456/1

MATHEMATICS

PAPER 1

JULY/AUG 2019

2½ HOURS

Uganda Certificate of Education Mock Exams.
MATHEMATICS PAPER 1
2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

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

☐ Any additional question (s) answered will not be marked.

☐ All necessary calculations must be shown clearly with the rest of the answer.

☐ Graph papers are provided.

☐ Silent non – programmable scientific calculators and mathematical tables with a list of formulae may be used.
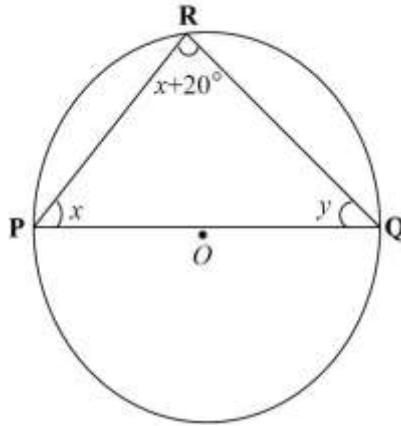
SECTION A (40 MARKS)
Answer all questions in this section.

1. Given that $x * y = xy(x - y)$, evaluate $6 * (4 * 2)$. (04 marks)

2. Solve for x in the inequality $\overline{} < 2.\overline{}$ (04 marks)

   $$\frac{20}{x}$$

3. If is a singular matrix and $x + y = 11$, determine the values of x and y.
   $$\begin{matrix} & \\ 2 & y \end{matrix}$$

   (04 marks)

4. In the figure below, PQ is a diameter and O is the centre of the circle.

   Find the values of x and y. (04 marks)
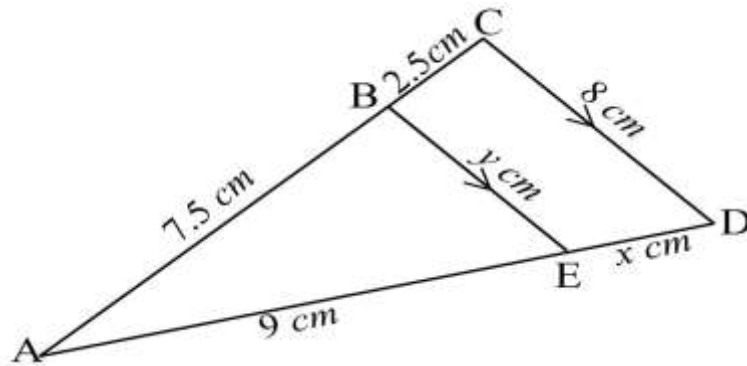
5. Without using mathematical tables or calculator, evaluate:

   $$\frac{32.135^2 - 17.865^2}{0.7135}$$

   (04 marks)

6. Given that $Cosx° = -0.4257$ and $0° \leq x \leq 360°$, find the two possible values of x.

   (04 marks)

7. Solve the quadratic equation $2x + x - 6 = 0$ (04 marks)

8. In the figures below, BE is parallel to CD. AB=7.5 cm, BC=2.5 cm, AE = 9 cm and CD=8 cm.

Calculate the values of x and y. (04 marks)

9. A box has 30 black pens and some red ones. If the probability of picking a red pen from the box is , how many pens are in the box? (04 marks)

10. An object at P(7, −2) undergoes an enlargement, centre O(0,0) and is mapped onto P(−14,4). Find the matrix for the enlargement. (04 marks)

SECTION B (60 MARKS)

Answer any five questions from this section. All questions carry equal marks.

11. (a) Copy and complete the following table of values for the curve
    $y = (x + 2)(x − 3)$ between $x = −4$ and $x = 5$. (03 marks)

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

(b) Using the values in (a) above, draw the graph of $y = (x + 2)(x − 3)$ for $−4 \le x \le 5$. (Use a scale of 1cm:1 unit on both axes). (03 marks) (c) Use your graph to solve;

(i). $x^2 - x - 6 = 0$ (02 marks)

(ii). $x^2 - 2x - 3 = 0$ (03 marks)

(d) From your graph, find the range of values of x for which $(x + 2)(x - 3) < 0$.

