EXAMINATION NO.:_____

NORTHERN EDUCATION DIVISION

2020 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION

MATHEMATICS

Friday, 27 March **Time Allowed: 2 h 30 mins**

PAPER II **8:00-10:30**

(100 marks)

Instructions:

1. This paper contains **18** 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 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 **examination number** at the top of each page 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 this column
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Section A (60 marks)

Answer **all** the **six** questions in this section

1. a. Simplify $\frac{2x+3}{4x^2-9} - \frac{x-3}{2x^2-7x+6}$ **(4 Marks)**

b. Given that $\underline{a} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$ find $|\underline{a}| + |\underline{b}|$ **(4 Marks)**

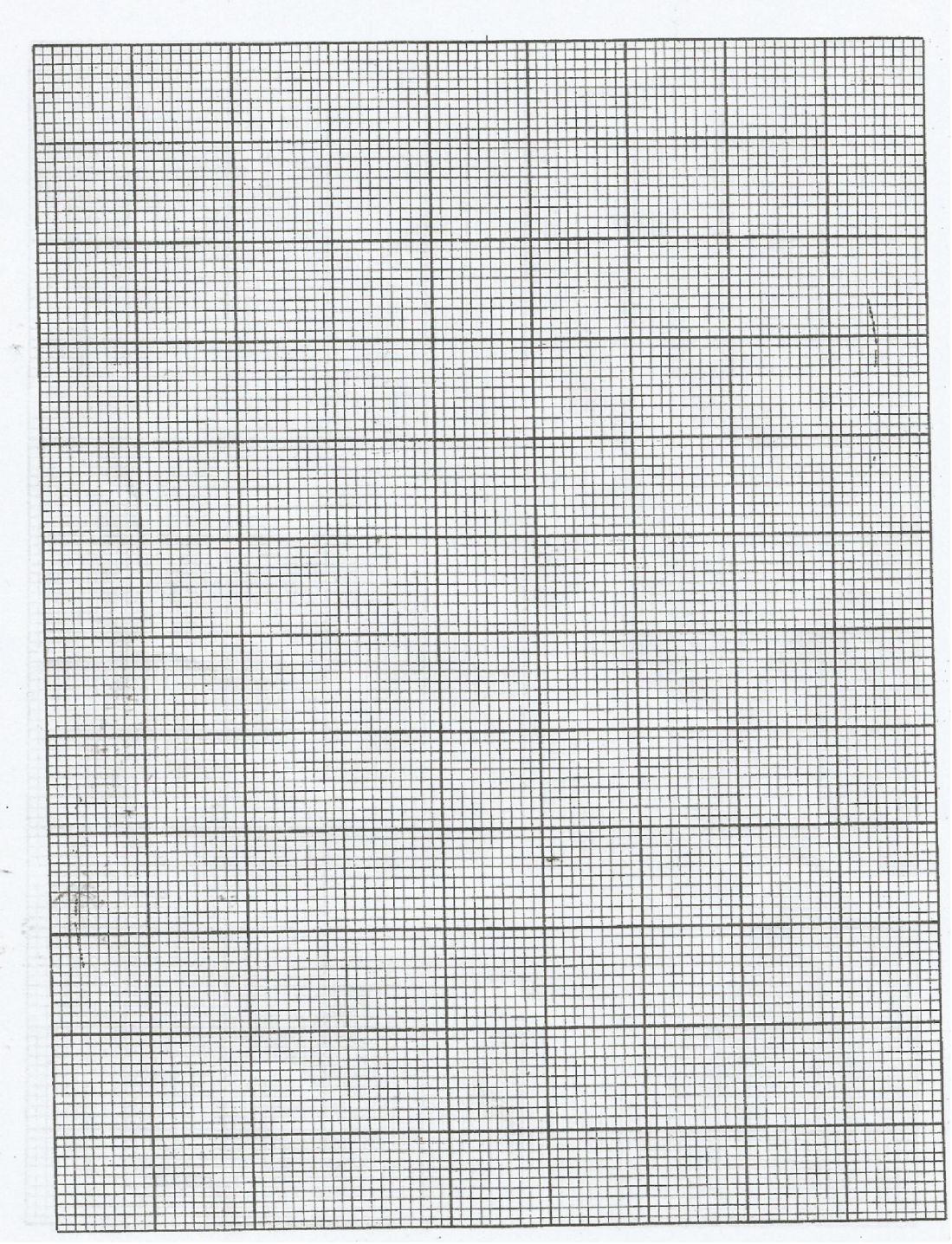
2. a. Without using calculators, simplify $\frac{\log 5\sqrt{5}}{\log 25}$ **(4 Marks)**

