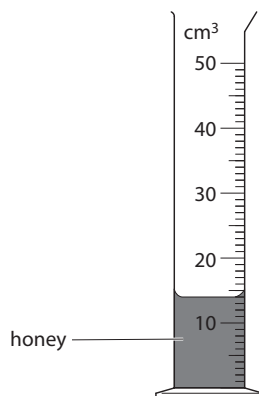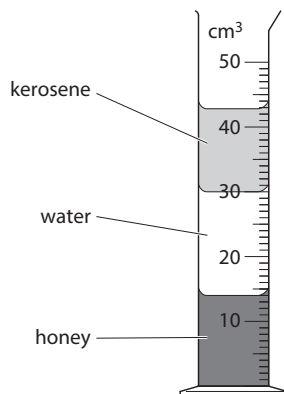**1**   A student investigates the density of three different liquids.

The student pours liquid honey into a container, as shown in the figure.

The student then carefully adds some water and then some kerosene. The liquids do not mix but form three separate layers as shown in the figure below.

Identify the correct statements about the densities of the liquids. Tick only **two** boxes.

☐   Honey has the smallest density.

☐   Honey has a larger density than water.

☐   Kerosene has the largest density.

☐   Kerosene has a smaller density than water.

☐   Water has a larger density than honey.

☐   Water has a smaller density than kerosene.

[2]

[Total: 2]

2   A student has a beaker of liquid as shown in the figure.
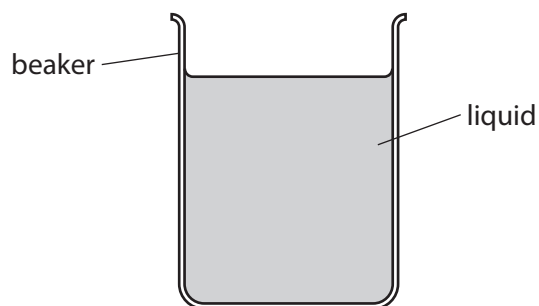
The student makes some measurements. His results are shown in the table.

mass of beaker and liquid	280 g
mass of empty beaker	120 g
volume of liquid	200 cm^3

(a) Calculate the mass of the liquid in the beaker.

mass of liquid = ... g   [1]

(b) Calculate the density of the liquid.

density = ... g / cm^3 [3]

[Total: 4]

3   A jeweller has a small block of metal. The block has a mass of 15.2 g and a volume of 1.36 cm^3.

(a) Calculate the density of the metal.

density = ... g / cm^3 [3]

(b) The jeweller looks up the values for the density of various metals and produces a table, part of which is shown below.

metal	$\dfrac{\text{density}}{\text{g/ cm}^3}$
gold	19.3
lead	11.3
platinum	21.5
silver	10.5

Using your answer to **(a)** and the information in the table, state which metal the block is most likely to be made from.

....   [1]

[Total: 4]

4 A steel object has **5 kg** stamped on its side, as shown in the figure.
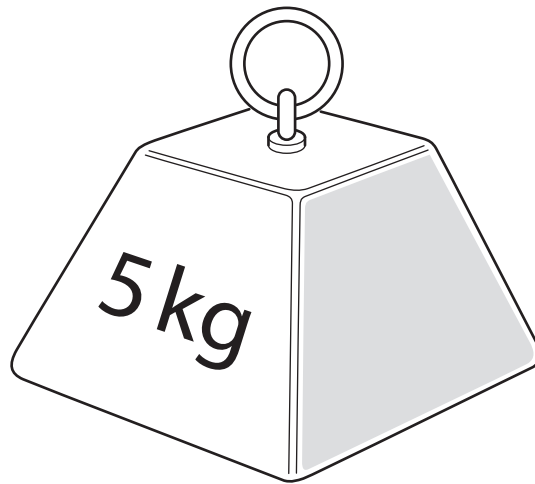
The density of the steel is $7.81\,\text{g}/\text{cm}^3$.

