

**MARANATHA ACADEMY****2023 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION****MATHEMATICS****February 2023****Subject number:M131/II****Time allowed: 2 h 30 mins****08:00 – 10:30 am****PAPER II**  
**(100 marks)****Instructions:**

1. **This paper contains 13 printed pages. Please check.**
2. Answer **all** the **six** questions in Section **A** and any **four** questions in Section **B**.
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. Scientific calculators may be used.
6. **All working must be clearly shown.**
7. Write your **Full name** at the top of question paper in the spaces provided.
8. 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			
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10			
11			
12			

**Section A** (60 marks)Answer all the **six** questions in this section

1. a. Simplify  $\frac{2a - 4a^2}{a - 2} \div \frac{a(1 - 2a)}{a^2 - 5a + 6}$  (4 marks)

b. Without using a calculator simplify  $\frac{3\sqrt{3}}{3 + \sqrt{3}}$ , giving the answer with a rational denominator. (4 marks)

2. a. On a birthday party of twin girls, a parent brought a bag containing 3 white balls and 2 black balls. As a birthday present each of the two girls took a ball from the bag. Find the probability that the two girls got balls of the same colour. **(6 marks)**

- b. Students at Bwaila Primary School stood in rows for the morning assembly. The first row had 10 students. Each successive row had 3 students more than the row before it. If they stood in eleven rows, calculate the number of students at the school. **(4 marks)**

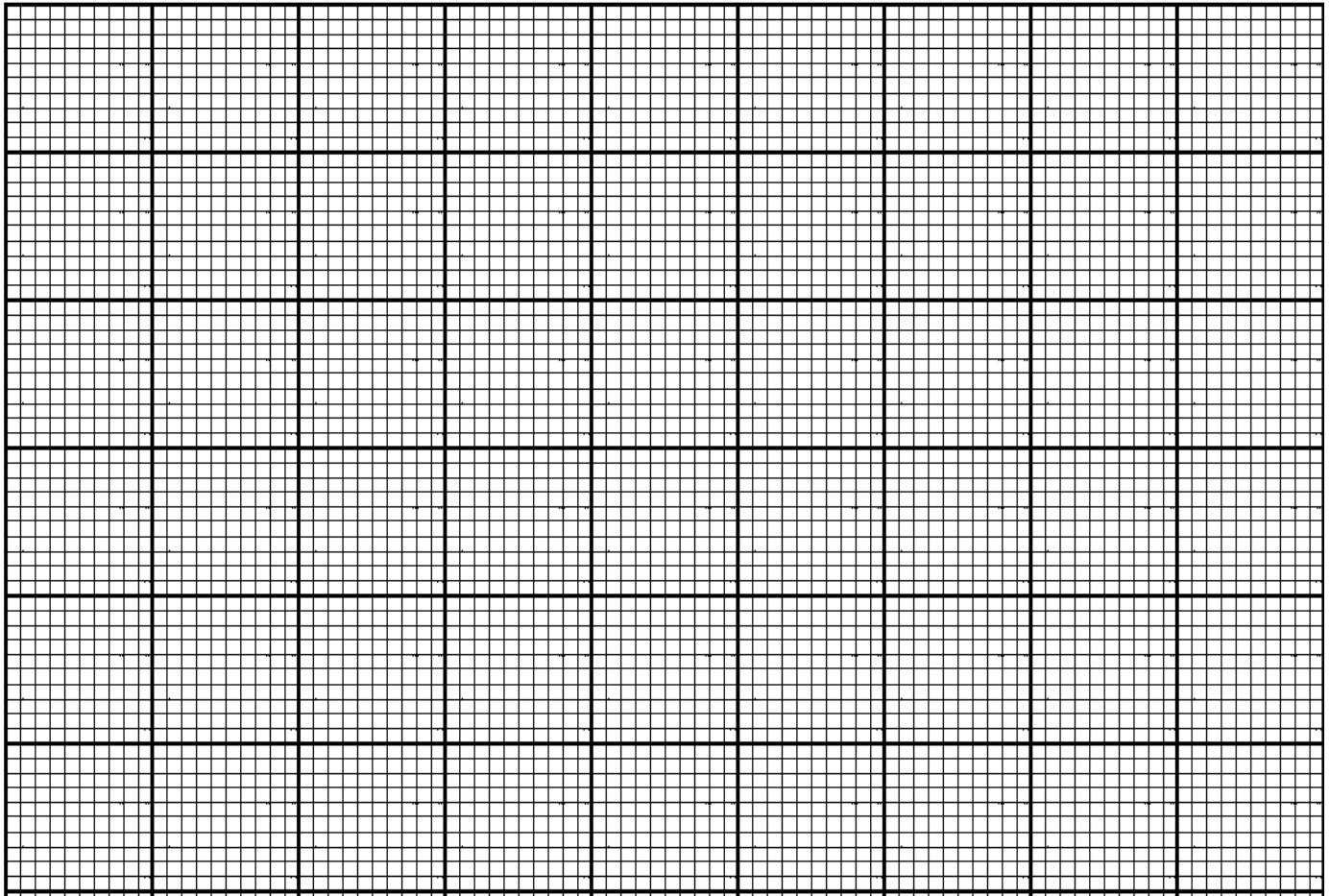
3. a. Prove the theorem which states that the opposite angles of a cyclic quadrilateral are supplementary. (5 marks)

