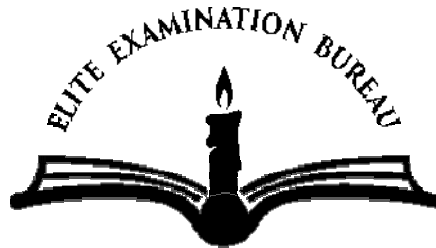


**456/2**  
**MATHEMATICS**  
**Paper 2**  
**JULY/AUGUST**  
**2 ½ hours**



**ELITE EXAMINATION BUREAU MOCK 2019**  
**Uganda Certificate of Education**

**MATHEMATICS**  
**Paper 2**

**2 HOURS 30 MINUTES**

**INSTRUCTIONS TO CANDIDATES:**

- *Answer all the questions in section **A** and not more than five questions from section **B**.*
- *All necessary calculations must be done on the same page as the rest of the answer.*
- *Mathematical tables with a list of formulae are provided.*
- *Silent non – programmable scientific calculators may be used.*

**SECTION A: (40 MARKS)**  
**(Answer all questions in this section)**

1. Work out:  $\frac{3\frac{1}{2} - 1\frac{1}{8} \times \frac{2}{3}}{1\frac{3}{4} + 7\frac{2}{3} \div 5\frac{3}{4}}$  and give your answer as a fraction. (4 marks)
2. Line T passes through the point P(-3, -2) and is parallel to the line whose equation is  $2y + 3x = 6$ . Determine the equation of line T. (4 marks)
3. Sets A and B are such that  $n(A) = n(A') = 8$ ,  $n(A' \cap B) = 6$  and  $n(B') = 7$ . Represent the information on a Venn diagram, hence state  $n(A \cap B)$ . (4 marks)
4. Simplify:  $1 + 2\log_{10}^5 - \log_{10}^{20} + 3\log_{10}^2$ . (4 marks)
5. Mark bought a radio at Shs 75,000 and sold it at Shs 70,000. Calculate his percentage loss. (4 marks)
6. a) By means of a papygran, illustrate the relation "exceeds by more than 3" on set  $P = \{-3, -2, -1, 0, 1, 2\}$ . (2 marks)  
 b) Use an arrow diagram to illustrate the mapping  $y: y \rightarrow \sqrt{y}$  on set  $Q = \{0, 1, 4, 9\}$  and its range. (2 marks)
7. A village of an area  $480\text{km}^2$  is represented by an area of  $120\text{cm}^2$  on a map. Find the length of a road in km which is represented by 15cm on the map. (4 marks)
8. Given that A is (1, 9) and B is (2, 5), find:  
 i) column vector AB. (2 marks)  
 ii) length of vector AB. (2 marks)
9. Express  $\frac{\sqrt{5}}{2-\sqrt{5}}$  with a rational denominator, hence find the value of  $\frac{\sqrt{5}}{2-\sqrt{5}}$ , given  $\sqrt{5} = 2.2361$ . (4 marks)
10. The capacity of a cylinder of height 14cm is 1.584 litres. Calculate the radius of the circular end of a cylinder. (Use  $\pi = \frac{22}{7}$ ) (4 marks)

**SECTION B: (60 MARKS)**  
**(Answer five questions from this section)**

11. Two functions f and g are defined as  $f(x) = x^2 - 4$  and  $g(x) = 4x + 1$ . Find:  
 a)  $f^{-1}(-3)$   
 b)  $fg(0.5)$   
 c) The value(s) of x for which  $f(x) = g(x)$ . (12 marks)

12. In Dokolo Secondary school, 50 boys like playing volleyball (V), 53 like basketball (B) and 36 like chess (C). 7 boys like only volleyball, 12 like volleyball and chess but not basketball and 21 like volleyball and basketball but not chess. Each boy likes at least one of the games and there are eighty boys in the school.
- Represent this information on a Venn diagram.
  - Find the number of students who like;
    - All the three games.
    - Chess and volleyball.
  - Find the probability that a boy plays at most two games. (12 marks)
13. The table below shows the tax structure on taxable incomes of a certain group of government employees in the month of February 2019.

| Amount (shs)      | Rate (%) |
|-------------------|----------|
| 50,001 – 120,000  | 5.0      |
| 120,001 – 180,000 | 7.5      |
| 180,001 – 250,000 | 10.0     |
| 250,001 – 350,000 | 15.0     |
| 350,001 – 480,000 | 25.0     |
| 480,001 – 550,000 | 28.5     |
| 550,001 – 600,000 | 32.0     |
| Above 600,000     | 37.5     |

The employee is entitled to the following allowances.