b.Table1shows speed of a car recorded every four seconds.

Time(s)	0	4	8	12	16	20	24	28
Velocity(m/s)	55	50	45	40	35	30	25	20

Figure 1

Draw the velocity time graph and use it to calculate the total distance covered by the car
(5 Marks)



3. a. Solve the following equations simultaneously:

$a = b + 2$

$b^2 - ab = 4$ **(5 Marks)**

b. The heights of two similar triangles **PQR** and **WXY** are 5 cm and 8 cm respectively. If the area of triangle **PQR** is100 cm^2, calculate the area of triangle **WXY**. **(4 Marks)**

4. a.Figure 2 is a cyclic quadrilateral **ABCD** centre **O**

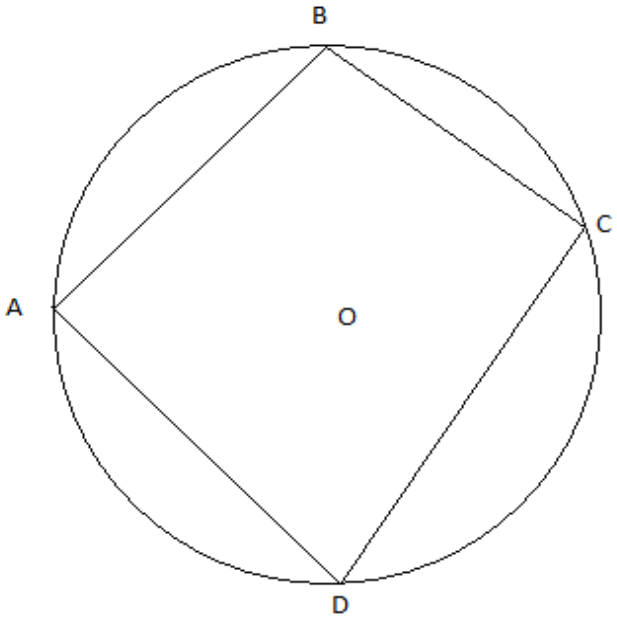


Figure 2

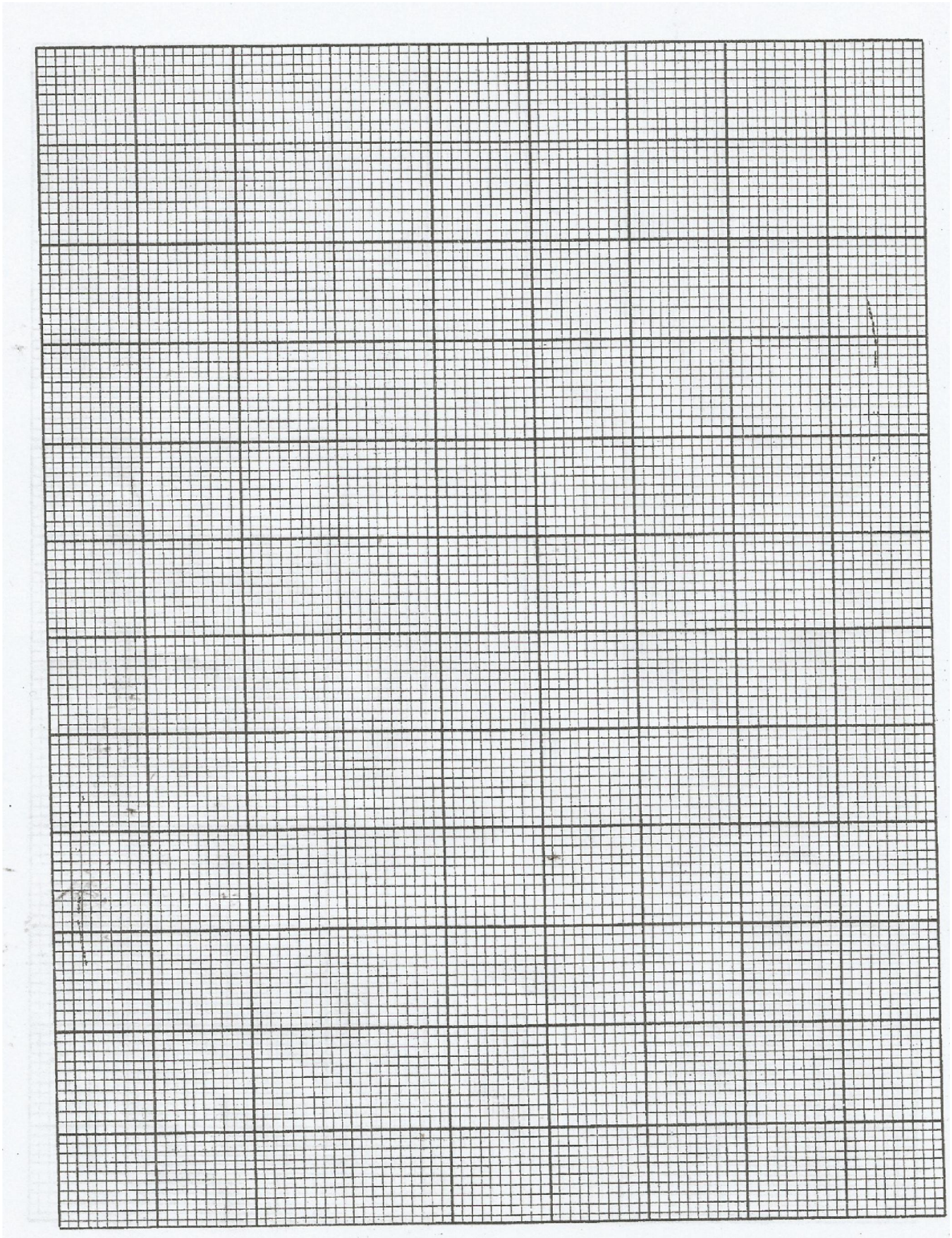
Prove that angle **A** + angle **C** =180^{o}. **(6 Marks)**

b.The gradient of a line passing through $(3,4)$ and $(t, 14)$ is 2. Calculate the value of t.

(4 marks)

5. a. The vertices of triangle ***ABC*** and its image after an enlargement are ***A*** (-1, 2), ***B*** (1, 4), ***C***(2, 2) and $\boldsymbol{A'}$(-1, -2), $\boldsymbol{B'}$(5, 4), $\boldsymbol{C'}$ (8, -2) respectively. Draw triangle ABC and its image on the graph paper provided and use it to find the scale factor and centre of enlargement (***O***).

(6 Marks)



b.Figure 4 is a triangle ***MNO***such that angle ***MNO***is 46^{o}, ***MN***= 14 cm and ***NO***= 18 cm

