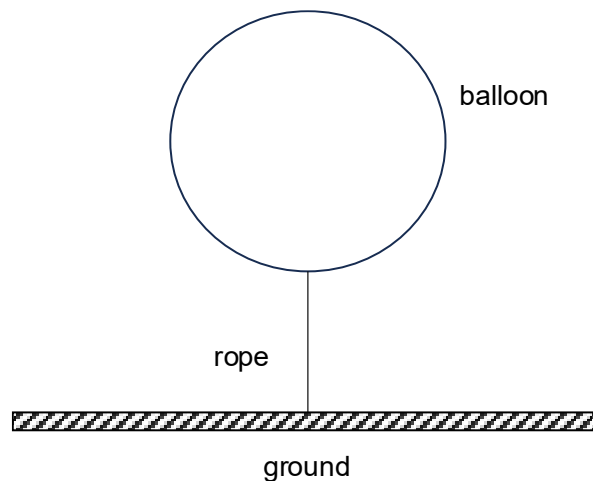


- 3 (a) Explain what is meant by *upthrust*.

.....  
.....  
..... [1]

- (b) Weather balloons are an important tool for meteorologists. They provide data that is used to improve weather forecasts and to understand the atmosphere.

Fig. 3.1 shows a helium inflated weather balloon tethered to the ground by a rope. The balloon is spherical in shape and has a diameter of 1.5 m.



**Fig. 3.1**

- (i) On Fig. 3.1, draw and label the forces acting on the balloon. [2]
- (ii) The density of the air surrounding the balloon is  $1.3 \text{ kg m}^{-3}$ . The mass of the helium filled balloon is 300 g.

Determine the tension of the rope.

tension = ..... N [2]

- (c) The rope is cut and the balloon rise to an equilibrium altitude of up to 30 km.

Explain how the balloon rises and reaches this height.

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.....

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.....

.....

.....[3]

[Total: 8]

