456/2
MATHEMATICS
PAPER 2
JUNE 2010
2 ½ HRS

Uganda Certificate of Education
INTERNAL MOCK EXAMINATION
MATHEMATICS
PAPER 2
2hours 30minutes

Instructions to Candidates

- *Attempt all the questions in section A and five from section B*
- *All questions carry equal marks in section B*
- *Begin each section B solution on a fresh page*
- *No papers should be provided for rough work*
- *Draw double margins on each of the pages to be used*
- *The graph papers are provided*
- *Only silent non-programmable calculators may be used*
- *For accuracy indicate TAB for use of the tables and CALC for use of a calculator*

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SECTION A (40MARKS)

Attempt all questions from this section

1. In how many years will shs 50,000 yield shs 10,000 interest at 12% per annum simple interest? (4marks)

2. Given that $4^x = 8^y$, find the value of $3x + 5y$. (4marks)

3. Solve the equation; $\frac{x+1}{3} - \frac{x-2}{4} = \frac{x}{6}$. (4marks)

4. If $Sin\theta = \frac{4}{5}$ and $Sin\alpha = \frac{12}{13}$ where $0^0 < \theta < 90^0$ and $90^0 < \alpha < 180^0$, find the value of $Sin\theta Cos\alpha + Cos\theta Sin\alpha$. (4marks)

5. Given that $N = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$ describe a transformation, find the image of the unit square under N. (4marks)

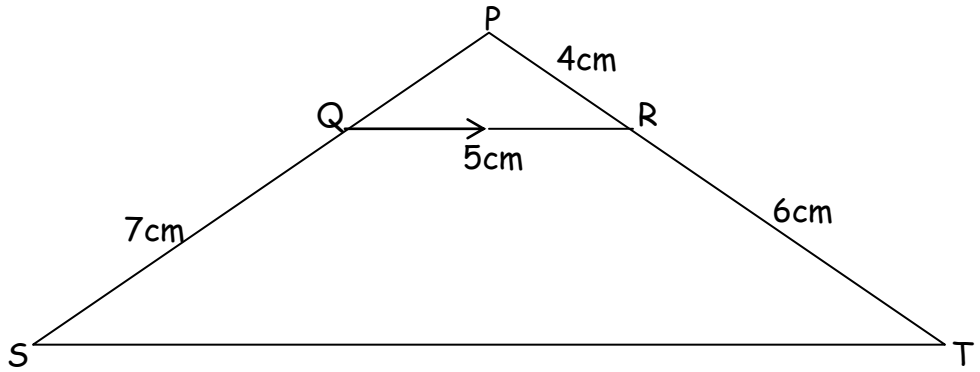
6. Find the values of x given that the matrix $\begin{pmatrix} x & 3x+4 \\ 1 & x+3 \end{pmatrix}$ is a singular matrix. (4marks)

7. Given two non-intersecting sets A and B are such that $n(\varepsilon) = 19$, $n(A \cup B)' = 4$ and $n(B) = 8$, using a venn diagram find;
   i) $n(A)$ ii) $n(A \cup B)$ (4marks)

8. Find the equation of a line which passes through the point $M(2,2)$ and is a perpendicular bisector of a line passing through the points $P(-2,3)$ and $Q(6,1)$, (4marks)

9. Using completing the squares method solve $2x^2 - 14x + 9 = 0$. Give the roots correct to 2d.ps. (4marks)

10. In the figure below $\overline{QR}$ is parallel to $\overline{ST}$, $\overline{SQ} = 7cm$



Find the length $\overline{PQ}$ and $\overline{ST}$. (4marks)

SECTION B (60MARKS)

Attempt any **five(5)** questions from this section.

