

Physical Quantities – 2021 IGCSE 0625

1. Nov/2021/QPaper_11/No.1

A student measures the volume of a quantity of water.

Which apparatus is suitable?

- A a balance ← mass
- B a measuring cylinder ← volume
- C a ruler ← length
- D a thermometer ← temperature

2. Nov/2021/QPaper_12/No.1

Which list places units of length in increasing order of magnitude (size)?

- A cm → mm → m
- B mm → cm → m
- C mm → m → cm
- D m → mm → cm

$$1\text{ m} = 100\text{ cm}$$

$$100\text{ cm} = 1000\text{ mm}$$

$$1\text{ m} = 100\text{ cm} = 1000\text{ mm}$$

$$m > \text{cm} > \text{mm}$$

3. Nov/2021/QPaper_13/No.1

A teacher asks a student to measure the volume of a pencil sharpener.

Which piece of apparatus would not be useful?

- A beaker ✓
 - B displacement can ✓
 - C balance ✗ ← measure mass and not volume.
 - D measuring cylinder ✓
- All the ticked can measure volume but various degree of accuracy.

4. Nov/2021/QPaper_21/No.1

Which instrument is most suitable for measuring the thickness of a single sheet of paper?

- A 15 cm rule \leftarrow \uparrow length.
- B balance \leftarrow measure mass
- C metre rule \leftarrow measure longer length than thickness of paper
- D micrometer screw gauge \leftarrow measures 0.01 cm of length.

5. Nov/2021/QPaper_22/No.1

A student is taking some measurements.

Which measurement is taken directly using a micrometer screw gauge?

- A 0.52 g/mm^2 \leftarrow two quantities
- B 0.52 g/mm^3 \leftarrow volume
- C 0.52 mm \leftarrow length
- D 0.52 mm^2 \leftarrow area

6. Nov/2021/QPaper_23/No.1

For which purpose is a micrometer screw gauge suitable?

- A measuring the current in a coil that is known to be about $3 \times 10^{-5} \text{ A}$ \leftarrow ammeter
- B measuring the diameter of a ball bearing that is known to be about $3 \times 10^{-3} \text{ m}$ \leftarrow measures length - diameter
- C measuring the mass of a grain of sand that is known to be about $3 \times 10^{-3} \text{ g}$ \leftarrow balance
- D measuring the moment used to turn a screw that is known to be about $3 \times 10^{-6} \text{ Nm}$

A student uses a ruler to measure the length of a piece of wire, as shown in Fig. 1.1.

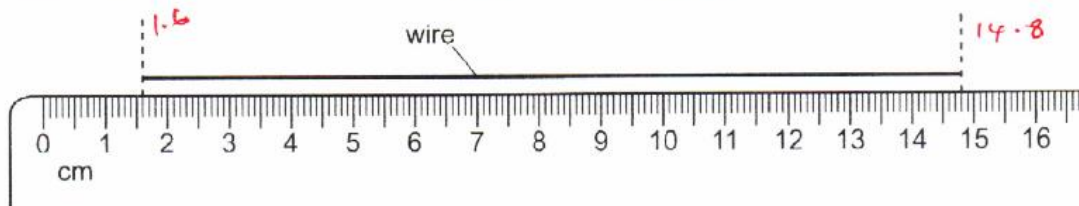


Fig. 1.1 (not to scale)

(a) Use the ruler in Fig. 1.1 to determine the length of the piece of wire.

$$\begin{array}{r} 14.8 \\ - 1.6 \\ \hline 13.2 \text{ cm} \end{array}$$

length of wire = 13.2 cm [2]

(b) The student folds the piece of wire and measures its mass.

(i) State the name of an instrument the student can use to measure mass.

..... balance (beam balance, electronic balance) [1]

(ii) The student determines the volume of the wire.

He uses a measuring cylinder part-filled with water and places the wire in it, as shown in Fig. 1.2.

