1 **(a)** Explain what is meant by *upthrust*.

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..... [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. 1.1 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.

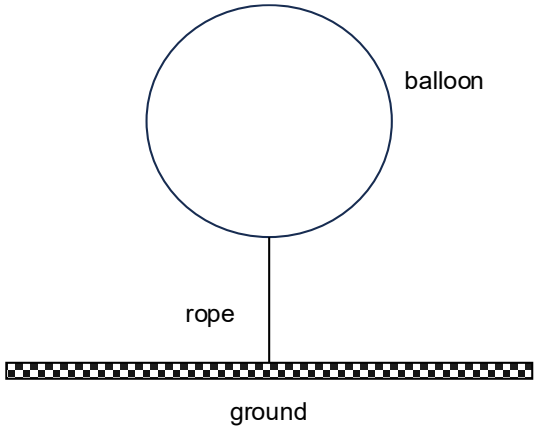

Fig. 1.1

(i) On Fig. 1.1, draw and label the forces acting on the balloon. [2]

(ii) The density of the air surrounding the balloon is 1.3 kg m^{-3}. The total mass of the helium filled balloon is 300 g.

Determine the tension of the rope.

tension = …… N [3]

(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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..... [3]

[Total: 9]