Marriage Shs 25,000 per half a month

Electricity / Yaka Shs 3 per minute

Medical care Shs  $\frac{3}{2}$  of the monthly marriage allowance.

Housing Shs 960,000 per 2 years

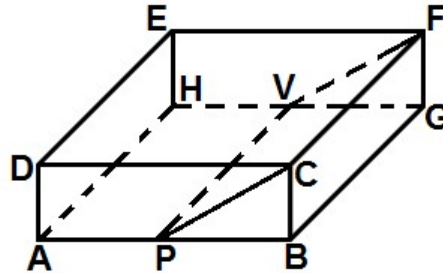
Transport Shs 1000 per day

Insurance Shs 35% of the monthly medical care allowance.

Child care for only two children. Shs 15,000 for each child below 10 years, Shs 6,000 for each child above 9 years and below 15 years.

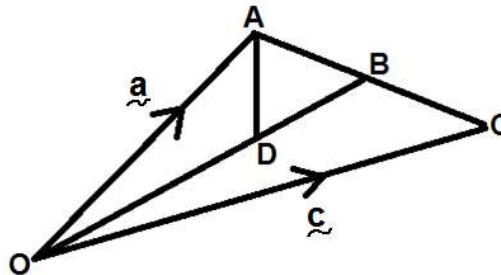
- Mr. Ojambo is married and has four children aged 8, 13, 15 and 18 years. Calculate the income tax he pays if he earns \$250 every month.
  - Find the percentage of his gross annual income that goes to tax.
  - Find the ratio of his total allowance to the net income if the exchange rate is \$1 = UgShs 3,000. (12 marks)
14. Town **P** is 460km from Town **Q**. A bus leaves Town **P** at 7:30am and travels at a steady speed of  $80\text{kmh}^{-1}$  towards town **B**. At the same time, a taxi leaves Town **B** travelling nonstop towards town **A** at a steady speed of  $100\text{kmh}^{-1}$ .

- a) On the same axes, draw a distance – time graph for the journeys of the two vehicles. (Use a scale of 2cm to represent 1 hour and 2cm to represent 50km) (4 marks)
- b) From the graph, find:
- The difference in their time of arrival. (4 marks)
  - When and where the two vehicles meet from town A. (4 marks)
15. ABCDEFGH is a rectangular block in which  $\overline{AB} = 8\text{cm}$ ,  $\overline{BC} = 6\text{cm}$  and  $\overline{BG} = 4\text{cm}$ . Study the diagram and answer the questions that follow.



If  $2\overline{PB} = \overline{AB}$  and  $\overline{PB} = \overline{VG}$ , find:

- Angle between line AF and the base.
  - Angle between plane PVFC and plane BGFC.
  - The volume of the remaining solid after cutting PVCFBG. (12 marks)
16. In the diagram below  $\vec{OA} = \underline{a}$ ,  $\vec{OC} = \underline{c}$ ,  $\vec{AB} = 4\vec{BC}$  and  $\vec{OD} = 2\vec{DB}$ .



- Express the following vectors in terms of  $\underline{a}$  and  $\underline{c}$ . (9 marks)
    - $\vec{CA}$
    - $\vec{CB}$
    - $\vec{OB}$
    - $\vec{OD}$
  - Show that  $\vec{AD} = \frac{1}{15}(8\underline{c} - 13\underline{a})$ . (3 marks)
17. a) P varies as  $V^2$  and inversely as T. Given that  $P = 2$ , when  $V = 4$  and  $T = 2$ , find the value of P when  $V = 5$  and  $T = 5$ . (4 marks)
- b) A company makes pens. The total cost (c) of making pens is partly constant and partly varies as the number of pens, n, made. If the cost of making 500 pens is Shs 29,000 and the cost of making 1000 pens is Shs 32,000. Calculate the cost of making 2,500 pens. (8 marks)

**END**