Calculate the volume of the object.

volume = ... cm^3 [3]

[Total: 3]

5 The figure below is a simplified diagram of a balance with equal arms.
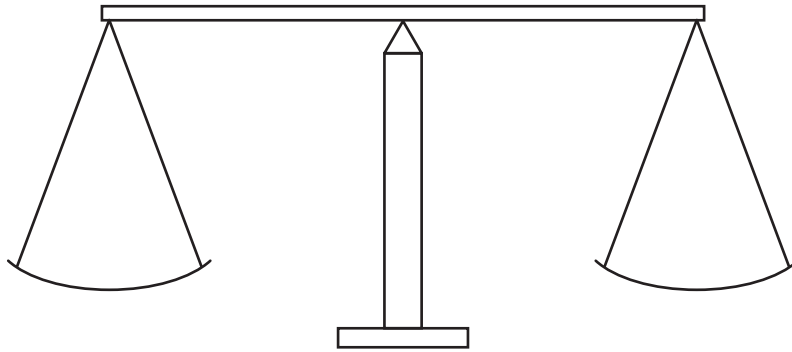
A copper block of unknown mass is placed on the left-hand pan. Six standard masses, placed on the right-hand pan, cause the balance to be in equilibrium, with the beam horizontal.

The six standard masses on the right-hand pan are:

$$100\,g,\ 100\,g,\ 50\,g,\ 10\,g,\ 5\,g,\ 2\,g$$

(a) What is the mass of the copper block?

mass = ... g   [1]

(b) What will be seen to happen if the 2 g mass is removed from the right-hand pan?

....

....   [1]

(c) The volume of the copper block is $30\,cm^3$.

Calculate the density of copper. State the unit in your answer.

density = ...   [4]

[Total: 6]

6 The figure shows a small wind-turbine used to generate electricity.
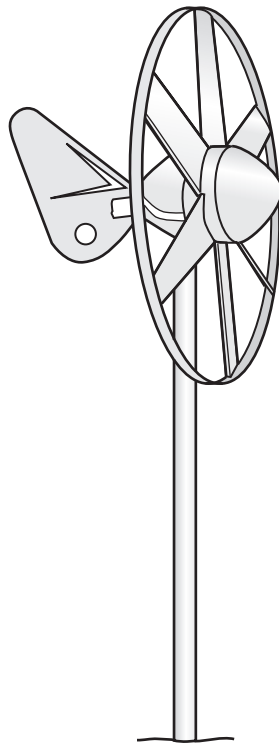
The wind-turbine drives an electric generator.

The wind blows with a velocity of 7.0 m/s at right angles to the plane of the turbine. The mass of air passing per second through the turbine is 6.7 kg.

The volume of air passing through the turbine each second is 5.6 m^3 (flow rate is 5.6 m^3/s).

Calculate the density of the air.

density of air = ... [2]

[Total: 2]

7 A student has been told to find the density of some liquid paraffin by measuring its mass and its volume.

These are the student's results.

mass of liquid = 62.4 g

volume of liquid = 80 cm^3

Calculate the density of the liquid paraffin.

density = ... [4]

[Total: 4]

8 A student wishes to determine the density of a small, irregularly shaped stone.

State the other quantity, apart from the volume, that must be measured in order to determine the density.

.... [1]

[Total: 1]

9 A student has a large number of coins of different diameters, all made of the same metal. She wishes to find the density of the metal by a method involving placing the coins in water.

(a) Describe how the measurements of the required quantities are carried out.

....

....

....

....

....

....

....

....

....

.... [5]

(b) State **one** precaution taken when carrying out the measurements in **(a)** to ensure that the result is as accurate as possible.

....

.... [1]

[Total: 6]

10 A student wishes to determine the density of a small, irregularly shaped stone.

State the formula that is used to calculate the density.

....

.... [1]

[Total: 1]

11   A liquid has a density of $0.80\,g/cm^3$.

Which could be the volume and mass of this liquid?

	volume/cm^3	mass/g
A	2.0	16
B	8.0	10
C	10	8.0
D	16	2.0

[1]

[Total: 1]

