6 **(a)** **(i)** Write down the derivative of e^{kx}, where k is a constant. [1]

(ii) A business has been running since 2009. They sell maths revision resources online.

Give a reason why an exponential growth model might be suitable for the annual profits for the business. [1]

Fig. 6 shows the relationship between the annual profits of the business in thousands of pounds (y) and the time in years after 2009 (x). The graph of $\ln y$ plotted against x is approximately a straight line.
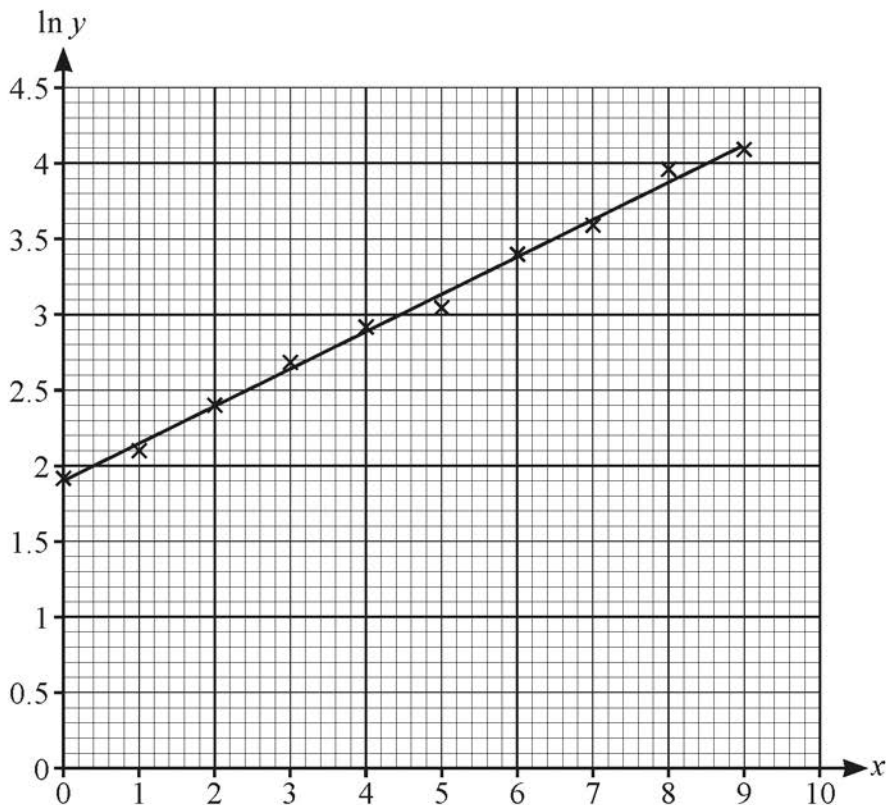

Fig. 6

(b) Show that the straight line is consistent with a model of the form $y = Ae^{kx}$, where A and k are constants. [2]

(c) Estimate the values of A and k. [4]

(d) Use the model to predict the profit in the year 2020. [3]

(e) How reliable do you expect the prediction in part **(d)** to be? Justify your answer. [1]