EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

2011 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

MATHEMATICS

Subject Number: M131/I

Tuesday, 5 July

Time Allowed: 2 hours
8:30 – 10:30 am

PAPER I

(100 marks)

Instructions

1. **This paper contains 14 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.
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	
1			
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1. Factorise completely $3 - 5x - 2x^2$. **(3 marks)**

2. Given that $g(x) = \frac{2x^3}{3} + 1$; find $g(-1)$ in its simplified form. **(3 marks)**

Continued/...

3. Without using a calculator or four-figure tables, simplify $\frac{1}{\sqrt{2}} - \frac{\sqrt{2}}{3}$ leaving your answer with a rational denominator. **(4 marks)**

4. Given that $\log_x 6\frac{1}{4} = 2$. Solve for x. **(4 marks)**

Continued/...

5. The ratio of area of two circles is 4:9. Given that the radius of the bigger circle is 18 cm, find the radius of the smaller circle. **(4 marks)**

6. Make y the subject of the formula $p=\sqrt{\frac{y-a}{y+1}}$. **(5 marks)**

Continued/...

7. The mean of $(x - 1)$, $(x + 2)$ and $(x + 5)$ is $2x$, find the value of x. **(5 marks)**

8. Simplify $\frac{m}{m+2} - \frac{6}{m^2+m-2}$. **(5 marks)**

Continued/...

9. **Figure 1** is a speed-time graph of a moving object.

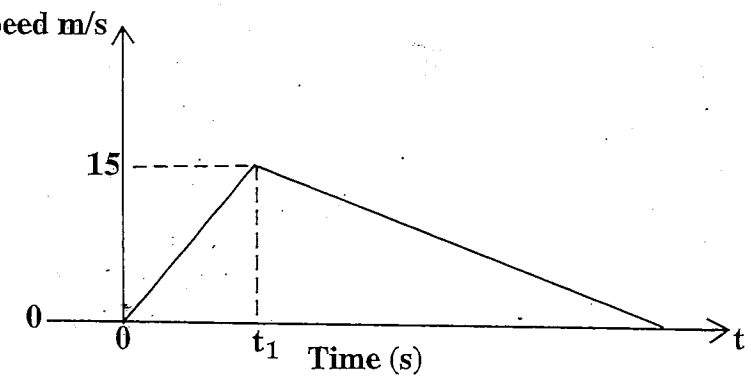

Figure 1

Given that the acceleration for the first t_1 seconds is 0.3 ms^{-2}, calculate the value of t_1. **(3 marks)**

Continued/...

10. Given that $(x + 1)$ and $(x - 3)$ are two factors of the polynomial $ax^3 + bx - 6$, calculate the values of a and b. (7 **marks**)

Continued/....

11. **Figure 2** shows a Venn diagram.

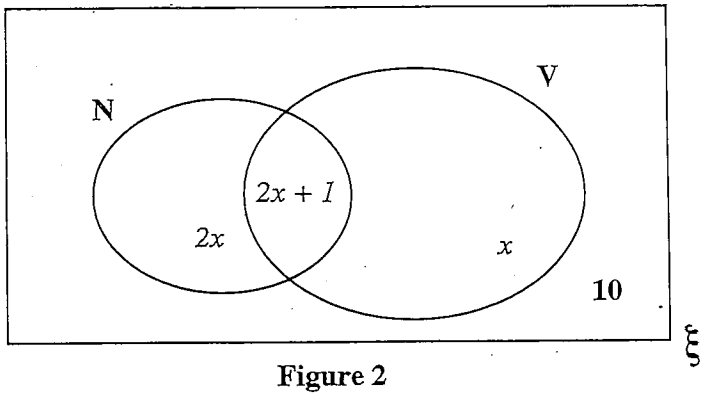

Figure 2

In the Venn diagram,

ξ = {girls in form three}
N = {girls that play netball}
V = {girls that play volleyball}

Given that there are 21 girls in the class, find how many girls play both netball and volleyball. **(5 marks)**

Continued/...