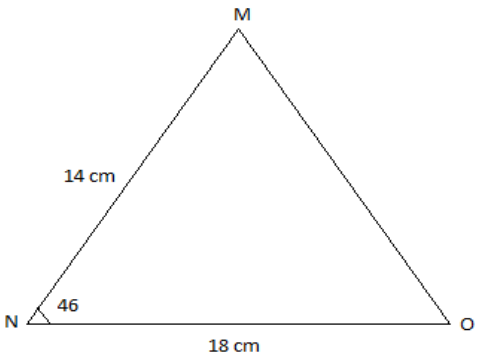


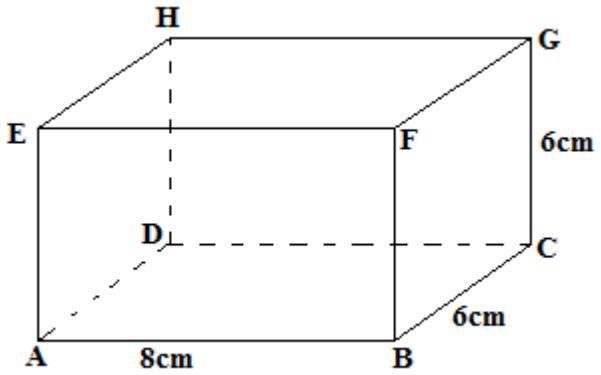
Figure 4

Calculate the length of ***MO***. Correct your answer to two decimal places.

(5 Marks)

6. a. At Mbawa research station, researchers are allowed to keep three types of animals namely: cattle, goats and sheep. The probability that the researcher will keep cattle, goats and sheep is $\frac{1}{2}, \frac{1}{5}$ *and* $\frac{1}{10}$ respectively. Draw a tree diagram and use it to calculate the probability that a researcher will keep only one type of animal **(7 Marks)**

b.Figure 5 shows a shows a cuboid ***ABCDEFG H*** in which ***AB*** = 8 cm, ***BC*** = 6cm and**GC** = 6 cm



Calculate the:

(i) Length of ***AG*** , leaving your answer in its simplest surd form

(ii) Angle between ***AG*** and the base ***ABCD*** to the nearest degree. **(6 Marks)**

Section B (40 Marks)

Answer any four questions in this section

7. In a group of 50 vendors, each of the vendors sell at least each of the following types of fish: chambo, micheni and bonya. It was found that:

- ✓ $(x + 4)$ vendors sell bonya only
- ✓ $(x - 1)$ vendors sell micheni only
- ✓ x vendors sell chambo only
- ✓ 5 vendors sell chambo and bonya only
- ✓ 8 vendors sell chambo and micheni only
- ✓ 9 vendors sell micheni and bonya only
- ✓ $(x + 1)$ vendors sell all the three types of fish

Using a Venn diagram, find the number of vendors who sell micheni. **(10 Marks)**

8. A certain boarding school had K5 000 000.00 to buy bags of rice and bags of maize flour. A bag of rice costs K50 000.00 and a bag of flour costs K20 000.00. The school decided to spend money as follows:

