. What is the interest rate for the loan? (4 marks)
10. P varies as the square of V and inversely as R. How is P affected when V is decreased by 10% and R is increased by 20% (4 marks)

Section B (60 marks)

11. (a) Copy and complete the table below

x	-4	-3	-2	-1	0	1	2
$(x+2)$			0				
$(2x-1)$			-5				
$y = (x+2)(2x-1)$			0				

(b) Draw a graph of $y = (x+2)(2x-1)$

(c) Use your graph to solve:

(i) $2x^2 + 3x - 2 = 0$.

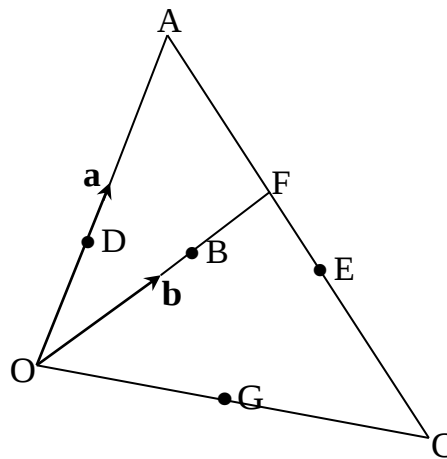
(ii) $x^2 + 2x - 3 = 0$.

(12 marks)

12. A survey showed that 75 people communicated using either (MTN)(M), Airtel(A) or UTL(U) networks. Forty used UTL and 47 used MTN. Those who communicated using MTN and Airtel only were twice those who communicated using Airtel and UTL only. The number of those who used MTN was equal to those who used Airtel. Given that $n(A \cap M' \cap U) = 8$ and $n(A \cap M \cap U) = 15$ and $n(M \cap U) = 20$.

- Draw a Venn diagram representing the give information
 - How many people in the group communicated using MTN only?
 - A member is chosen at random from the group, what is the probability that he/she uses only one of the networks?
- (12 marks)**

13.



In the figure above B, D, E and G are midpoints of OF, OA, AC and OC respectively. $AF:FE = 2:3$. If $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OB} = \mathbf{b}$.

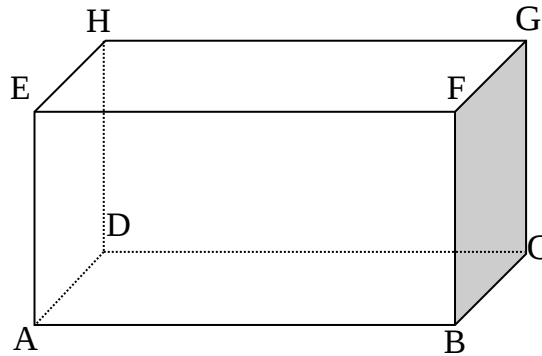
- Express the following vectors in terms of $\mathbf{a}$ and $\mathbf{b}$; $\mathbf{AF}$, $\mathbf{AE}$, $\mathbf{AC}$, $\mathbf{OC}$ and $\mathbf{DG}$.
 - Show that $\mathbf{DG}$ is parallel to $\mathbf{OC}$.
 - Show also that D, B, G are collinear
- (12 marks)**

14. Find:

- Equation of line M passing through the points (1,0) and (3,0).
- Equation of line N which is perpendicular to line M above and passing through point (-2,4).
- The coordinates of the point of intersection of lines M and N above

- (d) The y-intercepts for the lines M and N hence the area enclosed between lines M and N and the y axis. (12 marks)

15. ABCDEFGH is a cuboid in which $\overline{AB} = 8\text{cm}$ $\overline{BC} = \overline{GC} = 5\text{cm}$.



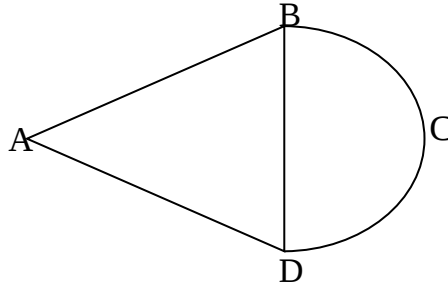
Find : (i) lengths $\overline{BE}$ and $\overline{GB}$.

(ii) the angle between EB and plane BCGF

(iii) the angle between planes EBG and BCGF

(12 marks)

16. The figure below shows a horizontal section of a pond. ABD is an equilateral triangle of 8 meters and BCD is a semi-circle.



The sides of the pond are vertical and the water is 6m deep.

Calculate;

(i) the area of the sides in contact with water.

(ii) the volume of water in the pond in litres.

(12 marks)

17. Members in an organization formed a loan scheme in which the interest rate on a loan is 4% per month declining balance (interest calculated on the unpaid balance). Maria got a loan of Shs. 1.6 million on 2nd November 2020. She was able to pay back Shs. 300,000 by 2nd of each following month.

(a) What is the unpaid balance by the 3rd February 2021?

(b) If on the 2nd March 2021, she cleared the loan and its interests. How much does she pay?

(c) How much interest has she paid for the loan?

(12 marks)

END