

**12** A curve has parametric equations  $x = \frac{1}{t}$ ,  $y = 2t$ . The point  $P$  is  $\left(\frac{1}{p}, 2p\right)$ .

**(a)** Show that the equation of the tangent at  $P$  can be written as  $y = -2p^2x + 4p$ . **[4]**

The tangent to this curve at  $P$  crosses the  $x$ -axis at the point  $A$  and the normal to this curve at  $P$  crosses the  $x$ -axis at the point  $B$ .

**(b)** Show that the ratio  $PA:PB$  is  $1:2p^2$ . **[8]**