12. T and R are two matrices. Given that $T = \begin{pmatrix} 2 & 1 \\ -1 & 3 \end{pmatrix}$ and $R = \begin{pmatrix} 0 & 3 \\ -1 & 1 \end{pmatrix}$, find $3R - T^2$. **(5 marks)**

13. A straight line which passes through *(3t, 7)* and *(t, -5)* has gradient *3*. Find the equation of the line. **(6 marks)**

Continued/...

14. p varies directly as r and inversely as the square root of q. Given that $p = 4$ when $q = 9$ and $r = 1$, calculate q when $r = 2$ and $p = 6$. **(6 marks)**

Continued/...

15. **Figure 3** shows a tangent **DE** to a circle **ABCD** at **D**. **AC** is parallel to **DE** and angle **ADC** = 130°.

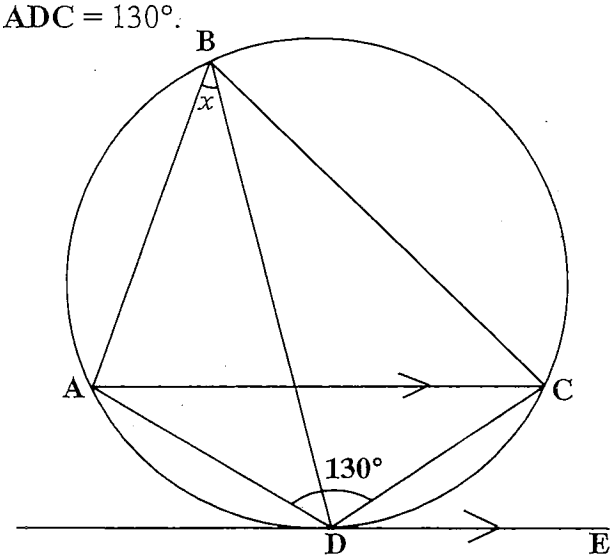

Figure 3

Calculate the value of angle x. **(5 marks)**

Continued/...

16. The 3rd and 9th terms of an Arithmetic Progression are 29 and 8, respectively. Calculate the 20th term of the progression. **(7 marks)**