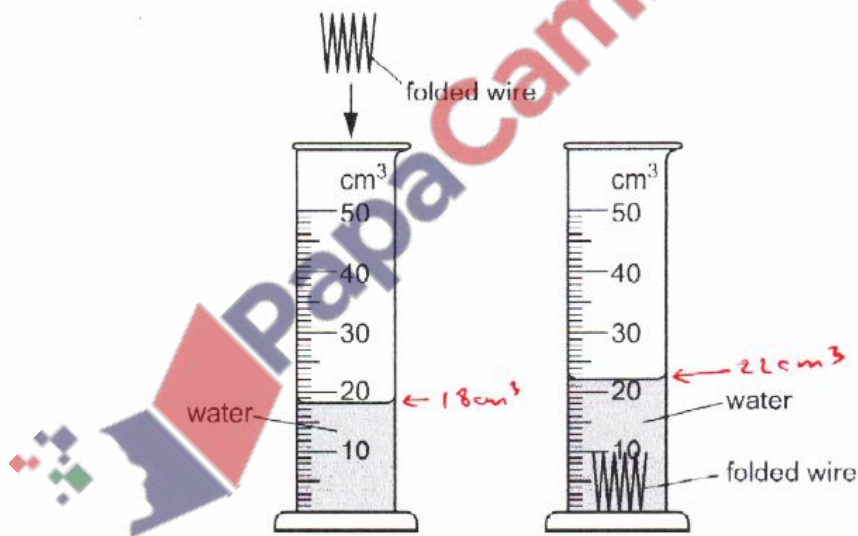


Fig. 1.2

Determine the volume of the wire by using information in Fig. 1.2.

$$\begin{array}{r} 22 \\ - 18 \\ \hline 4.0 \text{ cm}^3 \end{array}$$

volume of wire = 4.0 cm³ [2]

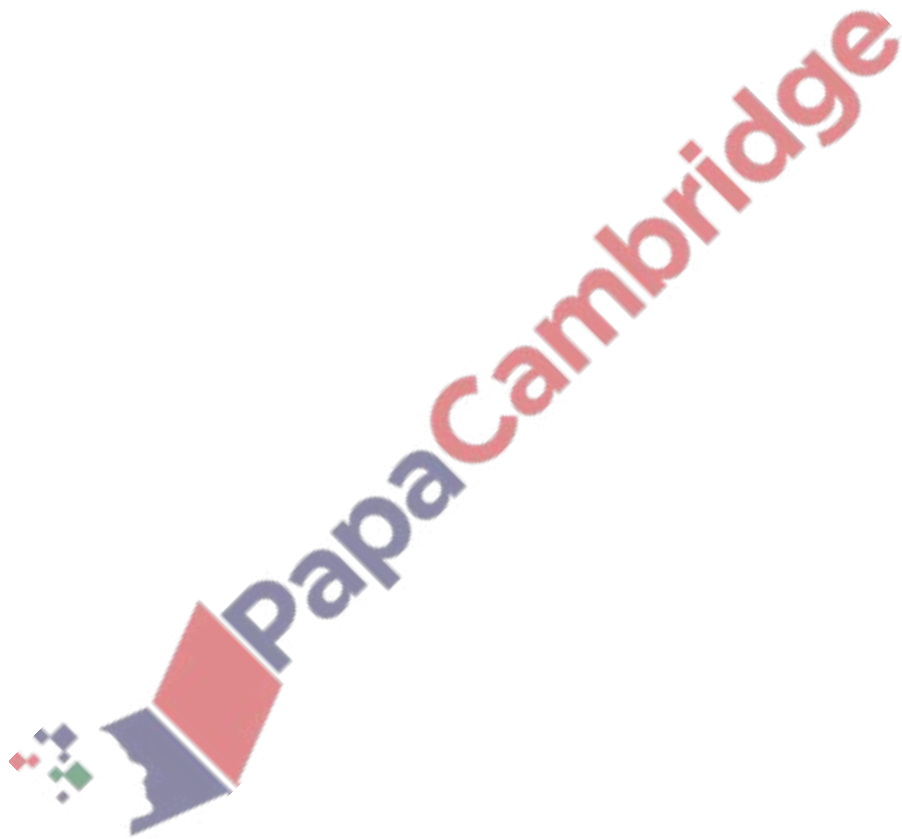
- (c) The student measures the mass and the volume of a piece of metal.
The mass of the piece of metal is 93.6g and its volume is 12cm³.

