12.

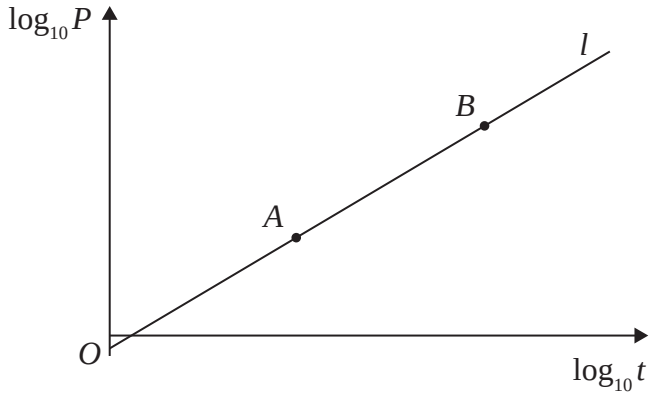

Figure 6

The total profit of a new business is monitored each month for several years.

At time t months after monitoring began, the total profit, £P, where P is measured in thousands, is modelled by the equation

$$P = at^b$$

where a and b are constants.

The line l, shown in Figure 6, illustrates the linear relationship between $\log_{10} t$ and $\log_{10} P$ for 3 years after monitoring began.

Given that the points $A(0.6, 0.8)$ and $B(1.2, 1.7)$ lie on l

(a) find an equation for l in the form

$$\log_{10} P = m \log_{10} t + c$$

where m and c are constants.

(3)

(b) Hence show that the model for the total profit can be written as

$$P = at^{\frac{3}{2}}$$

giving the value of a to 3 significant figures.

(3)

(c) Interpret, with reference to the model, the value of a

(1)

Given that the profit made in the 48th month was £8300

(d) evaluate the reliability of the model.

(3)

(e) Give one reason why this model may not be realistic for the total profit of the business.

(1)