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Mathematics
Paper 1
August 2019
$2\frac{1}{2}$ ***hrs***

UNNASE MOCK EXAMINATIONS

Uganda Certificate of Education
MATHEMATICS
PAPER 1
2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

- *Answer **all** the questions in Section **A** and any **Five** from Section **B.***
- *Any additional question(s) answered will not be marked.*
- *All necessary calculations **must** be done in the same 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.*

SECTION A: (40 MARKS)

*Attempt **all** questions in this section.*

1. Given that $a * b = 5a - 3b$, find the value of;
   a) $-2 * 3$
   b) b when $2 * b = 19$ **(4 marks)**

2. Solve the simultaneous equations.
   $2p - 3q = 5$
   $2q - p + 3 = 0$ **(4marks)**

3. Solve the inequality; $-3 - 2x < x \leq -2x + 6$. Hence show the solution on a number line. **(4marks)**

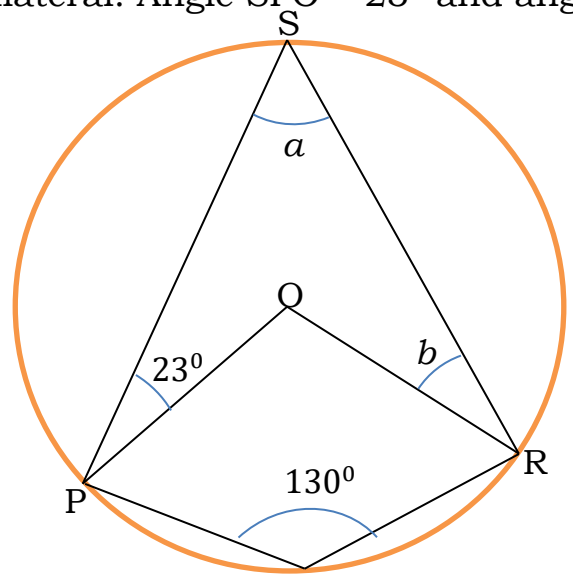
4. Make x the subject of the equation if; $y = \frac{b - bx^2}{cx^2 - a}$. **(4marks)**

5. Factories completely; $3a^2c - 5a^2d - 3b^2c + 5b^2d$. **(3marks)**

6. An interior angle of a regular polygon is 100^0 more than its exterior angle. Determine its;
   a) exterior angle **(2marks)**
   b) number of sides **(2marks)**

7. If $A^{-1} = \begin{pmatrix} 3 & 2 \\ 4 & 5 \end{pmatrix}$, determine matrix A. **(4marks)**

8. In the figure below, O, is the centre of the circle. PQRS is a cyclic quadrilateral. Angle SPO = 23^0 and angle PQR = 130^0.



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Find the values of angles a and b. **(4marks)**

9. The table below shows marks of 45 sudents obtained in a Chemistry test.

Marks	21 – 30	31 – 40	41 – 50	51 – 60	61 – 70
Frequency	5	7	15	10	8

a) Draw a histogram for the data.
b) Use the histogram to estimate the modal mark. **(5marks)**

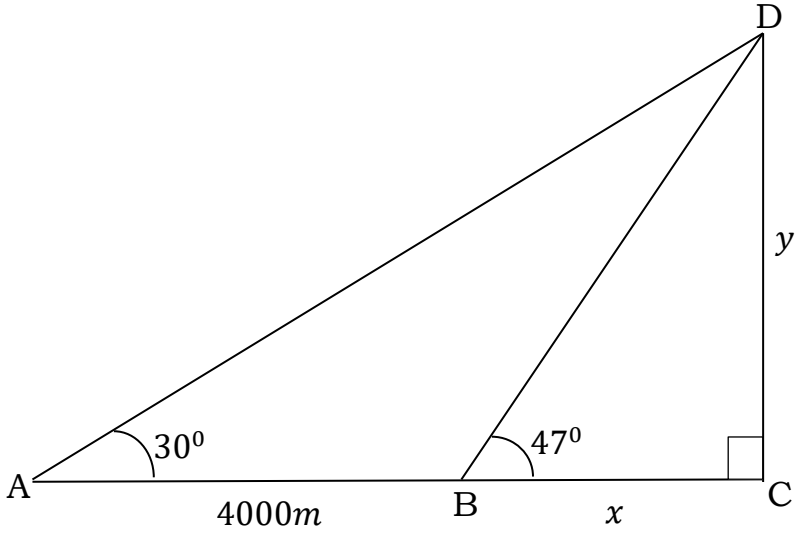
10. The vertices of a triangle ABC are $A(1,2), B(8,1)$ and $C(-2,5)$. If the triangle ABC is reflected in the line $y = -2$, find the coordinates of the vertices of its image, $A'B'C'$. **(4marks)**