11. Draw the graph of $y = 3x^2 + 4x - 4.$

a) Use your graph to solve the equation

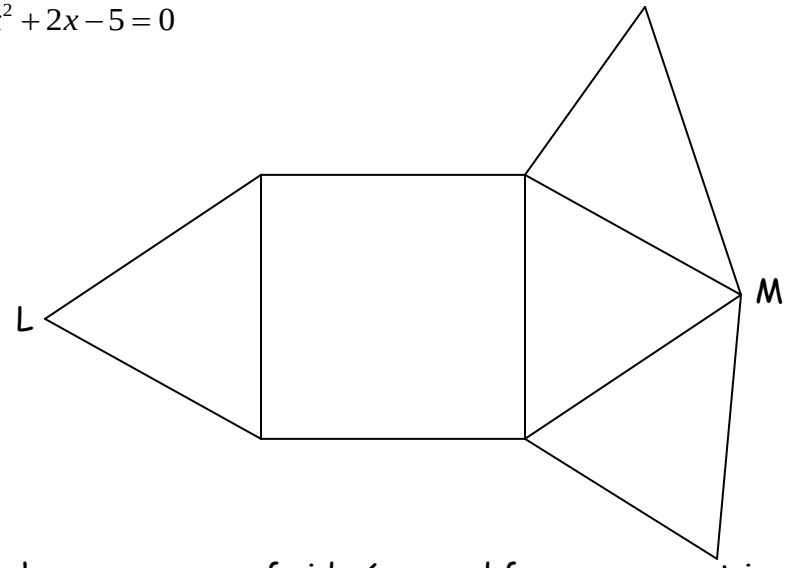
$3x^2 + 4x - 4 = 0$.

b) By using suitable lines to your graph solve;

i) $3x^2 + 4x - 6 = 0.$

ii) $3x^2 + 2x - 5 = 0$ (12marks)

12.



The figure shows a square of side 6cm and four congruent isosceles triangles. It represents the net of a pyramid on a square base. The distance LM is 20cm. Calculate;

a) The total surface area of the pyramid
b) The perpendicular height of the pyramid when the net is folded.
c) The angle of inclination of a triangular face to the base of the pyramid.

(12marks)

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13. Shell petroleum company owns two pump stations, one in Mukono town and the other in Seeta Town. Over two consecutive days, the sales were recorded as follows (in litres).

First day

Town	Petrol	Diesel	Kerosene
Mukono	1300	850	750
Seeta	1200	950	700

Second day

Town	Petrol	Diesel	Kerosene
Mukono	1350	925	650
Seeta	1250	850	850

a) i) Represent the above information on 2 x 3 matrices showing the sales of each day.
ii) Write down a matrix representing the total sales over the two days.

b) The cost of fuel at each station of given by; Petrol shs 2300 per litre, Diesel shs 2100 per litre and Kerosene shs 1800 per litre.
i) State a 3 x 1 cost matrix.
ii) Using a suitable matrix multiplication, find the total income from each station.
iii) Find the total income from both stations for the two days.

(12marks)

14. a) On the same set of axes, draw the graphs of $y = Cosx$ and $y = \frac{1}{2}Cos3x$ in the domain $0^0 \le x \le 360^0$ for x-values at 30^0 intervals.
Use a scale of 4cm to represent 1 unit on vertical axis and 1cm to represent 30^0 on horizontal axis.
Using your graph, estimate a solution of the equation;
i) $\frac{1}{2}Cos3x = 0.$
ii) $2\cos x - \cos 3x = 0.$

15.

PAY CASH AND SAVE 13%

OR

PAY IT EASY BY HIRE PURCHASE BY PAYING A DEPOSIT OF 17% OF THE VALUE OF GOODS AND THEN 8 MONTHLY EQUAL INSTALLMENTS OF 11% OF THE VALUE OF GOODS.

The above is an advert at a shop in Kampala placed on several generators. Mr. Musoke went to the shop wanting to but a generator at shs 1,550,000. How much would Musoke save by buying the generator on a cash basis instead of buying it on the hire purchase scheme? (12marks)

16. The manager of a cinema wishes to divide the seats available into two classes A and B. He has the following constraints:
    i) These are not more than 120 seats available.
    ii) There must be atleast twice as many B class seats as there are A class seats.
    iii) Class A seats are priced at shs 150 each and class B at shs 100 each and atleast shs 10,000 should be collected at each show to meet with expenses.

    Taking x as the number of class A seats and y as the number of class B seats, write down inequalities from the constraints listed above and plot them on a graph.

    a) Find the number of seats of each class which will give the maximum profit and calculate the maximum profit.

    b) Find the least number of seats that must be sold in order to incur no loss. (12marks)

17. A plane moves from airport A to B, 610km away on a bearing of 010^0, there after it changes its course on a bearing of 217^0 and covers a distance of 500km to C. It then moves 500km eastwards to airport D.

a) Using a scale of 1cm to represent 50km, draw an accurate diagram for the whole journey

b) Find the bearing and distance of A from D.

c) If the plane was using a speed of 400km/h, calculate the time taken for the plane to move from A to D. (12marks)

***** END *****

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