

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

- 1 (a) Complete Fig. 1.1 by putting a tick (\checkmark) in the appropriate column to indicate whether the listed quantities are scalars or vectors.

quantity	scalar	vector
acceleration		
force		
kinetic energy		
momentum		
power		
work		

Fig. 1.1

[2]

- (b) A floating sphere is attached by a cable to the bottom of a river, as shown in Fig. 1.2.

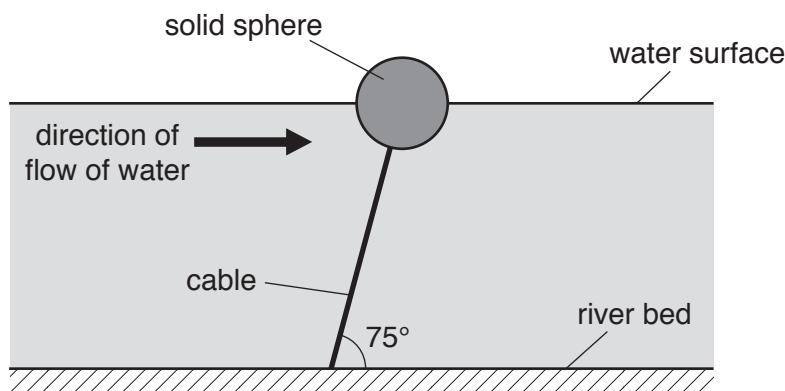


Fig. 1.2

The sphere is in equilibrium, with the cable at an angle of 75° to the horizontal. Assume that the force on the sphere due to the water flow is in the horizontal direction.

The radius of the sphere is 23 cm. The sphere is solid and is made from a material of density 82 kg m^{-3} .

- (i) Show that the weight of the sphere is 41 N.

[2]

- (ii) The tension in the cable is 290 N.

Determine the upthrust acting on the sphere.

$$\text{upthrust} = \dots \text{N} [2]$$

- (iii) Explain the origin of the upthrust acting on the sphere.

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[1]

[Total: 7]