

Changes of state and particle model – GCSE CS Physics1. **No.1**

0	1
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A student investigated the density of different types of rock.

Figure 1 shows a piece of limestone.

Figure 1



0	1	.	1
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The student was **not** able to calculate the volume of the piece of limestone using measurements taken with a ruler.

What is the reason?

[1 mark]

Tick (✓) **one** box.

A ruler is not very accurate.

☐

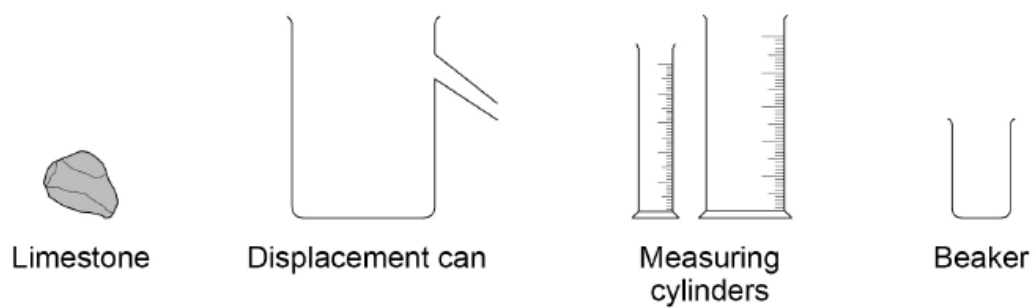
The piece of limestone has an irregular shape.

☐

There is a large uncertainty when using a ruler.

☐

0 1 . 2

Figure 2 shows some of the equipment given to the student.**Figure 2**

Describe a method the student could use to determine the volume of the piece of limestone.

[4 marks]

0 1 . 3

The mass of the piece of limestone was 155 g.

The volume of the piece of limestone was 62 cm³.

Calculate the density of the piece of limestone.

Use the equation:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

[2 marks]

Density = _____ g/cm³

0 1 . 4

Density can be measured in g/cm³.

What is another unit for density?

[1 mark]

Tick (✓) **one** box.

cm/g³

☐

kg/m³

☐

kg³/m

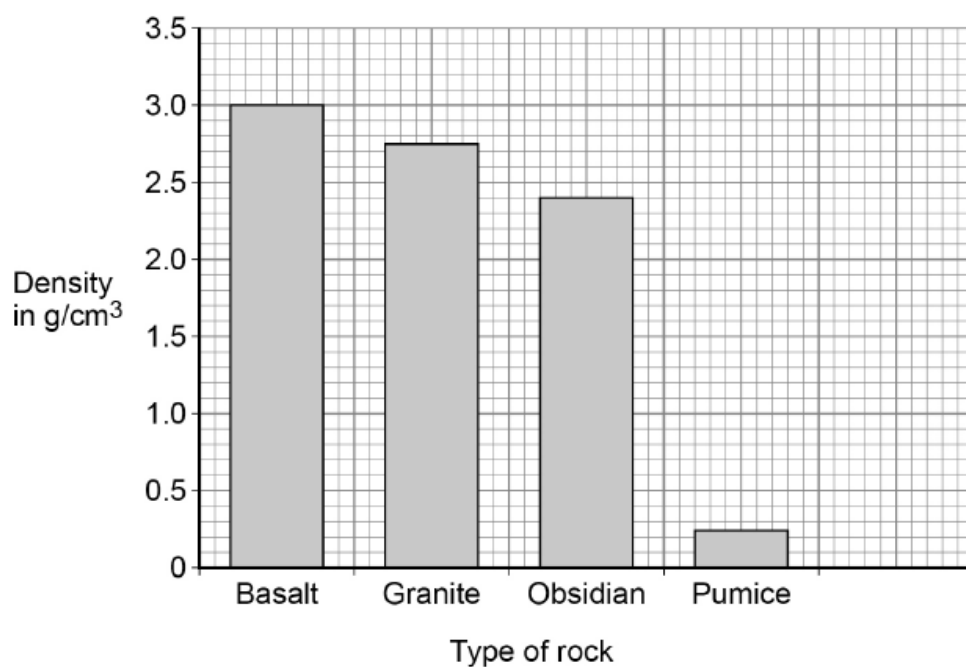
☐

kg³/cm

☐

Figure 3 gives the density of some other types of rock.

Figure 3



The student has a sample of an unknown type of rock.

The density of this rock is 2.4 g/cm³.

0 1 . 5 Draw a bar on **Figure 3** to show the density of the unknown type of rock.

[1 mark]

0 1 . 6 Complete the sentence.

Choose the answer from the box.

[1 mark]

basalt	granite	obsidian	pumice
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The data in **Figure 3** suggests that the unknown type of rock is _____.

0 1 . 7

The student **cannot** be certain that the unknown type of rock is one of the types of rock in **Figure 3**.

Give a reason why.

[1 mark]

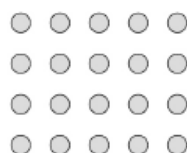
Pumice is a type of rock that has holes in it. The holes contain air.

