

456/2
MATHEMATICS

Paper 2

2022

Time: 2HOURS: 30MINUTES



MATIGO MOCK EXAMINATIONS
UGANDA CERTIFICATE OF EDUCATION

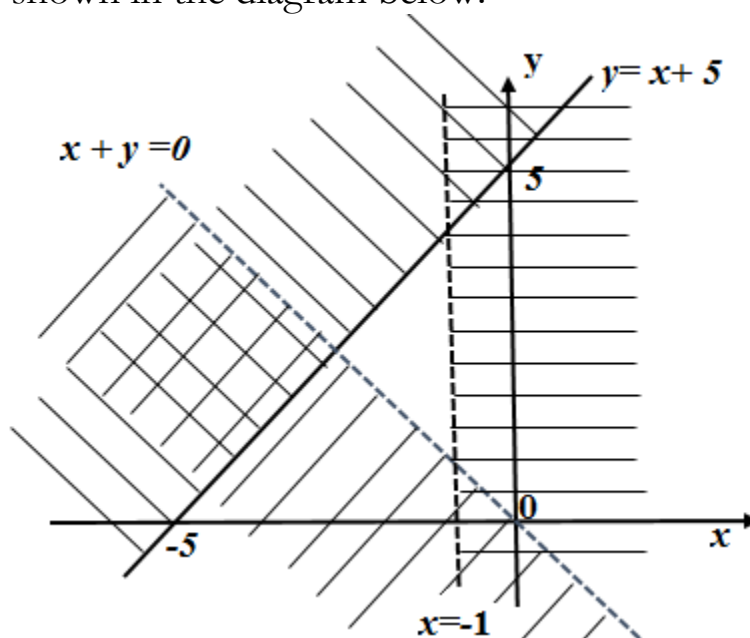
MATHEMATICS
PAPER TWO
DURATION: 2HOURS: 30MINUTES

INSTRUCTIONS TO CANDIDATES:

- ii) Attempt *all* questions in section **A** and not more than FIVE in section **B**.
- ii) All necessary working must be shown on the same sheet of paper as the rest of the answer.
- iii) Simple, silent non-programmable calculators may be used.

SECTION A (40 MARKS)
Attempt ALL questions in this section

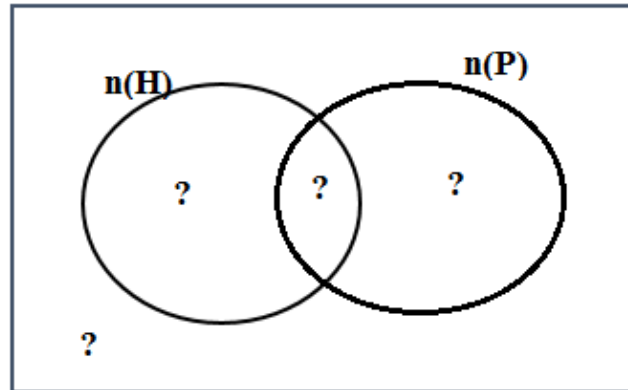
1. Express, $\frac{1-\sqrt{3}}{2-\sqrt{3}}$ in the form $a + b\sqrt{c}$. Hence state the values of a, b, and c (4 marks)
2. Find the value of t if $\log_3 y = 2$ and $\log_3 t y = 6$. (4 marks)
3. Write down the inequalities which describe the unshaded triangular region shown in the diagram below. (4 marks)



4. Factorise $a^2 - 2ab - 5a + 2b + 4$ completely. (4 marks)
5. It is given that $\tilde{x} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and $\tilde{y} = \begin{pmatrix} 6 \\ -1 \end{pmatrix}$, find (i) the column vector of $\tilde{x} - \tilde{y}$
(ii) the value of $|\tilde{x}| + |\tilde{y}|$ (4 marks)
6. Given that 420 US dollars are equivalent to Ush. 399,000 find
(i) the rate of exchange

- (ii) the equivalent of Ush. 150,000 in US dollars (4 marks)
7. In a class of 20 students, 7 take History but not Politics; 4 take Politics but not History. 6 students take neither History nor politics. Copy and complete the Venn diagram below. (4 marks)