12   The same mass of four different liquids is placed in some measuring cylinders.
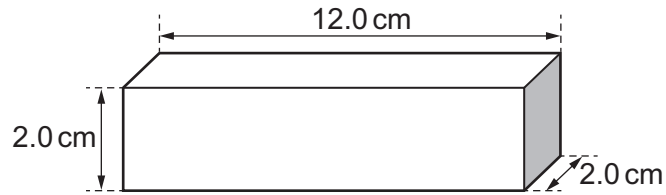
Which measuring cylinder contains the liquid with the greatest density?
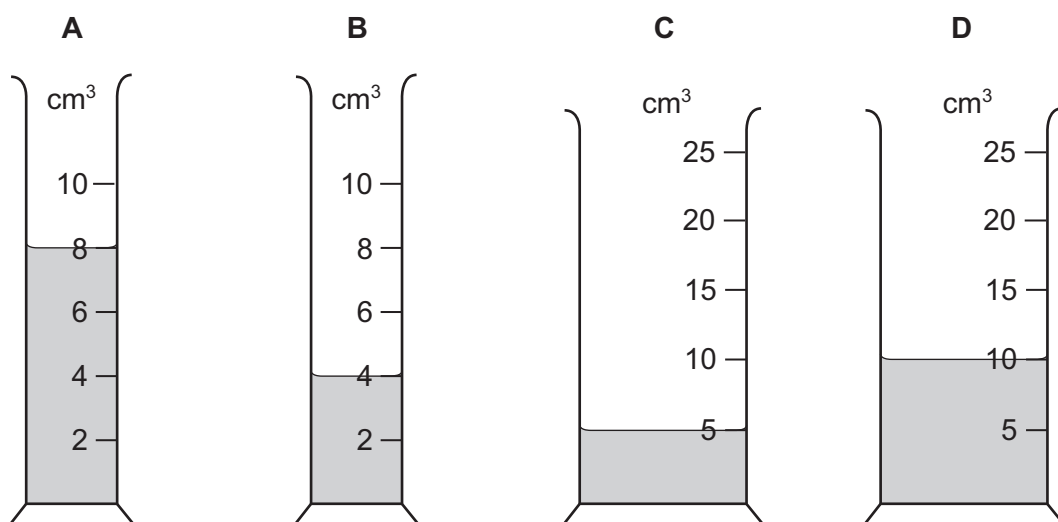
[1]

[Total: 1]

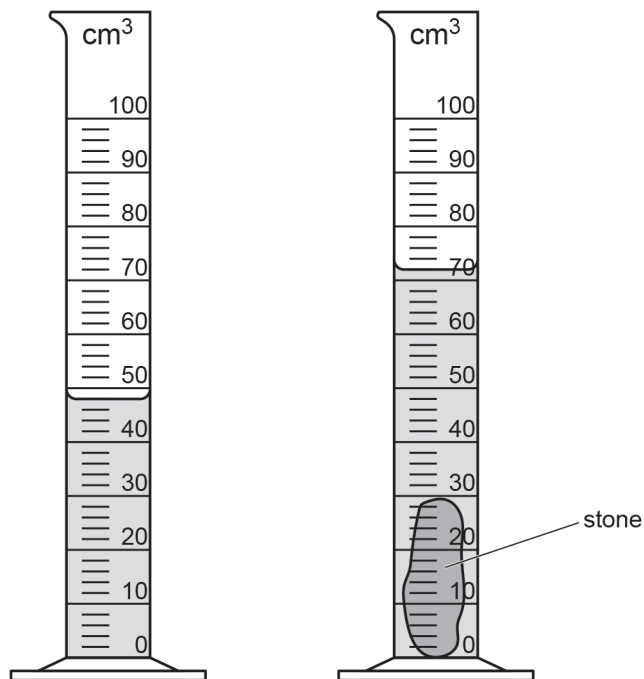**13** The diagram shows a metal block and its dimensions.

Calculate the volume of the metal block.

volume of the block = ... cm^3 [2]

[Total: 2]

14 The diagram shows a measuring cylinder before and after having a stone lowered into it.

Calculate the volume of the stone.
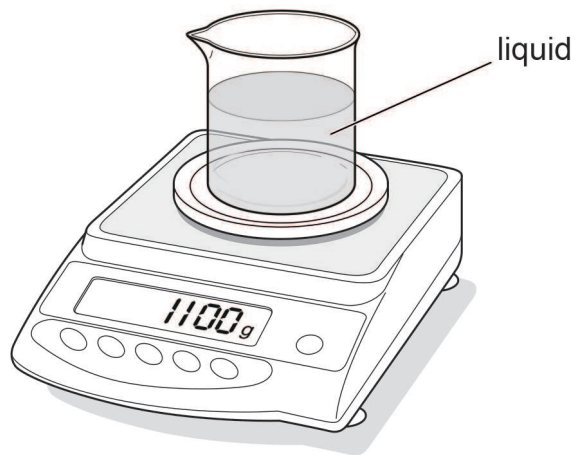
volume = ... cm^3 [2]

[Total: 2]

15 The diagram shows a beaker containing liquid on a top pan balance.

The mass of the empty beaker is 400 g.

