

STUDENT NAME: _____ SCHOOL: _____

2025

M132/I



SOUTH WEST EDUCATION DIVISION

2025 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION

ADDITIONAL MATHEMATICS

Friday, 11 April

Subject Number: 132/I

Time allowed: 2 hours

(08:00-10:30 am)

PAPER I (100 marks)

Instructions

1. This paper contains 17 pages. Please check.
2. Answer **all** the **seven** questions in **Section A** and any **two** questions from **Section B**
3. Section A carries 60 marks and Section B carries 40 marks
4. All answers should be written in the spaces provided after every question
5. Calculators may be used
6. **All necessary working should be shown** and any numerical expression being evaluated by calculators or mathematical tables must be clearly stated; otherwise marks for method may be lost
7. The final answer to a question requiring use of a table or a calculator should normally be given to three significant figures
8. Write your **Name** and the **name of your school** on top of each page of our question paper
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 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| Total | | | |

Answer **all** the **seven** questions in this section in the spaces provided.

1. a. Given $f(x) = 2x + 3$ and $g(x) = ax + b$. If $f(g(x)) = x$, find the values of a and b . (5 marks)

- b. Evaluate $\lim_{x \rightarrow 0} \frac{2 - \sqrt{4-x}}{x}$ (4 marks)

Continued/...

2. a. Find the range of x for which $5 - x \geq |2x|$

(5 marks)

b. Given that $f(x) = 2 + \sqrt{\frac{x-1}{3}}$ for $x \geq 1$. If $f^{-1}(x) = ax^2 + bx + c$,

calculate the values of the constants a , b and c

(6 marks)

3. a. The term independent of x in the expansion of $(x^4 + \frac{1}{px^2})^9$ is $\frac{14}{9}$. If p is the positive constant, find the value of p . (5 marks)

STUDENT NAME: _____ SCHOOL: _____

2025

Page 5 of 17

M132/I

- b. A curve is such that $\frac{dy}{dx} = \frac{x^2-4}{x^2}$ and it passes through (2, 7). Find the equation of the curve . **(5 marks)**

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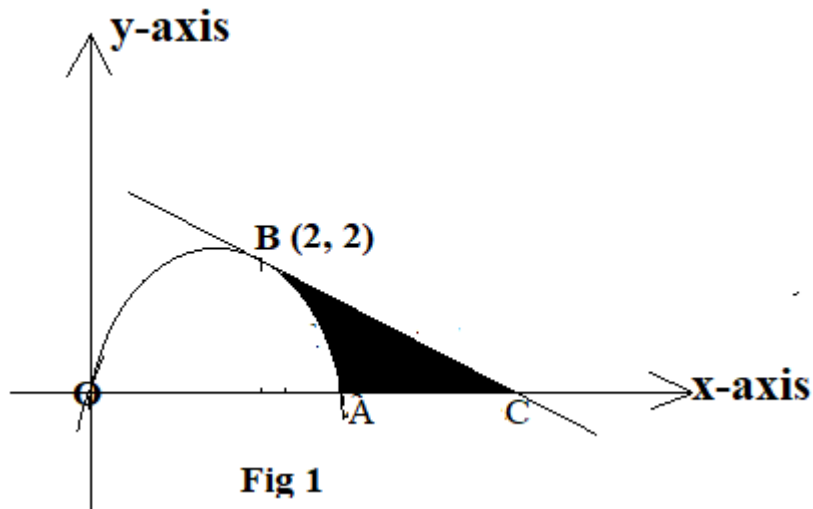
4. a. Solve the exponential equation $2^{2x+1} - 2^{x+1} + 1 = 2^x$

(5 marks)

b. Prove that $(2\sin\theta - \cos\theta)^2 + (\sin\theta + 2\cos\theta)^2 = 5$.

(5 marks)

5. **Fig 1** shows a curve $y = 3x - x^2$. The tangent to the curve at $B(2, 2)$ intersects the x-axis at C.