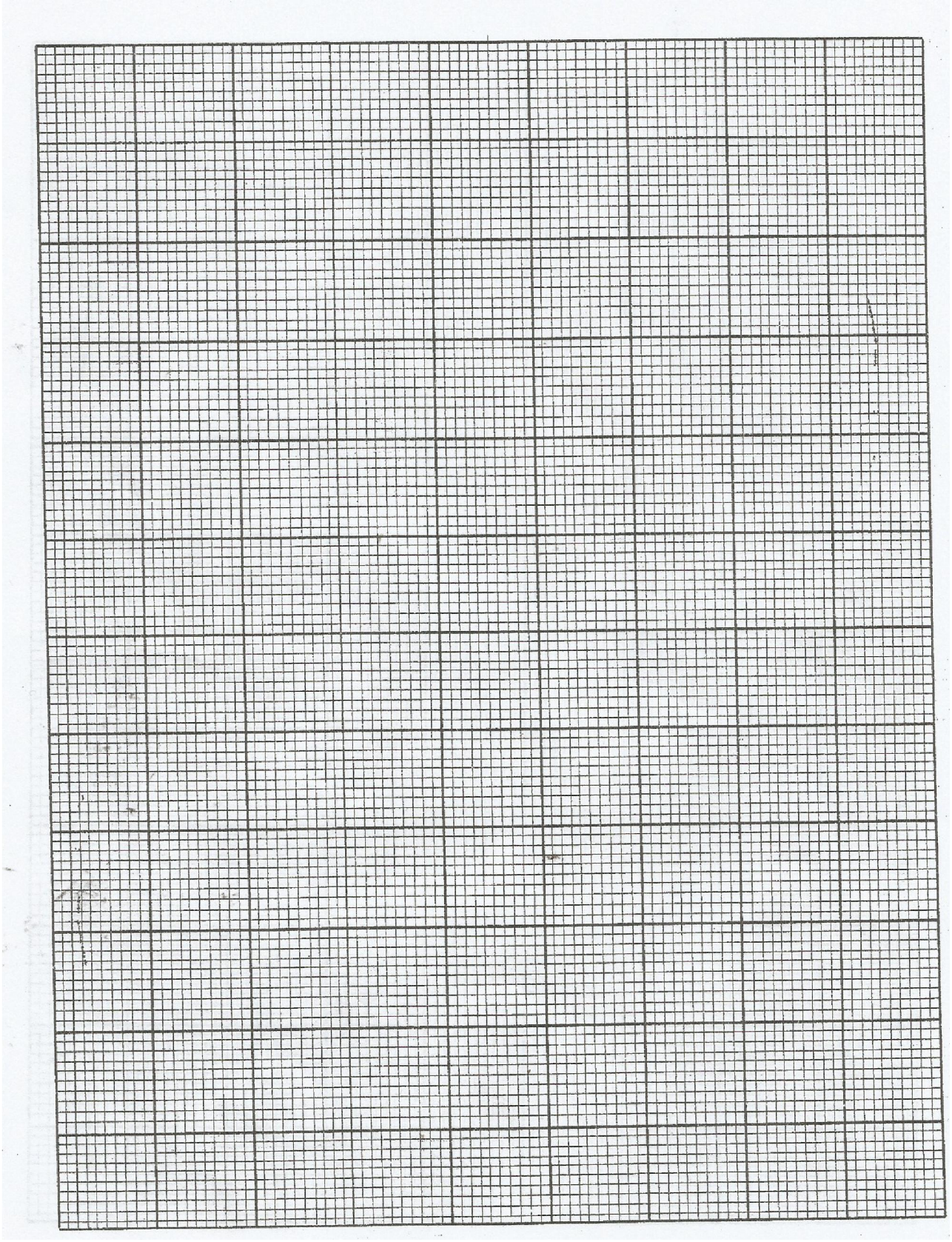
- ✓ Buy at least 30 bags of rice and at least 50 bags of flour
- ✓ Spend more on rice than on flour by not more than K1 000 000. 00

Taking x to represent the number of bags of rice and y to represent the number of bags of maize flour, write down four inequalities in x and y that satisfy the above information

Using a scale of 2 cm to represent 20 units on the horizontal axis and 2 cm to represent 25 units on the vertical axis, draw a graph to show the region bounded by the four inequalities by shading the unwanted region.

Use your graph to find the maximum number of bags of maize flour the school can buy if 40 bags of rice have already been bought.

(10 Marks)



9. **Table 2** shows some of the values for the equation $y = x^3 - 2x^2 - 5x + 6$.

