NAME : _____SCHOOL:_____

2024 M131/II

NSANJE DISTRICT MOCK

MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

MATHEMATICS

Subject Number: M131/II

Thursday, 21 March

Time Allowed: 2 hours 30 min.

8:00-10:30 am

PAPER II

(100 marks)

Instructions

- **This paper contains 17 printed pages. Please check**
- Write your full name on top of each and every paper
- Answer **all** questions in the spaces provided
- **All** work must be clearly shown
- Cheating of any kind is not allowed
- Hand in your work to invigilator if time **is** up
- All working must be clearly shown

Question Number	Tick If Answered	Do not write in this column	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

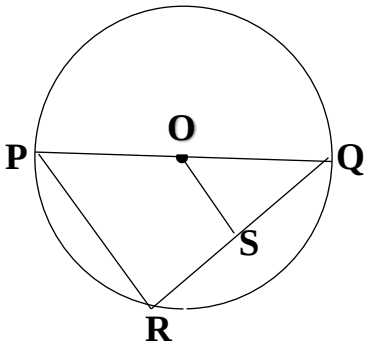
Section A (60 marks)

1. a. Express $\frac{1}{2\sqrt{2}-2}$ with a rational denominator. (**5 marks**)

b. Make p the subject of the formula in $q = \frac{r}{\sqrt{p}} - r$ (**4 marks)**

2. a. Factorise $x^3 - 2x^2 - 5x + 6$ (**5 marks**)

b. **Figure 1** is a circle center **O**. **SO** is perpendicular to **PQ**.



Prove that **POSR** is a cyclic quadrilateral. (**5 marks)**

3. a. Express $1 - \frac{1}{a} - \frac{a-2}{a-1}$ as a single fraction. **(5 marks)**

b. Given that $\underline{p} = = \begin{pmatrix} -2 \\ -4 \end{pmatrix}$ and $\underline{q} = \begin{pmatrix} -4 \\ 0 \end{pmatrix}$ Find $\frac{1}{2}(\underline{p} + \underline{q})$ (**5 marks**)

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4. a. Given that $log_5\ n + log_5 m = 3\ log_5 h$.show that $n = \frac{h^3}{m}$ **(4 marks)**

b. A bag contains 3 black, 5 red and 4 white marbles. Two marbles are drawn from the bag without replacement. Draw a tree diagram and label all the probabilities for all the branches. **(6 marks)**

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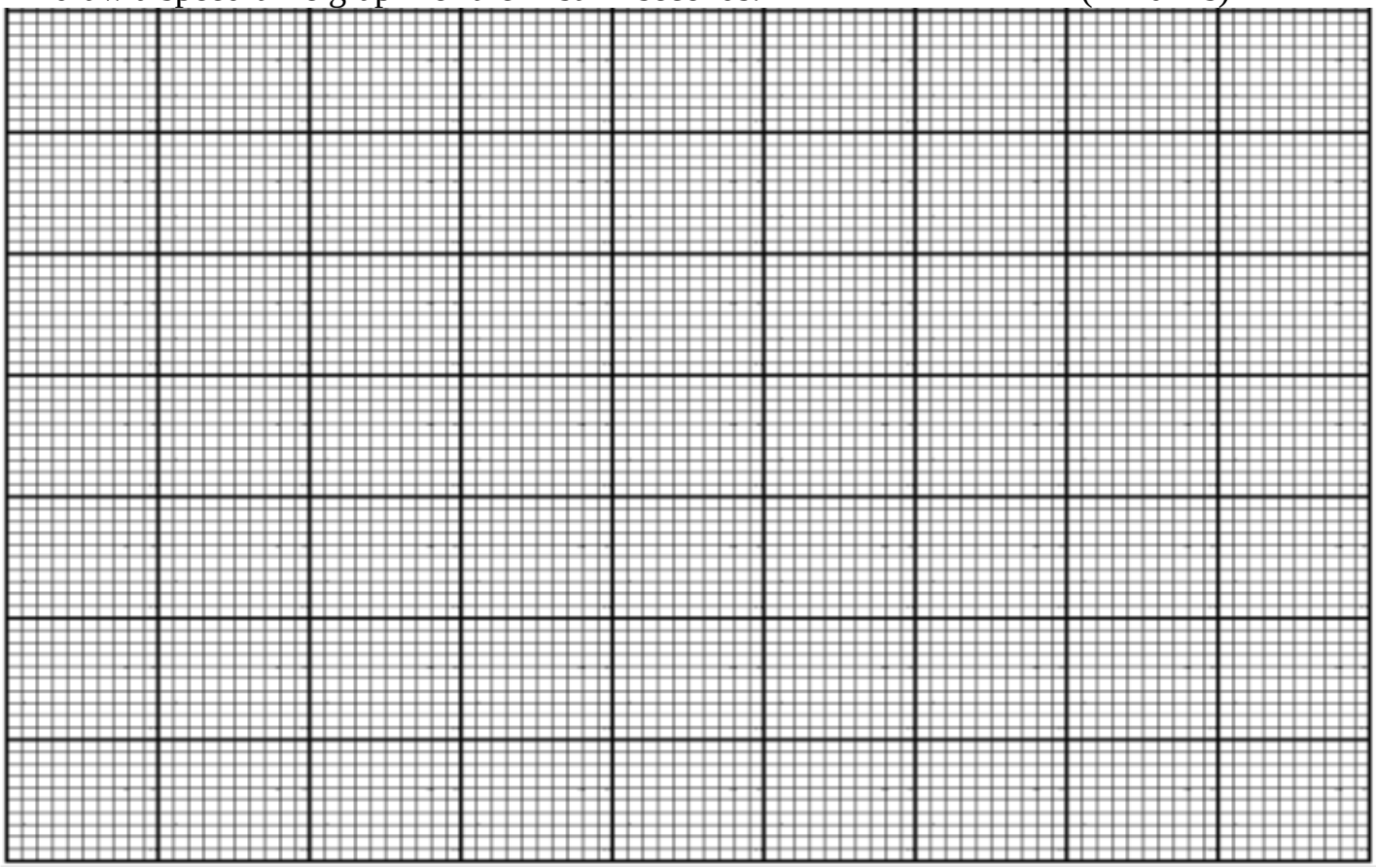
5. a. A car accelerates uniformly from rest to 80 m/s in 8 seconds. It then decelerates uniformly to 20 m/s in the next 6 seconds. Using a scale of 2 cm to represent 20 m/s on the vertical axis and 2 cm to represent 2 seconds on the horizontal axis, draw a speed-time graph for the first 14 seconds. (**4 marks**)



