

5 A social media website launched on 1 January 2017. The owners of the website report the number of users the site has at the start of each month. They believe that the relationship between the number of users, n , and the number of months after launch, t , can be modelled by $n = a \times 2^{kt}$ where a and k are constants.

- (i) Show that, according to the model, the graph of $\log_{10} n$ against t is a straight line. [2]
- (ii) Fig. 5 shows a plot of the values of t and $\log_{10} n$ for the first seven months. The point at $t = 1$ is for 1 February 2017, and so on.

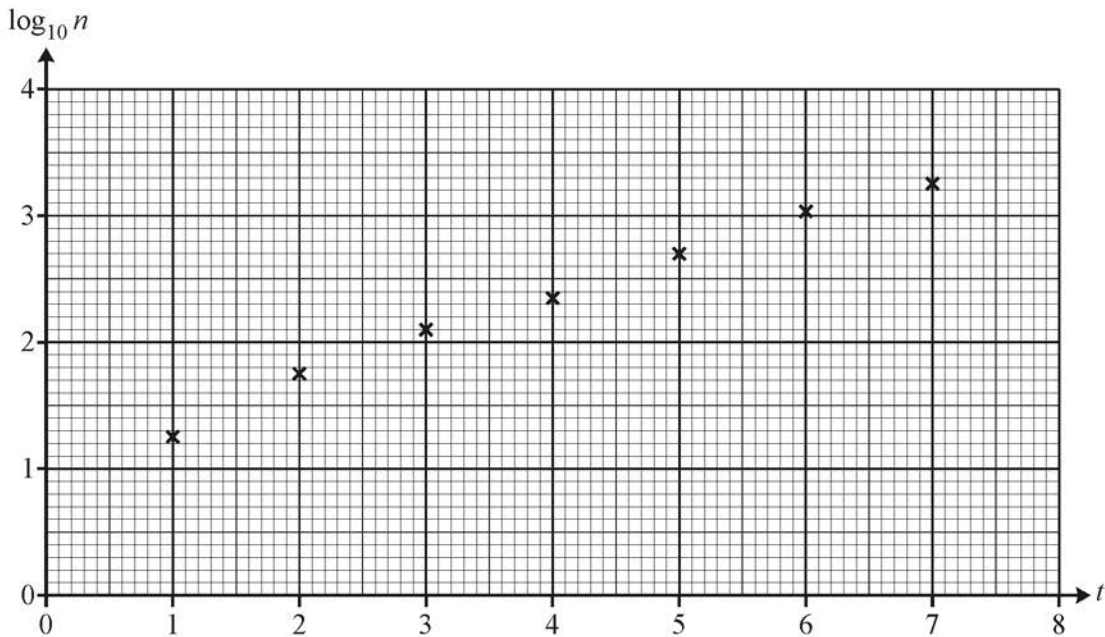


Fig. 5

- Find estimates of the values of a and k . [4]
- (iii) The owners of the website wanted to know the date on which they would report that the website had half a million users. Use the model to estimate this date. [4]
- (iv) Give a reason why the model may not be appropriate for large values of t . [1]