

456/2  
MATHEMATICS  
PAPER TWO  
2 ½ HOURS

**UGANDA CERTIFICATE OF EDUCATION  
MATHEMATICS  
PAPER 2  
2 HOURS 30 MINUTES**

**Instructions to candidates;**

- Answer **all** questions in section **A** and any **five** in section **B**.
- Any addition question (s) answered will not be marked.
- All necessary calculations must be done on the same page as the rest of the answer. Therefore no paper should be given for rough work.
- Graph paper is provided.
- Silent, non – programmable scientific calculators and mathematical table with a list of formulae may be used where not prohibited.

**Section A** (40 marks)

1. Without using a calculator or logarithm tables, evaluate;

$$\log_{10} 7000 - \log_{10} 7 \quad (04 \text{ marks})$$

2. Express the decimal 1.31818181..... as an improper fraction in its lowest terms. (04 marks)
3. If  $n(P) = 23$ ,  $n(Q) = 25$ ,  $n(P' \cap Q') = 4$  and  $n(\epsilon) = 45$ , find  $n(P \cap Q)$ . (04 marks)

4. Find the equation of the line through the points A (4, 3) and B (10, 9). (04 marks)

5. Given that  $\vec{OA} = \begin{pmatrix} 7 \\ 2 \end{pmatrix}$  and  $\vec{OB} = \begin{pmatrix} 15 \\ 17 \end{pmatrix}$ , determine the length of  $\vec{AB}$ . (04 marks)

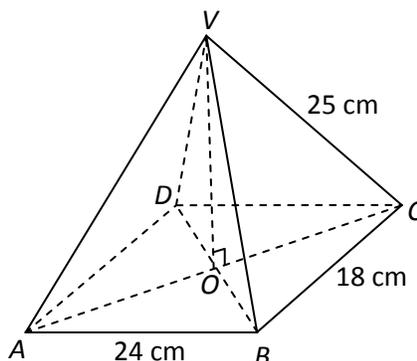
6. Without using a calculator or tables evaluate ;  
$$\frac{78.65^2 - 21.35^2}{5.73} \quad (04 \text{ marks})$$

7. A salesman gets a basic monthly salary of shs 256,000. She also gets 0.5% commission on sales. In a certain month, her sales were shs 28,000,000; calculate her income for that month. (04 marks)

8. Given that p varies inversely as the square of q and  $p = 9$  when  $q = 4$ , find the value of p when  $q = 8$ . (04 marks)

9. Given that  $g(x) = 9x^2 - 12x - 4$ , find the value of  $g(-5)$ . (04 marks)

10. The diagram below shows a right pyramid on a rectangular base ABCD.  $\overline{AB} = 24$  cm,  $\overline{BC} = 18$  cm and the slant side  $\overline{VC} = 25$  cm.



Find the height of the pyramid  $\overline{OV}$ . (04 marks)

**SECTION B** (60 marks) . Answer any five questions from this section.

11. (a) Three girls Betty, Diana and Mary shared shs 80,000 in the ratio 5: 2: 3 respectively. How much money did each girl get? (06 marks)
- (b) Find the next two terms on each of these sequences;

(i) 3, 5, 9, 17, \_\_\_\_\_, \_\_\_\_\_.

(ii) 3, 6, 10, 15, \_\_\_\_\_, \_\_\_\_\_.

(06 marks)

12. In a workshop, there are 50 teachers, 18 teach chemistry, 16 teach Biology, and 24 teach physics. 5 teach physics and chemistry, 7 teach physics and biology 6 teach chemistry and Biology. 8 teachers do not teach any of the three subjects.

(a) Represent the given information on a Venn diagram. (05 marks)

(b) How many teachers teach all the three subjects? (03 marks)

(c) How many teachers teacher's neither physics nor chemistry. (02 marks)

(d) Find the probability that a teacher selected at random from the workshop teaches one subject only. (02 marks)

13. (a) The function f is such that  $f(x) = 3x + 1$ . Find;

(i)  $f(5)$ .

(ii)  $f^{-1}(x)$ .

(iii)  $f^{-1}(4)$ .