Find

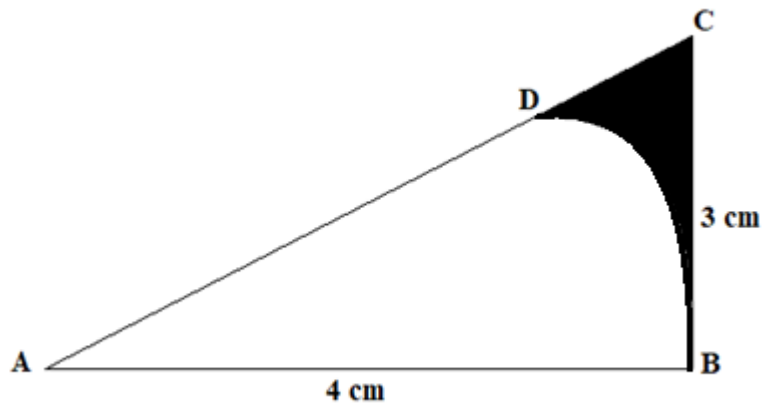
- i. The equation of the tangent to the curve at B (3 marks)

- ii. The area of the shaded region (4 marks)

Continued/...

6. Given that $\sin A = \frac{2}{\sqrt{5}}$ and $\cos B = \frac{1}{\sqrt{10}}$ where $90^\circ < A < 180^\circ$ and $0^\circ < B < 90^\circ$. Without a calculator, evaluate $\cos (A + B)$, leaving your answer in surd form (6 marks)

7. **Fig 2** below shows triangle ABC with sector ABD. $AB = 4 \text{ cm}$, $BC = 3 \text{ cm}$ and $\angle ABC = \frac{\pi}{2}$.

**Fig 2**

Find

- i. $\angle BAC$ in radians to 1 decimal place
- ii. The perimeter of the shaded part
- iii. The area of the shaded part

(7 marks)

Answer any **two** questions from this section in the spaces provided.

8. **a. Figure 3** shows a sporting track made up of a rectangle ABCD with semicircles of radius r cm at each end of lengths of rectangles. The perimeter of the rectangle is 1400m.

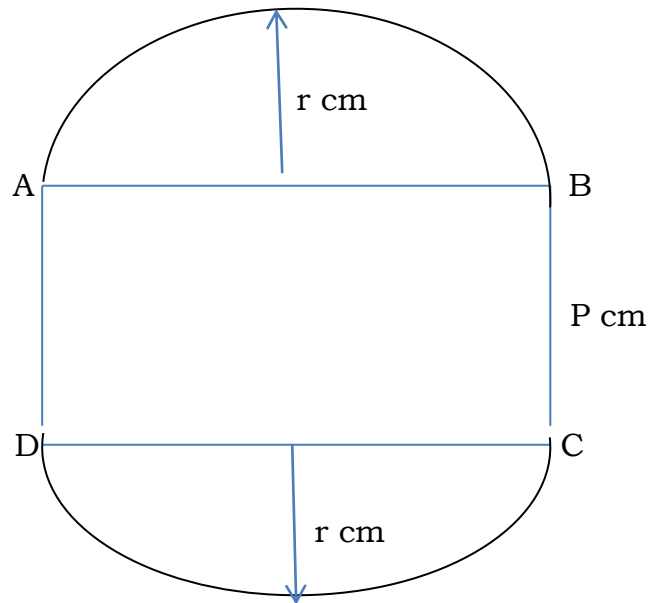


Figure 3

If the track has maximum area for this perimeter,
find the value of p and r .

(10 marks)

STUDENT NAME: _____ SCHOOL: _____

2025

Page 11 of 17

M132/I

b. Solve the equation $3 \cos 2x = 4 \sin 2x$ for $0^\circ \leq x \leq 360^\circ$

