

456/2 mathematics

Paper 2

July / August

Uganda Certificate of Education

RESOURCE MOCK EXAMINATION-2023

MATHEMATICS

Paper 2

2Hours 30Minutes

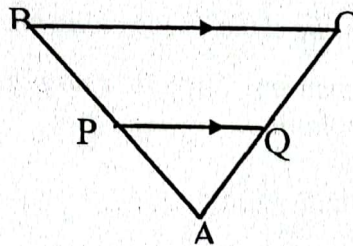
INSTRUCTIONS TO CANDIDATES

- 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

Answer *all* questions from this section

1. Given that $3^{2x+1} \times 4^{p-4} = 648$, find the value of x and p .
(04marks)
2. Solve the equation $\log(3x + 8) - 3 \log 2 = 3 \log(x - 4)$. (04marks)
3. Given that set $A = \{\text{All prime numbers less than 18}\}$ and set $B = \{\text{All composite numbers less than 15}\}$
 - a) List down the members in each set (02marks)
 - b) Find $n(A \cap B)$ (02marks)
4. Given that the points $P(3, t)$, $Q(-t, 2t + 2)$ and $R(1 - 4t, 5t)$ lie on the same straight line find the value of t . (04marks)
5. In the figure below PQ is parallel to BC, the ratio $AP:PB = 2:3$ and the area of triangle $ABC = 50\text{cm}^2$. Calculate the area of triangle APQ.

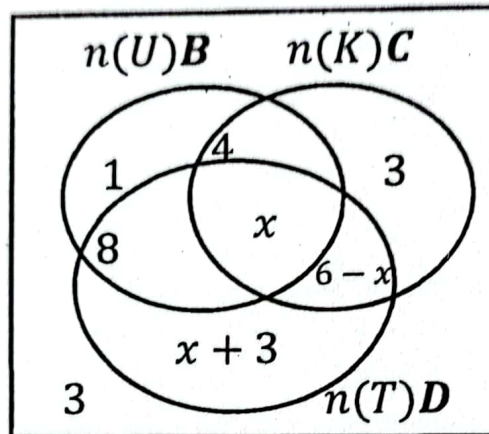


6. Given that m is inversely proportion to the square root of n and that $m = 5$ when $n = 4$, find the value of m when $n = 25$. (04marks)
7. Express $\frac{-1}{\sqrt{5} + \sqrt{3}} + \frac{2}{\sqrt{5} - \sqrt{3}}$ in form of $\frac{a\sqrt{b} + \sqrt{c}}{2}$ (04marks)
8. Determine the set of the domain that corresponds to the range $\{-1, 2, 5\}$ for the mapping $x \rightarrow 3x + 2$. (04marks)
9. If $U = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$, $V = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ and $W = \begin{pmatrix} -7 \\ 1 \end{pmatrix}$. Find the values of a and b such that $aU + bV = W$. (04marks)
10. A car is valued at Ugx18,000,000. If it depreciates by 10% in the first year, and by 8% in the subsequent consecutive years, estimate its value after 5 years. (04marks)

SECTION B

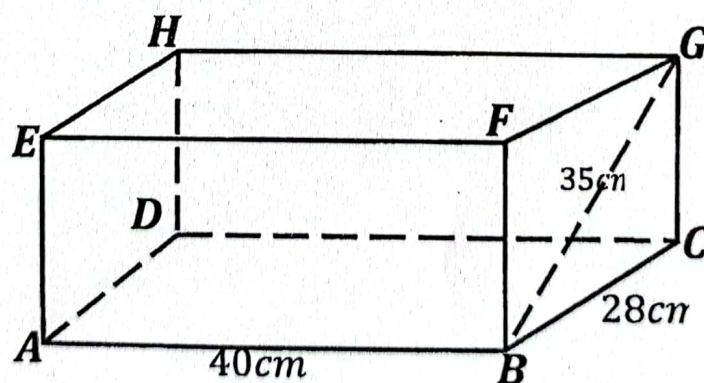
Answer five(5) questions from this section

11. (a) A triangle ABC has vertices with coordinates A(3, -1), B(7, 6) C(0, 2). Find the equation of its line of symmetry. (06marks)
- b) Find the equation of a line passing through a point (2,0) which is perpendicular to the line joining the points (-10, 3) and (6, -9). (06marks)
12. The Venn diagram below shows the number of tourists who visited Uganda (U), Kenya (K) and Tanzania (T).



- (a) Given that the number of tourists who visited at most one country is equal to those who visited two countries only, determine the value of x and the value of the universal set. (05marks)
- (b) Use your Venn diagram to find;
- $n[(T \cup K) \cap U]$. (03marks)
 - the number of tourists who visited atleast two countries. (02marks)
- (c) If a tourist is chosen at random, what is the probability that he/she visited one country? (02marks)
13. (a) Kenny deposited shs.810, 000/= in a bank that gives a compound interest of 18% per annum. Calculate the interest he earned after 4 years if there were no withdraws made during this period. (04marks)
- (b) A sales agent gets a commission of 20% on the first 50books he sells in excess of 50. The agent gets a fixed basic pay of Shs. 115,000 on top of the commission and his total earning is subjected to a tax of 10.5%. In a month of June, the agent sold 220 books and each book costs Shs. 27,000. Calculate the net pay the agent received in the month of June. (08marks)

14. (a) Two points P and Q have position vectors $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ and $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$ respectively. If R is a point such that $3PQ = PR$, find the coordinates of R. (06marks)
- (b) The vectors \mathbf{a} , \mathbf{b} and \mathbf{c} are such that $\mathbf{a} = \begin{pmatrix} 2 \\ y \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 2y-7 \\ -5 \end{pmatrix}$. Find possible values(s) of y given that $|\mathbf{a}| = |\mathbf{b} - \mathbf{c}|$. (06marks)
15. (a) Two functions f and g are such that for $x > 1$, $f(x) = 2 + \log x$ and $g(x) = 2(10^x) + 3$. Find;
- (i) The value of x when $f(x) = 4$. (02marks)
- (ii) $gf(100)$ (04marks)
- (b) Given that $h(y) = 3y + 2$ and $hk(y) = 6y + 11$;
- (i) form an expression of $k(y)$ (04marks)
- (ii) hence find $k(0)$ (02marks)
16. Kampala and Busia are about 300km apart. A Bus left Kampala at 8:00am at an average speed of 60km/hr. It stopped in Iganga town after covering a distance of 150km for half an hour and continued at an increased speed of 15km/hr more than the original speed to reach Busia. A Taxi leaves Busia town at 8:30am at an average speed of 100km/hr nonstop to Kampala, rested for 30minutes in Kampala and made a U-turn reaching Busia 6 minutes before the bus reaches its destination.
- (a) Using a scale of 2cm:1hour and 1cm:20km, show the journeys of the two vehicles on the same graph. (08marks)
- (b) At what distances and times did the two vehicles meet? (04marks)
17. The figure below is a cuboid ABCDEFGH in which AB = 40cm, BC = 28cm and BG = 35cm



Calculate the;

- (a) length AG
- (b) angle between planes BDG and ABCD
- (c) surface area of the cuboid.

(05marks)

(03marks)

(04marks)

END