

Required Practical Density

GCSE Physics · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

A metal cuboid measures 4.00 cm × 3.00 cm × 2.50 cm and has a mass of 81.3 g. Calculate its density. (3 marks)

Step 1 · Volume of a cuboid

$$V = \text{length} \times \text{width} \times \text{height} = 4.00 \times 3.00 \times 2.50 = 30.0 \text{ cm}^3$$

Step 2 · Density

$$\rho = m \div V = 81.3 \div 30.0$$

Step 3 · Calculate

$$\rho = 2.71 \text{ g/cm}^3$$

Answer: 2.71 g/cm³

Check: Compare with a table of densities to identify the metal (aluminium).

2. Now try one with the steps

A stone is lowered into a measuring cylinder. The water level rises from 36.0 cm³ to 60.0 cm³. The stone's mass is 64.8 g. Calculate its density. (3 marks)

Step 1 · Volume of stone

Step 2 · Density

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Name the instrument used to measure the mass of the object. [1]

2. Describe how to measure the volume of an irregularly shaped stone. [3]

3. A cuboid measures $2.0\text{ cm} \times 3.0\text{ cm} \times 5.0\text{ cm}$ and has a mass of 81 g. Calculate its density in g/cm^3 . [3]
4. The water level in a measuring cylinder rises from 40 cm^3 to 52 cm^3 when a stone is added. State the volume of the stone. [1]
5. Explain why the measuring cylinder should be read at eye level. [1]
6. Give one safety precaution for this practical. [1]
7. The stone in question 4 has a mass of 31.2 g. Calculate its density in g/cm^3 . [2]
8. 25.0 cm^3 of a liquid has a mass of 20.0 g. Calculate its density in g/cm^3 . [2]
9. Explain why vernier calipers are better than a ruler for measuring a small metal cube. [2]
10. Explain why the balance is tared (set to zero) with the empty measuring cylinder on it. [1]
11. Three measurements of the density of salt water are 1.06, 1.04 and 1.08 g/cm^3 . Calculate the mean in g/cm^3 . [2]
12. Convert a density of 1.06 g/cm^3 to kg/m^3 . [1]

13. Explain why drops of water left in the spout of the eureka can make the calculated density too high. [2]

14. Explain why using a larger stone would give a more precise value for its density. [2]

4. Before you hand it in

Using the final water level stone's volume

Volume of the object = final reading – starting reading.

Reading the top of the meniscus

Read the bottom of the meniscus with your eye level with the surface.

Including the mass of the measuring cylinder

Tare the balance with the empty cylinder, or subtract the empty mass from the full mass.

Mixing mm and cm when finding volume

Convert all lengths to the same unit before multiplying.