

THE MALAWI NATIONAL EXAMINATIONS BOARD

2010 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

MATHEMATICS

Tuesday, 3 August

Subject Number: M131/I

Time Allowed: 2 hours
8:30 – 10:30 am

PAPER I (100 marks)

Instructions

1. This paper contains 8 pages. Please check.
2. Answer **all** the 24 questions in this paper.
3. The maximum number of marks for each answer is indicated against each question.
4. Mathematical tables and answer books are provided.
5. Calculators may be used.
6. Used supplementary sheets must be handed in together with the answer book.
7. **All working must be clearly shown**; it should be done on the same sheet as the rest of the answer.
8. Read the instruction(s) on the Answer Book carefully.
9. Write your **Examination Number** at the top of each page of your Answer Book.

Answer **all** the **twenty four** questions in this **paper**.

1. Factorise completely $2x^2 + 3xy - 35y^2$. (3 marks)
2. Given that $X = \{a, c, e\}$; $Y = \{b, c, d, e\}$ and $Z = \{c, d, e, f\}$, find $(X \cup Y) \cap Z$. (3 marks)
3. **Figure 1** shows a circle **WXYZ** centre **O**. Angle **WOY** = 112° and angle **XWY** = 36° .

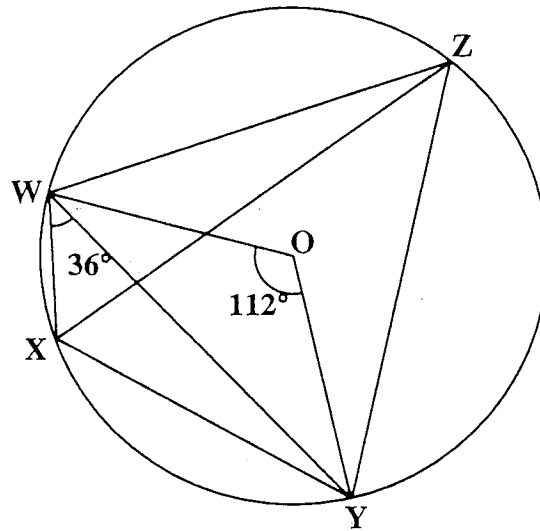


Figure 1

- Calculate the size of angle **WZX**. (4 marks)
4. The function $f(y) = 3y + 2$. Given that $\{5\}$ is the range, find the domain. (3 marks)
 5. Without using a calculator or four figure tables, simplify $\frac{\sqrt{54} + 3\sqrt{3}}{\sqrt{3}}$ in its simplest form. (4 marks)

Continued/...

6. A geometric progression has 6 terms. If its first term is 3 and the last term is 96, calculate the common ratio. (4 marks)
7. Given that matrix $P = \begin{pmatrix} 7 & 5 \\ 2 & 4 \end{pmatrix}$ and $Q = \begin{pmatrix} 3 & 10 \\ 5 & 1 \end{pmatrix}$, find PQ . (3 marks)
8. Given that $\log_5 x + \log_5 y = 3 \log_5 q$. Show that $x = \frac{q^3}{y}$. (3 marks)
9. Figure 2 shows a straight line passing through a point $P(3,4)$.

