5 A cylinder of cross-sectional area A contains liquid of density ρ to a height h, as shown in Fig. 5.1.

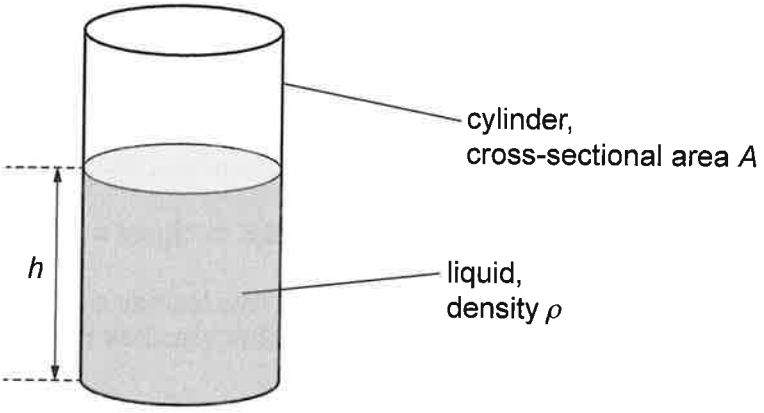

Fig. 5.1 (not to scale)

(a) By using the definitions of pressure and density, show that the pressure p exerted on the base of the cylinder due to the liquid is given by the expression:

$$p = \rho g h$$

where g is the gravitational field strength.

[3]

(b) The density of the liquid is $880\,\text{kg m}^{-3}$. The volume of the liquid in the cylinder is $370\,\text{cm}^3$. The radius of the cylinder is 3.0 cm.

(i) Calculate the height h of the liquid.

h = ... m [1]

(ii) Calculate the pressure due to the liquid on the base of the cylinder.

pressure = ... Pa [1]

(iii) An object of volume 130 cm^3 and weight 3.32 N is attached to a newton meter by a thin, light thread. The object is lowered into the liquid in the cylinder until it is fully submerged, as shown in Fig. 5.2.

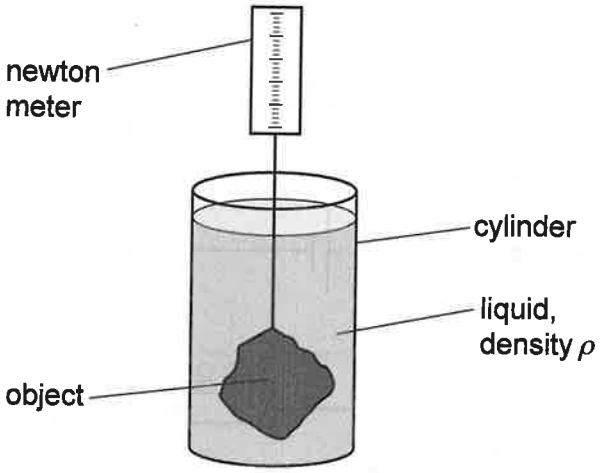

Fig. 5.2 (not to scale)

Determine the reading on the newton meter.

reading = ... N [3]

[Total: 8]