

9 A cube has edges of length x cm.

The total surface area, A cm², of the cube is increasing at a constant rate of 0.45 cm²/s

Find the rate of increase, in cm³/s, of the volume of the cube at the instant when the total surface area of the cube is 384 cm²

(7)

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10 Using formulae given on page 2

(a) show that

(i) $\sin 2\theta = 2\sin \theta \cos \theta$

(ii) $\cos 2\theta = 2\cos^2 \theta - 1$

(5)

Given that $\theta \neq (90^\circ + 180^\circ n)$ where $n \in \mathbb{Z}$ (b) use the results from part (a) to show that $\sin 2\theta - \tan \theta$ can be written as $\tan \theta \cos 2\theta$

(4)

(c) Solve for $0 < x < 360$

$$\sin 2x^\circ - \tan x^\circ = 0$$

(4)

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Question 10 continued

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Question 10 continued

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Question 10 continued

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(Total for Question 10 is 13 marks)



11

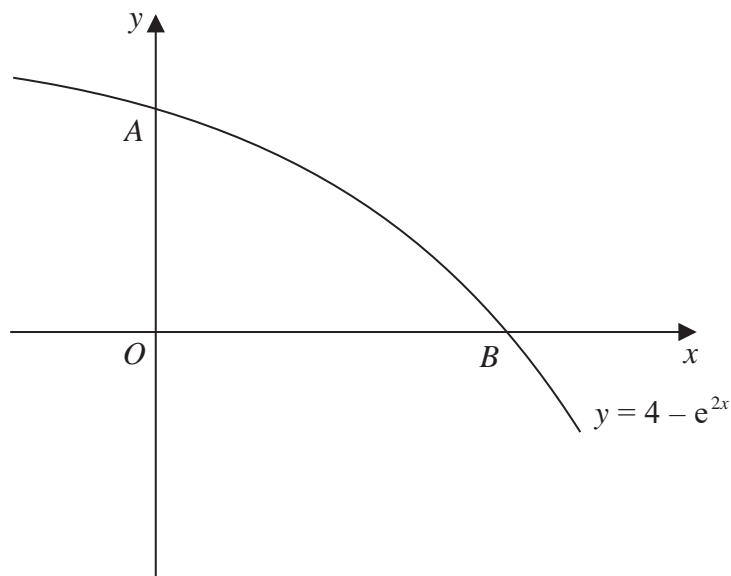
Diagram **NOT**
accurately drawn**Figure 3**

Figure 3 shows part of the curve C with equation $y = 4 - e^{2x}$.
The curve C crosses the y -axis at the point A and the x -axis at the point B .

(a) (i) Write down the y coordinate of point A .

(ii) Show that the x coordinate of B is $x = \ln 2$

(3)

The line l is the normal to C at the point B .

(b) Find an equation for l , giving your answer in the form $y = mx + c$

(4)

The finite region R is bounded by C , l and the y -axis.

(c) Using calculus, find the area of R .

Give your answer to one decimal place.

(7)

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Question 11 continued

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Question 11 continued

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Question 11 continued

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(Total for Question 11 is 14 marks)**TOTAL FOR PAPER IS 100 MARKS**