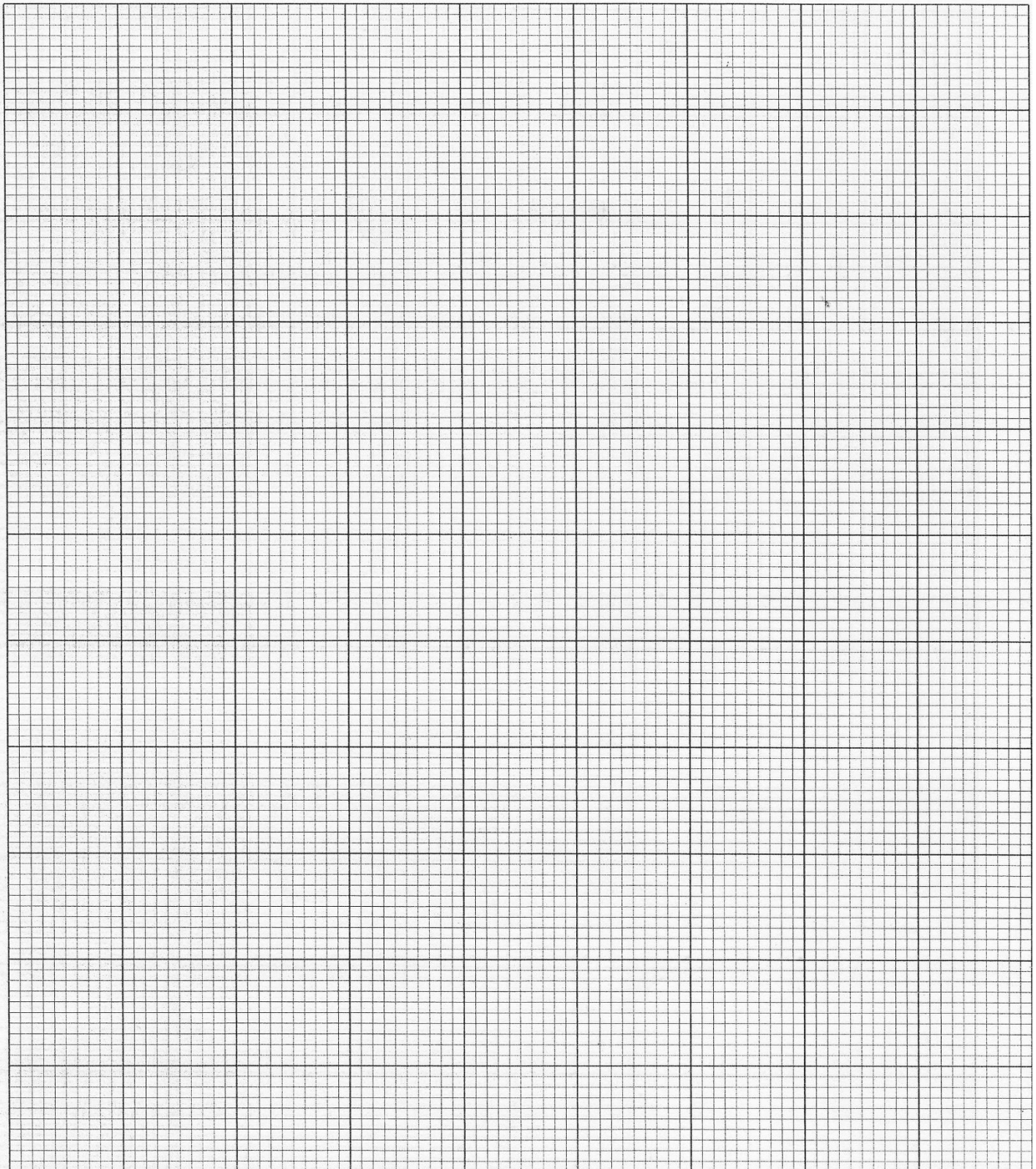
(10 marks)

9. a. using a scale of 2 cm to represent 30° on the horizontal axis and a scale of 4 cm to represent 1 unit on the vertical axis for $0^\circ \leq x \leq 270^\circ$

i. draw on the same axes, the graphs of $y = |\cos 2x|$ and $y = \left| \frac{x}{2\pi} \right|$.

- ii. use your graph to find the solutions to the equation $|2\pi \cos 2x| = |x|$

(10 marks)



b. **Figure 4** show the cross section of two drawer handles of shape A and shape B. Shape A is a rectangle PQRS joined to a diameter. The length AB = d cm and BC = 2d cm. Shape B is a sector OXY of a circle with centre O and radius of 2d cm. Angle XOY is in radians.

