THE MALAWI NATIONAL EXAMINATIONS BOARD

2009 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

MATHEMATICS

Tuesday, 13 October

Subject Number: M131/I

Time Allowed: 2 hours
8:30 – 10:30 am

PAPER I
(100 marks)

Instructions

1. **This paper contains 6 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.

Turn over

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

1. Factorise completely $2x^2 - 15x + 28$.   **(3 marks)**

2. Given that $f(x) = \dfrac{3}{3-x}$, find $f(-3)$ in its simplest form.   **(3 marks)**

3. The volume of a pyramid is 60 cm^3 and its base area is 20 cm^2. Calculate the height of the pyramid. (Volume of pyramid $= \frac{1}{3}$ base area x height).   **(3 marks)**

4. **Figure 1** shows a circle **ABC** Centre **O**. **OCP** is a straight line and **AP** is a tangent to the circle at **A**.
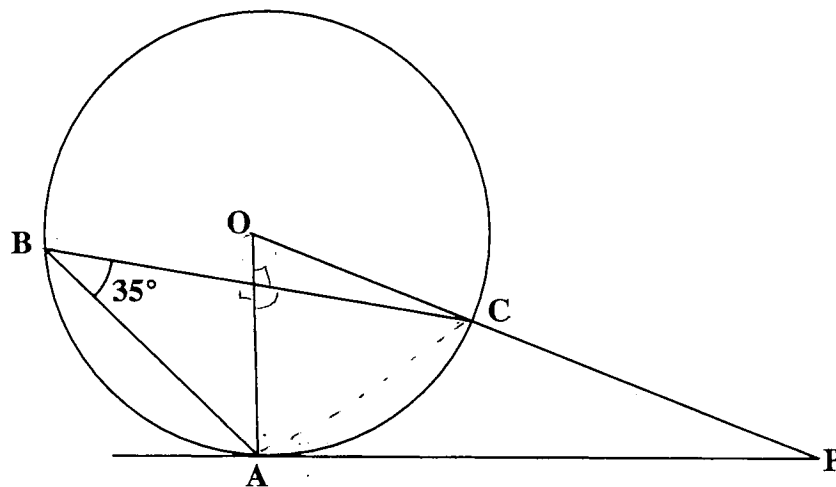

Figure 1

If angle **ABC** $= 35°$, calculate the value of angle **APO**.   **(5 marks)**

5. Without using a calculator or four figure tables, evaluate $\dfrac{\tan 60°}{\tan 30°}$.   **(4 marks)**

6. In a family, six members eat meat, five members eat fish while two members eat both. Calculate the number of members in the family.   **(4 marks)**

7. Solve the equation $3^y = \dfrac{9^y}{81}$.   **(5 marks)**

8. Given that $(x+3)(x+1)^2 \equiv Ax^3 + Bx^2 + Cx + D$, find the value of C.   **(4 marks)**

9. **Table 1** shows the distribution of ages of learners in a Form 2 class.

Table 1

Age	14	15	16	17	18	19
Number of learners	2	10	8	4	9	3

   What is the probability of picking at random a learner of 18 years of age?   (3 marks)

10. Find the gradient of a straight line whose equation is $\dfrac{y+2x}{4}=\dfrac{x}{3}$.   (4 marks)

11. Given that $\dfrac{1}{2}\log_3 x = \log_3 (6-x)^{\frac{1}{2}}$, find the value of x.   (5 marks)

12. The 9th term of an arithmetic progression $y, y+4, y+8, \ldots$ is 37.
    Find the value of y.   (5 marks)

13. Given that points P(-1, 4), Q(3, 0) and R(2, a) are collinear, find the value of a.   (5 marks)

14. Without using a calculator or four figure tables, simplify $\dfrac{11}{5-\sqrt{3}}$, leaving your
    answer with a rational denominator.   (4 marks)

15. A quantity T is proportional to m and the square of v. When v = 3 and
    m = 5, T = 90. Calculate the value of T when m = 2 and v = 10.   (5 marks)

