

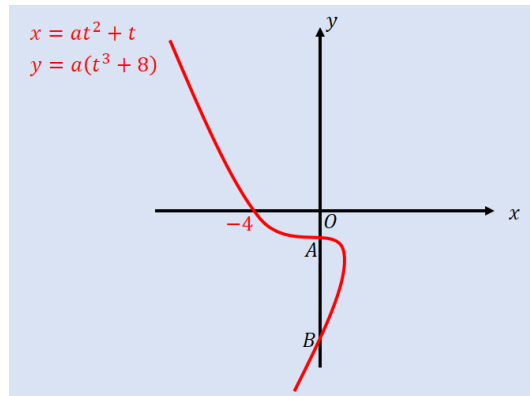
## 8D Intersections

1. The diagram shows a curve  $C$  with parametric equations:

$$x = at^2 + t, \quad y = a(t^3 + 8), \quad t \in \mathbb{R}$$

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

2. A curve is given parametrically by the equations:

$$x = t^2, \quad y = 4t$$

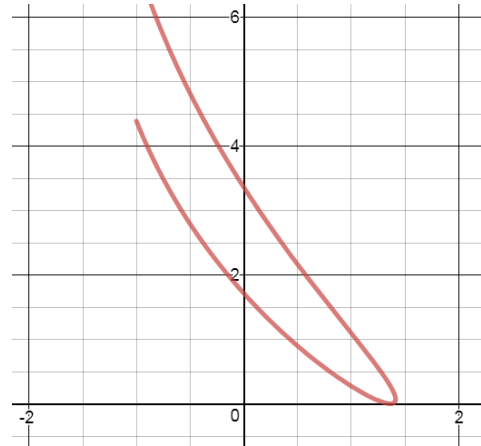
The line  $x + y + 4 = 0$  meets the curve at A. Find the coordinates of A.

3. The curve in the diagram is given parametrically by the equations:

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

$$-\frac{\pi}{2} < t < \frac{4\pi}{3}$$

- 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 meets the y-axis