BUGANDA EXAMINATION COUNCIL MOCKS

Uganda Certificate of Education

MATHEMATICS

## PAPER 1

2HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

- Attempt **ALL** questions in section **A** and not more than **FIVE** questions from section **B**.

- **ALL** necessary calculations **MUST** be done on the same page as the rest of the answers.

- Mathematical tables and graph papers will be provided.

- Neat work is a **MUST**

- Silent, non-programmable scientific calculators may be used.

SECTION A (40 MARKS)

Attempt all questions in this section

1. Given that $P \Delta q = p^2 + \sqrt{3pq}$, find the value of   (04marks)
    (a) $3 \Delta 4$ (b) $5 \Delta (3 \Delta 4)$

2. Given that $\dfrac{(a^{\frac{2}{3}} b^{-\frac{1}{2}})3}{a^{-\frac{2}{3}} b^{\frac{1}{2}}} = a^x, b^y$, find the values of the constants x and y.   (04marks)

3. Factorise completely the expression: (04 marks)
    $p^2 + q^2 + 2pq - 2p - 2q$

4. Solve the inequality;

    $\dfrac{3a+1}{5} - \dfrac{9+2a}{5} \le 1$ (04marks)

5. Given that the inverse of the matrix A, $A^{-1} = \begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix}$, find the matrix A.   (04marks)

6. Under an enlargement, the points P (1,2) and Q (3,1) are mapped onto P^1 (7,5) and Q^1 (3,7). Determine the centre and scale factor of the enlargement.   (04marks)

7. Given that $3 \tan\theta - 4 = 0$ and θ is reflex, find the value of $\cos\theta$ (04marks)

8. A bag contains three blue and four yellow marbles. Two marbles are picked from the bag at random, one at a time and without replacement, find the probability that the marbles are both blue.   (04marks)

9. In the figure below, O is the centre of the circle with angle OPQ = 38° and angle RSP = 29°
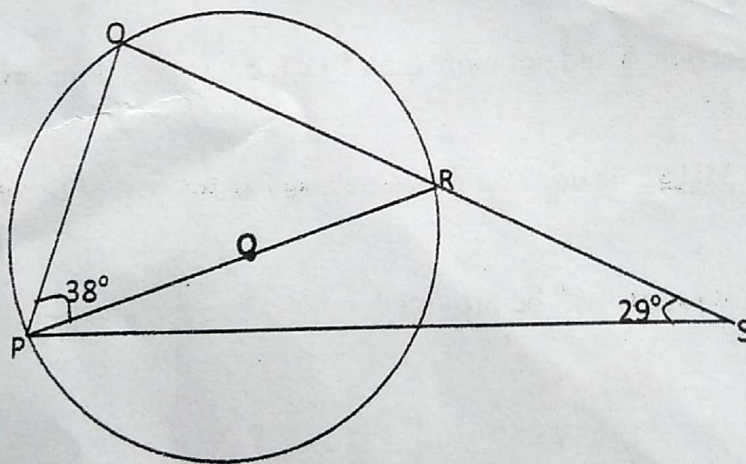
Find the value of the angle RPS.   (04marks)

10. The mean of 4 numbers is 20. If two other numbers, (x + 2) and (x + 3) are added to the four numbers, the new mean becomes 30, find the value of x.   (04marks)

SECTION B (60 MARKS)

Attempt only *five* questions in this section.

11. The cumulative frequency table showing the Marks scored by 50 students in a Maths test was as follows;

Marks	20-29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89	90 - 99
Cumulative frequency.	6	13	21	31	~~49~~ 39	46	49	50

(a) Use the above table to estimate;

(i) the mean mark

(ii) the modal mark

(b) Draw an ogive for the data and use it to estimate the median mark. (12marks)

12. A particle moves vertically upwards so that its height, **h** metres, above the ground after t seconds is given by $h = 1 + 6t - t^2$

(a) Draw the graph of h against t for $0 \leq t \leq 6$

(b) Use your graph to estimate;

(i) the maximum height of the particle

(ii) the speed time when the particle will be $9\,{}^3/_4$ metres above the ground. (12marks)

(iii) the speed of the particle when $t = 2$ seconds.

13. A transformation matrix $M = \begin{pmatrix} 4 & -2 \\ 3 & -2 \end{pmatrix}$ maps the vertices of a triangle PQR onto its image with vertices $P^1(2, \ 1)$ $Q^1(14, 10)$ and $R^1(6,2)$ respectively. The image $P^1Q^1R^1$ is then mapped onto the image $P^{11}Q^{11}R^{11}$ by another transformation represented by matrix

$$N = \begin{pmatrix} 1 & 0 \\ 0 & 7 \end{pmatrix}$$

Find:

(a) the coordinates of the vertices P, Q and R.

(b) the coordinates of the vertices $P^{11}\ Q^{11}\ and\ R^{11}$

(c) the single matrix of transformation that would help triangle $P^{11}\ Q^{11}\ R^{11}$ back onto triangle P Q R (12marks)

14. A plane flew from town p to town Q 420km away on a bearing of 130°. It then flew to town R 560km away on a bearing of 252°.

(a) Using a scale of 1cm to represent 50km, draw a diagram showing the flight path of the plane.

Turn over

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(b)   Use your diagram to determine;
  (i)   the bearing of town P from town R.
  (ii)   the distance of town R from town P.

(c)   If the plane flew at an average speed of 300km/hr, find the time taken the plane to fly from town P and back.   (12marks)

15(a)   Given that $A = \begin{pmatrix} 2 & -7 \\ 1 & -4 \end{pmatrix}$, $B = \begin{pmatrix} 8 & 4 \\ 0 & 2 \end{pmatrix}$ and $C = BA$, find

  (i) C^{-1} (ii) $C + \frac{1}{2}B$

(b)   Solve the simultaneous equations below using matrix method;
$$5x + 3y = 7$$
$$2x - 4y = 3$$
                                                                (12marks)

16.   Mr. Kaleebu went to a shop to buy books for his son Isaac. He bought 7 counter books and one graph book and spent a total of shs. 40,000. He later on sent his wife to the same shop with the same amount of money and she bought 6 counter books and 4 graph books. She was given back a balance of shs. 1,000.

(a)   Calculate the price of each counter book and each graph book.
(b)   How much would Viola pay at the same shop if she is to buy 4 graph books and 4 counter books?
                                                                (12marks)

17.   A farmer plans to plant a 20 hectare field with maize and beans. The farmer's estimates for the project are shown in the table below.

Number of working hours per hectare	Maize 15 days	Beans 6 days
Planting and harvesting costs per hectare	shs. 900,000	shs. 600,000
Expected profit per hectare	shs. 2,000,000	shs.1,500,000

The farmer has only shs. 12,600,000 to invest in the project while the total number of working days is 150.

(a)   Let **x** and **y** represent the number of hectares to be planted with maize and beans respectively. Write down all the inequalities for the above information

(b)   Write down an expression for the profit **p** in terms of **x** and **y**.

(c)(i) On the same axes, plot graphs of the inequalities by shading out the unwanted regions.

  (ii)   Use your graph to determine how the farmer should use the field to maximize the profit. Hence find the farmer's maximum profit.   (12marks)

END