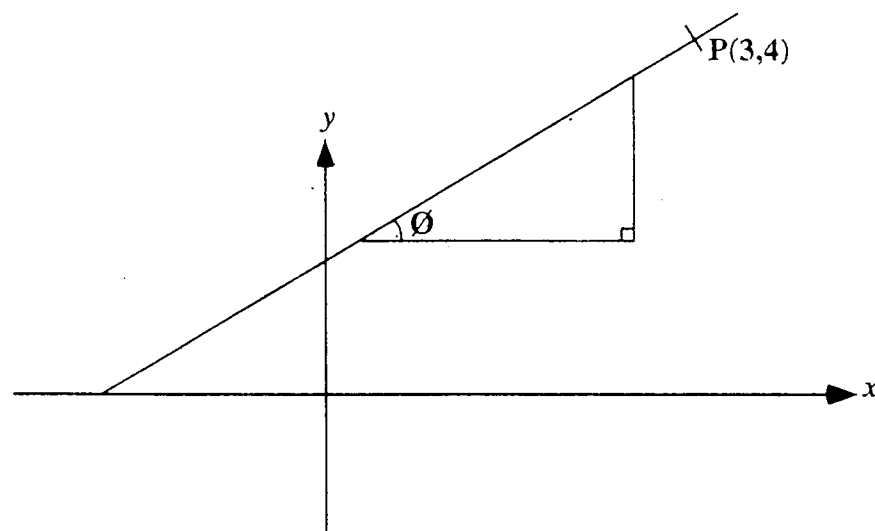


Figure 4

Given that $\tan \theta = \frac{2}{3}$, find the equation of the line in the form $y = mx + c$.

10. Show that $k + 3$ is a factor of $k^3 + 3k^2 - 4k - 12$. (4 marks)

Continued/...

≈ 135

$$\begin{aligned} T_n &= a(r+1) \\ n^{\text{th}} &= ar^{n-1} \end{aligned}$$

11. The results of a test marked out of 25 written by 20 learners were as follows:

1	7	13	12	14
12	18	17	19	17
17	19	22	23	24
22	22	24	23	22

Using class intervals of 1 – 5, 6 – 10, 11 – 15, ---, construct a frequency table for the results.

(3 marks)

12. Figure 3 shows two similar triangles **TQU** and **RSU**.
TU = 3 cm, **UR** = 6 cm and **RS** is parallel to **QT**.

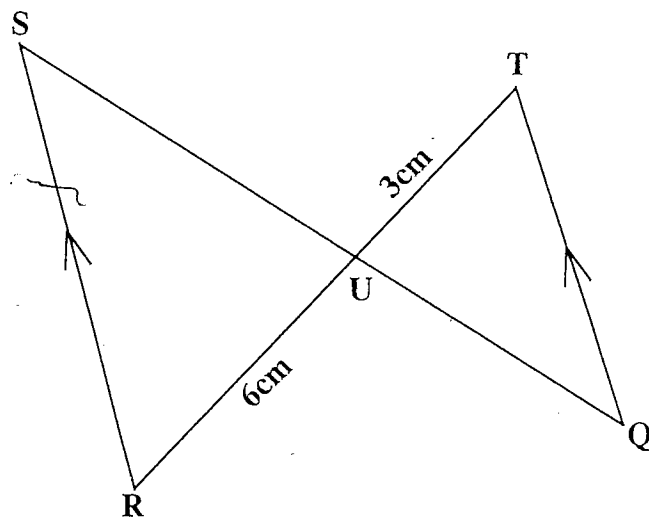


Figure 3

Calculate the ratio of the area of triangle **TQU** to the area of triangle **RSU**, leaving your answer in its simplest form.

(4 marks)

Continued/...

13. Make a the subject of the formula: $x = \frac{\sqrt{a}}{y} + b$. (4 marks)

14. Figure 4 shows a quadrilateral $KLMN$ in which $\overline{NK} = 3\underline{d}$, $\overline{NM} = \underline{e}$ and $\overline{ML} = \underline{d}$.

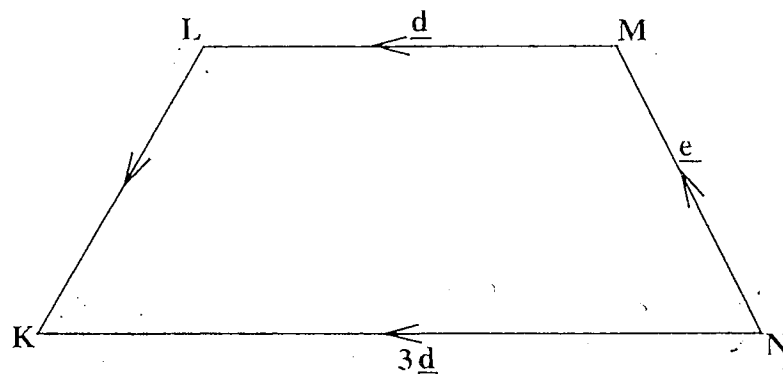


Figure 4

Express \overline{LK} in terms of \underline{d} and \underline{e} . (4 marks)

15. Simplify $\frac{d-1}{3} - \frac{2d+1}{7}$. (4 marks)

Continued/...

