

- 3** An elastic string has natural length 3 m and modulus of elasticity 24 N. One end of the string is attached to a fixed point O , and a particle of mass 0.4 kg is attached to the other end; the particle is always vertically below O .

Find the extension of the string when the particle is hanging in equilibrium. [2]

When the particle is moving with the string stretched, its displacement is x metres below the equilibrium position at time t seconds.

Show that the particle moves with simple harmonic motion. [2]

The particle is pulled to a point A which is below the equilibrium position and released from rest. When the particle reaches the point B the string starts to get slack and the speed of the particle is $\sqrt{40} \text{ ms}^{-1}$.

(i) Find the amplitude of the motion. [3]

(ii) Find the time for the particle to travel from A to B . [3]