

Name: _____



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2019 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATIONS

ADDITIONAL MATHEMATICS

PAPER I (100 Marks)

Subject Number: M132/I

Tuesday, 29th March, 2019

Time Allowed: 2Hrs 30 Min

Instructions

1. This paper contains **14 pages**. Please check.
2. Answer all **7** questions in **section A** and **any two** questions from **section B**.
3. **Section A** carries **60 marks** and **section B** carries **40 marks**
4. The maximum number of marks for each answer is indicated against each question.
5. Write your answers in the spaces provided on the question paper
6. Calculators may be used.
7. **All working must be clearly shown.**
8. Write your name at the top of each page on your question paper in the spaces provided.
9. In the table provided on this page, **tick** against the question number you have answered.

Ques	Tick if answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
			100

Section A: (60 marks)

Answer all the seven questions in this section

1. a. Given that $f(x) = x^2 + 1$ and $g(x) = \frac{2}{x-1}$, $x \neq 1$, find $g^{-1}(f(x))$ (5marks)

- b. Evaluate $\lim_{x \rightarrow 0} \frac{1 - \sqrt{1+x}}{x}$ (5 marks)



2. The area of a sector of a circle is 15cm^2 and the length of its arc is 3cm . Calculate the radius of the sector and its angle (5 marks)

3. a. Solve the inequality $|x| > 2|x + 1|$ (7 marks)



- b. Find the constant term in the expansion of $(1+x^2)(2x+\frac{1}{x})^{10}$ (6 marks)

4. a. If $p = kv^{\frac{2}{3}}$, where k is a constant, find the approximate percentage change in p if v is increased by 3% when it is 5. (7 marks)



b. Show that $\csc 2x - \cot 2x \equiv \tan x$

(6 marks)

5. A spherical ball is being inflated so that its volume is increasing at constant rate of $12\text{cm}^3/\text{s}$. Find the rate of change of the radius of the ball when volume is $36\pi\text{cm}^3$.
(6 marks)

$$(\text{Volume of a sphere} = \frac{4\pi r^3}{3})$$



6. Solve the equation $2\sin \theta \cos 2\theta + \sin 2\theta = 0$ for $0^\circ \leq \theta \leq 180^\circ$ (7 marks)



7. Given that $y = \sqrt{4+\sin^2 2x}$, show that $\frac{dy}{dx} = \frac{\sin 4x}{\sqrt{4+\sin^2 2x}}$ (6 marks)

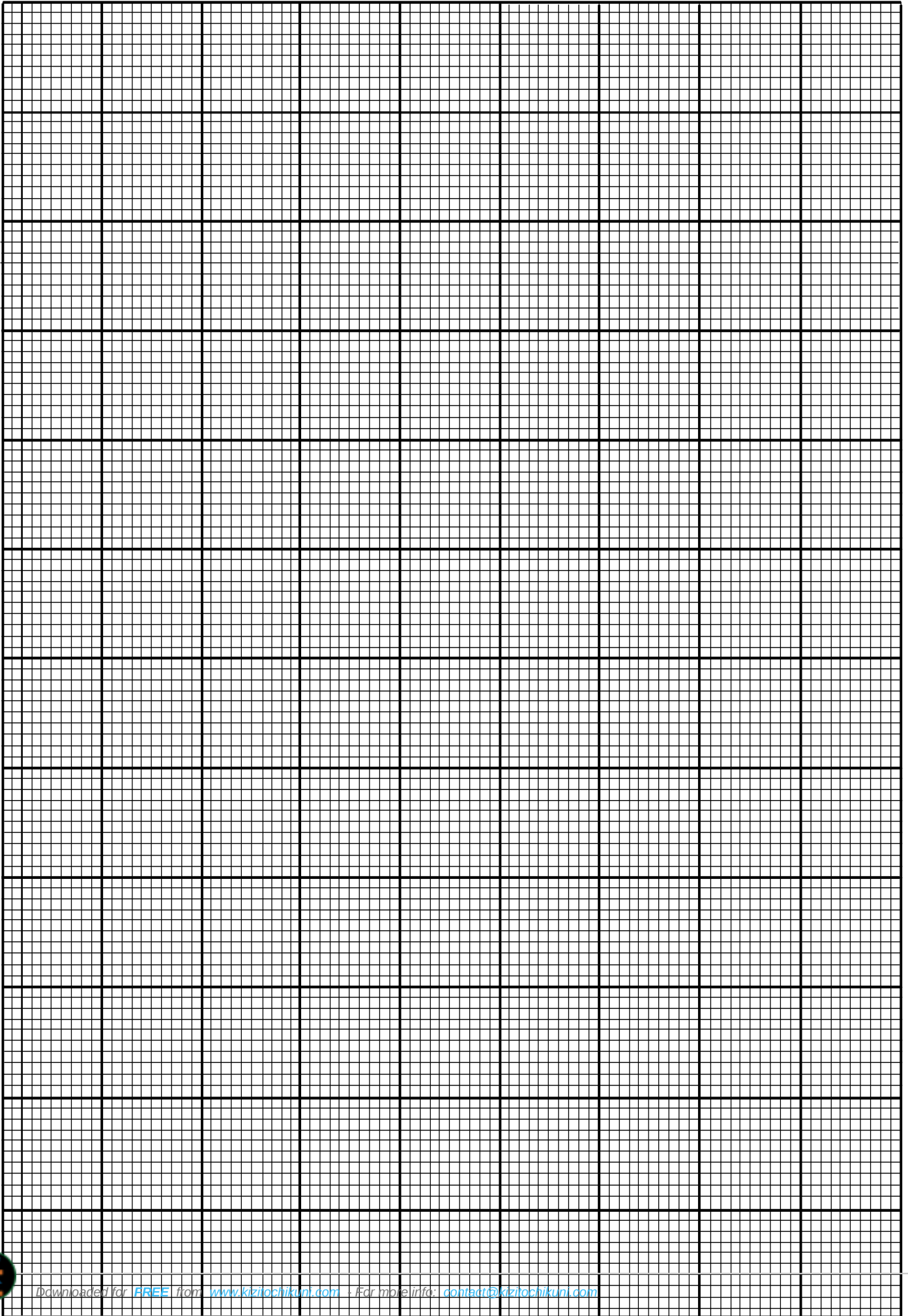
SECTION B (40 marks)