b. Given that $f(x) = x^2 + 1$ and $g(x) = kx + n$ where k and n are constants; and $f(0) = g(0)$ and $g(2) = 15$ Calculate the values of k and n . **(6 marks)**

6. a. A line parallel to $2y = 3x - 4$ passes through y-axis at 3. Find the equation in the form $y = mx + c$. (**5 marks**)

b. Using a ruler and a pair of compasses only construct in the same diagram.

- A circle center **O** of radius 3 cm.
- A point **P** outside the circle such that **OP** = 10 cm
- A tangent **PQ** to the circle at **Q**
- Measure and state the length of **PQ**. (**6 marks**)

Section B (40 marks)

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

7. The table below shows some values of *x* and *y* for the equation

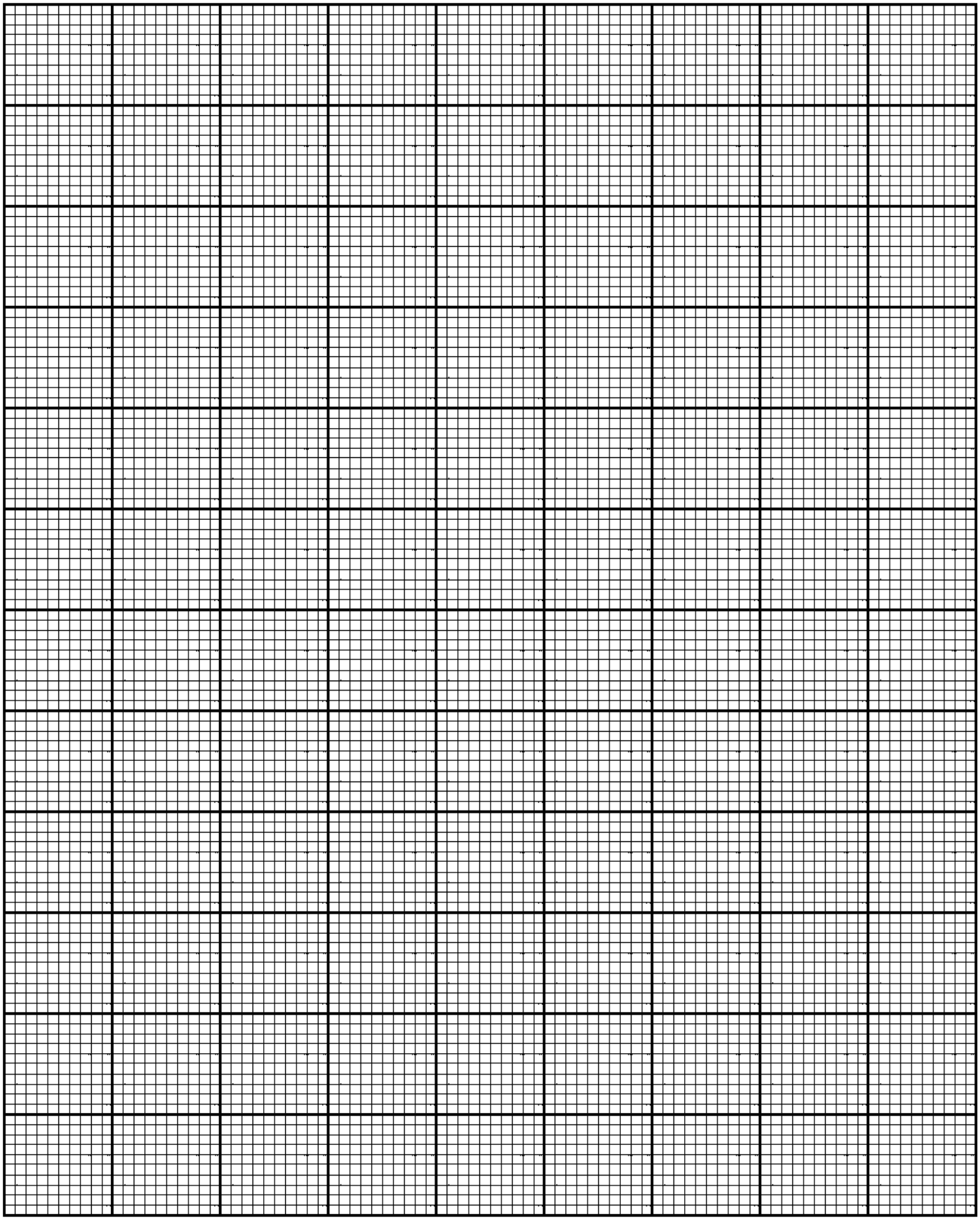
$y = 5 + x - 2x^2$

x	-3	-2	-1	0	1	2	3
y	-16		2	5		-1	-10

a. Complete the table of values (**2 marks**)

b. 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 the graph of $y = 5 + x - 2x^2$ on the graph paper provided on page **9**. (**4 marks**)

c. Use your graph to solve the equation $3 - 2x - 2x^2 = 0$ (**4 marks**)