16. Figure 5 is a graph of a quadratic equation.

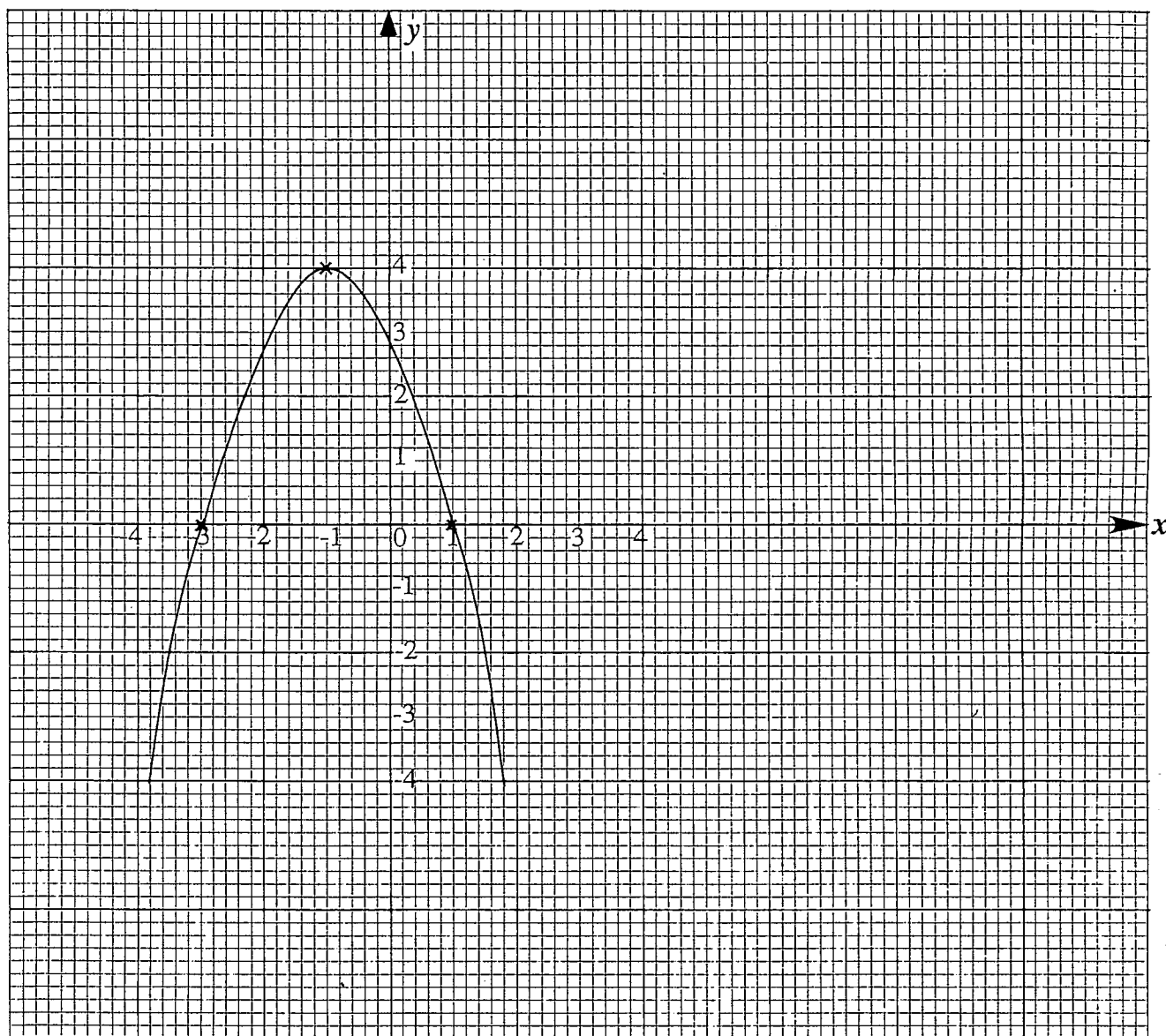


Figure 5

Formulate an equation of the graph in the form $y = ax^2 + bx + c$. (4 marks)

Continued/...

