3 A hollow tube, sealed at one end, has a cross-sectional area A of 24 cm^2.

The tube contains sand so that the total mass M of the tube and sand is 0.23 kg.

The tube floats upright in a liquid of density ρ, as illustrated in Fig. 3.1.

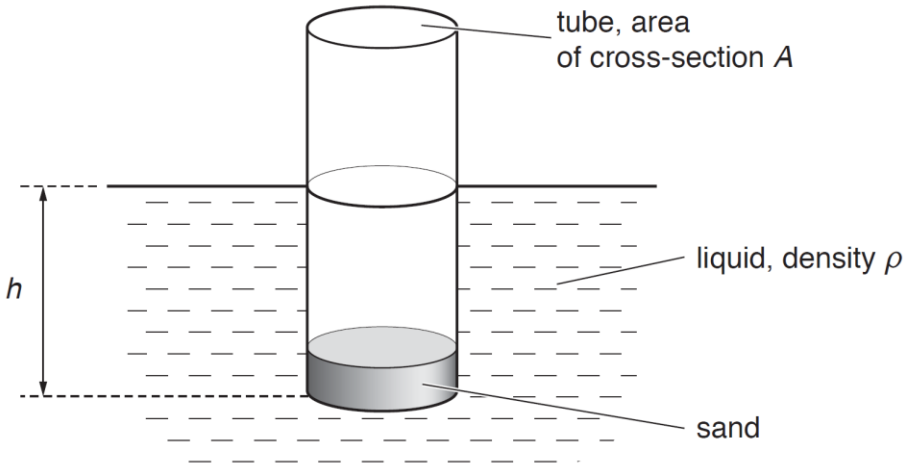
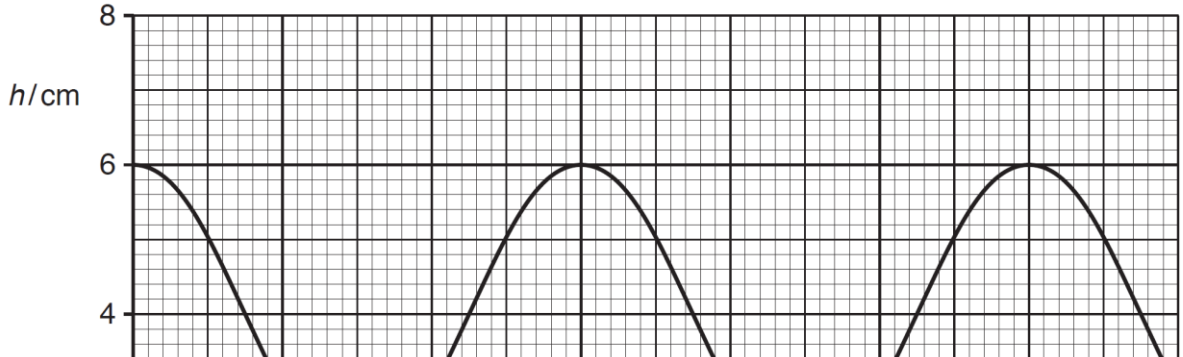


Fig. 3.1

The depth of the bottom of the tube below the liquid surface is h.

The tube is displaced vertically and then released. The variation with time t of the depth h is shown in Fig. 3.2.



(a) Determine the acceleration of the tube when h is a maximum.

acceleration = …… m s^{-2} [3]

(b) Describe the restoring force that gives rise to the oscillations of the tube.

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……..... [2]

(c) The oscillations illustrated in Fig. 3.2 are undamped. In practice, the liquid does cause light damping.

On Fig. 3.2, draw a line to show light damping of the oscillations for time $t = 0$ to time $t = 1.4$ s. [3]

[Total: 8]