EXAMINATION NUMBER _____

CENTRAL EAST EDUCATION DIVISION

2023 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION

MATHEMATICS

(100 marks)

Thursday, 23rd March 2023 PAPER II **Subject Number: M131/II**

Time allowed: 2 h 30 min

(8:00 a.m. – 10:30 a.m.)

Instructions

1. **This paper contains 18 pages. Please check.**
2. Answer **all** the **six** questions in section **A** and any four in section **B**.
3. The maximum number of marks for each answer is indicate against each question.
4. Write your answers in the spaces provided on the question paper.
5. Scientific calculators may be used.
6. The graph paper at the end of the question paper can be used if required. Do not tear it off.
7. **All working must be clearly shown**
8. Make sure you write your examination number in the spaces provided.
9. In the table provided on this page, **tick** against the question number you have answered.

Question Number	Tick questions answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
	Total		

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SECTION A (60Marks)

Answer all questions from this section

1. (a) Express $\frac{3x-7}{2x^2-9x-5} - \frac{2}{x-5}$ as single fractions.

(b) A chord MN of a circle of radius 8cm is at a distance of 4cm from the centre O of the circle. Sketch a diagram representing this information and calculate the length of the chord leaving the answer in its simplest surd form. (5marks)

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2. (a) Without using calculator or mathematical tables simplify $\frac{\sqrt{3}+3\sqrt{5}}{\sqrt{5}-\sqrt{2}}$. Leave your answer with a rational denominator
(4marks)

(b) Make m subject of the formula : $p^{m^2} = k$ (4marks)

3. (a)Prove the theorem which states that tangents from an external point to a circle are equal in length. (6marks)

b. Find a and b in this matrix $\begin{bmatrix} 2 & 1 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 7 \\ 9 \end{bmatrix}$ **(4 marks)**

4. (a) A trapezium has a height of 3cm and its volume is $6cm^3$. Calculate the volume of a similar trapezium with a height of 9cm.
(4 marks)

(b) **Figure1** shows a quadrilateral ABCD with angle ADC = x+168° and angle ABC=$2x^2$.

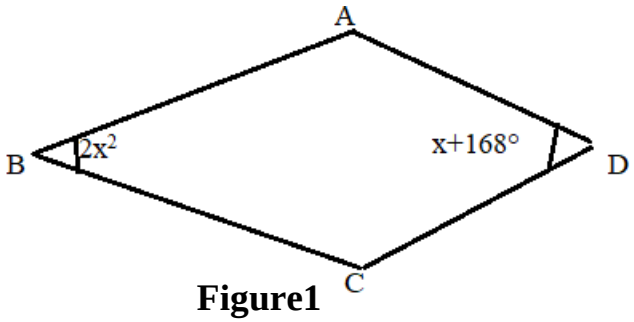

Figure1

If the quadrilateral is cyclic, find the value of x giving the answer correct to 2d.p. (7marks)

5. (a) Find the value of x which satisfy the equation $7^{2x}-8(7^{x}) + 7 = 0$ (5marks)

(b) The chemistry scores of a class of 50 students are shown in the grouped frequency table below:

Score class interval	Frequency
0 - 19	3
20 - 39	y
40 - 59	18
60 - 79	14
80 - 99	5

(i) Calculate the value of y. (2marks)

(ii) Calculate the class boundary of the modal class. (3marks)

6. (a) Using a pair of compasses, a ruler and a protractor only, in the same diagram:

   (i) construct a circle with centre O of diameter 6cm. (1mark)

   (ii) construct a tangent KT to the circle at point K such that OT = 7cm. (3marks)

   (iii) Measure and record the size of angle OTK. (2marks)

(b)In a class of 50 students, 30 students take history, 25 take chemistry and three take Use the venn diagram to find number of students who take history and chemistry.

(i) Present this information in a venn diagram. (3marks)

(ii) Use the venn diagram to find the number of students who take

and chemistry only. (2marks)

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SECTION B (4OMarks)

