456/1
MATHEMATICS
PAPER 1
July/August 2019
2½ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- *Answer **all** questions in section **A** and any **five** questions from section **B**.*
- *Any additional question(s) answered will not be marked.*
- *All necessary calculations **must** be done in the same answer booklet/sheets provided, with the rest of the answers. Therefore no paper should be given for rough work.*
- *Graph paper is 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 $n \boxtimes m = \frac{n+m}{n-m}$, find the value of $(5 \boxtimes 3) \boxtimes {}^{-}2$ *(04 marks)*

2. Factorise completely: $16x^4 - 81$ *(04 marks)*

3. Figure 1 below shows a circle of centre O.

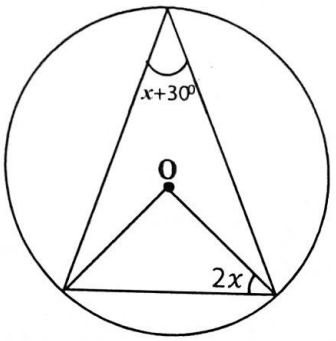

Fig. 1

Use it to find the value of x. *(04 marks)*

4. In an election, John got 12,516 votes. This gave him 3,332 more votes than Mary. Together John and Mary received 70% of the total votes. How many people voted? *(04 marks)*

5. Given that $A = \sqrt{\frac{m-r}{p-mr}}$, make r the subject of the expression *(04 marks)*

6. Given matrices $x = \begin{pmatrix} 3 & 2 \\ 2 & 4 \end{pmatrix}$ and $Y = \begin{pmatrix} 2 & {}^{-}1 \\ 3 & 2 \end{pmatrix}$
Find $(x - 2Y)^{-1}$ *(04 marks)*

7. Solve for x: $\frac{3}{2} - \frac{5x}{3} > 8 + \frac{x}{2}$ *(04 marks)*

8. Two shirts and a pair of trousers cost Shs. 12,000. One shirt and two pairs of trousers cost Shs.15,000. Find the cost of a shirt and a pair of trousers. *(04 marks)*

9. A bag contains **black**, **blue** and **green** balls. The probability of picking a black ball is $^1/_4$ and that of a blue ball is $^8/_{12}$. If the bag contains 84 balls, find the number of green balls in the bag. *(04 marks)*

10. A ladder 5.3m long is leaning against a vertical wall with its foot 1.7m from the wall. Calculate the angle the ladder makes with the horizontal ground. *(04 marks)*

SECTION B (60 marks)

Attempt any **five** *questions from this section. All questions carry equal marks.*

11. Using a ruler, pencil and a pair of compasses only,
    (i) construct a triangle PQR such that $PQ = 8.5cm$ angle $PQR = 60^0$ and angle $QPR = 45^0$.
    (ii) draw a circle to circumscribe the triangle PQR. Measure its radius.
    (iii) construct a perpendicular from R to meet PQ at N. Measure RN and use it to determine area of triangle PQR. *(12 marks)*

12. Copy and complete the table below for the graph: $y = 2x^2 + 8x + 3$.

x	-5	-4	-3	-2	-1	0	1	2
$2x^2$		32						
$8x$		-12						
3		3						
y								

    (b) Use the table completed above to plot a graph of $y = 2x^2 + 8x + 3$.
    Use your graph to solve the equation:
    (i) $2x^2 + 8x - 3 = 0$
    (ii) $x^2 + 3x + {}^1/_2 = 0$ *(12 marks)*

13. The table below shows marks scored by 50 Students in a Chemistry test.

32 11 42 51 68 36 33 29 59 32
22 56 32 78 45 15 47 53 62 46
37 63 27 47 25 42 25 30 49 23
66 41 56 35 49 73 58 48 17 53
58 31 72 40 65 55 39 28 44 64

