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

……

……

…… [1]

(b) Before a small balloon is inflated, its mass is 1.30 g as recorded on an electronic mass balance. The balloon is inflated with air so that it is spherical in shape with a diameter of 22.0 cm. The density of air is 1.21 kg m^{-3}.

(i) Calculate the mass of air displaced by the balloon.

mass of air = ... g [2]

(ii) The inflated balloon gives reading of 1.55 g when placed on the balance.

Calculate the mass of air in the balloon.

mass of air = ... g [2]

(iii) Explain the difference between the values in **(b)(i)** and **(b)(ii).**

……

…… [1]

(c) A nut of mass 2.10 g is now tied to the balloon with a light cotton thread. The balloon is dropped from a height of 4.00 m.

Explain why the acceleration will approach zero as the balloon descends.

……

……

…… [2]