

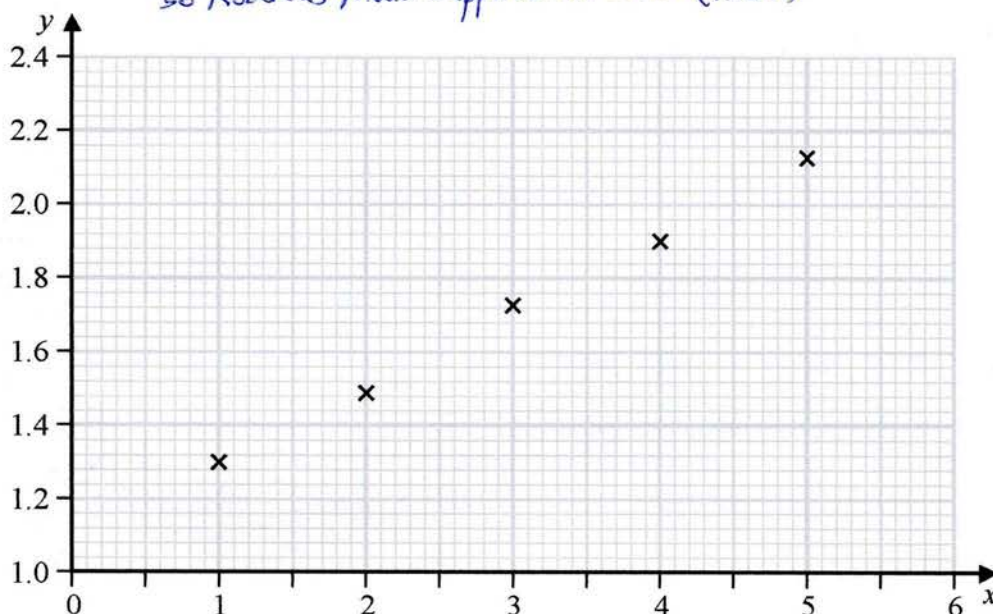
6. Roberta started a business five years ago.

She believes that the number of customers, c , is growing exponentially.

She produced the graph below by coding her data such that

x = number of years since the business started

$y = \log_{10} c$ (b) contd $211.39... > 200$
so Roberta's Model supports her claim (1 mark)



Roberta found the regression line for this graph to be $y = 1.10 + 0.204x$

(a) (i) Explain how the graph supports Roberta's belief of exponential growth.

(ii) Find the relationship between the number of customers and number of years since the business started, in the form $c = ab^x$

(a)(i) the log values lie close to a straight line, which is consistent with (5)

Roberta claims that after 6 years she will have more than 200 customers. exponential growth in the unlogged values (1 mark)

(b) Show that Roberta's model supports this claim.

(b) After 6 years, Model predicts $c = 12.6 \times 1.60^6 = 211.39...$ (1)

(c) Comment on the reliability of using Roberta's model in your answer to part (b). You must give a reason for your answer.

(c)(ii) $\log_{10} c = 1.10 + 0.204x \Rightarrow c = 10^{1.10 + 0.204x}$ (1)

$$\Rightarrow c = 10^{1.10} (10^x)^{0.204} = 10^{1.10} (10^{0.204})^x \quad (2 \text{ marks})$$

$$\Rightarrow c = 12.589... \times 1.5995...^x$$

$$= 12.6 \times 1.60^x \quad 3sf \quad (2 \text{ marks})$$

(c) 6 years is outside (though, it is only just outside)

the range of years (1 to 5) used to derive the model, so it is an extrapolation and could yield an unreliable prediction here (1 mark)