4.

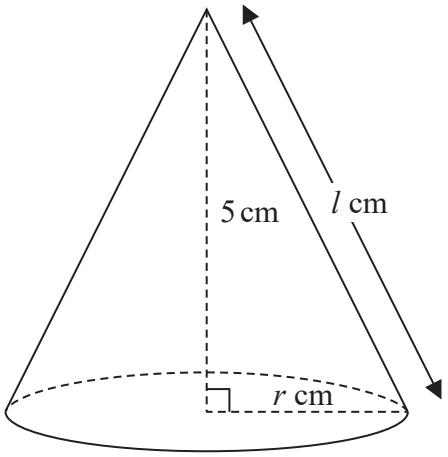


Figure 2

A cone, shown in Figure 2, has

- fixed height 5 cm
- base radius r cm
- slant height l cm

(a) Find an expression for l in terms of r

(1)

Given that the base radius is increasing at a constant rate of 3 cm per minute,

(b) find the rate at which the total surface area of the cone is changing when the radius of the cone is 1.5 cm. Give your answer in cm^2 per minute to one decimal place.

[*The total surface area, S, of a cone is given by the formula* $S = \pi r^2 + \pi rl$]

(4)

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Question 4 continued

(Total for Question 4 is 5 marks)

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5. (a) Find $\int x^2 \cos 2x \, \mathrm{d}x$

(4)

(b) Hence solve the differential equation

$$\frac{\mathrm{d}y}{\mathrm{d}t} = \left(\frac{t \cos t}{y} \right)^2$$

giving your answer in the form $y^n = \mathrm{f}(t)$ where n is an integer.

(5)

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