- b. Factorise completely  $y^3 + 6y^2 + 3y - 10$  (6 marks)

4. a. The **table** below show frequency distribution of marks obtained by some students.

Marks	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30
Frequency	3	5	9	6	4	1

Using a scale of 2cm to represent 2 units on the vertical axis and 2cm to represent a class on the horizontal axis, draw a frequency polygon for the data. **(6 marks)**



- b. Given that  $\log_a y = 0.6021$ , evaluate  $\log_a \left( \frac{a^2}{y} \right)$  **(4 marks)**

5. a. Solve the following equations simultaneously:

$$x - y = 5$$

$$x^2 - y^2 = 35$$

**(6 marks)**

- b. Show that points  $A(4, 0)$ ,  $B(14, 11)$  and  $C(19, 16.5)$  are collinear. **(4 marks)**

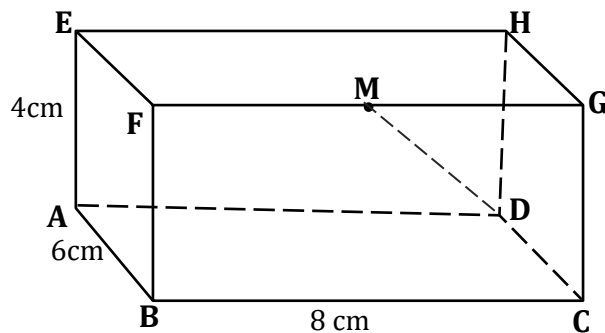
6. a. Triangle PQR is such that  $PQ = 7 \text{ cm}$ ,  $QR = 5 \text{ cm}$  and  $PR = 6 \text{ cm}$ . Find angle PQR giving the answer correct to three significant figures. **(5 marks)**

- b. i. Using a ruler and a pair of compasses only, construct in the same diagram:
- (1) A circle centre O of radius 3 cm
  - (2) Two tangents to the circle at F and at G from an external point M which is 9 cm away from the centre O
- ii. Measure and state the value of angle FMG. **(6 marks)**

**Section B** (40 marks)

Answer any **four** questions from this section.

7. **Figure 1** shows a prism  $ABCDHGFE$  in which  $AB = 6\text{ cm}$ ,  $BC = 8\text{ cm}$ ,  $AE = 4\text{ cm}$  and  $M$  is the midpoint of  $FG$ .

**Figure 1**

Calculate:

- (a). the length of line  $MD$ , correct the answer to two decimal places. **(6 marks)**

- (b). the angle that line  $MD$  makes with plane  $ABCD$ , correct the answer to 1 decimal place. **(4 marks)**