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8. An aeroplane leaves the airport **P** on a bearing of 23^{o} and flies for 34 km to another airport **Q**. It then leaves airport **Q** and flies on a bearing of 300^{o} to another airport **R**. If the airports **P** and **R** are 68 km apart, calculate the value of angle **PRQ**. (**10 marks)**

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9. The first term of a GP exceeds the second term by 4 and the sum of the 2nd and the 3rd terms is $2\frac{2}{3}$. Find the common ratio. **(10 marks)**

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10. **Figure 4** below is a cube of sides 3cm.

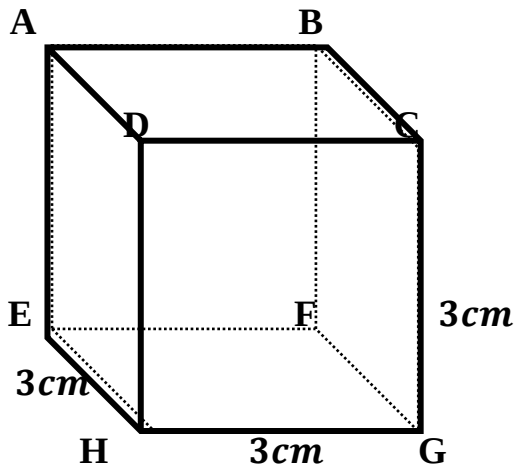

Figure 4

a. Calculate the length **AG**.

b. The angle that AG makes the plane **HEFG.** **(10 marks)**

11. A class of 100 students wrote tests in Mathematics, Chemistry and Physics.

The results of the tests were as follows;

- 24 passed Mathematics and Physics;
- 38 passed Mathematics and Chemistry;
- 34 passed Chemistry and Physics;
- 4 passed Physics only;
- 10 passed Mathematics only;
- 12 passed Chemistry only.

