THE MALAWI NATIONAL EXAMINATIONS BOARD

MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

SAMPLE PAPER

MATHEMATICS

Subject Number: M131/I
Time Allowed: 2 hours

PAPER I

(100 marks)

Instructions

1. **This paper contains 12 printed pages. Please check.**

2. Answer **all** the **20** questions in this paper.

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 and blank answer sheet at the end of the question paper can be used if required. Do **not** tear them off.

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
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©MANEB   **Turn over**

1. Given that $f(x) = x^2 + 3$. Calculate $f\left(2^{\frac{1}{2}}\right)$. **(3 marks)**

2. Factorize completely $12xy^2 + 11xy - 5x$. **(4 marks)**

3. Simplify $2302_5 - 1423_5 + 311_5$, giving your answer in base 10. **(5 marks)**

4.   Solve the equation $2x^2 - 5x + 1 = 0$, giving your answer correct to
     2 significant figures.

     (5 marks)

5.   The sum of interior angles of a regular polygon is $1440°$, calculate the
     number of sides of the polygon.

     (5 marks)

6. A woman earns K200 000.00 per month. If income tax is calculated as follows:

0% in the first K30 000.00
15% in the next K5 000.00
30% in the excess of K35 000.00

Calculate the net income for the woman. **(6 marks)**

7. Without using a calculator. simplify $\dfrac{3\sqrt{2}+1}{\sqrt{6}+\sqrt{3}}$ leaving your answer with a rational denominator. **(6 marks)**

8.   Given that $b + \dfrac{x^2}{a} = c$, make x the subject of the formula.   **(4 marks)**

9.   **Figure 1** shows a right angled triangle **ABC**. Angle **BDC** = 38°, angle **ABD** = 12°, **BC** = 14 cm and **DC** = 17.9 cm.
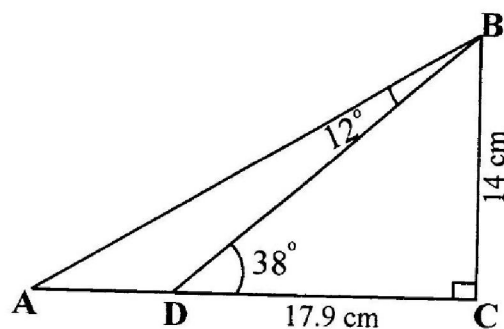
Figure 1

Calculate the length of **AD**, giving your answer correct to one decimal place.   **(6 marks)**

10. A point $X(3. 4)$ is translated to X^1 and X^1 is 4 units to the right and 5 units down of X. Calculate the coordinates of the image of point $Y(5. 6)$ under the same translation. **(5 marks)**

11. x varies directly as y and inversely as the square root of z. When $y = 3$. $z = 36$, $x = 20$. Calculate x when $y = 2$ and $z = 100$. **(5 marks)**

12.   **Figure 2** shows a graph of straight line **AB** whose gradient is $-\frac{2}{3}$. The
       Coordinates of point **B** are (-6. 6).
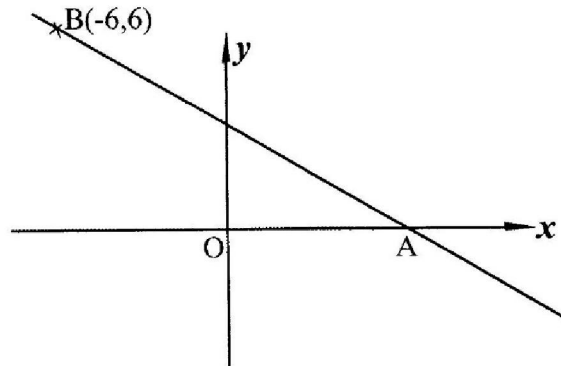
Figure 2