Answer any **four** questions from this section

7. The **table1** below shows some values of *x* and *y* for the equation $y = x^2 - 4x + 5$

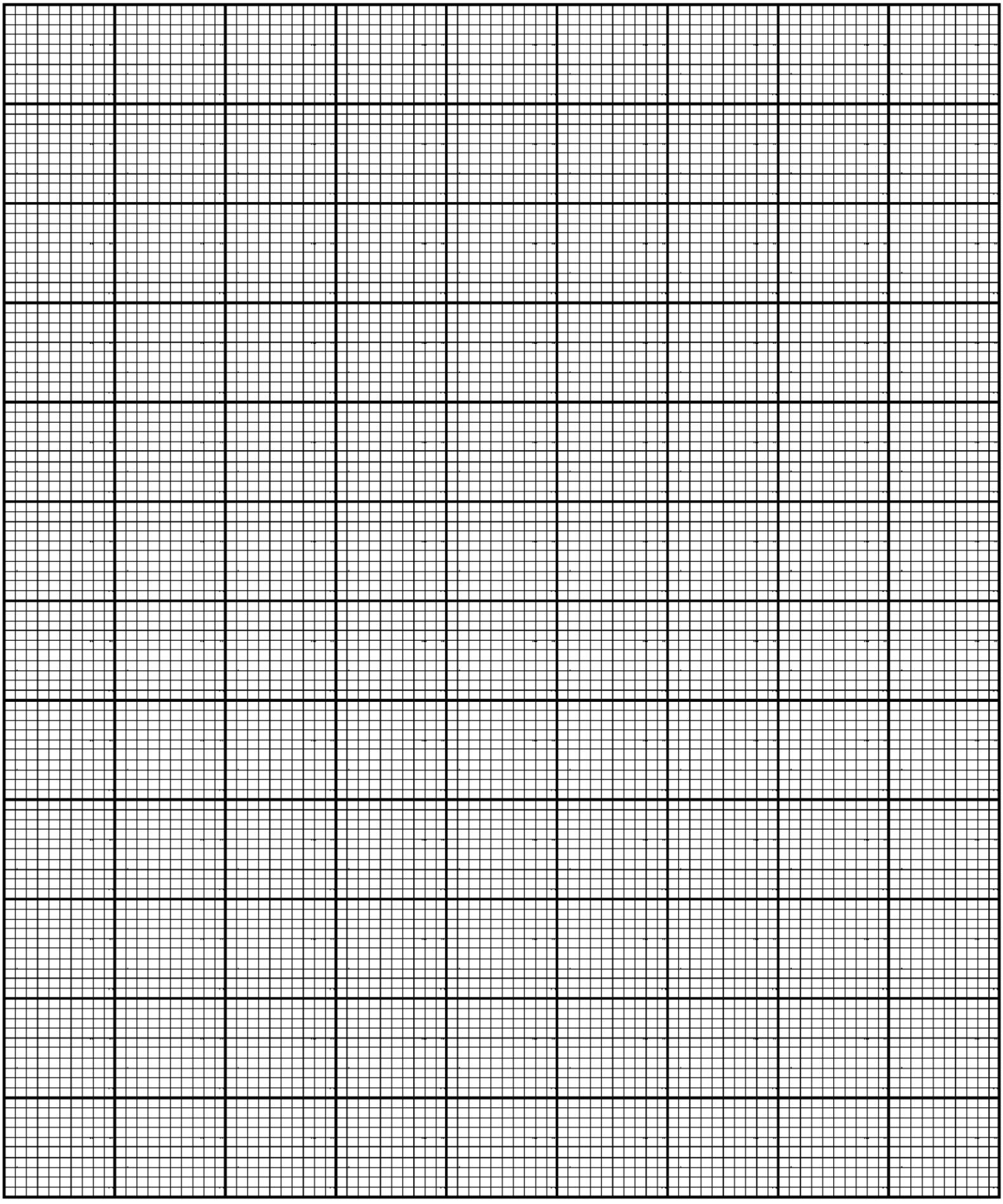
Table 1

X	-1	0	1	2	3	4	5
Y	10	5		1	2		10

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

b. Using a scale of 2cm to represent 1 unit on the horizontal axis and 2cm to represent 2 units on the vertical axis, draw the graph of $y = x^2 - 4x + 5$ on the graph paper provided
(4 marks)

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



8. The polynomial $x^3 + ax + b$ where a and b are constants leaves a remainder of 11 and 41 when divided by $(x - 3)$ and $(x - 4)$ respectively. Find the remainder when the same polynomial is divided by $(x - 5)$ **(10 marks)**

9. The parking fee (P) for an aeroplane at an airport is partly constant and partly varies with time (T) that it takes at the airport. A one hour fee is K200, 000 and two hour fee is K375, 000. Calculate the time taken for an aeroplane which has been charged a fee of K112, 500.

   (10marks)