If 10 students failed all the three subjects and x passed all the subjects.
Use a Venn-diagram to calculate the value of x. **(10 marks)**

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12. A man has K4 500 to buy two types of fruits: mangoes and oranges. Mangoes cost K100 each and oranges cost K150 each. .He plans to buy at least three of each type and not more than thirty mangoes.

a. Taking ***x*** to represent number of mangoes and ***y*** to represent number of oranges, write down **four** inequalities that satisfy the given information. **(4 marks)**

b. Using a scale of 2 cm to represent 10 units on both axes, draw the graph to show the region represented by the inequalities by shading the unwanted region on the graph paper provided on page **15**. **(4 marks)**

c. Use your graph to find the maximum number of fruits he could buy. (**2 marks**)

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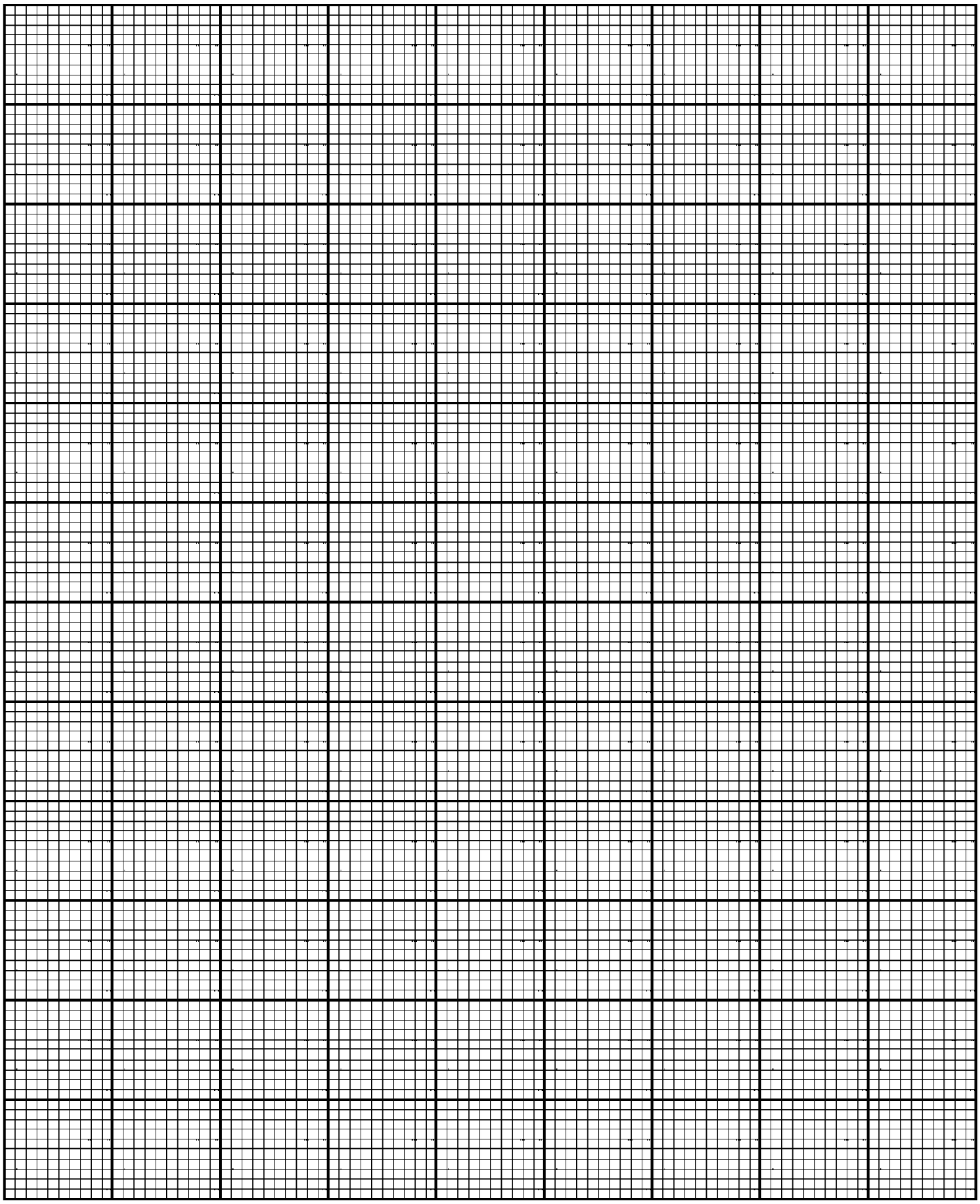

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END OF QUESTIONPAPER

NB: This paper contains 16 pages