**456/2**
**MATHEMATICS**
**Paper 2**
**August**
**2 ½ Hours**

# ELITE EXAMINATION BUREAU MOCK 2016

## Uganda Certificate of Education

MATHEMATICS

**Paper 2**

**2 Hours 30 Minutes**

**INSTRUCTIONS TO CANDIDATES**

- ✓ *Answer all questions in section **A** any **five** from section **B**.*
- ✓ *Any additional question (s) answered will not be marked.*
- ✓ *All necessary working must be shown clearly on paper.*
- ✓ *Silent, non programmable scientific calculators and mathematical tables with a list of formulae may be used.*

## SECTION A (40 MARKS)

### Answer all questions

1. Express $0.\overline{64}$ in its simplest form of $\frac{a}{b}$, hence find the value of a + b (4marks)

2. Evaluate $1\frac{1}{5}$ of $20 + 3\frac{3}{4} \div {}^{3}/_{8} - 4\frac{1}{2} \times 3\frac{1}{3}$. (4marks)

3. Given that $\overrightarrow{AB} = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$ and $\overrightarrow{BC} = \begin{pmatrix} -4 \\ 1 \end{pmatrix}$. Find $\overrightarrow{OC}$ the position vector of c if c is the midpoint of $\overrightarrow{AB}$. (4marks)

4. Rationalize, $\frac{2}{\sqrt{5}-\sqrt{3}}$ and hence find its value, given that $\sqrt{3} = 1.732$ and $\sqrt{5} = 2.236$ (4marks)

5. Without using tables or calculators, simplify $\log_{10} 750 - 2\log_{10} 3 + \log_{10} 1.2$ (4marks)

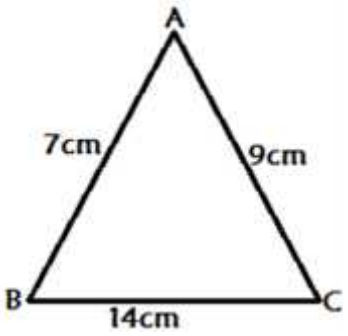
6. Form a quadratic equation whose roots are $x = \frac{-5}{2}$ and $x = 3$. (4marks)

7. Given that $\cos\theta = \frac{12}{13}$ express as fractions the values of $\sin\theta$ and $\tan\theta$ if $180^o \leq \theta \leq 360^o$ (4marks)

8. Mr. Katwalo bought a spacio car for Shs 16,500,000. If it depreciates at a rate of 10% per annum, calculate; the value of the car after 3 years. (4marks)

9. Find $f^{-1}(4)$ , given that f(x) = 3x + 2. (4marks)

10. Calculate to 2 decimal places the area of the triangle ABC where,
    AB = 7cm, BC = 14cm and AC = 9cm.




(4marks)

## SECTION B

11. a) Line T passes through points (-2, 3) and (4, 5). Find the equation of line T.
b) If the equation of line R is $y + 2x = 6$, find the coordinates of the point of intersection of line T and R.
c) Determine the y – intercepts for lines R and T. Hence find the area enclosed between the 2 lines and the y-axis. (12marks)

12. In a certain company the worker gets monthly allowance as follows.
Medical shs 480,000 per annum
Transport shs 50,000
Lunch Shs 1,000 per day
Housing Shs 10% of the gross annual income
Family allowance for children using the following system
12 years and below shs 3000
Above 12 years but below 18 years shs 2,000
Akena earns a gross annual income of Shs 8,160,000 and has children aged 5, 9, 15, 17 and 22. If he is taxed using the structure below.

| Taxable income Shs | Rates % |
|---|---|
| 0 – 130,000 | 5.0 |
| 130,001– 260,000 | 10.0 |
| 260,001 – 360,000 | 15.0 |
| 360,001 – 400,000 | 20.5 |
| Above 400,000 | 30.0 |

a) Calculate Akenna's
(i) Monthly taxable income
(ii) Monthly income tax.
b) Express the net income paid as a percentage of his annual income.
(12marks)

