



EXAMINATION NO.: \_\_\_\_\_

# THE MALAWI NATIONAL EXAMINATIONS BOARD

MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

## SAMPLE PAPER

# MATHEMATICS

Subject Number: M131/II

Time Allowed: 2 h 30 mins

## PAPER II

(100 marks)

### Instructions

1. This paper contains 15 printed pages. Please check.
2. Answer all the six questions in Section A and any four questions from Section B.
3. The maximum number of marks for each answer is indicated against each question.
4. Write your answers in the spaces provided on the question paper.
5. Calculators may be used.
6. The graph paper at the end of the question paper can be used if required.
7. All working must be clearly shown.
8. Write your Examination Number at the top of each page of your question paper in the spaces provided.
9. In the table provided on this page, tick against the question number you have answered.

Question Number	Tick if answered	Do not write in these columns	Examiner's Initials
1			
2			
3			
4			
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6			
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8			
9			
10			
11			

**Section A (60 marks)**

Answer **all** the **six** questions in this section.

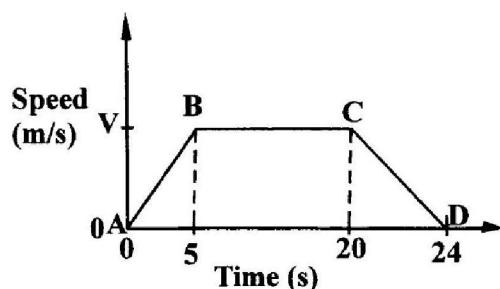
1. a. Simplify  $\frac{y+3}{2y^2+y-3} \div \frac{5y+15}{2y+3}$ . **(5 marks)**
- b. A square based pyramid with base side 6 m has volume 62.4 m<sup>3</sup>. Calculate the height of the pyramid, leaving your answer to one decimal place. **(4 marks)**

2. a. The third term of a geometrical progression is 32 and the tenth term is 4096. Find the first term. **(5 marks)**
- b. A cylinder is 10 cm high and its base diameter is 5 cm. The height of a larger similar cylinder is 15 cm. Find the ratio of the volume of the larger cylinder to the smaller cylinder. **(4 marks)**

3. a. Given that  $\underline{a} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$ ,  $\underline{b} = \begin{pmatrix} 7 \\ -3 \end{pmatrix}$  and  $\underline{c} = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$  find the value of  $m$   
such that  $\underline{b} + m\underline{a} = \underline{c}$ . (5 marks)
- b. Using a ruler and a pair of compasses only, construct a circle centre  $O$  of diameter 5 cm. Through any point  $X$  on the circle, construct a tangent  $PX$  such that  $PX = 6$  cm. Join  $PO$ . Measure and state the length of  $PO$ . (5 Marks)

4. a. The universal set  $(\mu) = \{4, 5, 6, 7, 8, 9, 10, 11, 12\}$ .  
 $A = \{5, 6, 9, 11\}$  and  $B = \{4, 6, 8, 10, 12\}$ . Using a Venn diagram  
find  $n(A' \cap B')$ . (5 marks)

- b. **Figure 1** shows a sketch of a speed-time graph ABCD of a moving object.



**Figure 1**

If acceleration during the first 5 seconds (AB) is  $4 \text{ m/s}^2$ , calculate  
the total distance covered by the object. (6 marks)

5. a. Given that  $\log_{(k-2)} 1\frac{7}{9} = 2$ , find the values of  $k$ . (5 marks)

- b. In **Figure 2**,  $BOC$  is a diameter and angle  $TDC = 90^\circ$ .  
 $DTX$  is a tangent to the circle  $BCT$  at  $T$ .

