

9. The yearly amount of coal mined in the UK,  $L$  million tonnes, is modelled by the equation

$$L = ab^t$$

where  $a$  and  $b$  are constants and  $t$  is the number of years after 1700

Using data for the years from 1700 to 1900, a graph is plotted of  $\log_{10} L$  against  $t$ .

The points lie approximately on a straight line with

- gradient 0.0108
- intercept 0.304 on the  $\log_{10} L$  axis

- (a) Find a complete equation for  $L$  in terms of  $t$ .

Give the value of  $a$  and the value of  $b$ , each to 3 decimal places.

(3)

- (b) In the context of the model, interpret the value of the constant  $a$ .

(1)

- (c) Use the model to estimate the amount of coal mined in the UK in the year 2000

(2)

- (d) Comment on the reliability of the answer to part (c).

(1)