

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

1 (a) Make estimates of

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

mass = kg [1]

(ii) the volume, in cm^3 , of a cricket ball or a tennis ball.

volume = cm^3 [1]

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

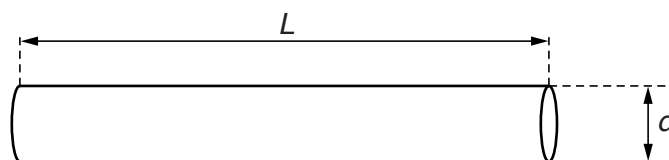


Fig. 1.1

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.

density = kg m^{-3} [5]

[Total: 7]

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

- 1 The speed v of a transverse wave on a uniform string is given by the expression

$$v = \sqrt{\frac{Tl}{m}}$$

where T is the tension in the string, l is its length and m is its mass.

An experiment is performed to determine the speed v of the wave. The measurements are shown in Fig. 1.1.

| quantity | measurement | uncertainty |
|----------|-------------|-------------|
| T | 1.8N | $\pm 5\%$ |
| l | 126cm | $\pm 1\%$ |
| m | 5.1g | $\pm 2\%$ |

Fig. 1.1

- (a) State an appropriate instrument to measure the length l .

..... [1]

- (b) (i) Use the data in Fig. 1.1 to calculate the speed v .

$v =$ ms^{-1} [2]

- (ii) Use your answer in (b)(i) and the data in Fig. 1.1 to determine the value of v , with its absolute uncertainty, to an appropriate number of significant figures.

$v =$ \pm ms^{-1} [3]

[Total: 6]