(06 marks)

(b) Given that  $g(x) = ax^2 + 2x$  and  $g(3) = 24$ , find the value;

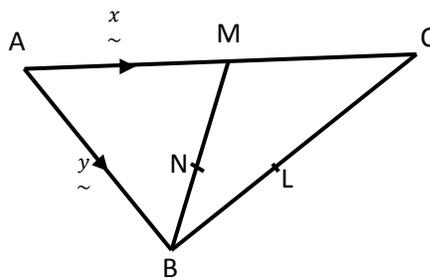
(i) a.

(ii)  $g(-3)$ .

(06 marks)

14. In the diagram below, M is the midpoint of  $\overline{AC}$  and N is the midpoint of  $\overline{MB}$ .  $\overline{BL} : \overline{LC} =$

$1 : 2$ ,  $\overline{AB} = \underset{\sim}{y}$  and  $\overline{AM} = \underset{\sim}{x}$ .



(a) Find in terms of  $\underset{\sim}{x}$  and  $\underset{\sim}{y}$ .

(i)  $\overline{MB}$  (ii)  $\overline{AN}$  (iii)  $\overline{LB}$  (iv)  $\overline{AL}$ . (07 marks)

(b) If  $\overline{AN} = q \overline{AL}$ , find the value of q, hence find the ratio of  $\overline{AN}$  to  $\overline{NL}$ . (05 marks)

15. (a) On the imported goods, customs duty and value added tax were levied as shown in the table below.

Customs duty	25% of the value of the goods.
Value added tax	15% of 9 value of the goods + customs duty.

Find the total amount which was levied on importing a television set valued at

shs 500,000. (06 marks)

(b) A man borrowed shs 6,000,000 from a bank to complete a commercial building at a compound interest rate of 25% per annum. He had to repay the loan and interest within two years in equal monthly installments. Calculate the;

- (i) Total amount of money the man paid to the bank.
- (ii) Amount of money he paid per month.
- (iii) Interest he paid on the loan at the end of two years. (06 marks)

16. At 11:00 am, a cyclist left Kampala for Masaka 120 km away at an average speed of  $20 \text{ kmh}^{-1}$ . After cycling for 3 hours, he rested for an hour. He then continued to Masaka at the same speed.

At the same time, a motorist left Masaka for Kampala at an average speed of  $60 \text{ kmh}^{-1}$ . He then stayed in Kampala for  $1\frac{1}{2}$  hours before returning to Masaka at an average speed which took him back to Masaka in  $2\frac{1}{4}$  hours.

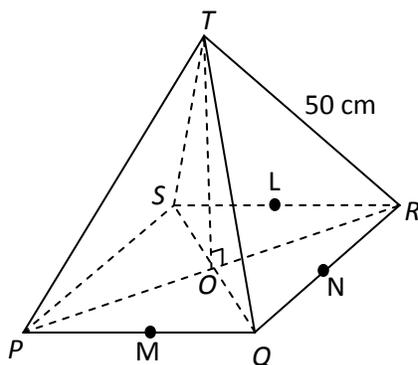
(a) On the same axes, using a scale of 1 cm to represent 5 km on the vertical axis and 2 cm to represent 1 hour on the horizontal axis, draw a distance - time graph for the cyclist and motorist. (06 marks)

(b) From your graph in (a), determine;

(i) The time and distance from Kampala at which the motorist met and bypassed the cyclist on the way to and from Kampala respectively. (04 marks)

(ii) How long did the motorist have to wait in Masaka before the cyclist could arrive? (02 marks)

17.



The figure above shows a right pyramid PQRST on a rectangular base PQRS. Given that  $\overline{PQ} = 64 \text{ cm}$ ,  $\overline{QR} = 48 \text{ cm}$ , the slant length  $\overline{PT} = \overline{QT} = \overline{RT} = \overline{ST} = 50 \text{ cm}$ . L, M and N are the midpoints of  $\overline{SR}$ ,  $\overline{PQ}$  and  $\overline{QR}$  respectively. Calculate the;

- (i) Height of the pyramid  $\overline{OT}$ . (05 marks)
- (ii) Volume of the pyramid PQRST. (02 marks)
- (iii) Angle between the slant face TQR and the base PQRS. (02 marks)
- (iv) Angle between the opposite slants faces PQT and SRT. (03 marks)

END