Answer any two questions in this section

8. a. i. Draw the graphs of $y = 2\sin x$ and $y = \cos x + 1$ on the same axes using a scale of 2cm to represent 45° on the x axis and 2cm to represent 1 unit on y axis for $0^\circ \leq x \leq 360^\circ$

- ii. Use your graphs to solve the inequality $\cos x + 1 \geq 2\sin x$

(12 marks)



b. Evaluate $\int_0^1 \frac{dx}{\sqrt[3]{7x+1}}$

(8 marks)



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9. a. Experimental values of X and y are measured as follows:

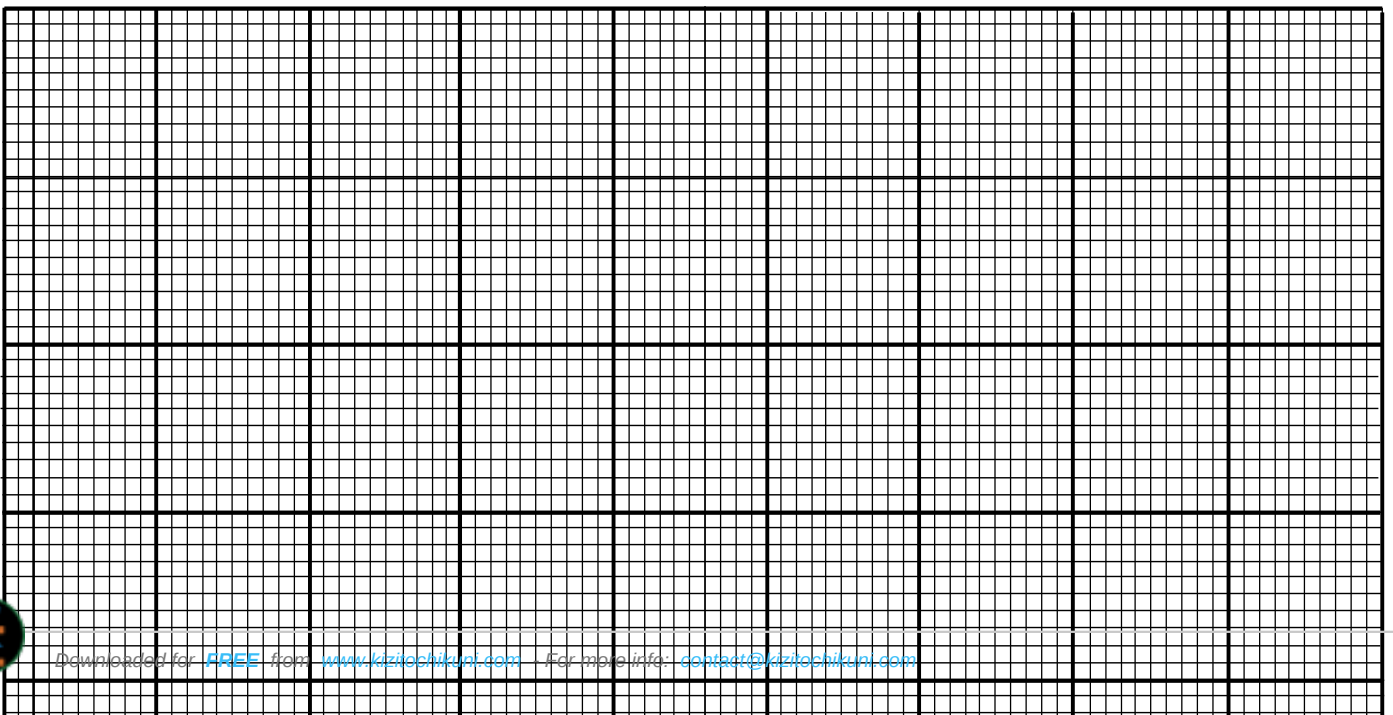
x	1	2.5	3.2	4.5	5.1	6
y	96	27	15	5	3	1

The law connecting x and y is believed to be of the form $y=kn^{-x}$, where k and n are constants.

- (i) Draw a suitable linear graph
