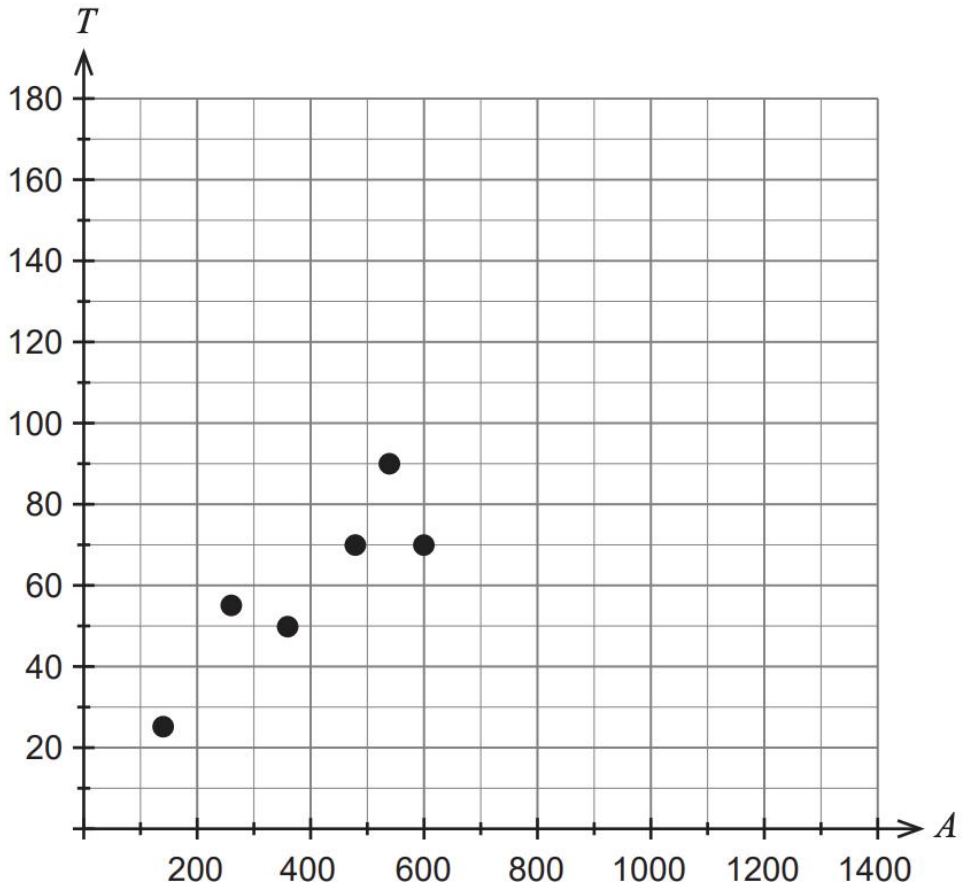
Question 8 **(13 marks)**

Abdul has a lawnmowing business and is investigating if there is a relationship between the size of a lawn and the length of time it takes to cut the lawn. He takes a random sample of eight customers and measures the areas of their lawns and notes the times, in minutes, it takes to mow their lawns. The results are in the table below, where A is the area of the lawn in square metres and T is the time in minutes. (Note: some values are missing.)

Customer	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
A (m^2)		260		480	540	600	860	1180
T (min)	25	55	50	70	90	70	135	140

(a) Complete the scatterplot below. (1 mark)



(b) From the information below, determine the equation of the least-squares line in terms of A and T and state the coefficient of determination for these data. (2 marks)

Linear Reg

$y = ax+b$

a = 0.114691

b = 16.008241

r = 0.9510026

$r^2 = 0.9044059$

(c) Interpret the value of the gradient of the least-squares line in the context of the question. (2 marks)

(d) Given that Abdul charges $30 per hour, estimate the charge for mowing a customer's lawn with an area of 500 m^2. (2 marks)

(e) Explain whether the estimate determined in part (d) would be valid. (2 marks)

(f) Using the least-squares line correct to three decimal places

(i) calculate the residuals for Customers B and D. (2 marks)

(ii) explain the significance of the sign and the size of these residuals in reference to the least-squares line. (2 marks)