17. **Figure 6** is a tree diagram which shows the probability of picking two balls one at a time without replacement from a bag containing 6 red and 4 white balls.

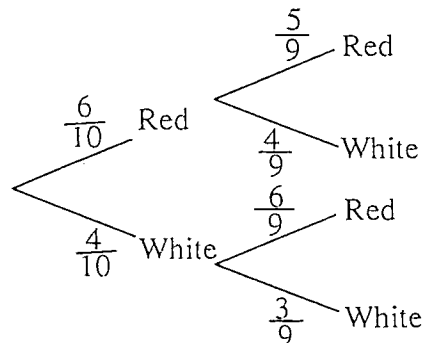


Figure 6

Use the tree diagram to calculate the probability of picking two balls of different colours, leaving your answer in its simplest form. **(5 marks)**

18. **Figure 7** shows a rectangular based right pyramid **FGHIJ**. **GH** = 10 cm and **HI** = 7 cm.

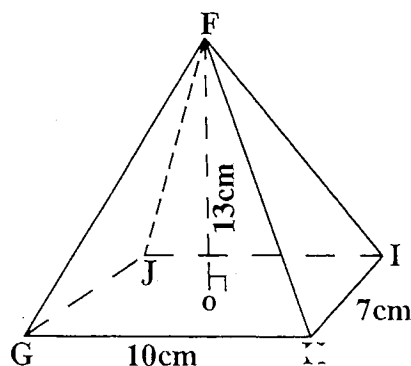


Figure 7

If the height of the pyramid is 13 cm, calculate the angle between **FHI** and the base.

(5 marks)

19. On the same axes, sketch the graphs of the region described by the following inequalities:

$$x \geq 0$$

$$y = 0$$

$$y \leq 3x + 2$$

$$y + 4x < 8$$

Shade the unwanted region.

(5 marks)

20. Given that $V \propto rd$ and $V = 54$ when $r = 2$ and $d = 3$. Find V when

$$r = \frac{1}{2} \text{ and } d = 6.$$

(5 marks)

Continued/...

21. Figure 8 shows a circle **KLM** centre **O**. The diameter **KM** = 15 cm and chord **KL** = 12 cm. **E** is a point on **LM**.

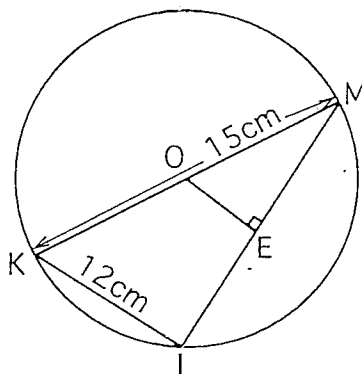


Figure 8

- If **OE** is perpendicular to the chord **LM**, calculate the length of **EM**. (5 marks)
22. On the graph paper provided, using a scale of 2 cm to represent 1 unit on both axes, draw a triangle whose vertices are **A** (2,2), **B** (3, 5) and **C** (5, 3). On the same axes, draw the image of triangle **ABC** using $-\frac{1}{2}$ as a scale factor and (0, 0) as centre of enlargement. (5 marks)
23. Figure 9 shows an isosceles triangle **XYZ** with sides **XY**=**XZ**=9 cm and **YZ**= 12 cm. **XD** is a perpendicular bisector of **YZ**.

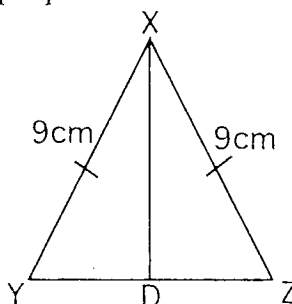


Figure 9

- Calculate angle **YXZ**, giving your answer correct to the nearest degree. (6 marks)
24. Using a ruler and a pair of compass only, construct in the same diagram,
 (i) a circle centre **O** of radius 4 cm.
 (ii) a tangent **TP** to the circle at any point **P** such that angle **POT** = 60°
 (iii) Measure and state the length of **PT**. (6 marks)

END OF QUESTION PAPER

NB: This paper contains 8 pages.