

5.

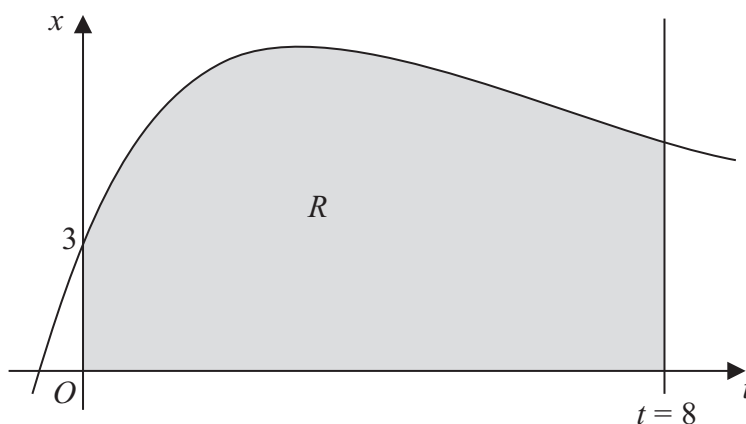


Figure 1

Figure 1 shows part of the curve with equation $x = 4te^{-\frac{1}{3}t} + 3$. The finite region R shown shaded in Figure 1 is bounded by the curve, the x -axis, the t -axis and the line $t = 8$.

- (a) Complete the table with the value of x corresponding to $t = 6$, giving your answer to 3 decimal places.

t	0	2	4	6	8
x	3	7.107	7.218		5.223

(1)

- (b) Use the trapezium rule with all the values of x in the completed table to obtain an estimate for the area of the region R , giving your answer to 2 decimal places.

(3)

- (c) Use calculus to find the exact value for the area of R .

(6)

- (d) Find the difference between the values obtained in part (b) and part (c), giving your answer to 2 decimal places.

(1)



7.

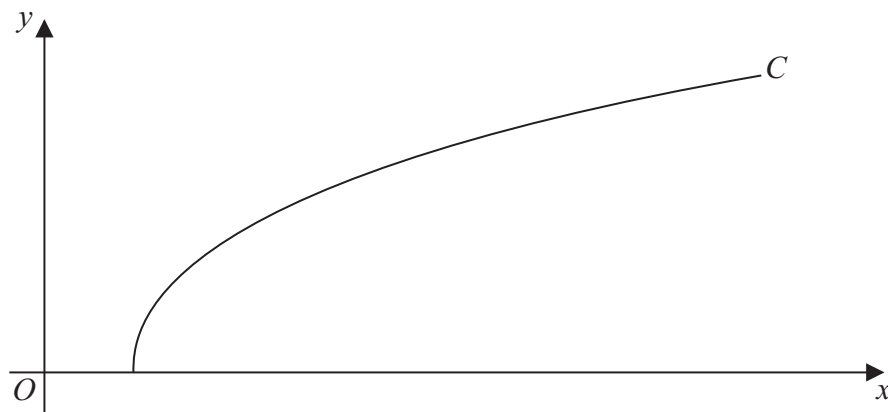


Figure 2

Figure 2 shows a sketch of the curve C with parametric equations

$$x = 27 \sec^3 t, \quad y = 3 \tan t, \quad 0 \leq t \leq \frac{\pi}{3}$$

(a) Find the gradient of the curve C at the point where $t = \frac{\pi}{6}$ (4)

(b) Show that the cartesian equation of C may be written in the form

$$y = (x^{\frac{2}{3}} - 9)^{\frac{1}{2}}, \quad a \leq x \leq b$$

stating the values of a and b . (3)

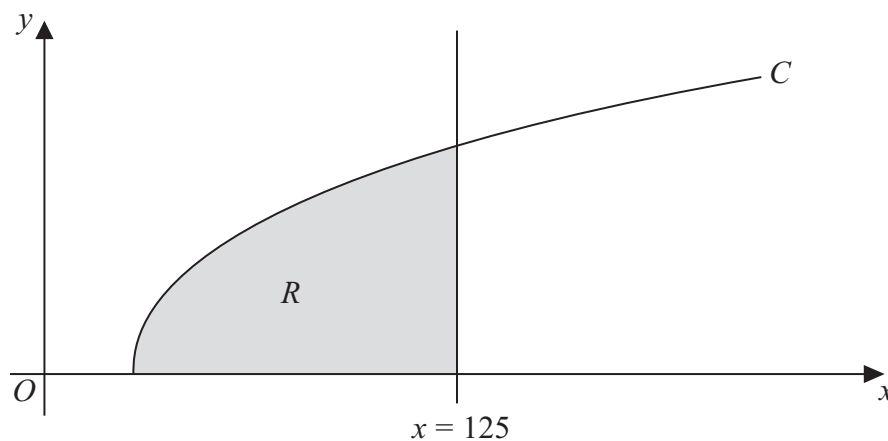


Figure 3

The finite region R which is bounded by the curve C , the x -axis and the line $x = 125$ is shown shaded in Figure 3. This region is rotated through 2π radians about the x -axis to form a solid of revolution.

(c) Use calculus to find the exact value of the volume of the solid of revolution. (5)



