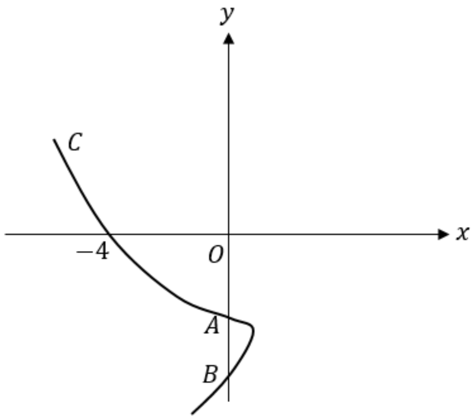
Points of Intersection

We can find where a parametric curve crosses a particular axis or where curves cross each other.
The key is to first find the value of the parameter t.

[Textbook] The diagram shows a curve C with parametric equations $x = at^2 + t, \quad y = a(t^3 + 8)$, $t \in \mathbb{R}$, where a is a non-zero constant. Given that C passes through the point $(-4,0)$,
a) find the value of a.
b) find the coordinates of the points A and B where the curve crosses the y-axis.



[Textbook] A curve is given parametrically by the equations $x = t^2,\ y = 4t$. The line $x + y + 4 = 0$ meets the curve at A. Find the coordinates of A.

Whenever you want to solve a Cartesian equation and pair of parametric equations simultaneously, substitute the parametric equations into the Cartesian one.

[Textbook] The diagram shows a curve C with parametric equations

$$x = \cos t + \sin t, \qquad y = \left(t - \frac{\pi}{6}\right)^2, \qquad -\frac{\pi}{2} < t < \frac{4\pi}{3}$$

a) Find the point where the curve intersects the line $y = \pi^2$.

b) Find the coordinates of the points A and B where the curve cuts the y-axis.

Test Your Understanding

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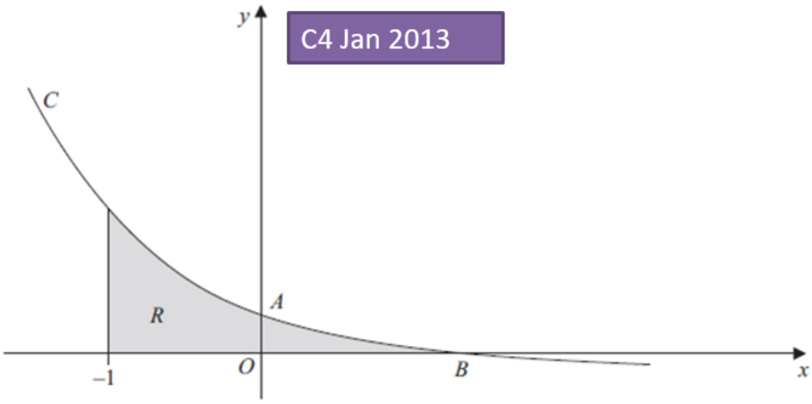

Figure 2

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

$$x = 1 - \frac{1}{2}t, \qquad y = 2^t - 1.$$

The curve crosses the y-axis at the point A and crosses the x-axis at the point B.

(*a*) Show that A has coordinates (0, 3).

(2)

(*b*) Find the x-coordinate of the point B.

(2)

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