(a) Using the information in the diagram, determine the mass of the liquid in the beaker.

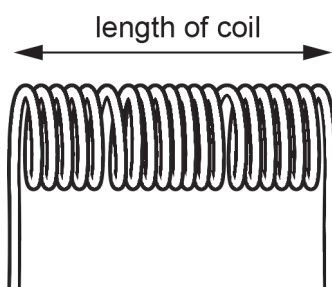mass = ... g   [1]

(b) The beaker contains 750 cm^3 of liquid.

Calculate the density of the liquid.

density = ... g / cm^3 [3]

[Total: 4]

16 The diagram shows a coil of wire.

length of coil

(not to scale)
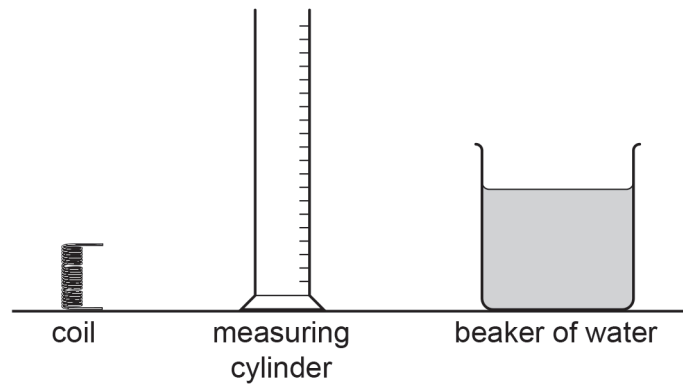
The volume of the wire in the coil is 16.6 cm^3 and its mass is 148 g.

Calculate the density of the metal used for the wire in the coil.

density = ... g / cm^3 [3]

[Total: 3]

17   A student has a coil, a measuring cylinder and a beaker of water, as shown in the diagram.

| coil | measuring cylinder | beaker of water |

Describe how the student can determine the volume of the coil by using the equipment shown in the diagram.

....

....

....

....

....

....   [4]
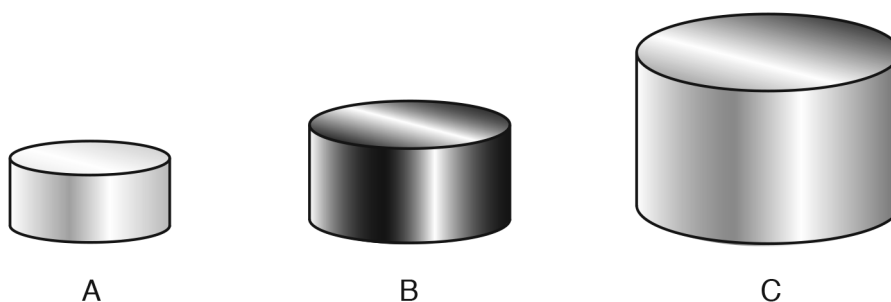
[Total: 4]

18 The diagram shows three metal blocks. Each block has the same mass.

A   B   C

The volumes of the blocks are different.

Each block is made of a different metal. The table gives the density of each metal.

name of metal	density (g/cm^3)
aluminium	2.83
iron	6.95
lead	11.3

Use the data from the table to identify the metal used to make each block.

A ....

B ....

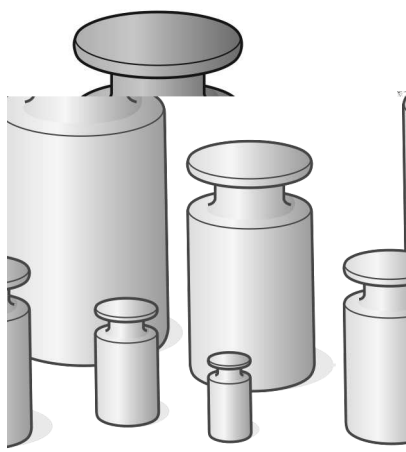C ....   [1]

[Total: 1]

19 The diagram shows a set of masses made from the same material.

Identify the quantity that is the same for all the masses.

