456/2
MATHEMATICS
PAPER 2
May, 2019
2 ½ hours

Uganda Certificate of Education

MATHEMATICS
PAPER 2
2 hours 30 minutes

Instructions

- ***Answer all questions in Section A and any five questions from Section B.***
- ***Any additional question(s) will not be marked.***
- ***All necessary calculations must be shown clearly.***
- ***Silent, non-programmable scientific calculators and list of Mathematical formulae may be used.***
- ***State the degree of occurance on each answer by writing Cal for Calculator and Tab for Tables.***

SECTION A

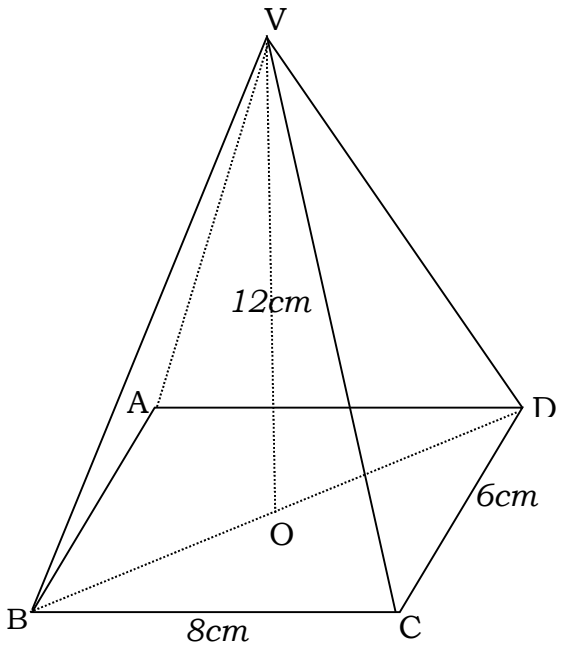
1. Without using tables or calculator simplify
$\sqrt{243} - \sqrt{108} + \sqrt{75}$ (4marks)
2. The midpoint of the line segment $\overline{AB}$ is T. Given that the coordinate of B are (6, 5) and T are (2, 3), determine the coordinates of A. (4marks)
3. Given the function $f(x) = \frac{1}{x}$ and $g(x) = 2x - 1$. Determine an expression for $gf(x)$ and find the value of x for which $gf(x) = 0$ (4marks)

4. The value of a machine depreciates by 5% each year. If the value is now sh3.61 million, what was the value of the machine 2 years ago. (4marks)

5. The set P and Q are such that $\cap(P) = \cap(P1 \cap Q) = 7$, $\cap(Q^1) = 8$ and $\cap(\varepsilon) = 20$. Represent the given information on a Venn diagram hence find $\cap(P \cap Q^1)$. (4marks)

6. The base areas of two similar tins are $24cm^2$ and $54cm^2$. If the volume of the smaller tin is $144cm^3$, determine the volume of the larger tin. (4marks)

7. Below is a pyramid ABCDV on a rectangular base ABCD in which CD = 6cm, BC = 8cm and vertical height $OV = 12cm$.



Determine;

(i) angle between plane VCD and the base
(ii) Volume of the pyramid (4marks)

8. Given that the position vectors of A and B are $\begin{pmatrix}-2\\4\end{pmatrix}$and $\begin{pmatrix}7\\7\end{pmatrix}$ respectively and also that X is on **AB** such that AX:XB = 1:2
Determine the column vector;
(i) AB
(ii) **OX** (4marks)

9. Two quantities x and y are such that y is partly constant and partly varies inversely as x and that, $y = 11$, when $x = 2$ and $y = 7$ when $x = 6$. Determine value of y when $x = 4$. (4marks)

10. On a map, a forest of area 7.2km^2 is represented by 5cm^2. Find the length of a road represented by 9cm on the map. (4marks)

SECTION B

11. Given the column vector $\boldsymbol{AC} = \begin{pmatrix}8\\2\end{pmatrix}$ and $\boldsymbol{BC} = \begin{pmatrix}4\\-2\end{pmatrix}$. X and Y are midpoints of $\boldsymbol{AB}$ and $\boldsymbol{AC}$ respectively.