Calculate the coordinates of point **A**.   **(5 marks)**

13.   **Figure 3** shows a circle **ABCD** centre **O**. **AB** = 15 cm, **CD** = 14 cm
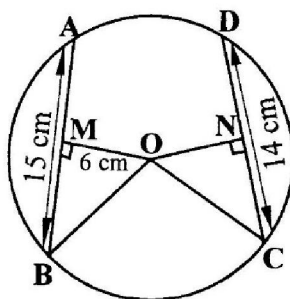   and **OM** = 6 cm.
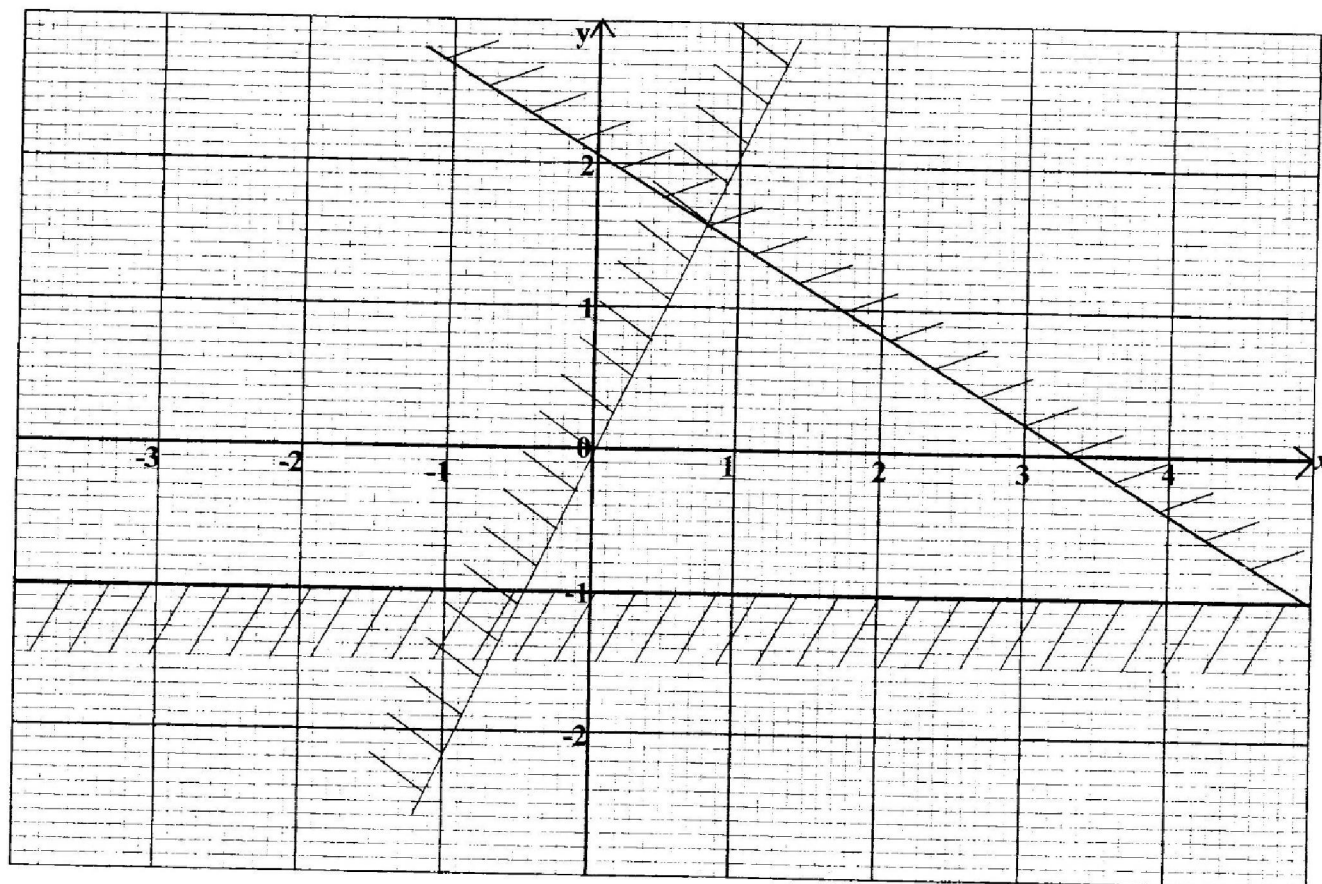

Figure 3

Calculate the length of **ON**.   **(5 marks)**

14.   Given that $M = \begin{pmatrix} 3 & 1 \\ 6 & 0 \end{pmatrix}$ and $N = \begin{pmatrix} 5 & -7 \\ 0 & 4 \end{pmatrix}$, find $\frac{1}{2}(M^2 + N)$.   **(5 marks)**

15.   **Figure 4** shows region **R** bounded by three inequalities **A**. **B** and **C**.

Write down the **three** inequalities which define the region.   **(5 marks)**

16. Calculate the total surface area of a solid hemisphere of radius 14 cm.
     (Take area of a sphere = $4\pi r^2$ and $\pi = \frac{22}{7}$).   **(5 marks)**

17. **Figure 5** shows a circle **BCD** in which **AB** and **AC** are tangents at **B** and **C**
     respectively. Angle **BAC** = 70° and angle **ACD** = 40°.
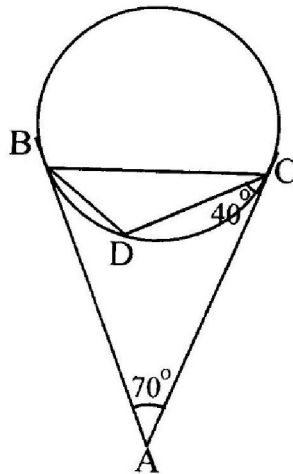