Tick **one** box.
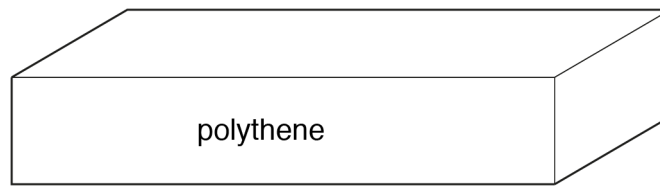
☐ density

☐ volume

☐ weight

[1]

[Total: 1]

20 The mass of a small steel ball is 120 g. The volume of the ball is 16.0 cm^3.

Calculate the density of the steel ball.

density = ... g / cm^3 [3]

[Total: 3]

21 The diagram shows a block of polythene.

polythene

Polythene floats in water. Explain why polythene floats.

.... [1]

[Total: 1]

22 A student investigates the density of three different liquids.

The student pours liquid honey into a container, as shown in the figure.
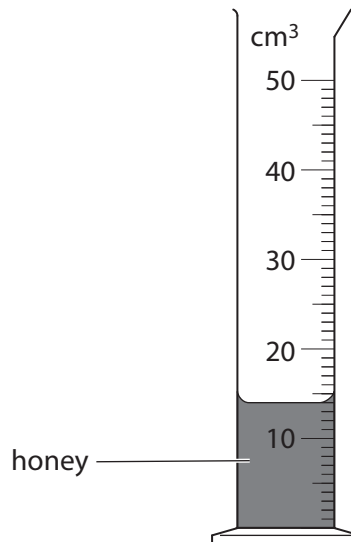
Name the other piece of apparatus necessary when determining the density of the honey.

.... [1]

[Total: 1]

23 A student has a large number of coins of different diameters, all made of the same metal. She wishes to find the density of the metal by a method involving placing the coins in water.

State the formula needed to calculate the density.

.... [1]

[Total: 1]

24 A measuring cylinder has a mass of 120 g when empty.

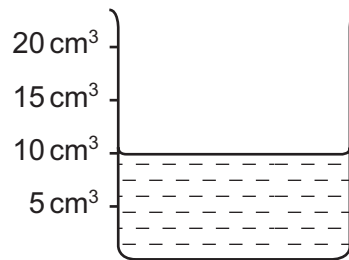When it contains 50 cm^3 of a liquid, the total mass of the measuring cylinder and the liquid is 160 g.

What is the density of the liquid?

A $\dfrac{40}{50}$ g/cm^3

B $\dfrac{50}{40}$ g/cm^3

C $\dfrac{120}{50}$ g/cm^3

D $\dfrac{160}{50}$ g/cm^3

[1]

[Total: 1]

25 The beaker shown has a mass of 16 g when empty and 28 g when filled to the 10 cm^3 mark.

What is the density of the liquid in the beaker?

A $\dfrac{10}{28-16}$ g/cm^3

B $\dfrac{28-16}{10}$ g/cm^3

C $\dfrac{16}{10}$ g/cm^3

D $\dfrac{28}{10}$ g/cm^3

[1]

[Total: 1]

26 A block of wood has a volume of 210 cm^3 and a mass of 180 g.

(a) Calculate the density of the block of wood.

density = ... [2]

(b) The block is held just above the surface of a liquid of density $0.88 \, \text{g/cm}^3$.

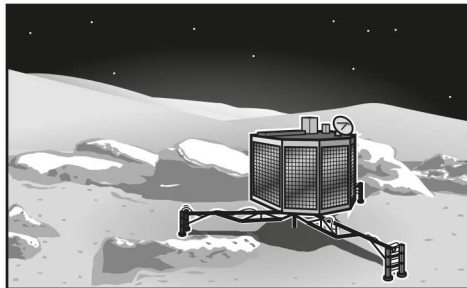Predict and explain what happens when the block is released.

....

....

