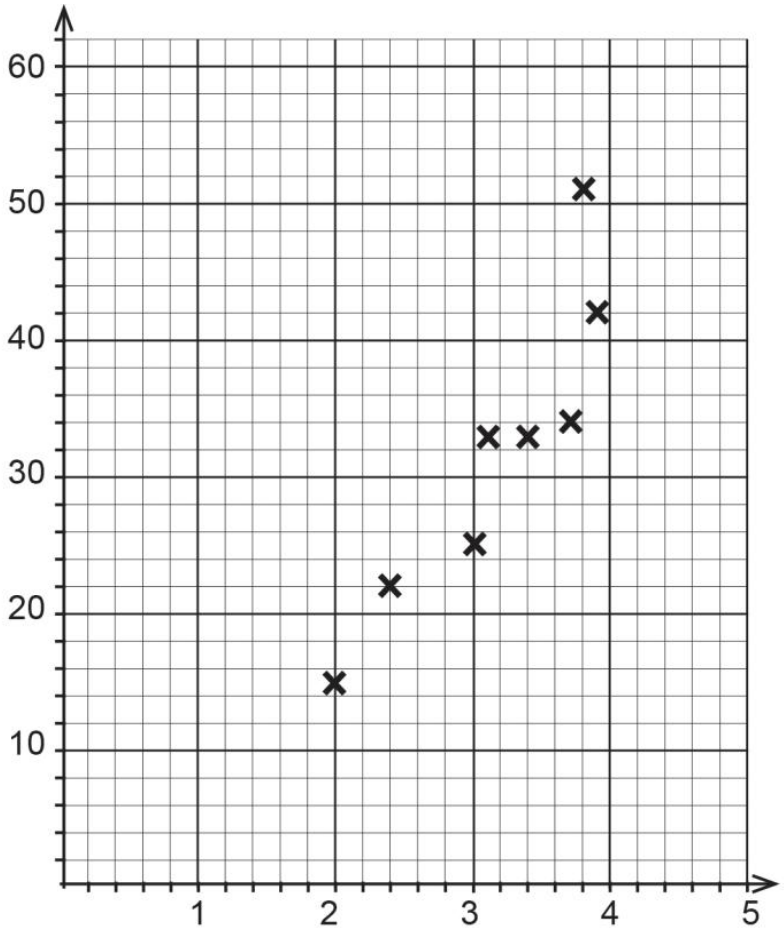
Question 8 **(17 marks)**

An experiment was conducted to determine whether there was any relationship between the maximum tidal current, in centimetres per second, and the tidal range, in metres, at a particular marine location. (The tidal range is the difference between the height of high tide and the height of low tide.) Readings were taken over a period of 12 days and the results are shown in the following table.

Tidal range	2.0	2.4	3.0	3.1	3.4	3.7	3.8	3.9	4.0	4.5	4.6	4.9
Maximum tidal current	15.2	22.0	25.2	33.0	33.1	34.2	51.0	42.3	45.0	50.7	61.0	59.2

(a) State the explanatory variable. (1 mark)

(b) Complete the scatterplot below by plotting the last four data points and labelling the horizontal axis and the vertical axis clearly. (2 marks)



(c) Calculate the correlation coefficient for the data, and comment briefly on your answer with reference to the appearance of the scatterplot in part (b). (2 marks)

(d) (i) Determine the equation for the least-squares line that models these data. State the slope and vertical-intercept correct to one decimal place. (2 marks)

(ii) Draw this line on the scatterplot in part (b) by showing two calculated points on the graph. (2 marks)

(iii) Interpret the slope of the least-squares line. (2 marks)

(e) Calculate the coefficient of determination and interpret it. (2 marks)

(f) (i) Estimate the maximum tidal current on a day when the tidal range is 4.2 m and comment on the reliability of this estimate. (3 marks)

(ii) It is suggested that the equation found in part (d)(i) could be used to predict the maximum tidal current on a day when the tidal range is 15 m. Comment briefly on the validity of this suggestion. (1 mark)