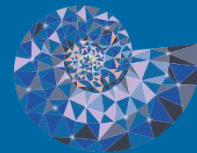


Variable acceleration



Gold

An object is released from rest at the surface of oil and at time t seconds. Its depth, s metres is given by:

$$s = 3t^2 - 4t^3, 0 \leq t \leq 0.75$$

- a** Show that the object returns to the surface of the oil after $t = \frac{3}{4}$ s.
- b** Using a graph, explain the restriction $0 \leq t \leq 0.75$.
- c** Find the greatest depth reached by the object.

Silver

A particle P , having mass 2 kg, moves in a straight horizontal line from a fixed point O . The velocity of the particle v m s⁻¹ at time t seconds is given by:

$$v = 2t^2 - 2t - 12$$

- a** Find the time when particle P is instantaneous at rest.
- b** Find the acceleration of the particle at $t = 1$ s.
- c** Given that the particle passes through O when $t = 2$ s, find an expression for the displacement of the particle from O at time t s.

Bronze

A particle moves in a straight line and at time, t , seconds. It has velocity v m s⁻¹, where:

$$v = 12t^2 - 4t + 3$$

- a**
 - i** Find an expression for the acceleration of the particle at time, t .
 - ii** Find the acceleration of the particle when $t = 1$ second.
- b** When $t = 0$ s, the particle is at the origin. Find an expression for the displacement of the particle from the origin at time, t .

Variable acceleration