Figure 5

Calculate angle **ABD**.   **(5 marks)**

18. Calculate the standard deviation of the following set of numbers:
     10, 15, 17, 21, 22   **(6 marks)**

19. In the same diagram, construct a triangle **ABC** in which **AB** = 8cm,
     BC = 10 cm and angle **ABC** = 60°. Construct a circumscribed circle
     of the triangle **ABC**. Measure the radius of the circle.   **(5 marks)**

20.   **Figure 6** shows two triangles **ABO** and **PQO**. **OB = OQ**, **AB = PQ**
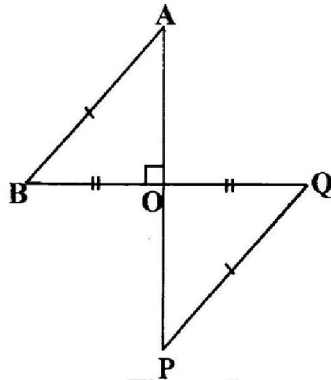and **AOB** = 90°. **AOP** is a straight line.

Figure 6

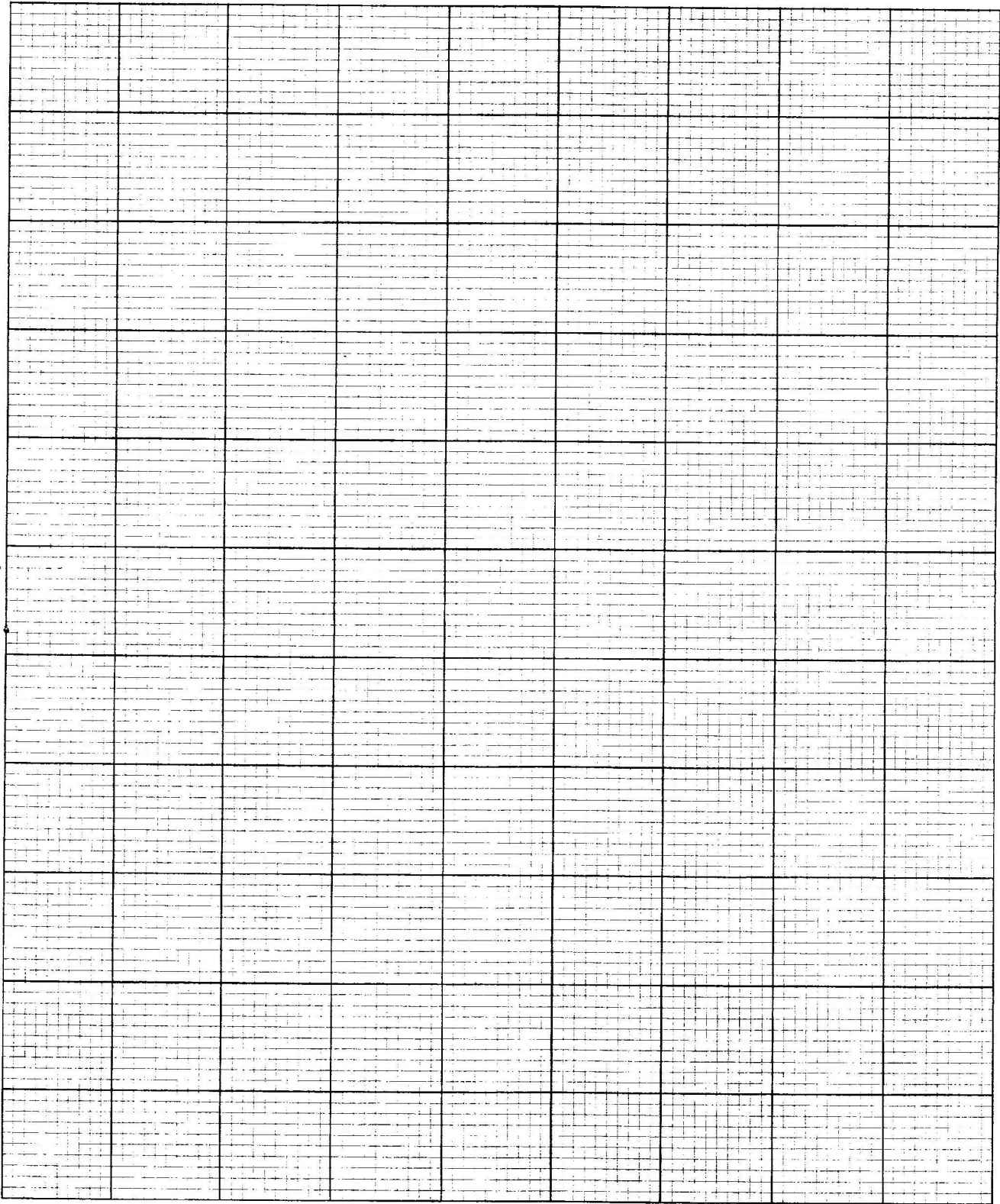Show that **AO = OP**.   **(5 marks)**

END OF QUESTION PAPER
NB: This paper contains 12 printed pages.