



Figure 1

Red squirrels were introduced into a large wood in Northumberland on 1st June 1996.

Scientists counted the number of red squirrels in the wood, P , on 1st June each year for t years after 1996.

The scientists found that over time the number of red squirrels can be modelled by the formula

$$P = ab^t$$

where a and b are constants.

The line l , shown in Figure 1, illustrates the linear relationship between $\log_{10} P$ and t over a period of 20 years.

Using the information given on the graph and using the model,

- (a) find an equation for l , (2)
- (b) find the initial number of red squirrels that were introduced into the wood, (2)
- (c) find a complete equation for the model giving the value of b to 4 significant figures. (2)

On 1st June 2019 there were found to be 198 red squirrels in the wood.

- (d) (i) Use this information to show that the model is not valid on 1st June 2019. (3)
- (ii) Suggest a reason for the model not being valid at this time.