

Answer **all** the questions in the spaces provided.

**1 (a)** Make estimates of

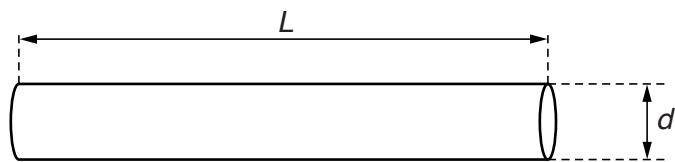
- (i) the mass, in kg, of a wooden metre rule,

$$\text{mass} = \dots \text{kg} [1]$$

- (ii) the volume, in  $\text{cm}^3$ , of a cricket ball or a tennis ball.

$$\text{volume} = \dots \text{cm}^3 [1]$$

**(b)** A metal wire of length  $L$  has a circular cross-section of diameter  $d$ , as shown in Fig. 1.1.



**Fig. 1.1**

The volume  $V$  of the wire is given by the expression

$$V = \frac{\pi d^2 L}{4}.$$

The diameter, length and mass  $M$  are measured to determine the density of the metal of the wire. The measured values are:

$$d = 0.38 \pm 0.01 \text{ mm},$$

$$L = 25.0 \pm 0.1 \text{ cm},$$

$$M = 0.225 \pm 0.001 \text{ g}.$$

Calculate the density of the metal, with its absolute uncertainty. Give your answer to an appropriate number of significant figures.

$$\text{density} = \dots \pm \dots \text{kg m}^{-3} [5]$$

[Total: 7]