SECTION B (60MARKS)

*Answer any **five** questions from this Section.*

11. a) Given that $5tan\alpha = 12$ and $0^0 < \alpha < 360^0$. Find the two possible values of α. **(4marks)**

b) In the figure below, ACD is a right angled triangle. $\overline{AB} = 4000m$, $\overline{BC} = xcm, \overline{DC} = ycm$, angle $DBC = 47^0$ and angle $DAB = 30^0$.



Calculate the lengths; $\overline{BC}$, $\overline{DC}$ and $\overline{BD}$. **(8marks)**

12. a) Solve the equation; $\frac{6}{x-4} - 1 = \frac{4}{x}$. **(6marks)**

b) PQR is a right angled triangle in which $PQ = (x-1)cm$, $PR = 2xcm$ and $QR = (2x+1)cm$. Angle $QPR = 90^0$. Determine the;

i) Value of x

ii) Area of triangle PQR. **(6marks)**

13. a) Copy and complete the table below for the function $y = (x-1)(x-3)$.

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

(3marks)

b) Using $2cm$ to represent 1unit on both axes, draw the graph of the function; $y = (x-1)(x-3)$ for $-1 \leq x \leq 5$. **(4marks)**

c) Use your graph in (b) above to solve the equation $3 - 5x + x^2 = 0$. **(5marks)**

14. Pius and Paul went to the supermarket for shopping. Pius bought 2 apples, 4 markers, 5 cans of ice cream, and one Art book. Paul bought 5 apple , 3 Art books and half dozen of Markers. The cost of an apple was $Shs.1200$, a Marker $Shs.1000$, a Can of Ice Cream $Shs.2400$ and an Art book $Shs.3000$.

a) Write down a;

i) 2×4 matrix for the items purchased.

ii) 4×1 matrix for the cost of the items. **(4marks)**

b) Calculate the;

i) Expenditure of each person by a suitable matrix multiplication.

ii) Total expenditure of both of them. **(6marks)**

c) How much did Pius spend more than Paul? **(2marks)**

15. a) A bucket contains white and yellow identical pegs. Of these, 24 are white and the rest are yellow. The probability of picking a yellow peg from the bucket at random is $^3/_5$. Find the number of yellow pegs in the bucket. **(3marks)**

b) A box contains 7red beads and 14 black beads. Two beads are drawn at random without replacement.
i) Draw a probability tree diagram to show the results of the drawing. **(7marks)**
ii) Find the probability that both are of different colours. **(2marks)**

16. The coordinates of the vertices of a rectangle $PQRS$ are $P(1,1), Q(6,1), R(6,4)$ and $S(1,4)$. $PQRS$ is mapped onto its image $P'Q'R'S'$ by a transformation given by the matrix $\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$. $P'Q'R'S'$ then undergoes a negative quarter turn about the origin to form its image $P''Q''R''S''$.

a) Find the coordinates of;
i) P', Q', R' and S' **(3marks)**
ii) P'', Q'', R'' and S'' **(5marks)**

b) Find a single matrix of transformation that would map $P''Q''R''S''$ back onto $PQRS$. **(4marks)**

17. Anna and Mary are tailors. They make x blouses and y skirts each week. Anna does all the cutting and Mary does all the sewing. To make a blouse, it takes 5 hours of cutting and 4 hours of sewing. To make a skirt, it takes 6 hours of cutting and 10 hours of sewing. Neither tailor works for more than 60 hours. They make atleast 8 blouses each week. They also make atleast one skirt each week.
a) Write down four inequalities to represent the information above. **(4marks)**

b) Draw a graph to show the region that satisfies all the inequalities in (a) above. Use a scale of 1cm for 1 unit on each axis. **(6marks)**

c) If the profit on a blouse in Shs.3000 and on a skirt is shs.10,000, calculate the maximum profit that Anna and Mary can make each week. **(2marks)**

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