1 **(a)** Fig 1.1 shows a fluid of density ρ in a rectangular container. The height of the liquid is h.
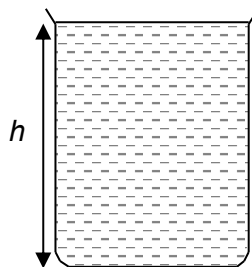

Fig 1.1

Show that the pressure P at the bottom of the container due to the fluid is given by

$$P = \rho gh$$

[2]

(b) **(i)** An object of mass m and density d is surrounded by air of density ρ.

Show that the resultant force F acting downward on the object is given by

$$F = mg\left(1 - \frac{\rho}{d}\right)$$

[2]

(ii) A chemist uses an accurate balance to weigh a sample as shown in Fig. 1.2.
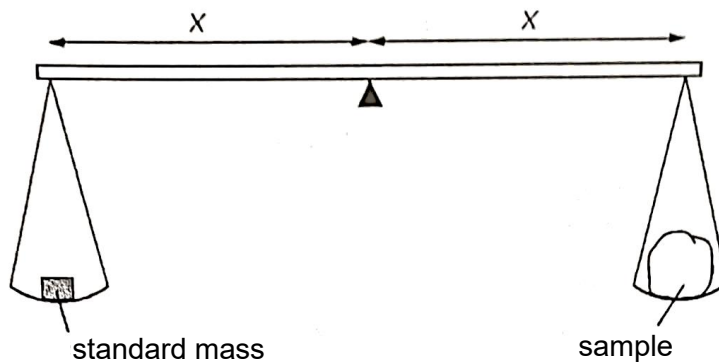

Fig. 1.2

The mass of the standard mass is 0.17851 kg. The density of the sample is 940.0 kg m⁻³, the density of the standard mass is 8493 kg m⁻³, and the density of air is 1.29 kg m⁻³.

Using your answer in **(b)(i)**, calculate the mass of the sample.

Leave your answer to 5 decimal places.

mass = ……………………….. kg   [3]

[Total: 7 marks]