

Q1. (2018)

0 2

A student wanted to determine the density of the irregular shaped object shown in **Figure 3**

Figure 3

a)

0 2 . 1

Plan an experiment that would allow the student to determine the density of the object.

[6 marks]

b)

0 2 . 2

Another student did a similar experiment.

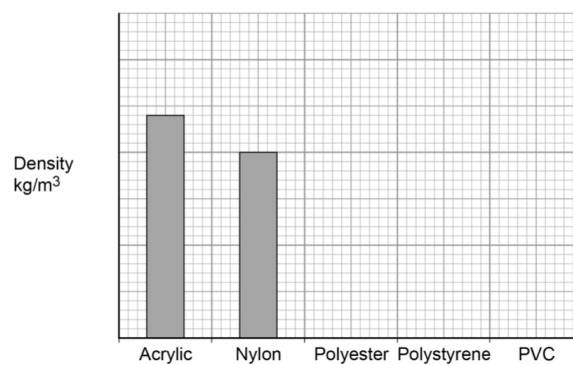
He determined the density of five common plastic materials.

Table 1 shows the results.

Table 1

Plastic material	Density in kg/m^3
Acrylic	1200
Nylon	1000
Polyester	1380
Polystyrene	1040
PVC	1100

Figure 4 shows the results plotted in a bar chart.

Figure 4

Complete **Figure 4**

You should:

- Write the correct scale on the y-axis.
- Draw the bars for polyester, polystyrene and PVC.

[4 marks]

c)

- 0 2 . 3 The student is given a piece of a different plastic material.

The student determined the density of the material three times.

Table 2 shows the results.

Table 2

	Density in kg/m^3
1	960
2	1120
3	1040

Determine the uncertainty in the student's results.

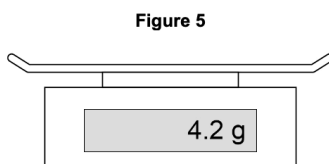
[2 marks]

Q2. (2021)

- 0 4 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.



a)

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

[1 mark]

b)

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

[1 mark]

c)

- 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 _____.

d)

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

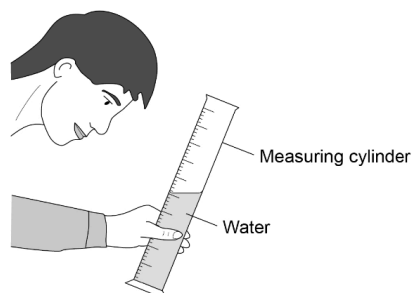
The student had several identical coins.

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]

e)

- 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]

Q3. (2021)

- 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

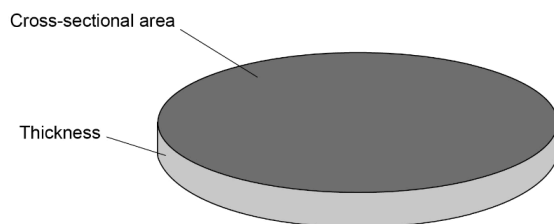


Table 2 shows information about the discs used to make each coin.

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]