456/2
MATHEMATICS
PAPER 2
2½ hours

WAKISSHA

Uganda Certificate of Education

MATHEMATICS

Paper 2

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. Find the Highest Common Factor (HCF) of 12, 18 and 30. (04 marks)

2. A trader sold a bicycle at Ug shs 180,000, making a loss of 10%. What was the cost price of this bicycle? (04 marks)

3. Without using a calculator, simplify $2\sqrt{147}-\sqrt{243}+\sqrt{75}$ (04 marks)

4. The sets A and B are such that n (A) = 13, n (B) =10, n $(A \cap B^{l})$ =5 and n $(A^{l} \cap B^{l})$ =3. Represent the above information on a Venn diagram and hence state $n(\varepsilon)$ where ε is the universal set. (04 marks)

5. A straight line passing through the points $(7, y)$ and $(4,5)$ is perpendicular to the line $5y+3x=0$. Determine the value of y. (04 marks)

6. Given that P is inversely proportional to the square of q and P =5 when q = 2. Find the value of P when q =10. (04 marks)

7. Given that $g(x)=3x^{2}$ -1, find $g^{-1}(x)$ and hence evaluate $g^{-1}(47)$ (04 marks)

8. If $8^{x} = 0.25$, without using tables or a calculator find the value of x. (04 marks)

9. Two plastic containers are similar in shape. The smaller container is 20cm high with capacity of $^{1}/_{9}$ liters. What is the height of bigger container whose capacity is 3 litres? (04 marks)

10. The vectors $\overrightarrow{OA} = \underset{\sim}{a}$, $\overrightarrow{OB} = \underset{\sim}{b}$, and point C is such that $3\overrightarrow{CB} = 2\overrightarrow{AC}$. Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$ the vector $\overrightarrow{OC}$. (04 marks)

SECTION B (60 marks)

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

11. (a) Given the set $\{3,5,6,10,12\}$ draw a papygram to show the relation "Is a multiple of" (04 marks)

    (b) A function $f(x)$ has its inverse $f^{-1}(x)=\dfrac{x+5}{2x-3}$

    Find $f(x)$ and hence evaluate $f\left(\dfrac{-1}{3}\right)$ (04 marks)

    (c) Given that $g(x)=x^{2}+1$ and $h(x)=x-3$. Find the value of x for which $gh(x)=hg(x)$ (04 marks)

12. (a) Evaluate $\dfrac{1\frac{1}{5}\text{ of}\left(1\frac{1}{4}+1\frac{3}{5}\right)}{8\frac{1}{3}\div 2\frac{1}{4}}$ (06 marks)

(b) Given that $\sqrt{6}=2.450$, $\sqrt{10}=3.162$ and $\sqrt{15}=3.873$, without using a calculator evaluate to two significant figures;

$$\frac{\sqrt{3}+\sqrt{2}}{\sqrt{5}+\sqrt{2}}$$ (06 marks)

13. A class of 100 Students were asked whether they had ever visited the cities: Arua (A), Jinja (J) or Mbale (M). The number that had visited Jinja only was twice that which had visited Mbale only. 55 had visited Arua, 14 had visited Jinja and Mbale only, 17 had visited Arua and Mbale only 20 had visited Arua and Jinja only, 10 had not visited any of the three cities and 15 had visited all the three cities.

(a) Represent the given information on a Venn diagram. (04 marks)

(b) How many students had;

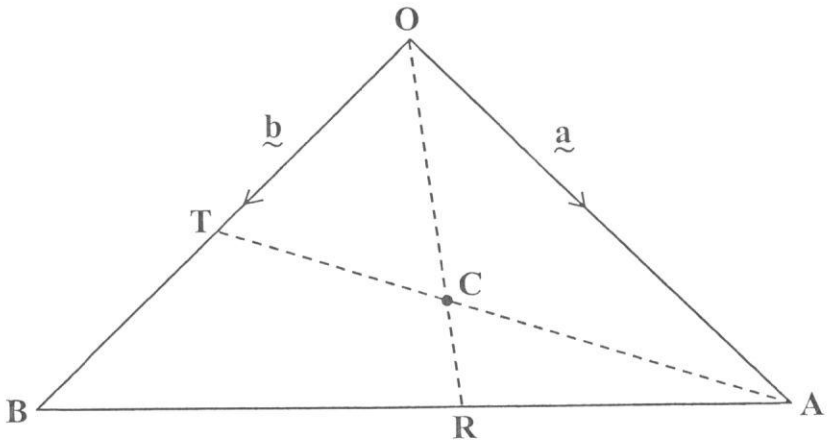
(i) visited Jinja?

(ii) not Visited Arua?

(06 marks)

(c) What is the probability that a student picked at random from this class had visited at most two cities? (02 marks)

14. In the diagram below, OA = $\underset{\sim}{a}$, OB = $\underset{\sim}{b}$, T is the mid-point of OB, R is on AB such that 2AR = RB, C is a point of intersection of AT and OR.



(a) Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$ the vectors:

(i) AB

(ii) OR

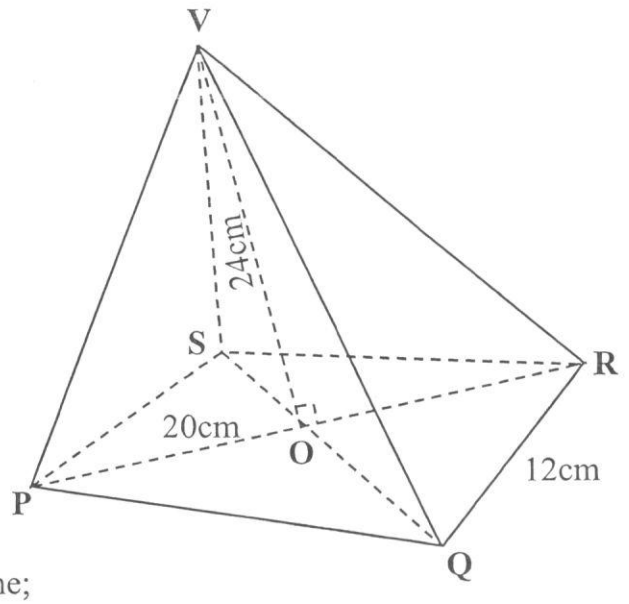
(iii) AT

(06 marks)

(b) Given that OC = tOR and that AC = kAT, find the values of the scalars k and t. (06 marks)

Turn Over

15. The figure below shows a right pyramid on a rectangular base PQRS.
PR = 20cm and QR = 12cm. Point V is 24cm vertically above the base PQRS.



Calculate the;

i) volume of the pyramid. (04 marks)

ii) angle PVR. (03 marks)

iii) angle between the planes PSV and QRV. (05 marks)

16. The towns Jinja and Soroti are 240km apart. One day a cyclist started riding from Jinja at 9.45am towards Soroti at a steady speed of 60km/hr. On the same day a motorist started driving from Soroti at 10:50am towards Jinja at a steady speed of 80km/hr. Determine the;

a) distance from Jinja where they bypassed each other.

b) time when they by-passed each other.

c) difference in their time of arrival.

(12 marks)

17. (a) A teacher's gross monthly salary is Ug shs 845,000. If Shs. 230,000 is tax free, Shs. 300,000 is taxed at 8% and the remainder is taxed at 15%. Determine the Teacher's net pay per year. (06 marks)

(b) Customs duty and Purchase tax are levied on certain imported goods as follows;
Purchase tax = 10% of (value + duty)
Customs duty = 25%of the value of the goods.
Find the total amount levied on imported goods value at Shs. 20.5 million.
(06 marks)

END