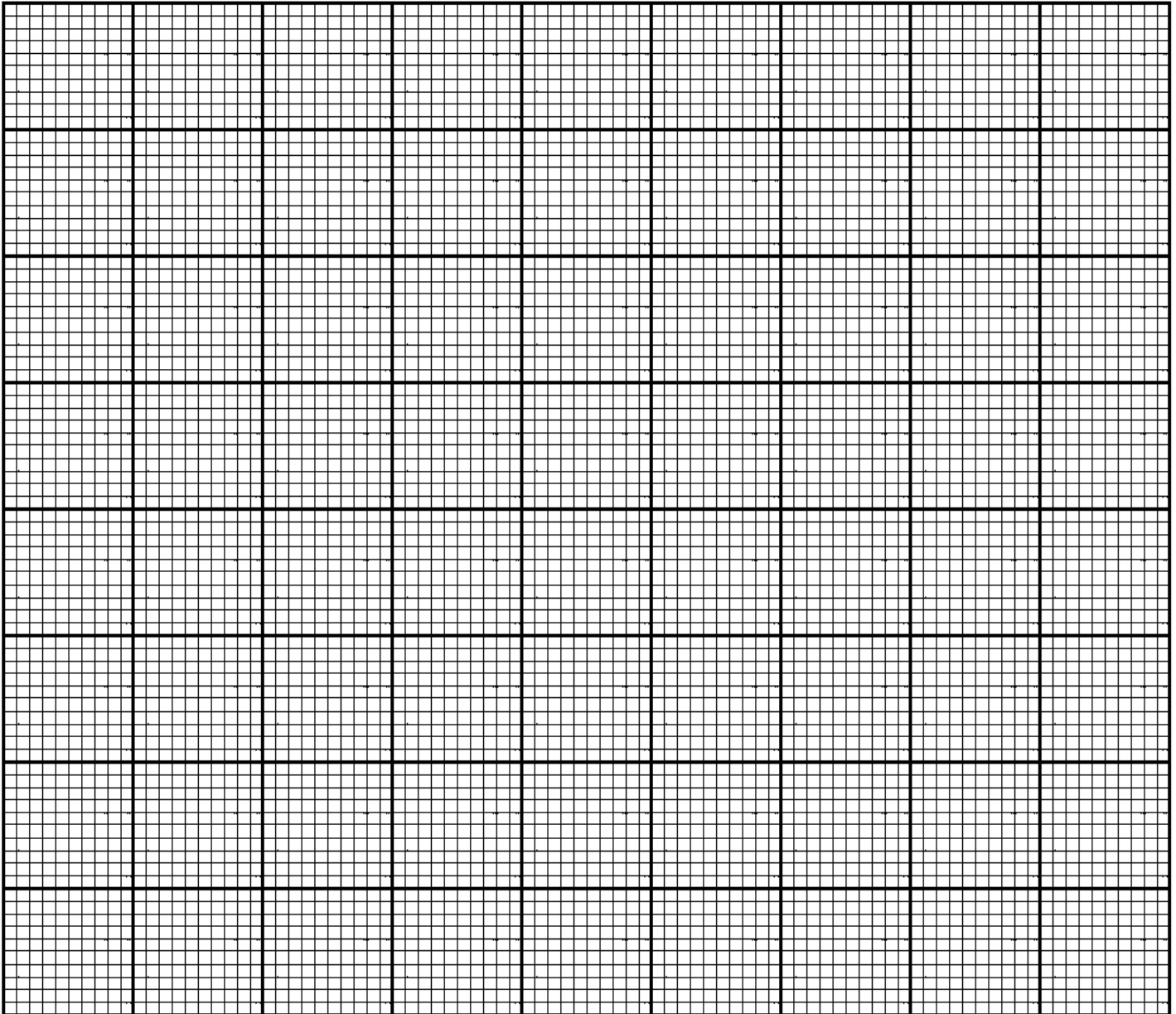


8.  $M$  is the sum of two terms, one of which varies directly as  $n$  and the other directly as the square of  $n$ . When  $n = 4$ ,  $M = 52.8$  and when  $n = 5$ ,  $M = 81$ . Find  $M$  when  $n = 7$ .  
(10 marks)

9. A coach of a kindergarten soccer team has K1 500 to spend on gifts for his team players. There are two types of gifts he can buy: toffees and chocolates. One toffee cost K60 and one chocolate cost K75. He decides that there must not be less than 4 of each and that each of the 13 players must get at least one gift.

- a. Taking  $x$  to represent the number of toffees bought and  $y$  to represent number of chocolates bought, write down **four** inequalities in  $x$  and  $y$  that satisfy the information above. (4 marks)

- b. Use a scale of 2 cm to represent 5 units on both axes, draw graphs to show the region represented by the four inequalities and shade the unwanted region. (5 marks)



- c. Use the graph to find the maximum number of chocolates he can buy if he bought 10 toffees **(1 marks)**