Calculate the density of the metal.

$$\begin{aligned} \rho &= \frac{m}{V} \\ &= \frac{93.6\text{g}}{12\text{cm}^3} \\ &= 7.8\text{g/cm}^3 \end{aligned}$$

density of metal = 7.8g/cm³ [3]

[Total: 8]



(a) A coin collector has 19 identical coins, as shown in Fig. 2.1.



Fig. 2.1

Fig. 2.2 shows one of the coins in the coin collector's hand.

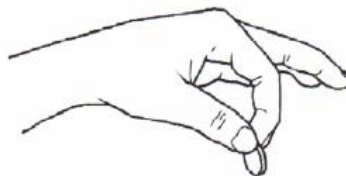


Fig. 2.2

The coin collector wants to check the thickness of one coin. She has a 30 cm ruler.

Describe how she can use the 30 cm ruler to determine the thickness of one coin accurately.

You may include a diagram if you wish.



- Pile up the coin on top of each other.
- Measure the total thickness of the stack of the 10 coins.
- Thickness of one coin = $\frac{d}{10}$ [3]

(b) The coin collector finds another coin. She thinks this coin is made of gold.

She performs an experiment to find the coin's density.

She obtains the following results:

mass of coin = 52.5 g

volume of coin = 5.4 cm³

(i) Show that the density of this coin is about 10 g/cm³.

$$\begin{aligned} \rho &= \frac{m}{V} \\ &= \frac{52.5 \text{ g}}{5.4 \text{ cm}^3} \\ &= 9.72 \text{ g/cm}^3 \end{aligned}$$

$$\begin{aligned} \rho &= 9.72 \text{ g/cm}^3 \\ &\approx \underline{\underline{10 \text{ g/cm}^3}} \end{aligned}$$

[3]

(ii) The density of liquid mercury is 13.6 g/cm³. State and explain whether the coin in (b)(i) floats on liquid mercury.

- The coin will float on mercury.

- coin has less density to that of mercury. [1]

[Total: 7]



Fig. 2.1 shows a pea plant. One of the pods is open, showing the peas inside.



Fig. 2.1

- (a) A food scientist needs to find the average diameter of a pea. She places 14 peas against a ruler, as shown in Fig. 2.2.

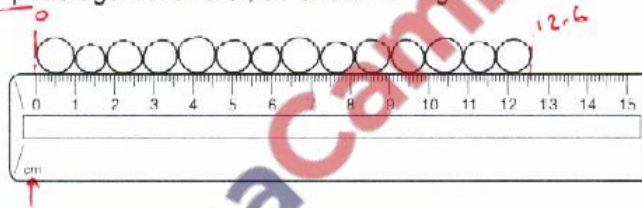


Fig. 2.2

Use information from Fig. 2.2 to determine the average diameter of one pea.

$$\text{length 14 peas} = 12.6 \text{ cm}$$

$$\text{diameter 1 pea} = \frac{12.6}{14}$$

$$= 0.90 \text{ cm}$$

average diameter of one pea = 0.90 cm [3]

(b) The food scientist needs to find the average density of some peas.

She uses the following values:

mass of peas = 183 g
volume of peas = 250 cm³.

Calculate the average density of these peas.

$$\begin{aligned} \rho &= \frac{m}{V} \\ &= \frac{183 \text{ g}}{250 \text{ cm}^3} \\ &= 0.732 \\ &\approx 0.73 \text{ g/cm}^3 \text{ (to 2 s.f.)} \end{aligned}$$

average density = 0.73 g/cm³ [3]

(c) A different variety of pea has a density of 0.89 g/cm³. One pea of this variety is placed in salt water. The density of the salt water is 1.02 g/cm³.

State whether this pea floats or sinks in the salt water. Give a reason for your answer.

answer floats

reason its density (0.89) is less than that of salt water

[1]

[Total: 7]