 - (ii) Use your graph to find the approximate values of k and n.
- marks)**

(12





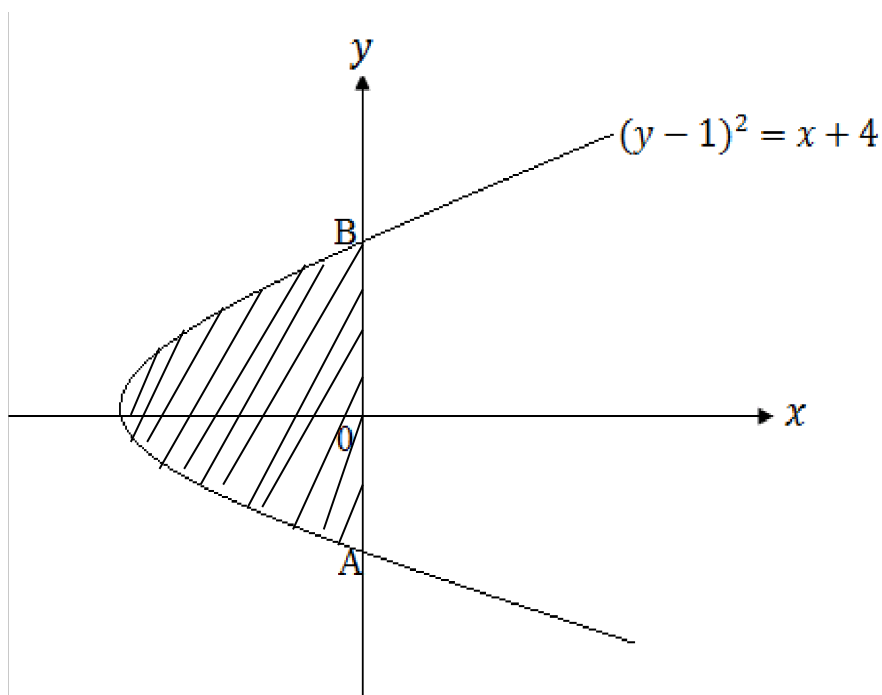
b. Figure 1 shows the curve $(y-1)^2 = x + 4$ meets the y-axis at **A** and **B**

(i) Find the coordinates of **A** and **B**.

(ii) Find the area of the shaded region
marks)

(8

Figure 1



10. a. The tangent to the curve $y = ax^2 + bx + 2$ at $(1, \frac{1}{2})$ is parallel to the normal to the curve $y = x^2 + 6x + 10$ at $(-2, 2)$. Find the values of a and b . (10 marks)



b. Sketch the graph of $y = \frac{3x+5}{6-2x}$ hence use your graph to solve the inequality

$$\frac{3x+5}{6-2x} \geq 0.$$

(10

marks)



END OF QUESTION PAPER

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