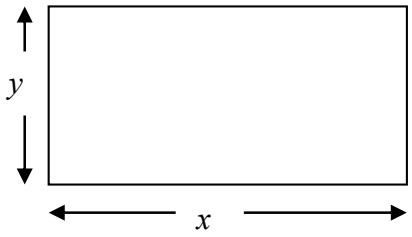
Question 8 **(50 marks)**

Kieran has 21 metres of fencing. He wants to enclose a vegetable garden in a rectangular shape as shown.

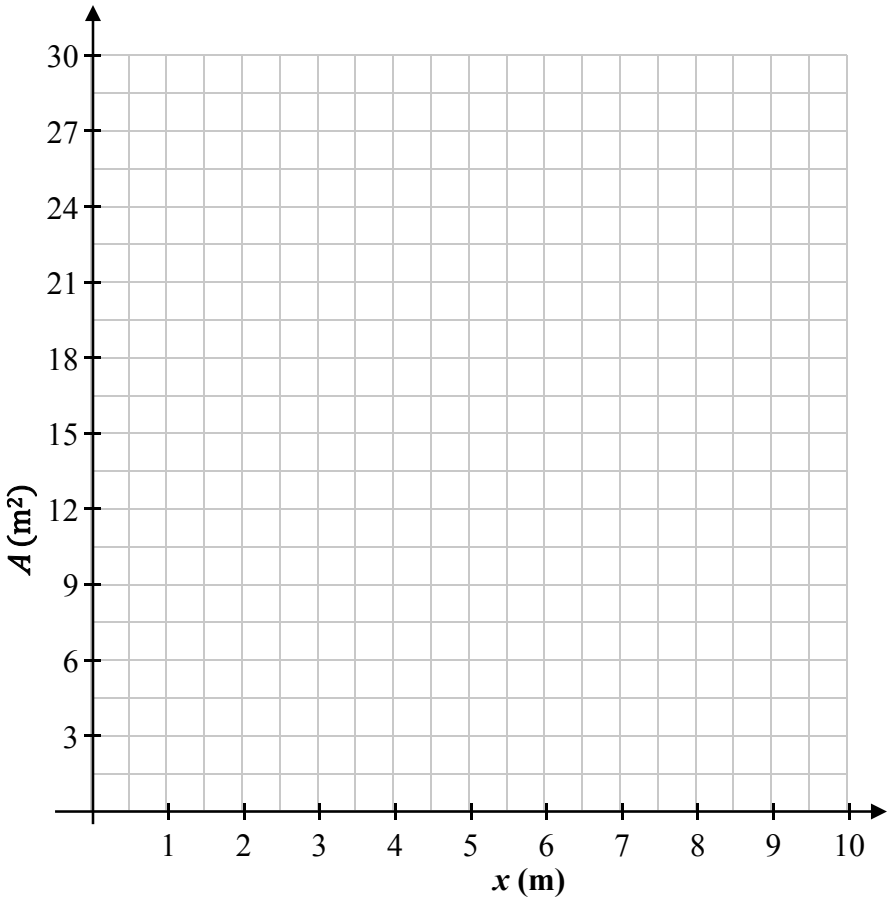


(a) By writing an expression for the perimeter of the vegetable garden in terms of x (length in metres) and y (width in metres), show that $y = 10{\cdot}5 - x$.

(b) **(i)** Complete the table below to show the values of y and A (the area of the garden) for each given value of x.

x (m)	0	1	2	3	4	5	6	7	8	9	10
y (m)					6·5						
A (m^2)					26						

(ii) Use the values of x and A from the table to plot the graph of A on the grid below.



(c) Use your graph to estimate the maximum value of A and write the corresponding length and width.

A: Maximum area (m^2)	
Length (m)	
Width (m)	

(d) **(i)** Show that the area of the rectangle can be written as $A = 10{\cdot}5x - x^2$.

(ii) Find $\frac{dA}{dx}$.

(iii) Hence, find the value of x which will give the maximum area.

(iv) Find this maximum area.