

456/1

MATHEMATICS

Paper 1

June /July 2012

2 $\frac{1}{2}$ hours

UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

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

All necessary calculations must be done on the answer sheets provided

Graph paper is provided.

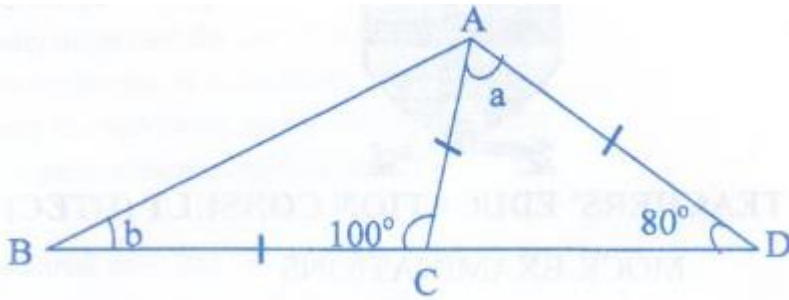
Silent non-programmable scientific calculators and Mathematical tables with a list of formulae may be used.

Attempt all questions in this section

1. Make x the subject of the formula $\frac{A}{B} = \frac{T-x}{x}$ (4 marks)

2. Given that $A = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 0 & 2 \\ 2 & 1 & 4 \end{pmatrix}$ $B = \begin{pmatrix} 2 & 0 & 0 \\ 3 & 3 & 0 \\ 0 & 0 & 5 \end{pmatrix}$. Find AB (4 marks)

3. Find the angles marked with letters in the figure below. (4 marks)



4. Solve the linear inequalities $5 + 3x < 23$ and $25 < 6x + 1$ and illustrate your solution on a number line. State the combined solution. (5 marks)

5. Solve the equation: $y + \frac{1}{y} = 2\frac{1}{2}$ (4 marks)

6. Given that: $W * T = \frac{7W+13T}{13W+7T}$; find $30 * 0.00615$, giving your answer to 4 decimal places.

7. One card is picked from a shuffled pack of playing cards. Find the probability that;

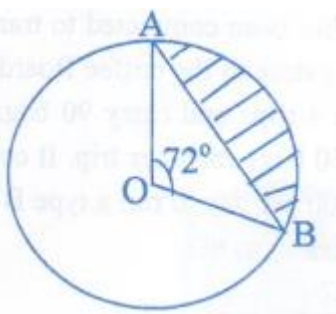
a) the card is a prime number

b) the card is a king or an ace or a ten of a spade. (4 marks)

8. The area of the figure is completely destroyed under the transformation given by the matrix $\begin{pmatrix} 5 & 2x \\ x & 10 \end{pmatrix}$. Find the two possible matrices. (4 marks)

9. The figure below shows a circle centre O . AOB is a sector of the circle and $\angle AOB = 72^\circ$. If the area of the sector is $5\pi\text{cm}^2$. Find the radius of the circle and the area of the shaded part.

(4 marks)



10. Determine the mean of 2, 4, 6, 8, 3 and 7 hence find the mean of 1642, 1644, 1646, 1648, 1643, 1647. (3 marks)

SECTION B: (60 marks)

Attempt any five questions

11. The marks obtained by 40 students in a test are shown in the following table.

Marks	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79
Frequency	6	12	9	5	5	3

- a) Plot a cumulative frequency curve and hence estimate the median. (6 marks)
- b) Use your graph for (a)(i) above. To answer the following questions
- i) If 25% of the students were to fail, what would be the highest mark of a failing student. (3 marks)
- ii) If only 4 students were to be awarded grade A, what would be the minimum mark for an A grade. (3 marks)
12. Draw triangle OBA and OCD where O is the origin, A (-6, 2), B (-2, 4), C (3, -1) and D (2, -4). A transformation y consists of a reflection followed by an enlargement, centre O. y maps triangle OCD onto triangle OBA.
- a) By measurement of two appropriate lengths, determine the linear scale factor of the enlargement correct to 2 s.f. (4 marks)
- b) (i) Calculate the area of triangle OCD and triangle OBA. (2 marks)
- (ii) Find the area scale factor of the enlargement. (2 marks)
- (iii) Hence find a more accurate value of the linear scale factor. (2 marks)
- c) Describe geometrically the transformation y . (4 marks)
13. Using a ruler, a pencil and a pair of compasses only;
- a) Construct a triangle with $PQ = 2$ cm, $PR = 5$ cm, $\angle QPR = 60^\circ$.
- b) Construct the circumcircle of triangle PQR, measure and state its radius.
- c) Find a point S where the bisector of $\angle PQR$ meets the circle. Measure QS. (12 marks)
14. A transport company has two types of lorries: 9 of type A and 5 of type B. There are 11 drivers available. The company has been contracted to transport at least 3600 bags of coffee from a certain co-operative store to the coffee Board of Kenya stores in Nairobi. Type A lorries can each make 4 trips and carry 90 bags per trip. Type B lorries make 3 trips per day and carry 150 bags each per trip. It costs shs.150,000 per day to run a type A lorry and Shs.240,000 per day to run a type B lorry. How should the company organized the use of its lorries so as to
- a) run the lorries at a minimum cost?
- b) carry the maximum number of bags each day?
- c) use the minimum number of drivers? (12 marks)
15. a) Factorise $cx - 2dy + cy - 2dx$

b) Solve the equation: $\frac{n-1}{2} - \frac{3n+2}{3} = \frac{1}{4}$

c) Two positive integers differ by 4 and the sum of their squares is 136.

Form an equation and solve it to find the numbers.

(12 marks)

16. a) Find x, y, p, q if $\begin{pmatrix} 3 & 2 \\ 1 & 2 \end{pmatrix} \cdot \begin{pmatrix} 4 & x \\ x & y \end{pmatrix} = \begin{pmatrix} 10 & 3 \\ p & q \end{pmatrix}$.

b) A matrix p is given by $p = \begin{pmatrix} x & 0 \\ 5 & y \end{pmatrix}$.

i) Determine p^2

ii) If $p^2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, determine the possible values of x and y

(12 marks)

17. Given that $y = \sin 3x^\circ$

a) Copy and complete the table in the range $0^\circ \leq x^\circ \leq 180^\circ$

x°	0	15	30	45	60	75	90	105	120	135	150	165	180
$3x^\circ$	0		90				270				450		540
$y = \sin 3x^\circ$	0		1				-1				1		0

(b) Using a scale of 1cm to represent 15° on the horizontal axis and 4cm to 1 unit on the vertical axis. Draw the graph of $y = \sin 3x^\circ$.

(c) Use your graph above, solve the equations

i) $\sin 3x^\circ = 0$

ii) $\sin 3x^\circ$

END