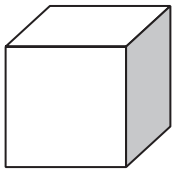
2:



x cm

Figure 1

Figure 1 shows a cube which is increasing in size.

At time t seconds,

- the length of each edge of the cube is x cm
- the volume of the cube is V cm^3

Given that the volume of the cube is increasing at a constant rate of $5\,\text{cm}^3\text{s}^{-1}$

(a) find $\dfrac{\mathrm{d}x}{\mathrm{d}t}$ giving your answer in terms of x.

(3)

(b) Hence find the value of $\dfrac{\mathrm{d}x}{\mathrm{d}t}$ when $V = 64$

(2)

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Question 2 continued

(Total for Question 2 is 5 marks)

3: Given that $y = 0$ at $x = 5$ solve the differential equation

$$8y\frac{dy}{dx} = xe^{-y^2} \qquad y \geqslant 0 \quad x \geqslant 5$$

giving your answer in the form $y^2 = f(x)$

(5)

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