17. In **Figure 4**, **ABC** is a triangle such that $\angle ABC = 46°$, **AB** = 7 cm and **BC** = 9 cm.

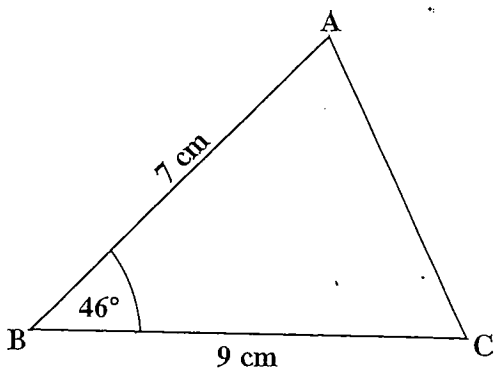

Figure 4

Calculate the length of **AC** to one decimal place. **(5 marks)**

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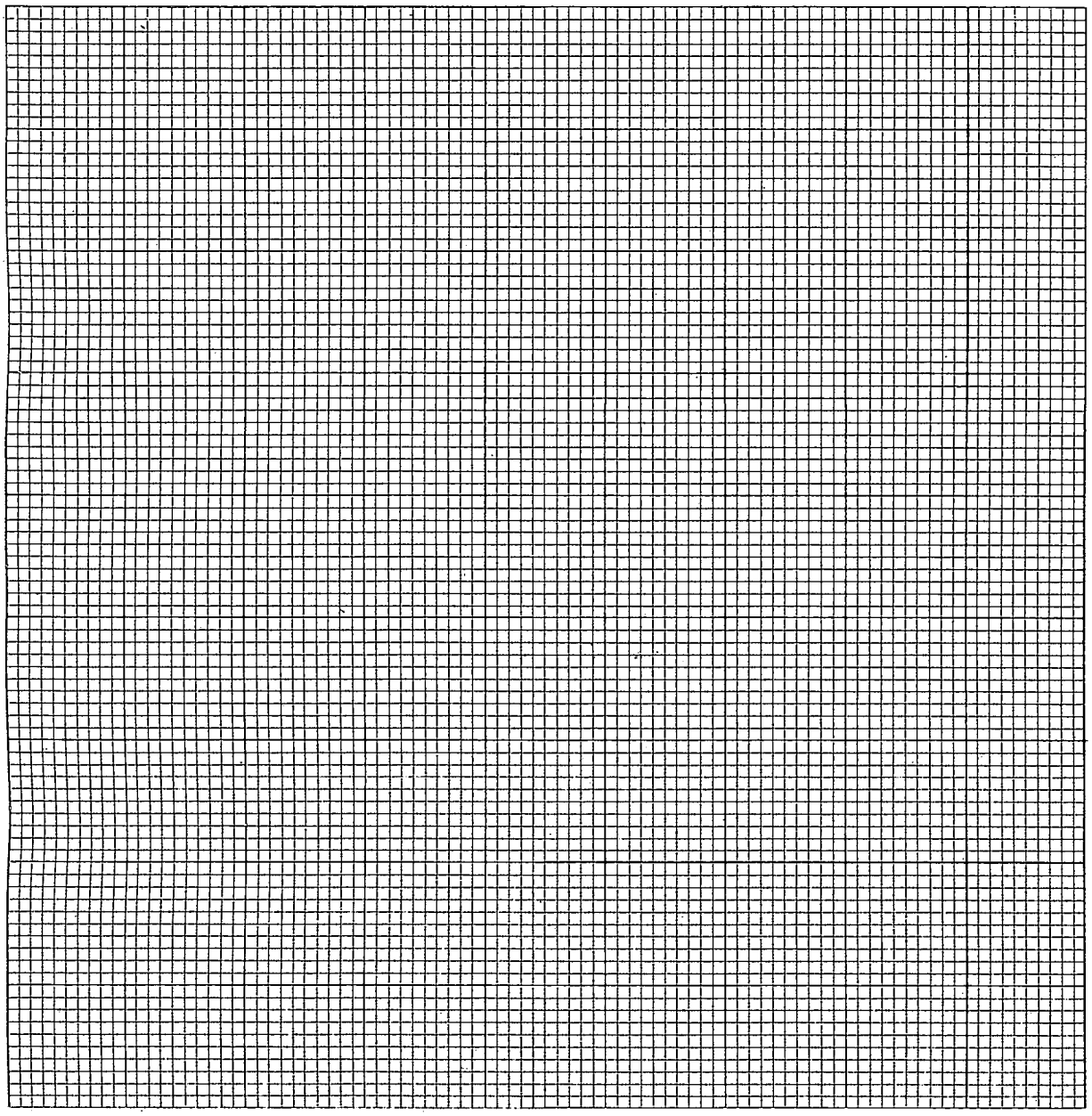
18. Sketch the region represented by the following inequalities by shading the unwanted region:

$x \geq -1$
$y \geq -4$
$y < 2x + 4$
$y + 2x \leq 6$ **(6 marks)**



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19. A pond 12 m in diameter, has a shape of a hemisphere and is full of water. The pond is emptied and all the water poured into a cylindrical tank of radius 5 m. Assuming there is no loss of water, calculate the height of water in the tank. (volume of sphere $= \frac{4}{3}\pi r^3$). **(6 marks)**

20. Given that $\underline{a} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} 9 \\ 4 \end{pmatrix}$, calculate $|\underline{a} + \underline{b}|$. **(6 marks)**

END OF QUESTION PAPER

NB: This paper contains 14 pages.