16. Express $\dfrac{1}{x-1}+\dfrac{3y}{xy-y}$ as a single fraction.   (3 marks)

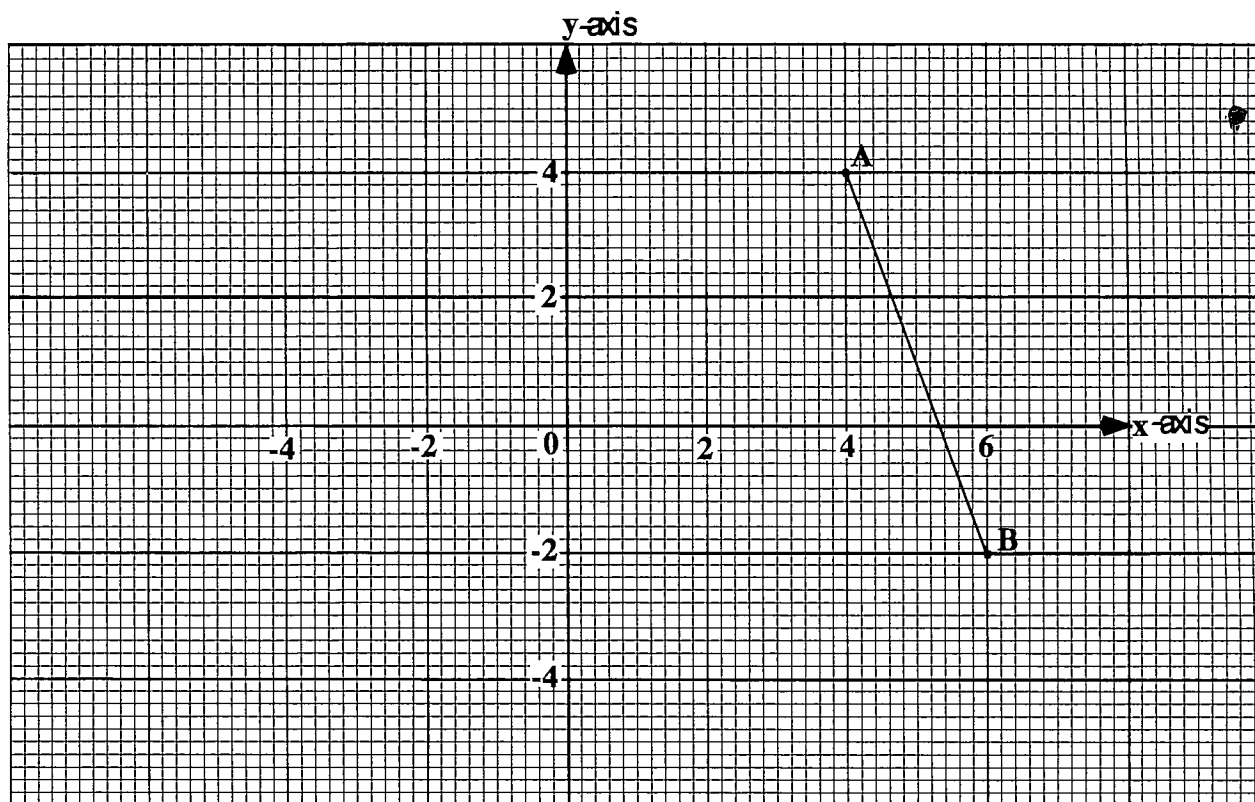17. **Figure 2**, shows line **AB**.

Figure 2

Calculate the coordinates of its image A'B' after the translation $T = \begin{pmatrix} -6 \\ 2 \end{pmatrix}$.   **(5 marks)**

18. Make r the subject of the formula $P = m\left(\dfrac{r}{x}\right)^3$.   **(4 marks)**

19. **Table 2** shows midpoints of marks scored by a group of 50 pupils in a test.

Table 2

Midpoint mark	12	13	14	15	16	17	18	19
Number of pupils	2	3	6	12	10	8	6	3

Using a scale of 2 cm to represent 1 unit on the horizontal axis and 2 cm to represent 2 units on the vertical axis, draw a frequency polygon to represent this information.   **(5 marks)**

20. The areas of two similar triangles ABC and XYZ are in the ratio 1:16. If the
    height of the smaller triangle is 2 cm, calculate the height of the bigger triangle.   **(4 marks)**

21. On the same axes, sketch the graphs of the region described by the inequalities,
    $2 < x \le 5$ and $0 \le y < 4$. Shade the unwanted region.   **(5 marks)**

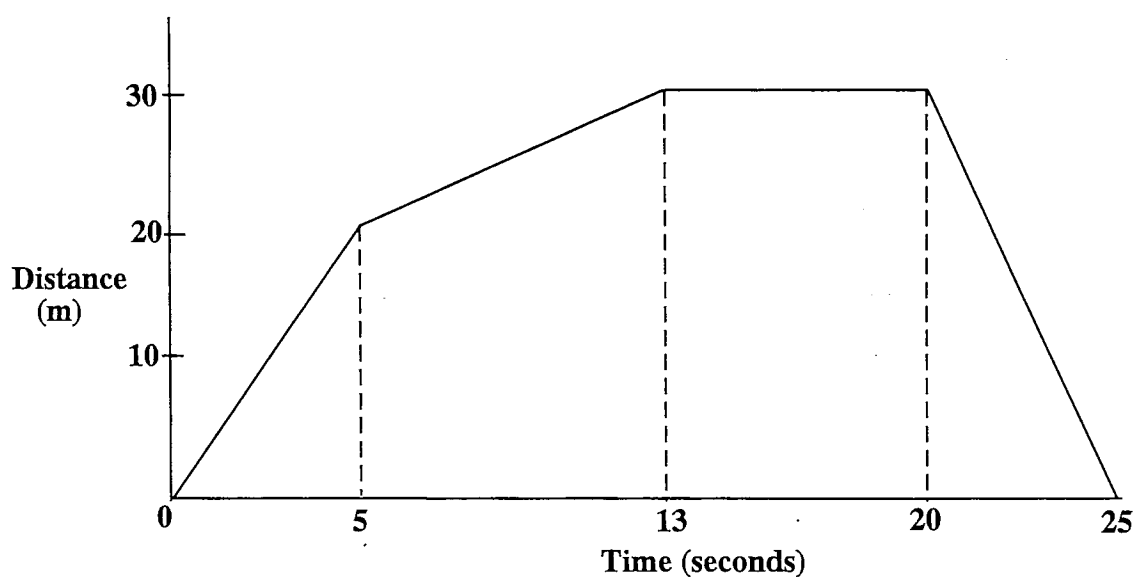22. **Figure 3** shows a distance/time graph of an object.