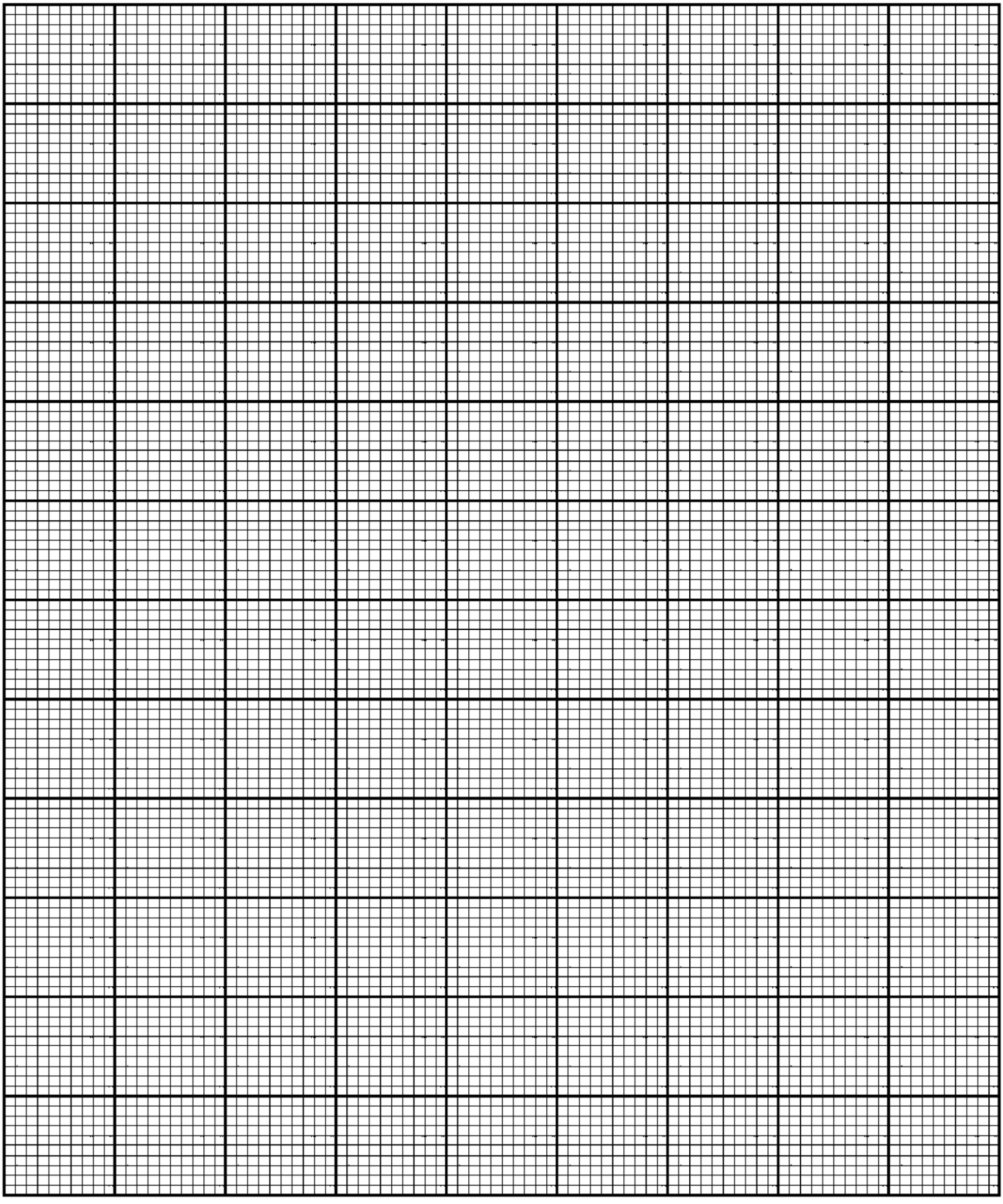
10. Given that six numbers 14, n, 15, 11, 2n and 5 have a mean of t, which when each number is increased by 3, the mean becomes $5t/4$. Find the value of n.

11. Mr Donasi gets a loan to buy layers and broilers. The layers are sold at K2500 each and the broilers are sold at K2000 each. She would like to spend K10000 more on layers than on broilers and she has K50000 to spend.

(a) Taking x to represent number of broilers and y to represent number of layers, formulate two inequalities in x and y in addition to $y \geq 0$ and $x \geq 0$ that satisfy the information above.
(2marks)

(b) Using a scale of 2cm to represent 5 units on both axes draw graphs on the graph paper provided to show the region represented by the four inequalities. Shade the unwanted region.
(5marks)

(c) Use the graph to find the maximum number of chickens that she can get with the K50000.
(3marks)



12. **Figure 3**, shows a prism ABCDEF on a rectangular base. AB = 14m, BC = 10 m, CF = 5 m and angle BCF = 90°.

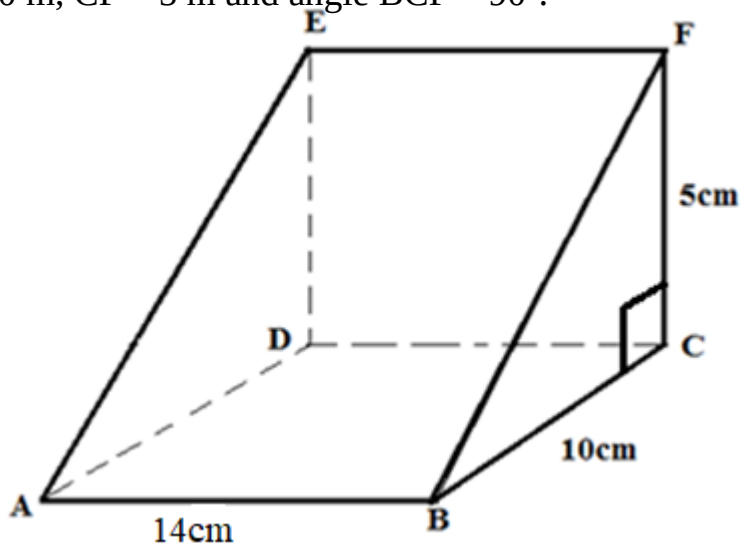


Figure 3

Calculate

i) The volume of the prism.

(ii) Angle FAC to the nearest degree.

END OF QUESTION PAPER

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