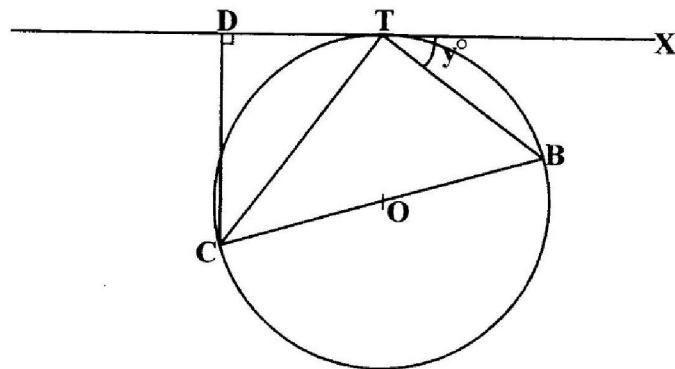


Figure 2

If angle  $BTX = y^\circ$ , show that angle  $DCT = \text{angle } BCT$ . (6 marks)

- 6.** a. Triangle **PQR** is such that **PQ = 7 cm**, **QR = 5 cm** and **PR = 3 cm**.  
Find angle **PQR** giving the answer correct to two significant figures. **(6 marks)**

## 6. (Continued)

- b. **Table 1** shows masses in kg of 30 students.

**Table 1**

43	45	50	51	58	52	47	42	54
61	50	45	57	41	46	49	51	50
59	44	53	49	40	48	52	51	48

Taking class intervals: 40 – 44, 45 – 49, .... construct the frequency distribution table of the masses. **(4 marks)**

**Section B (40 marks)**

Answer any **four** questions from this section.

7. **Table 2** shows some values of  $x$  and  $y$  for the equation  $y = 2x^2 + 3x - 6$ .

**Table 2**

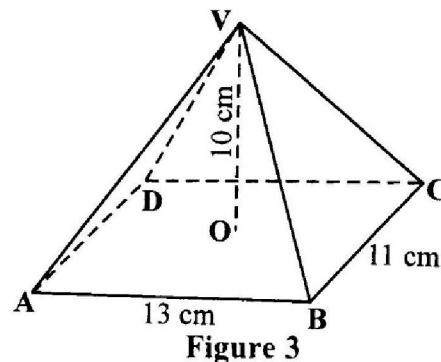
-4	-3	-2	-1	0	1	2	3
14	3		-7	-6		8	21

- (i) Complete the table.
- (ii) Using a scale of 2 cm to represent 2 units on horizontal axis and 2 cm to represent 5 units on the vertical axis, draw the graph of  $y = 2x^2 + 3x - 6$  **on page 9**.
- (iii) Use your graph to solve the equation  $2x^2 + x - 7 = 0$ . **(10 marks)**

**7. (Continued)**

Continued/...

8. Figure 3 shows a right pyramid  $VABCD$  standing on a rectangular base  $ABCD$ .  $AB = 13 \text{ cm}$ ,  $BC = 11 \text{ cm}$  and the vertical height  $VO = 10 \text{ cm}$ .



Calculate the:

- Angle between the plane  $VBC$  and the base  $ABCD$
- Length of  $VA$
- Volume of the pyramid

(10 marks)

**9.** Solve the simultaneous equations:

$$4m - n = 7$$

$$mn = 15$$

**(10 marks)**

- 10.** The cost (C) of producing cars is partly constant and partly varies as the number (N) of cars produced. If the cost of making 40 cars is K748 000 and that of making 100 cars 100 cars is K1 420 000. Calculate the cost of making 200 cars. **(10 marks)**

11. Given that the polynomial  $2x^3 + Px^2 + 2x + 15$  is exactly divisible by  $(x + 1)$ ,
- find the value of P
  - hence solve for  $x$  for which  $2x^3 + Px^2 + 2x + 15 = 0$ . **(10 marks)**

12. A farmer has 20 hectares of land. He plans to plant beans and potatoes. The cost per hectare for beans is K1 000 and for potatoes is K800. He has to hire 2 men per hectare for beans and 1 man per hectare for potatoes. He should hire at least 18 men altogether. He plans to spend a minimum of K12 000.
- (i) Taking  $x$  to represent the number of hectares for beans and  $y$  to represent the number of hectares for potatoes, write down **three** inequalities in  $x$  and  $y$  in addition to  $x \geq 0$  and  $y \geq 0$  that satisfy the given information.
- (ii) Using a scale of 2 cm to represent 5 units in both axes, draw graphs on **page 15** to show the region represented by the five inequalities by shading unwanted region.
- (iii) Using your graphs, find the maximum profit per hectare of each crop given that beans has K2 400 profit per hectare and potatoes K1 600 profit per hectare.

**(10 marks)**

**12. (Continued)**

**END OF QUESTION PAPER**

**NB:** This paper contains 15 printed pages.

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M131/II