Figure 3

Calculate the speed of the object between $t = 5$ and $t = 13$.   **(4 marks)**

23. A and B are two matrices. If $A = \begin{pmatrix} 0 & 1 \\ 3 & 2 \end{pmatrix}$, find B given that $A^2 = A + B$.   **(3 marks)**

24. **Figure 4** shows a graph of a quadratic equation $y = ax^2 + bx + c$.
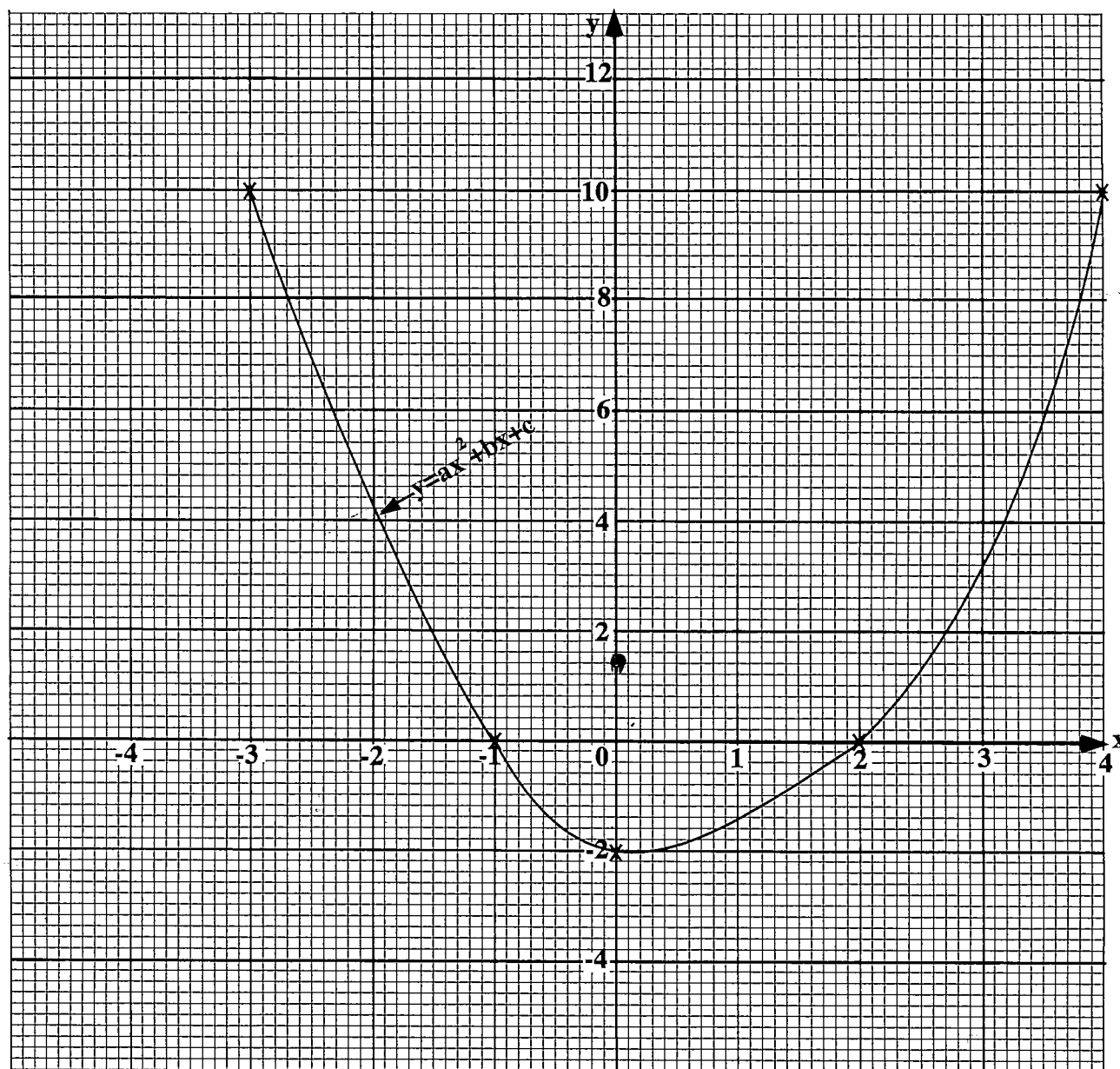

Figure 4

Find the quadratic equation for the graph in the form $y = ax^2 + bx + c$.   (5 marks)

END OF QUESTION PAPER

NB: This paper contains 6 pages.