    (a) Construct a frequency distribution table with equal class interval starting from $10 - 19$. *(03 marks)*
    (b) Draw a cumulative frequency curve and use it to estimate the;
    (i) median mark
    (ii) number of students who scored 35% and above. *(07 marks)*
    (c) Calculate the mean mark. *(02 marks)*

14. Quadrilateral $ABCD$ with coordinates $A(^-2, ^-5,)$, $B(4, ^-3)$, $C(2, 6)$ and $D(^-4, 4)$ is transformed by matrix N to form the image $A^I\ B^I\ C^I\ D^I$ with coordinates $A^I(^-12, ^-1)$, $B^I(^-2, 15)$, $C^I(14, 0)$ and $D^I(4,16)$
    (a) Find matrix N.
    (b) If $A^IB^IC^ID^I$ is then given an enlargement of scale factor $+2$, centre $(0,0)$, to produce $A^{II}B^{II}C^{II}D^{II}$, find the coordinates of A^{II}, B^{II}, C^{II} and D^{II}.
    (c) Find a single matrix of transformation that maps $A^{II}\ B^{II}\ C^{II}\ D^{II}$ back onto $ABCD$. *(12 marks)*

15. A plane flies in the $North - East$ direction from point A to point B, a distance of 400km. From point B, it flies on a bearing of 145^0 to point C, a distance of 350km.

(a) Represent this information on a drawing. Use a scale of 1cm: 50km. *(06 marks)*

(b) Using your drawing, find the;
(i) bearing of $A\ from\ C$.
(ii) shortest distance between $A\ and\ C$. *(04 marks)*

(c) If the plane has to fly from C directly back to back to A at an average speed of $600kmh^{-1}$, find the time it takes. *(02 marks)*

16. L.I.C Investments limited supplied a hotel with x executive and y ordinary chairs. Given that y chairs are at most 10, and the sum of the two types of chairs is more than 15. y chairs are also greater than x chairs supplied;

(a) write down three inequalities in terms of $x\ and\ y$ to represent the above information. *(03 marks)*

(b) by shading the unwanted region show graphically the feasible region. *(06 marks)*

(c) find the maximum number of $\boldsymbol{x\ and\ y}$ types of chairs supplied. *(03 marks)*

17. A and B are centres of two circles which touch internally at P as shown in figure 2 below. TP is 8 cm and it is a common tangent to the two circles.

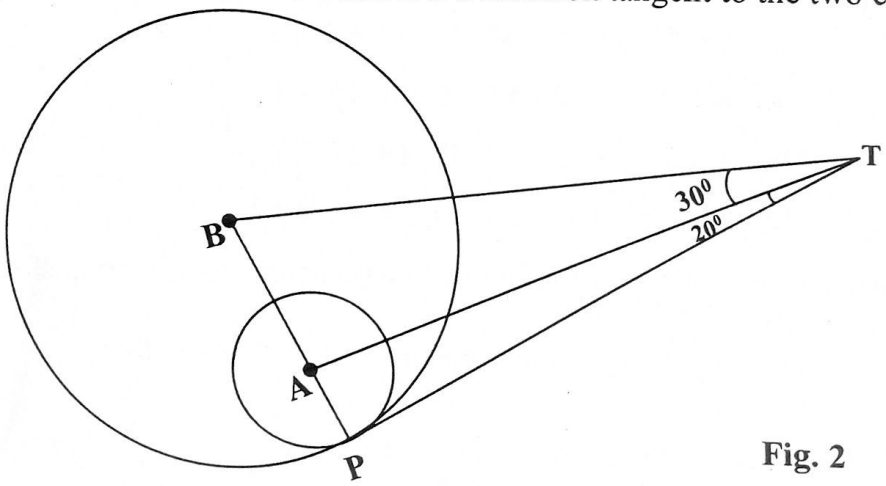

Fig. 2

Calculate the;

(a) radius of each of the circles. *(04 marks)*

(b) distance between the circle centres A and B. *(02 marks)*

(c) area of the larger circle. *(03 marks)*

(d) area of triangle PAT. *(03 marks)*

END