**10. Table 2 below** shows some values of  $x$  and  $y$  for the equation  $y = 3 + 2x - x^2$

$x$	-2	-1	0	1	2	3	4
$y$	-5		3	4		0	-5

**Table 2**

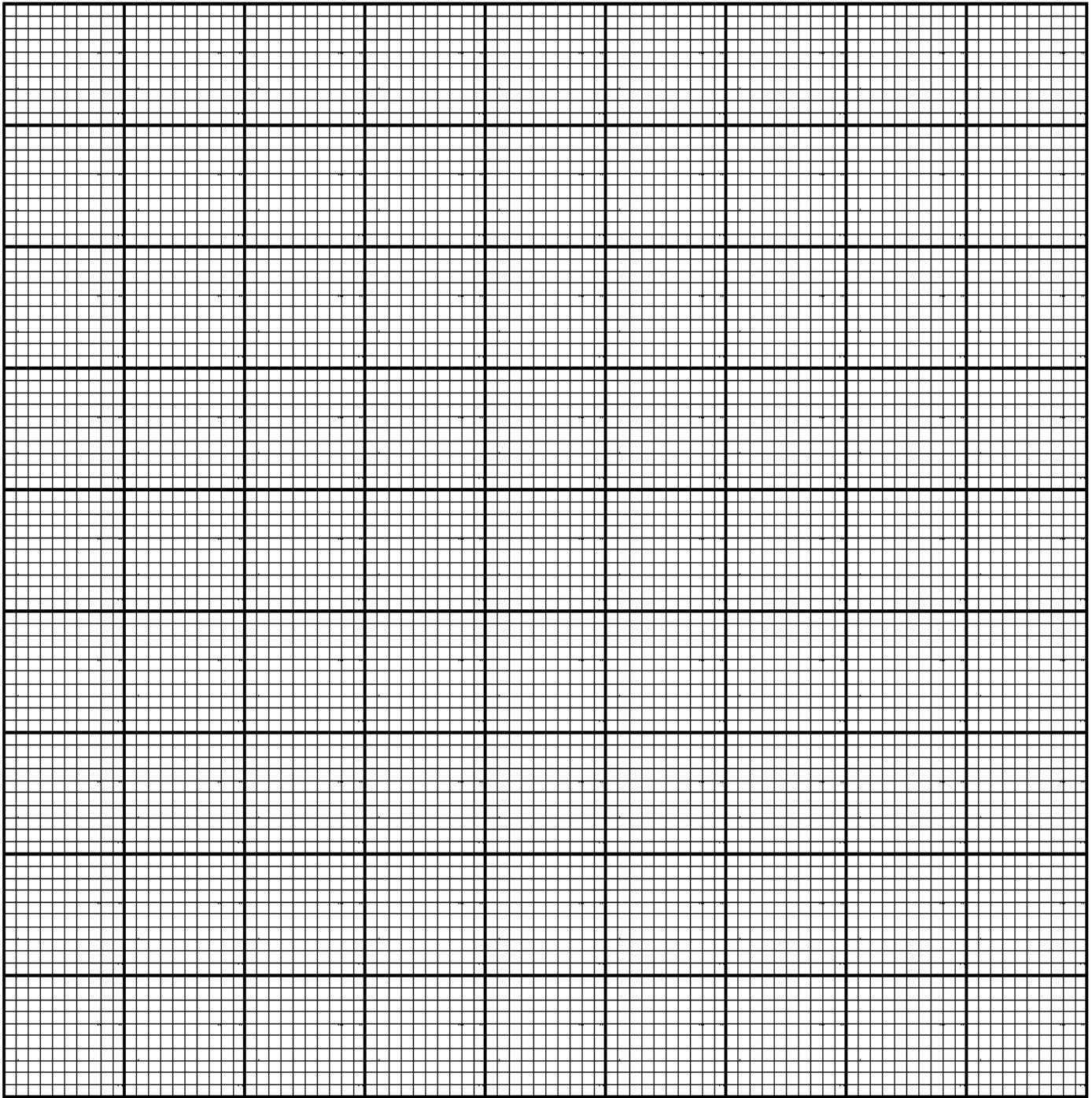
- (a) Complete the table of values

**(2 mark)**

- (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  $y = 3 + 2x - x^2$  on the graph paper below. **(5 marks)**

- (c) Use the graph to solve the simultaneous equations:

$$y = 3 + 2x - x^2 \text{ and } 2y = x - 2$$

**(3 marks)**

- 11.** The first three terms of a geometric progression (GP) are:  $(2 + a)$ ,  $(3 + a)$  and  $(6 + a)$ .  
Calculate the **sixth** term of the GP. **(10 marks)**

**12.** In a group of boys 18 play soccer (S), 19 play rugby(R) and 16 play hockey (H). Six play soccer only, 9 play rugby only, 5 play soccer and rugby only and 2 play rugby and hockey only.

a. Present the information above in a Venn diagram. **(7 marks)**

b. Use the Venn diagram to calculate how many boys are there altogether. **(3 marks)**

**END OF QUESTION PAPER.**

**NB: This paper contains 13 printed pages**