.... [2]

[Total: 4]

27 The diagram shows remote sensing equipment on the surface of a distant planet.

(a) The mass of the equipment is 350 kg. The acceleration of free fall on the surface of this planet is $7.5 \, \text{m/s}^2$.

  (i) State what is meant by the term *weight*.

  ....

  .... [1]

  (ii) Calculate the weight of the equipment on the planet.

weight = ... [2]

(b) The equipment releases a balloon from a point that is a small distance above the surface of the planet. The atmosphere at the surface of this planet has a density of $0.35\,kg/m^3$. The inflated balloon has a mass of $80\,g$ and a volume of $0.30\,m^3$.

Make an appropriate calculation and then predict and explain the direction of any motion of the balloon. Show your working.

prediction ....

explanation ....

.... [4]

[Total: 7]

28 (a) The walls of a room are to be painted.

A tin of paint has a total mass of $7000\,g$ and a volume of $5000\,cm^3$.

The empty tin has a mass of $500\,g$.

   (i) Determine the mass of the paint.

mass of paint = ... g [1]

   (ii) Calculate the density of the paint. Include the unit.

density = ... [3]

(b) The painter drops a brush into the tin of paint. The brush floats.

Suggest why the brush floats.

....

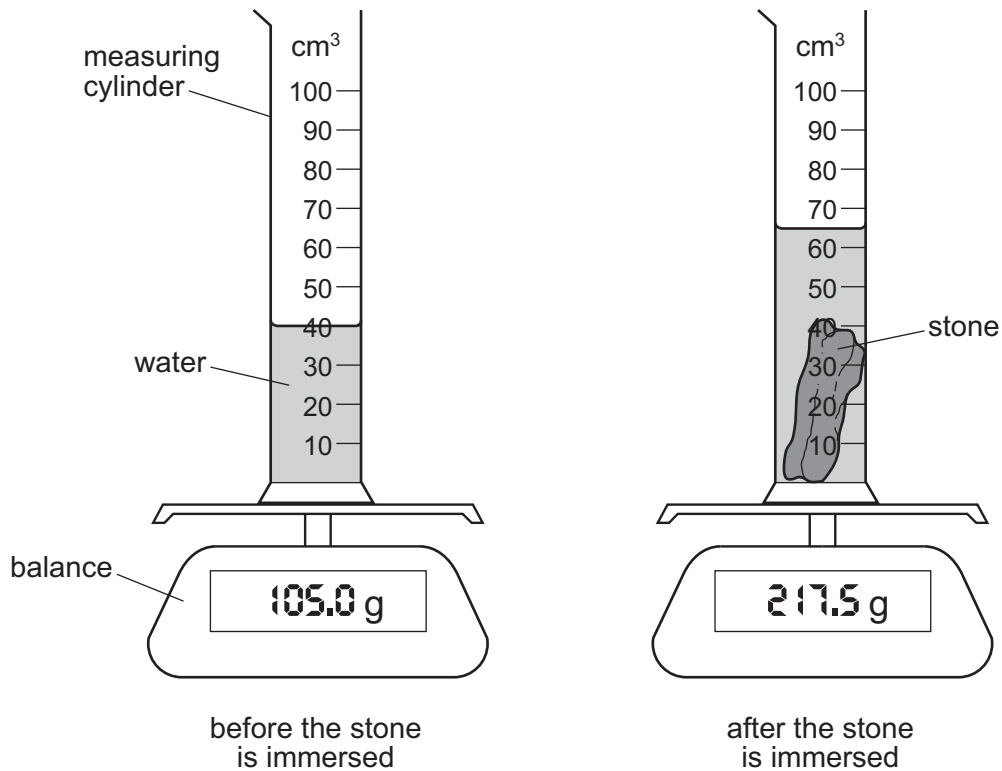.. [1]

[Total: 5]

29 A measuring cylinder containing only water is placed on an electronic balance. A small, irregularly shaped stone is now completely immersed in the water.

The diagrams show the equipment before and after the stone is immersed.

before the stone
is immersed

after the stone
is immersed

What is the density of the material of the stone?

A 1.7 g / cm^3 **B** 3.3 g / cm^3 **C** 4.5 g / cm^3 **D** 8.7 g / cm^3

[1]

[Total: 1]