

- 2 (a)** Explain the origin of upthrust acting on a body in a fluid.

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- (b)** In order to lift a submerged load of 600 kg from a seabed, a lifting bag made of an elastic material of negligible mass is filled with air and attached to the load, as shown in Fig. 2.1. The density of seawater is 1050 kg m^{-3} and the lifting bag contains 0.700 m^3 of air of density 1.27 kg m^{-3} such that the load ascends with a constant speed.

The volume of the load is negligible compared to the volume of the lifting bag.

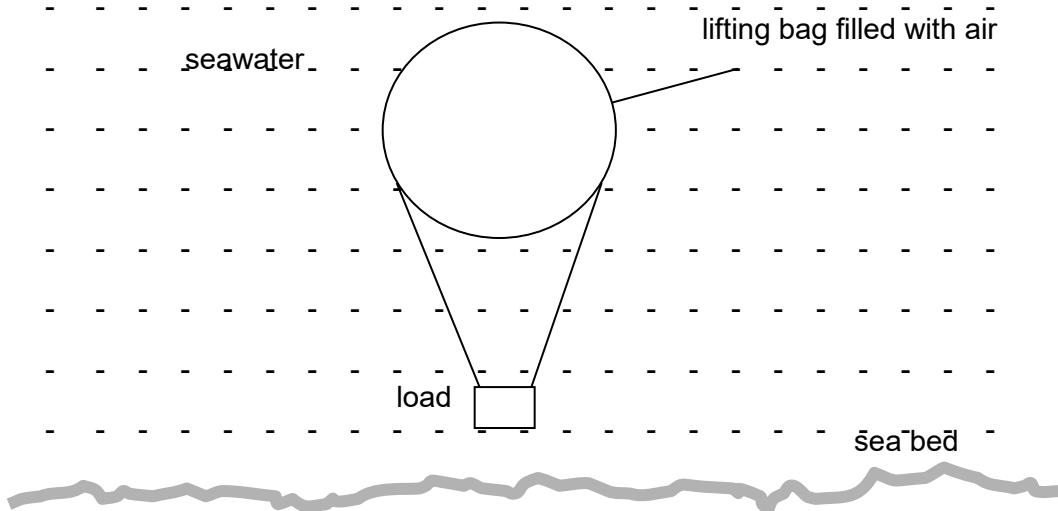


Fig. 2.1 (not to scale)

- (i) Calculate the upthrust on the lifting bag when its volume is 0.700 m^3 .

upthrust = N [2]

(ii) Calculate the total drag force on the bag and load.

total drag force = N [2]

(iii) Explain why in practice, to maintain a constant speed of ascent, air has to be released continuously from the lifting bag. Temperature change during the ascent is negligible.

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