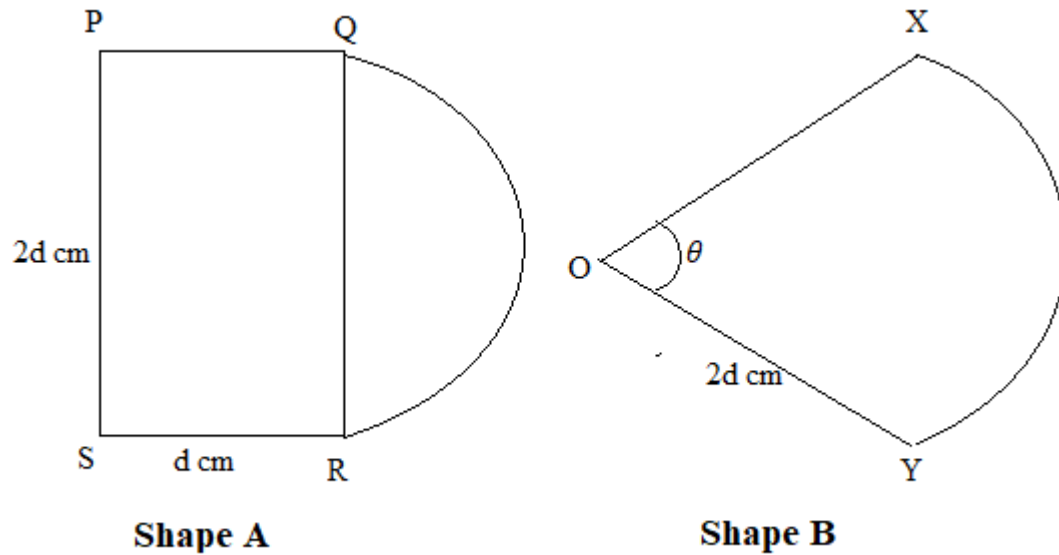


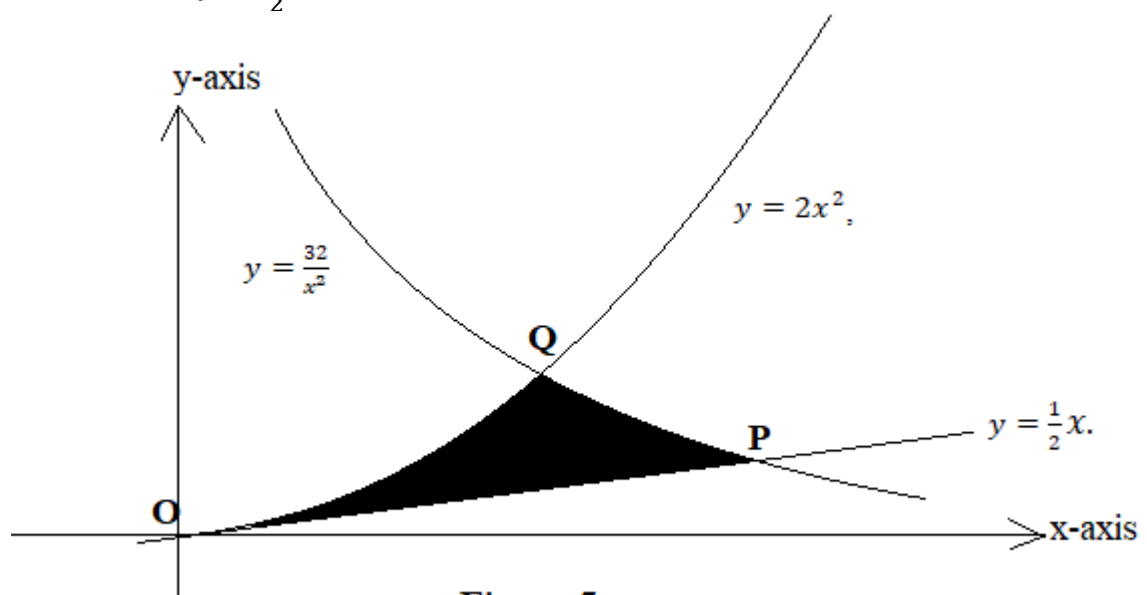
Figure 4

- i. Given that the areas of shapes A and B are equal, prove that $\theta = 1 + \frac{\pi}{4}$.
 (6 marks)

- ii. If $d = 3$, calculate the perimeter of the shape B leaving the answer in terms of π .