(01 mark)

12. A number is selected at random from the set $\{1, 3, 5, 7, 9\}$ and added to another number also selected at random from the set $\{2, 4, 6, 8, 10\}$.
   (a). Draw up a table showing all the possible sums. (04 marks)
   (b). Write down the least and most likely sums. Hence find their corresponding

   probabilities. (04 marks)

   (c). Calculate the probability that:
   (i). the sum is odd and prime.

   (ii). the sum is divisible by three. (04 marks)

Turn Over

13. (a) Suppose $A = \begin{pmatrix} 3 & 1 \\ -1 & 0 \end{pmatrix}$, $B = \begin{pmatrix} -2 & 2 \\ 1 & -3 \end{pmatrix}$ and $A + 2C = -B$, find matrix C.

(04 marks)

(b) It is given that $M = \begin{pmatrix} 2 & q \\ p & 3 \end{pmatrix}$ and that $M^2 - 5M = 2I$, where I is the identity

matrix.

(i). Find a relation connecting the constants p and q. (04 marks)

(ii). Given that p and q are positive and that $det.\ M = -3p$, find the values of p and q. (04 marks)

14. (a) Three brothers Amos, Bob and Chris share Shs. 10,500 so that Bob has four times as much as Chris and Amos has half as much as Bob. Find how much each boy gets. (05 marks)

(b)   The average between a two-digit number and the number obtained by interchanging the digits is 55. If the difference between the two numbers is 18, find the difference between the two digits of the numbers.   (07 marks)

15.   Using a ruler, a pencil and a pair of compasses only,
        (a). Construct a triangle BCK with angle BKC = 120°, BK = 7.5 cm and BC =

              11.4 cm.   (03 marks)

        (b). Draw a circumcircle of triangle BCK and construct a perpendicular to line BC

              passing through point K to meet the circle at point D.   (04 marks)

        (c). Measure the;

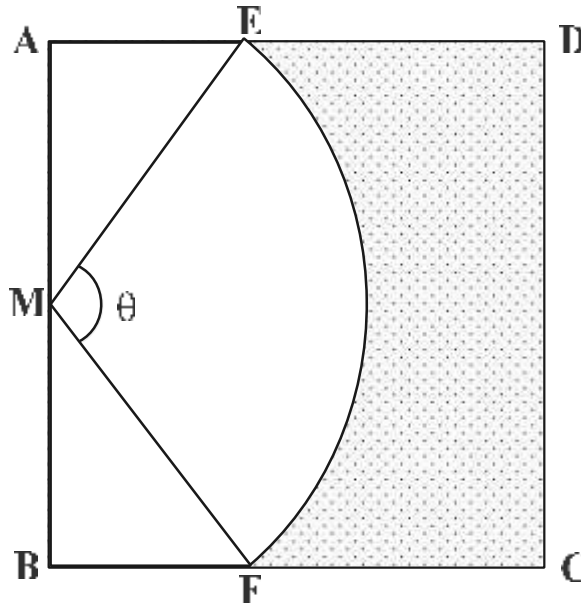   (i).   radius of the circle.

              (ii).   lengths KD and CD.

              (iii).   angles KBC and KDC   (05 marks)

16.   The image of triangle A(4,1), B(7,1) and C(5,4) under a rotation is triangle A (2,3), B (5,4) and C (2,6).
        (a).   Determine the centre and angle of rotation.   (07 marks)

        (b).   The triangle A B C is then reflected in the line $y + x = 0$ to give triangle

                A B C′ . Use your graph to find the coordinates of A , B and C′ (05 marks)

17.

The diagram above shows a square ABCD of sides 16 cm. M is the mid-point of AB. The points E and F are on AD and BC respectively such that AE = BF = 6cm. EF is an arc of the circle with Centre M, such that angle EMF = θ°.

(a). Fine the value of θ, correct to the nearest degree. (04 marks)

(b). Calculate the perimeter of the shaded region. (04 marks)

(c). Calculate the area of the shaded region. (04 marks)

END