$$n(\mathcal{E}) = 20$$

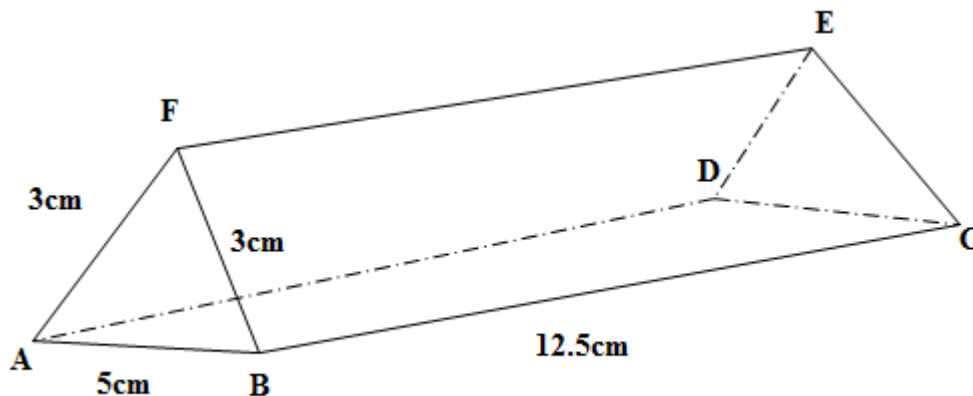


8. Use a papygram to illustrate the relation “is a multiple of” in the set $A = \{4, 8, 12, 16, 20\}$ (4 marks)
9. If $p:q = 5:6$ and $q:r = 8:9$, find $p:q:r$. (4 marks)
10. Find the equation of the line perpendicular to $y = 3 - 2x$ and passing through the point $(1,2)$ (4 marks)

SECTION B (60 MARKS)

Attempt only (five) questions in this section

11. The diagram below shows a right glass prism ABCDEF with the dimensions $AB=5\text{cm}$, $\overline{AF} = \overline{BF} = 3\text{cm}$ and $\overline{BC} = 12.5\text{cm}$.



Calculate to one decimal place;

a) The total surface area of the prism.

b) The volume of the prism.

(12 marks)

12. a) Without using tables or a calculator, evaluate

$$2\log_{10} 5 + \log_{10} 4 - \log_{10} 0.1$$

b) Use logarithm tables to evaluate;

i) $\sqrt[3]{0.6765}$

ii) $\frac{3.749 \times 0.5826^1}{0.05078}$

(12marks)

13. The table below shows the income tax rates of government employees

Taxable monthly income(Shs)	Tax rate
100000 - 200000	10%
200000 - 300000	20%
300000 - 400000	30%
400000 - 500000	40%
500000 and over	55%

An employee who pays sh.69526 as monthly income tax is entitled to the following allowances.

- Marriage allowance: Shs 126,500 per month
- Housing and transport: Shs 105,585 per month
- Medical care: Shs48,000 per month

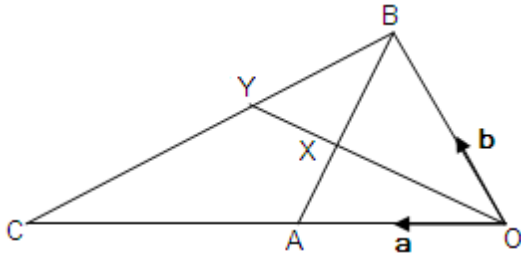
Find his:

(a) Taxable income

(b) Gross monthly income

- (b) Net monthly income (12 marks)
14. (a) The cost, c of running a produce cooperative marketing society of coffee in Uganda is partly constant and partly varies directly as the number of full members, m . if a society consists of 500 members, the cost is Shs 8000 while the cost of running a society of 600 members is Shs 9000. Find how much it costs to run a society of 1000 members. (6 marks)
- (b) z Varies directly as y and inversely as t . when $z = 6, y = 4$ and $t = 5$. Find z when $y = 24$ and $t = 20$ (6 marks)
15. In a group of 34 senior five students 23 study mathematics (M), 19 Economics (E) and 26 Geography (G)
 12 study M and E
 16 study M and G
 13 study E and G
 All the 34 students study at least one of the three subjects.
- (a) Find the number of students who study all the three subjects
- (b) Determine the probability that a student chosen at random from the group studies;
- (i) Mathematics
 - (ii) Economics and Geography but not mathematics
 - (iii) Only one of the three subjects (12 marks)
16. (a) Given that $f(x) = 8x + 5$ and $g(x) = 3x - 5$, find
- (i) $fg(2)$
 - (ii) $gf(2)$ (6marks)
- (b) if $f^{-1} = \frac{2-3x}{5x}$, and $h(x) = 6x - 5$
 Find (i) $f(x)$
 (ii) $fh(x)$ (6marks)

17. In the figure below, $\mathbf{OA} = a$ and $\mathbf{OB} = b$.



- (i) Express $\mathbf{BA}$ in terms of a and b .
- (ii) If X is the mid-point of BA , show that $\mathbf{OX} = \frac{1}{2}(\mathbf{a} + \mathbf{b})$.
- (iii) Given that $\mathbf{OC} = 3a$, express $\mathbf{BC}$ in terms of a and b .
- (iv) Given that $\mathbf{BY} = m\mathbf{BC}$, express $\mathbf{OY}$ in terms of a , b , m .
- (v) If $\mathbf{OY} = n\mathbf{OX}$ use the results of (ii) and (iv) to evaluate m and n .
(12marks)

END