Determine the;
(a) Column vectors of;

i) $\boldsymbol{AB}$

ii) $\boldsymbol{AX}$

iii) $\boldsymbol{XC}$

iv) $\boldsymbol{AY}$

(b) Length XC

(c) Show that XY is parallel to DC. (12marks)

12. Given $f(x) = 2x + 5$ and $g(x) = log_{10}x$
Determine;

a) $f^{-1}(x)$

b) value of x if $f(x) = 12$

c) an expression for $gf(x)$

d) value of x for which $gf(x) = 1$

e) Value of $fg(1)$. (12marks)

13. The distance between two towns A and B is 300km. At 7:15am a Bus sets off from A moving steadily at 75kmh^{-1} going to town B. One and half hours later a Saloon car sets off from A going to B and over took the bus at 10:15am.

(a) Calculate;
(i) the distance from A when the saloon car over took the bus
(ii) the speed of the saloon car
(iii) the difference in their times of arrival at B.

(b) Draw the distance-time graph showing the routes of the vehicles.
(12marks)

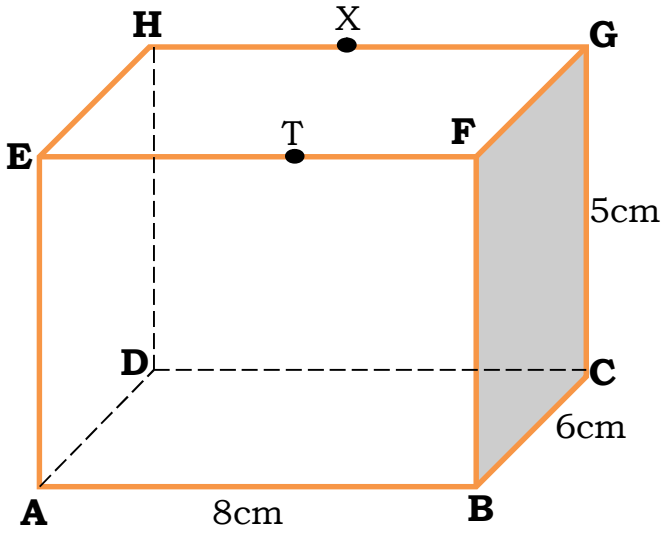
14. In a group of 35 ladies on a tour visited a certain fruit stall, which had Mangoes (M), Apples (A) and Pineapples (P). 18 ladies bought apples, 13 did not buy mangoes and 18 did not buy pineapples. 3 bought apples and mangoes only, 8 bought apples and pineapples, and 8 bought mangoes and pineapples only. If 3 bought neither fruit;

(a) Represent the information on a Venn diagram

(b) How many ladies bought all the fruits

(c) If a lady is picked at random what is the probability that she bought one type of fruit. (12marks)

15. Below is a cuboid in which AB = 8cm, BC = 6cm, GC = 5cm, X is the midpoint of HG



(a) Determine the length;

(i) AH

(ii) AX

(b) angle between AH and plane ADHE:

(c) Angle between ABX and the base ABCD. (12marks)

16. (a) Use logarithms tables to evaluate;

$\sqrt{\frac{23.5 \times 0.146}{8.3}}$ (Give your answer to 3 significant figures)

(c) Given that $\log_{10} 2 = 0.3010$, determine the values of;

(i) $\log_{10} 200$

(ii) $\log_{10} 0.2$

(iii) $\log_{10} \sqrt[3]{0.2}$ (12marks)

17. A school was to buy a bus at a cost of sh180 million. They decided to go in for a 4 years' loan from a bank at an interest of 24% per annum, simple interest. The loan processing fee was 2% of the loan. The loan was to be paid termly of equal installments. Calculate,

(i) the interest to be paid in 4 years

(ii) the total amount to be paid on completion of the loan

(iii) amount to be paid termly

(iv) the percentage extra cost incurred by going in for a loan to buy the bus. (12marks)

END*