0 1 . 8

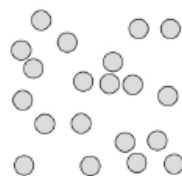
Which diagram shows the arrangement of particles in air?

[1 mark]

Tick (✓) **one** box.


☐

☐

☐

☐

0 1 . 9

Complete the sentence.

Choose the answer from the box.

[1 mark]

less than

the same as

more than

The holes containing air cause the density of pumice to

be _____ the density of other types of rock.

2. No.4

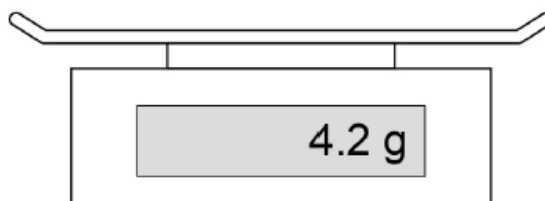
0	4
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A student determined the density of a cube made of bronze.

The student used a balance to measure the mass of the bronze cube.

Figure 5 shows the balance before the cube was added.

Figure 5



0	4	.	1
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What type of error is shown on the balance?

[1 mark]

0	4	.	2
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How could the student get a correct value for the mass of the cube from the balance?

[1 mark]

0 4 . 3

The student measured the length of the bronze cube using Vernier callipers and then using a micrometer.

Table 1 shows the results.

Table 1

Equipment	Length in mm
Vernier callipers	20.1
Micrometer	20.14

Complete the sentence.

[1 mark]

The results in **Table 1** show that the Vernier callipers and the micrometer have a different _____ .

The student wanted to determine the density of a bronze coin.

The student had several identical coins.

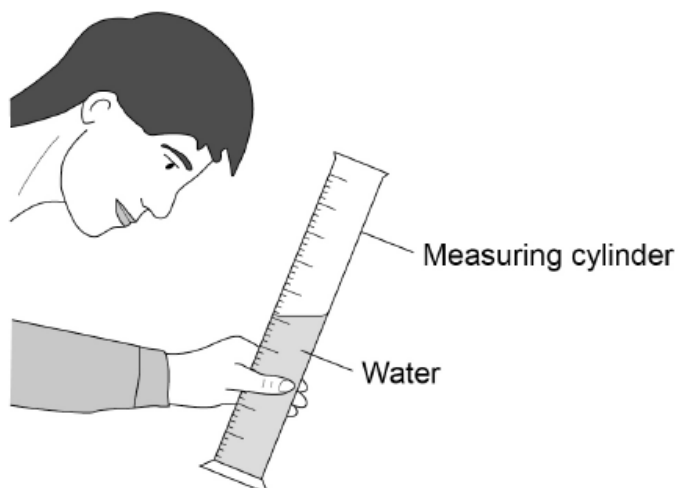
The volume of each coin was very small.

0 4 . 4

The student added water to a measuring cylinder.

Figure 6 shows the student reading the volume of water in the measuring cylinder.

Figure 6



Give **two** changes the student should make to increase the accuracy of the volume measurement.

[2 marks]

1 _____

2 _____

0 4 . 5

Describe how the student could use a displacement method to determine an accurate value for the volume of a single coin.

[3 marks]

0 4 . 6

Old penny coins were made from a disc of bronze.

New penny coins are made from a disc of a different metal.

Figure 7 shows a disc of metal.

Figure 7

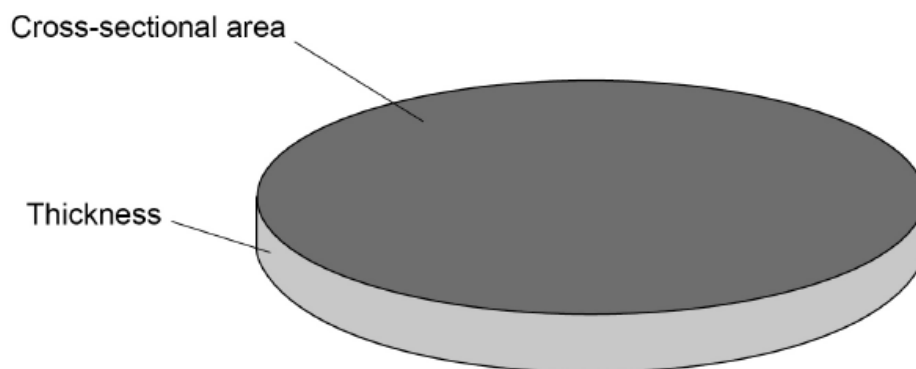


Table 2 shows information about the discs used to make each coin.

Table 2

Disc	Mass in g	Density in g/cm^3	Thickness in cm
Old penny	3.6	8.9	0.16
New penny	3.6	X	0.17

The discs used to make the old and the new coins have the **same** cross-sectional area.

Calculate value **X** in **Table 2**.

Give your answer to 2 significant figures.

The volume of a disc can be calculated using the equation:

$$\text{volume of a disc} = \text{cross-sectional area} \times \text{thickness}$$

[5 marks]

Density (2 significant figures) = _____ g/cm³