DENSITY OF GLASS

1 An IGCSE student is making measurements as accurately as possible in order to determine the density of glass.

Fig. 1.1 shows a glass test-tube drawn actual size.

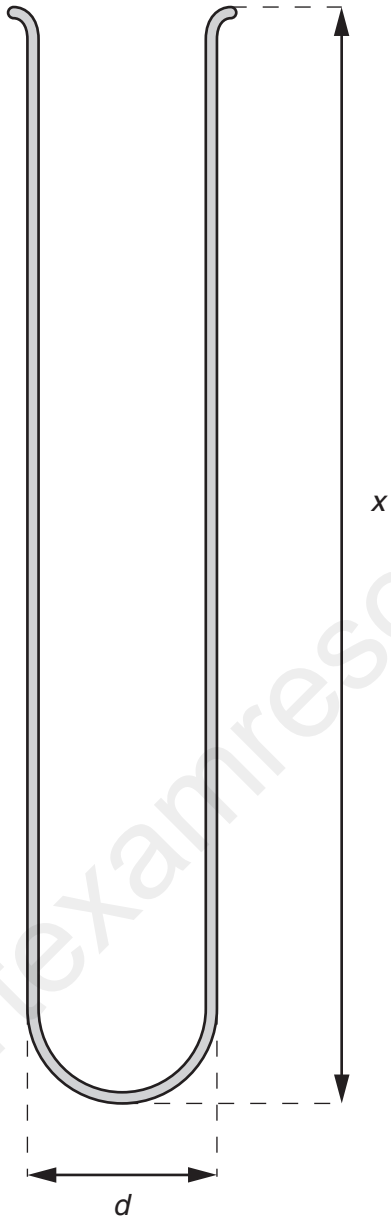

Fig. 1.1

(a) (i) Use your rule to measure, in cm, the external diameter *d* of the test-tube.

d = ... cm

(ii) Use your rule to measure, in cm, the length x of the test-tube.

x = ...

(iii) Draw a labelled diagram to show how you would use two rectangular blocks of wood and your rule to measure the length x of the test-tube as accurately as possible.

[4]

(b) The mass m of the test-tube is 31.2 g.

(i) Calculate the external volume V_e of the test-tube using the equation

$$V_e = \frac{\pi d^2 x}{4}.$$

V_e = ...

(ii) The student then fills the test-tube with water and pours the water into a measuring cylinder. Fig. 1.2 shows the measuring cylinder.

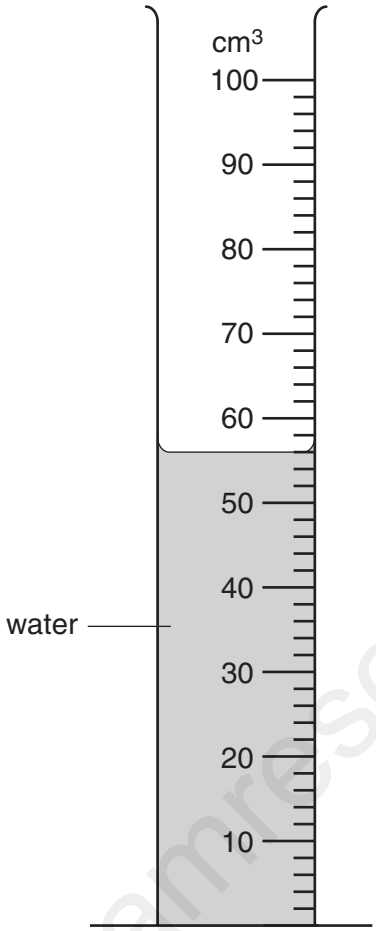

Fig. 1.2

Record the volume reading V_i from the measuring cylinder. This is the internal volume of the test-tube.

V_i = ...

(iii) Calculate the density ρ of the glass from which the test-tube is made using the equation

$$\rho = \frac{m}{(V_e - V_i)} .$$

ρ = ... [4]

[Total: 8]

(a) *d* 2.5 (cm) [1]
x 14.5 (cm) [1]
diagram showing blocks correctly placed across the ends [1]
rule position (or distance) shown correctly [1]

(b) **(i)** V_e 71.1 - 71.2 (cm^3) ecf allowed [1]

(ii) measuring cylinder reading 56 (cm^3) [1]

(iii) ρ 2.05–2.08 (or 2.1) ecf allowed [1]
g/cm^3 and 2 or 3 significant figures [1]

[Total: 8]