

456/2

MATHEMATICS

PAPER 2

JULY/AUG. 2023

2 ½ hours



HOIMA DIOCESE EXAMINATIONS BOARD

UCE Mock Examination, 2023

MATHEMATICS

Paper 2

2 hours 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 answer booklets provided. Therefore, no paper should be given for rough work.*

Graph papers may be provided.

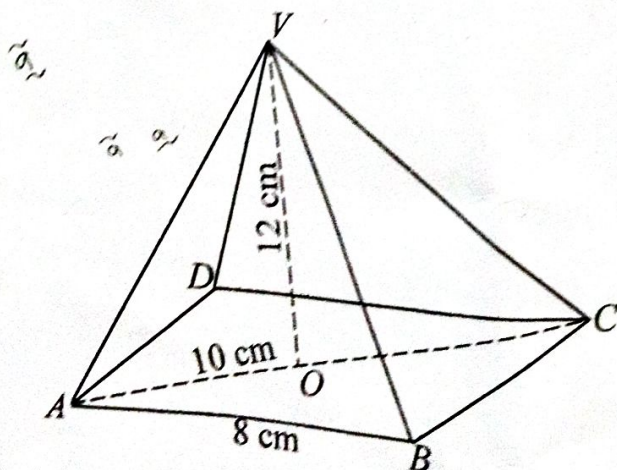
*Neat work is a **must**.*

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

SECTION A: (40 MARKS)

Attempt all the questions from this section

1. Convert $0.1333\dots$ to a fraction to its simplest form. (04 marks)
2. Solve for x in $2^x = 5$. (04 marks)
3. Given that vector $a = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$, $b = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$, and $c = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$, find the magnitude of $p = 2a + b - c$. (04 marks)
4. The area of a swamp is 175 km^2 and is represented by 7 cm^2 on a map. Find the scale of the map. (04 marks)
5. The function $g(x)$ is such that $g^{-1}(x) = \frac{2x}{x+1}$. Find $g(4)$. (04 marks)
6. Find the equation of a line perpendicular to the line $3y - x + 4 = 0$ and passes through $(1, -3)$. (04 marks)
7. A tourist visited Uganda from America. He came with 4600 dollars which he exchanged to Ug Sh at a rate of US\$ 1 = Ug Sh. 4200. During his stay in Uganda, he spent sh. 6,720,000 and exchanged the rest back to dollars at a rate US\$ 1 = Ug Sh. 4600. Find how many dollars he went back with. (04 marks)
8. Sets A and B are such $n(A \cap B') = 7$, $n(A \cap B) = 3$ and $n(A \cup B) = 15$. Using a Venn diagram, find $n(A' \cap B)$. (04 marks)
9. In the figure below, $\overline{AB} = 8 \text{ cm}$, $\overline{AC} = 10 \text{ cm}$ and height $\overline{OV} = 12 \text{ cm}$.



Find the volume of the figure shown above.

10. A saloon car passes a parked traffic car travelling at 80 km h^{-1} . Fifteen minutes later, the traffic car sets off at 100 km h^{-1} chasing the saloon car. Find how far the traffic car travels before catching up with the saloon car. (04 marks)

SECTION B: (60 MARKS)

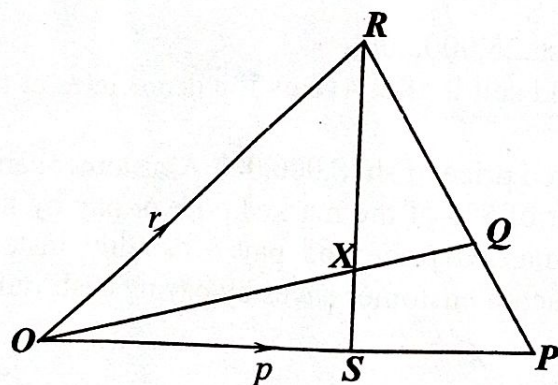
Attempt any five questions from this section.

11. (a) Given that $h(x) = ax^2 + bx$, $h(1) = 5$ and $h(-2) = 8$, find the values of a and b . (05 marks)
- (b) The functions $g(x)$ and $f(x)$ are such that $g(x) = 2x^2 - 3x$ and $f(x) = \frac{1}{3(x+1)^2}$. Find the values of x for which $fg(x)$ is meaningless. (07 marks)
12. In a class of 80 students, they were asked which of the three subjects Agriculture (A), Biology (B) and Chemistry (C) they liked. It was found out that $n(A \cup B \cup C)' = 10$, $n(A \cap B' \cap C') = 13$, $n(A' \cap B \cap C') = 15$, $n(A' \cap B' \cap C) = 8$, $n(A \cap B \cap C) = 10$, and $n(A \cap B \cap C') = n(A \cap B' \cap C) = n(A' \cap B \cap C)$.
- (a) Represent the above information on a Venn diagram. (05 marks)
- (b) Find the number of students who liked at least two subjects. (04 marks)
- (c) Find the probability that a student chosen at random liked at most one subject. (03 marks)
13. (a) Jane bought a vehicle at sh.25,000,000. Find how much she would sell it after 4 years if it depreciates at rate of 12% p.a. (05 marks)
- (b) A photocopier has a marked price of sh. 8,000,000. A customer can opt to pay cash and is allowed a discount of 8% of the marked price or pay by hire purchase by depositing 40% of the marked price and pay 8 monthly instalments each of sh.700,000. Find how much a customer saves by paying cash rather than by hire purchase. (07 marks)
14. Express:
- (a) $\frac{1}{\sqrt{5}-\sqrt{2}} + \frac{1}{\sqrt{5}+\sqrt{2}}$ in the form $a\sqrt{b}$ hence state the values of a and b . (05 marks)
- (b) Using mathematical tables, evaluate $\sqrt{\frac{731 \times 0.0475}{2.347}}$. (07 marks)
15. The cost (C) of printing a copy of an exam is partly constant and partly varies inversely as the square of the number (n) of the copies printed. Given that when 10 copies are printed, the cost per copy is sh. 600 and when 20 copies are printed, the cost per copy is sh. 525,
- (a) formulate the equation relating C and n .
- (b) Find the cost per copy when 25 copies are printed. (12 marks)

16. ✓ Kampala and Mbale are 400 km apart. A bus leaves Kampala ^{for} Mbale at 7:00 am travelling at 70 km h^{-1} . After travelling for $1\frac{1}{2}$ hours, the bus got a mechanical problem and was repaired for 1 hour after which it continued with the journey reaching Mbale at 11:30 am. One hour later, a pick-up set off from Mbale for Kampala travelling at 120 km h^{-1} constantly.

- (a) Represent the journeys of the two vehicles on a graph using a scale of 2 cm for 30 minutes and 2 cm for 50 km.
- (b) Use your graph to determine
- how far from Kampala where the two vehicles met
 - when the two vehicles met.
 - the difference in their times of arrival.
- (12 marks)

17. In the figure below, $\overrightarrow{OP} = p$, $\overrightarrow{OR} = r$, $RQ = 4QP$ and $2OS = 3SP$. Lines \overline{RS} and \overline{OQ} intersect at X .



- (a) Express in terms of vectors p and r the vectors
- \overrightarrow{PR}
 - \overrightarrow{RS}
 - \overrightarrow{OQ}
- (b) If $\overrightarrow{OX} = n\overrightarrow{OQ}$ and $\overrightarrow{RX} = m\overrightarrow{RS}$, express \overrightarrow{OX} in terms of
- p , r and n
 - p , r and m .
- (c) Find the scalars m and n .

(12 marks)

END