

11.2) Using differentiation

Worked example

A particle P is moving on the x -axis.

At time t seconds, the displacement x metres from O is given by

$$x = 3t^4 - 96t + 7$$

Find:

- (a) the velocity of P when $t = 5$
- (b) The value of t when P is instantaneously at rest
- (c) The acceleration of P when $t = 0.5$

Your turn

A particle P is moving on the x -axis.

At time t seconds, the displacement x metres from O is given by

$$x = t^4 - 32t + 14$$

Find:

- (a) the velocity of P when $t = 3$
- (b) The value of t when P is instantaneously at rest
- (c) The acceleration of P when $t = 1.5$

a) 76 ms^{-1}

b) $t = 2$

c) 27 ms^{-2}

Worked example

A particle P is moving on the x -axis.

At time t seconds, the displacement x metres from O is given by

$$x = \frac{1}{3}t^3 - \frac{7}{2}t^2 + 12t + 15$$

Find the distance between the two points at which the particle is at rest.

Your turn

A particle P is moving on the x -axis.

At time t seconds, the displacement x metres from O is given by

$$x = \frac{1}{3}t^3 - \frac{11}{2}t^2 + 30t + 5$$

Find the distance between the two points at which the particle is at rest.

0.17 m (2s f)