5. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

(a) Show that

$$\frac{\cot^2 x}{1 + \cot^2 x} \equiv \cos^2 x$$

(3)

(b) Hence solve, for $0 \leqslant x < 360°$

$$\frac{\cot^2 x}{1 + \cot^2 x} = 8\cos 2x + 2\cos x$$

Give each solution in degrees to one decimal place.

(5)

(Total for Question 5 is 8 marks)

6

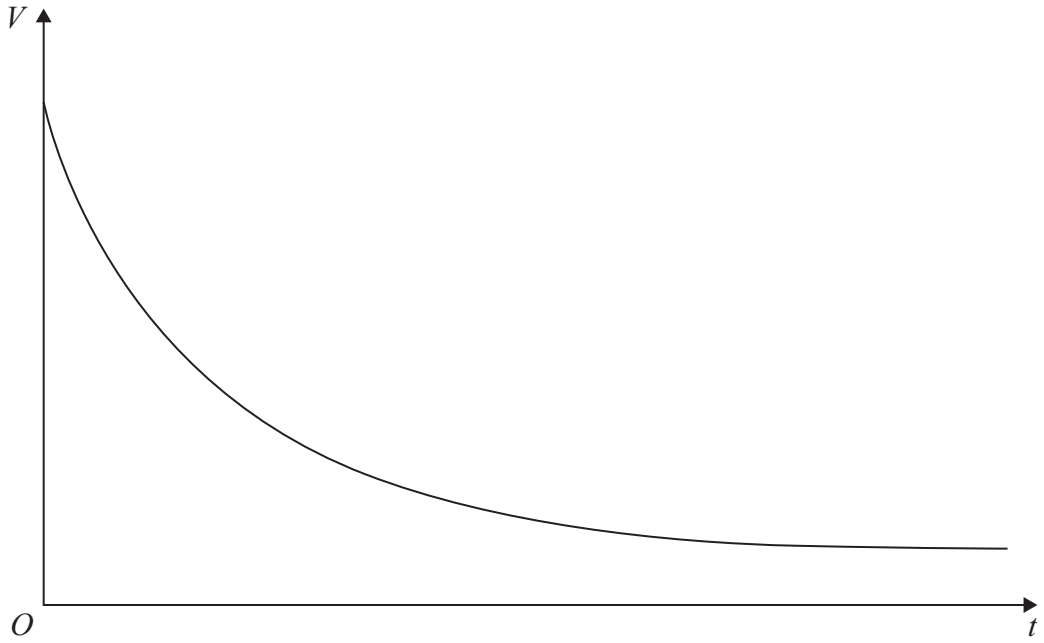

Figure 1

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

The value of a particular car is modelled by the formula

$$V = 18\,000e^{-0.2t} + 4000e^{-0.1t} + 1000 \qquad t \geqslant 0$$

where the value of the car is V pounds when the age of the car is t years.

A sketch of t against V is shown in Figure 1.

(a) State the range of V.

(2)

According to this model,

(b) find the rate at which the value of the car is decreasing when $t = 10$
Give your answer in pounds per year.

(3)

(c) Calculate the exact value of t when $V = 15\,000$ giving the answer in its simplest form.

(4)

(Total for Question 6 is 9 marks)