13. a) Give n that $f(x) = \frac{8x+4}{x^2-4}$. Find

(i) the values of x for which $f(x)$ is undefined

(ii) $f(3)$

b) Given that $f(x) = x^2 - 7$ *and* $g(x) = x + 1$. Find the values of x for which fg(x) + gf(x) = 0 (12marks)

14. In a class of 60 students, 10 study mathematics only, 11 study physics only, 14 study only chemistry. 8 students study both chemistry and physics only, 11 study chemistry and mathematics. The number of students who study all the subjects is one more than those who study all the subjects is one more than those who study mathematics and physics only. There are two students studying none of the three subjects.

a) Represent this information on a Venn diagram

b) Find the number of students who study.

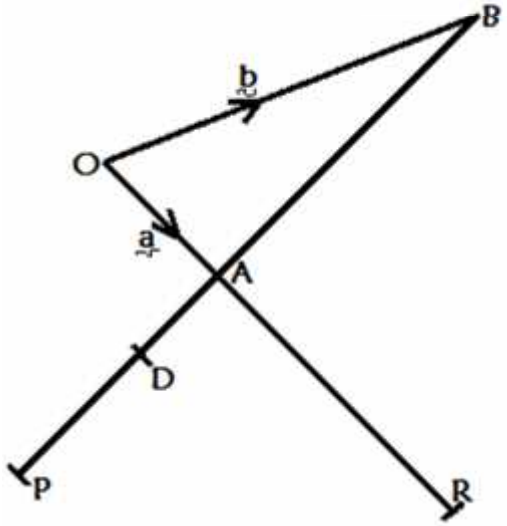
(i) All the subjects

(ii) Mathematics.

c) If a student is chosen at random from the class, determine the chance that she studies only two subjects. (12marks)

15. a) Given that $\underline{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ $\underline{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$. Find the length of $2\underline{b} - \underline{a}$.

b) in the figure below $OA = \underline{a}$, $OB = \underline{b}$ 2OA = AR, DA:DB = 1:3 and 3AD = DP.

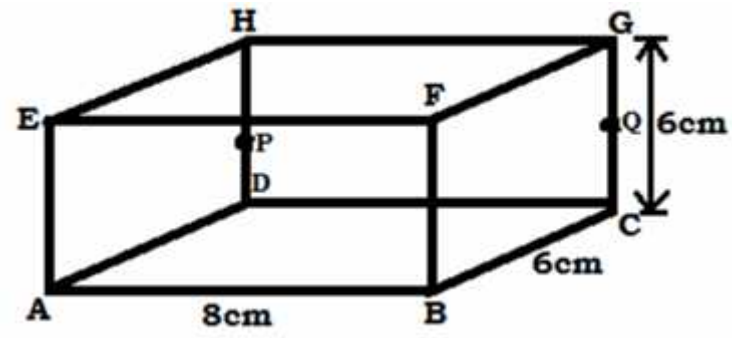



**Find the following vectors in terms of a and b.**

**(i) AB**
**(ii) OD**
**(iii) PB**
**(iv) OR**
**(v) Show that OB is not parallel to PR**

(12marks)

16. The figure below shows a cuboid ABCDEFGH.




P and Q are mid points of $\overline{HD}$ and $\overline{GC}$ respectively $\overline{AB} = 8cm$, $\overline{BC} = \overline{GC} = 6cm$.

Find

a) the length of $\overline{DB}$ and $\overline{HB}$.

b) the angle between $\overline{HB}$ and the base ABCD.

c) The angle between planes ABQP and the base ABCD.

d) Volume of the cuboid. (12marks)

17. Villages A and B are 500km apart. A bus left A and traveled towards B at an average speed of 60kmh$^{-1}$. After 2½ hours, a car left A and traveled along the same road at an average speed of 100kmh$^{-1}$.

a) Find the;

(i) Distance of the bus from B when the car took off.

(ii) Distance the car travelled to catch up with the bus.

b) Immediately the car caught up with the bus, the car stopped for 25 minutes. Find the new average speed at which the car travelled in order to reach B at the same time as the bus. (12marks)

**END**