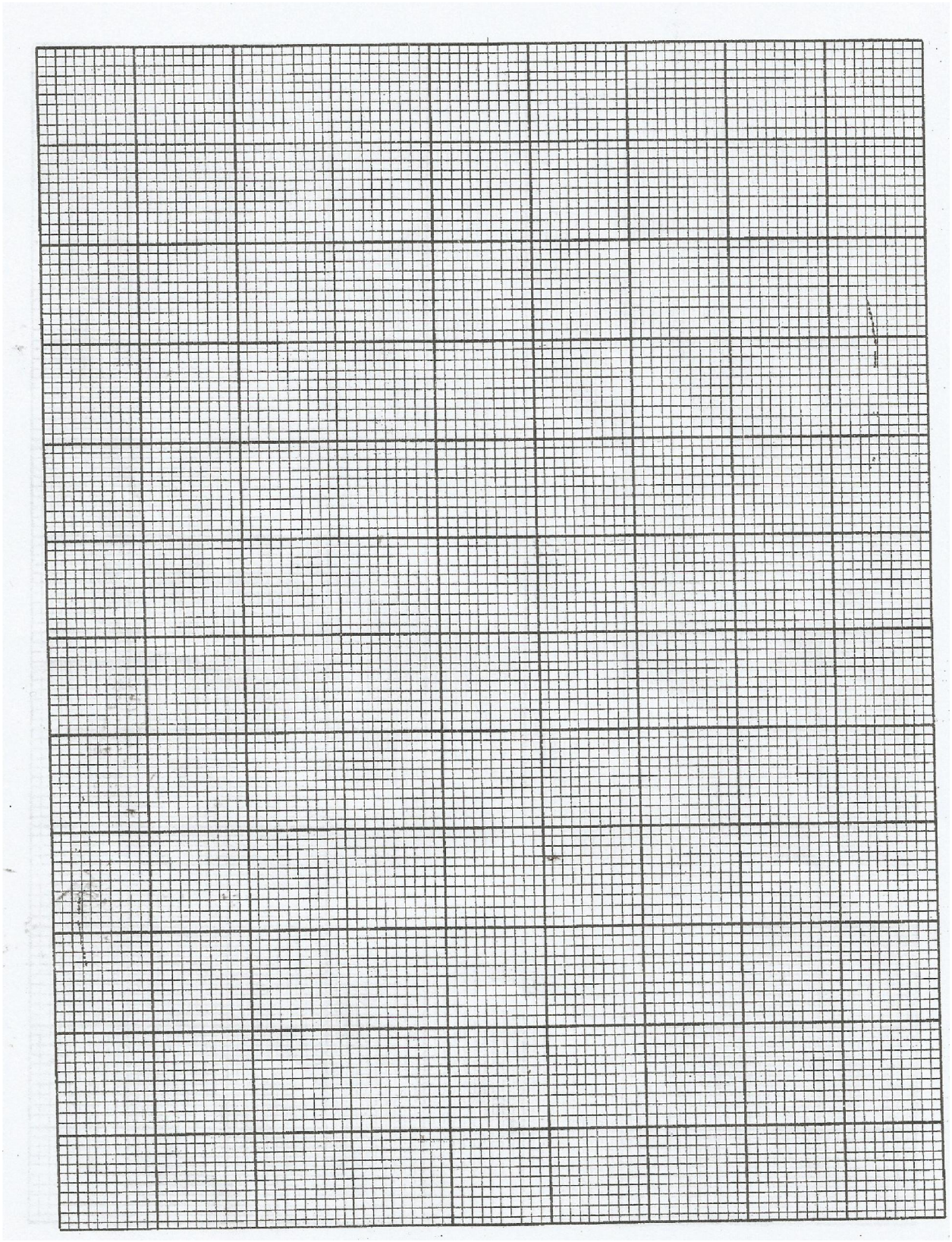
x	-3	-2	-1	0	1	2	3	4
y	-24		8	6		-4		18

Table 2

Complete the table.

Using a scale of 2 cm to represent 1 unit on the x-axis and 2 cm to represent 5 units on the y-axis, draw the graph of $y = x^3 - 2x^2 - 5x + 6$

Use your graph to solve the equation $x^3 - 2x^2 - 5x + 4 = 0$ **(10 Marks)**



10. Calculate the standard deviation of the following numbers: $2y, (2y - 2), (2y + 2)$

(10 Marks)

11. The quantity m is the difference of two parts. The first part is constant and the second varies inversely as the square of n. if $m = 1$, then $n = 2$ and $m = 6$ when $n = 3$. Find the positive value of n when $m = 9$ **(10 Marks)**

12. The sum of the first three positive numbers which are in a geometric progression is 52. The square of the second number is equal to four times the third number. Calculate the third term of the progression. **(10 Marks)**

END OF QUESTION PAPER