

11.

(c) When $t = 24$

Model predicts

$$V = 1000(0.953)^{24} \\ = \pounds 314.94 \text{ to nearest penny}$$

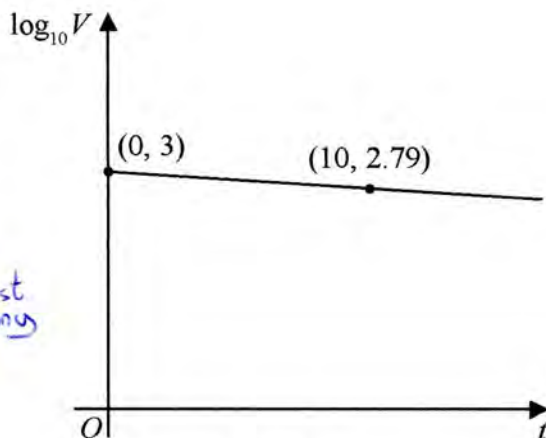


Figure 2

The value, V pounds, of a mobile phone, t months after it was bought, is modelled by

$$V = ab^t$$

where a and b are constants.

Figure 2 shows the linear relationship between $\log_{10} V$ and t .

The line passes through the points $(0, 3)$ and $(10, 2.79)$ as shown.

Using these points,

(a) find the initial value of the phone,

(b) find a complete equation for V in terms of t , giving the exact value of a and giving the value of b to 3 significant figures.

Exactly 2 years after it was bought, the value of the phone was $\pounds 320$

(c) Use this information to evaluate the reliability of the model.

$$\text{(c) cont.} \\ \frac{\text{prediction} - \text{actual}}{\text{actual}}$$

$$= \frac{314.94 - 320}{320}$$

$$= -1.6\%$$

which is a small difference,
So model seems quite reliable.

(2)

(3)

(2)

$$\text{(a) When } t = 0, \log_{10} V = 3 \Rightarrow V = 10^3 = \pounds 1,000$$

$$\text{(b) When } t = 0, 1000 = ab^0 \Rightarrow a = 1,000$$

$$\text{When } t = 10, \log_{10} V = 2.79 \Rightarrow V = 10^{2.79}$$

$$10^{2.79} = 1,000 b^{10} \Rightarrow b^{10} = \frac{10^{2.79}}{10^3} = 10^{-0.21}$$

$$b = (10^{-0.21})^{0.1} = 10^{-0.021} = 0.9527... = 0.953 \text{ (3sf)}$$

$$\text{so, } V = 1000(0.953)^t$$