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

Find, by algebraic integration,

$$\int_1^3 2x \ln(3x)\,\mathrm{d}x$$

giving the answer in the form $A\ln 3 + B$ where A and B are integers.

(5)

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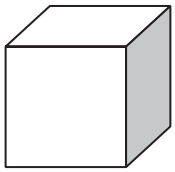
Question 1 continued

(Total for Question 1 is 5 marks)

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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