(4 marks)

- 10.a. **Fig 5** shows part of the curve $y = 2x^2$, part of the curve $y = \frac{32}{x^2}$ and part of the curve $y = \frac{1}{2}x$.



find

- i. the coordinates of P and Q

STUDENT NAME: _____ SCHOOL: _____

2025

Page 15 of 17

M132/I

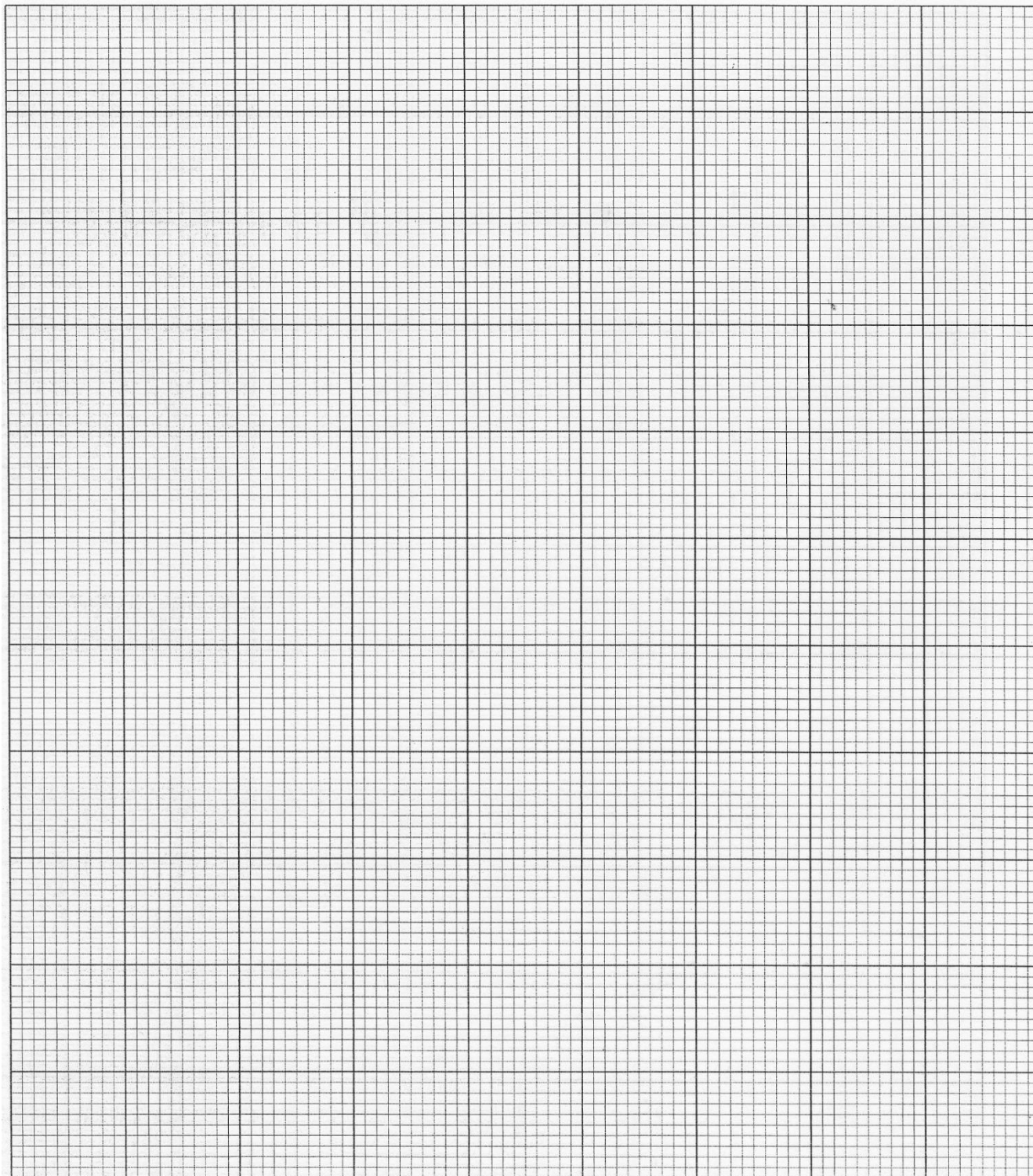
ii. the area of the shaded region

(10 marks)

- b. A ball is thrown vertically upwards. The height, h (in meters) is measured at various times, t (in seconds) giving the following results:

| | | | | |
|-----------------|----|----|----|----|
| Time, t (sec) | 1 | 2 | 3 | 4 |
| Height, h (m) | 20 | 30 | 30 | 20 |

It is known that $h = ut + \frac{1}{2}at^2$ where u is initial velocity of the ball and a is the acceleration. By plotting a graph of $\frac{h}{t}$ against t , find the value of u and of a . (10 marks)



END OF THE QUESTION PAPER

NB: This paper contains 17 printed pages.