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MATHEMATICS
Paper 2
June, 2023
$2\frac{1}{2}$ *hours*

MATIGO EXAMINATIONS BOARD

PRE MOCK 2023
Uganda Certificate of Education
MATHEMATICS
Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer ALL *questions in Section* A *and not more than* five *from section* B.

Any additional question(s) answered will not be marked.

All necessary calculations must be shown and should be done on the same page as the rest of the answer.

Mathematical tables and graph papers are provided.

Silent, non-programmable scientific calculators may be used.

Turn Over

SECTION A (40 MARKS)

*Attempt **all** question in this sections*

1. Mr. Opendi spends 1/4 of his salary on school fees. He spends 2/3 of the remainder on food and a fifth of what is left on transport. He saves the balance. In certain month he saved Sh. 3400. What was his salary? (04 marks)

2. Given that the universal set $\varepsilon = \{$ *all counting numbers less than* 29$\}$,

M and N are subsets of ε where, M = $\{$*Numbers which are multiples of* 4$\}$

N = $\{$*Numbers which are perfect squares*$\}$ Find MnN. (04 marks)

3. A small cone of height $8cm$ is cut off from a bigger cone to leave a frustum of height$16\ cm$. If the volume of the smaller cone is $160\ cm^3$. Find the volume of the frustum. (04 marks)

4. Simplify the expression. $\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ giving your answer in the form of $a + b\sqrt{c}$. (04 marks)

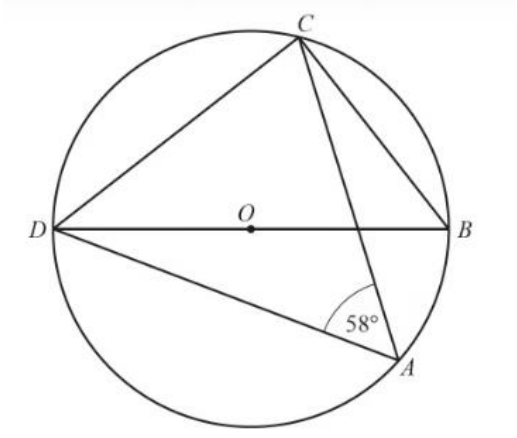
5. If $f(x) = 3x^2 + bx - 3$ and $f(2) = 15$, find the value b. (04 marks)

6. A line with gradient 2 passes through the point A$(-1, -3)$, find the coordinates of the points where the line meets the axes. (04 marks)

7. A man invests Shs 500,000 at a rate 0f 2% per year compound interest. Calculate the value of her investment at the end of 3 years. (04 marks)

8. If R is a point on SQ such that RQ $=\frac{1}{4}SQ$ and P is a point such that $\overrightarrow{SP} = p$ and $\overrightarrow{PQ} = q$, find $\overrightarrow{PR}$ in terms of p and q. (04 marks)

9. ABC and D are points on the circumference of the circle, centre O, DOB is a straight line and angle DAC =58°. Find angle CDB. (04 marks)



10. Evaluate $\sqrt[3]{\frac{1828}{98.64}}$ using logarithms (04 marks)

SECTION B (60 MARKS)

11. The pandemic strikes and a subset of the 1000 students begin exhibiting symptoms of COVID, including fever, cough, and loss of smell. When the medical center screened the 140 symptomatic students, they found 79 students had a fever, 69 students had a cough, 42 students had loss of smell. In addition, 30 students appeared with fever and cough, 11 students showed cough and loss of smell, 16 students had fever and loss of smell.

(i) Use Venn diagram to represent the given information. (03 marks)

(ii) Calculate the number of students exhibiting all three symptoms: fever, cough, and loss of smell. (06 marks)

(iii) What is the probability that a student picked at random could have neither fever nor cough. (03 marks)

12. (a) Simplify: $\frac{\left(1\frac{2}{3}\times 1\frac{1}{4}\right)\times\left(\frac{1}{4}\right)}{2\frac{1}{3}-1\frac{6}{7}}$ (05 marks)

(b) Solve for x from the logarithmic equation below:
$2\log x = \log 18 + \log(x-4)$ (07marks)

13. The distance between towns A and B is $360km$. A minibus left town A at 8.15 a.m. and traveled towards town B at an average speed of 90km/hr. A drone left town B $2\frac{1}{3}$hours later on the same day and travelled towards A at an average speed of 110km/hr.

