Section A

Answer **all** the questions in this Section in the spaces provided.

1 A small sphere of volume V and density ρ_S is submerged in a liquid of density ρ_L, as shown in Fig. 1.1.

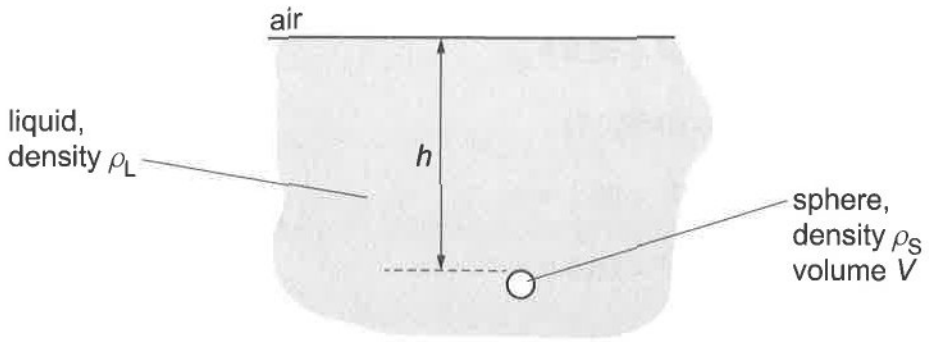

Fig. 1.1

The liquid density ρ_L is greater than the density ρ_S of the sphere.
The top of the sphere is a distance h below the surface of the liquid.

(a) (i) Explain why the liquid exerts an upthrust on the sphere.

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.....

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.....

..... [3]

(ii) Determine, in terms of ρ_L, V and the acceleration of free fall g, the upthrust produced by the liquid on the sphere. Explain your working.

upthrust = ... [2]

(b) Complete Fig. 1.2 to show the variation with depth *h* of:

- the weight of the sphere (label this line W)
- the upthrust on the sphere (label this line U).

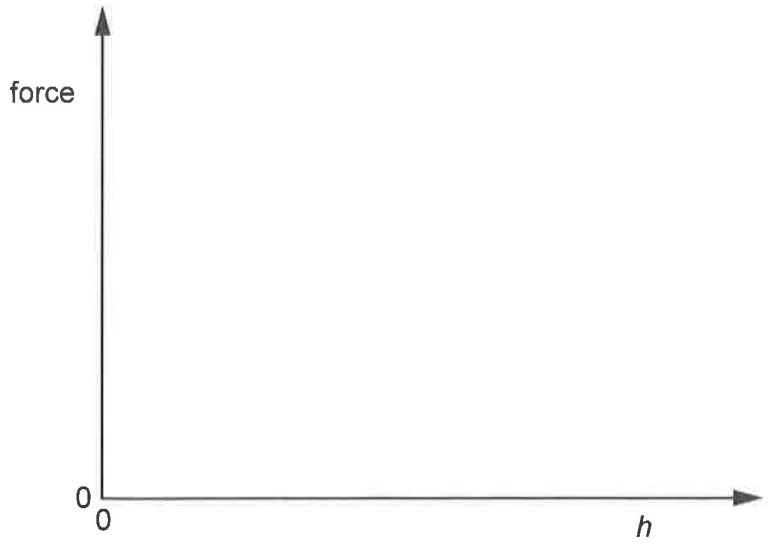

Fig. 1.2

[2]

(c) Complete Fig. 1.3 to show the variation with depth *h* of the downward force on the sphere due to both atmospheric pressure and water pressure.

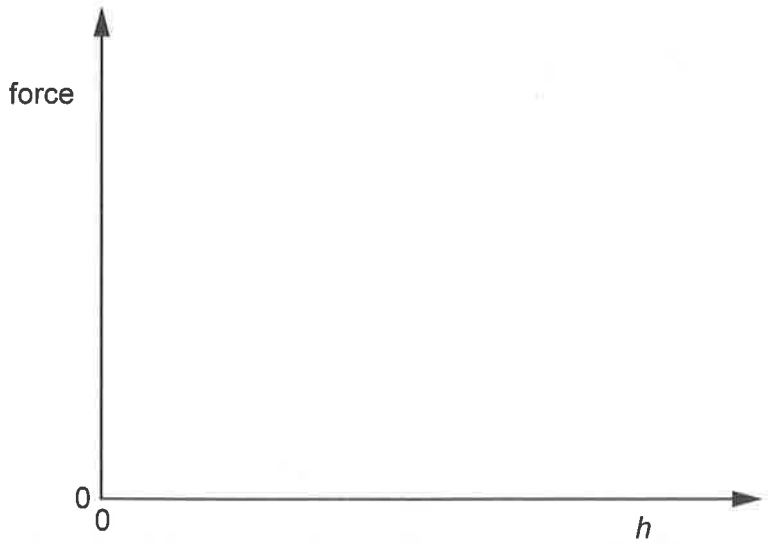

Fig. 1.3

[2]

[Total: 9]