(i) At what time did the two vehicles meet? (05 marks)

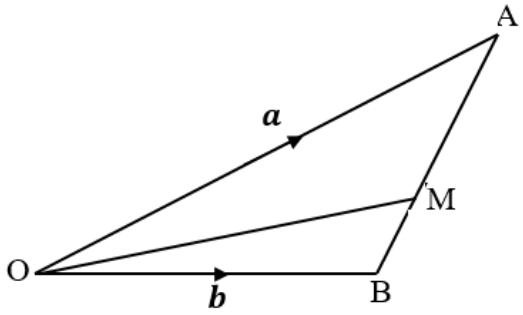
(ii) How far from A did the two vehicles meet? (03 marks)

(b) A motorist started from his home at 10.30 $a.m.$ on the same day as the Drone and travelled at an average speed of $100km/h$. He arrive at B at the same time as the minibus. Calculate the distance from A to his house.

(04 marks)

14. In the diagram below, O is the origin, $\boldsymbol{OA} = \boldsymbol{a}$ and $\boldsymbol{OB} = \boldsymbol{b}$. The point **M** lies on **AB** such that **AM: MB= 3:2**

Find in terms of a and b in its simplest form:



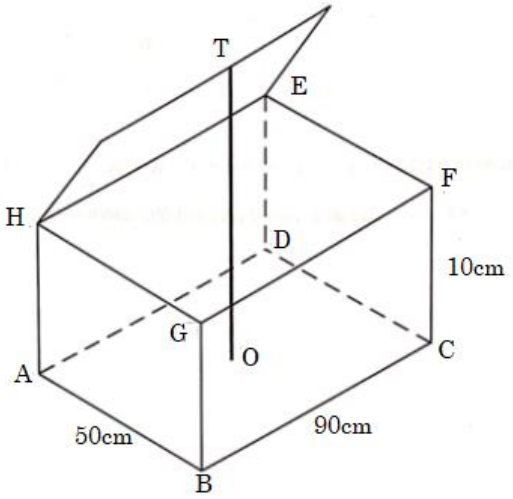
(a) **AB** (01 mark)

(b) **AM** (03 marks)

(c) the position vector of M (03 marks)

(d) Given that **OM** is extended to point C. the position vector of C is $\boldsymbol{a} + k\boldsymbol{b}$ find the value of k (05 marks)

15. The figure ABCDEFGH represents a box



The top lid of the box is opened such that the height OT is 35cm. Calculate the:

(a) angle the top lid makes with the plane FGHE. (04marks)

(b) length BE, correct to 2 decimal places. (04 marks)

(c) angle between planes ABCD and BCEH. (04 marks)

16. The table below shows monthly income tax rates for a certain year.

Monthly Income (in Shs)	Tax rate in each shilling
$0 - 11180$	10%
$11181 - 21714$	15%
$21715 - 32248$	20%
$32249 - 42782$	25%
Above 42782	30%

In that year, a monthly personal tax relief of Shs 1,280 was allowed. In a certain month of that year, Kimono earned a monthly basic salary of Shs 52,000, a house allowance of Shs 7,800 and a commuter allowance of Shs 5,000.

(a) Calculate:

(i) Kimono's taxable income; (03 marks)

(ii) the net tax payable by Kimono in that month; (05 marks)

(b) In July that year, Kimono's basic salary was raised by 4%. Determine Kimono's net salary in July. (04 marks)

17. (a) Given the Set {0.2, 0.25, 0.5, 2, 4, 5}, Draw a papygram to show the relation 'is the reciprocal of' (03 marks)

(b) If $f(x) = 2x + 1$, $g(x) = x^2 + 4$ and $h^{-1}(x) = \frac{1+x}{x}$. Find;

(i) $h(x)$ (05 marks)

(ii) x if $f(x) = g(1)$ (04 marks)

END

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