Density of solids and liquids

Physics required practical | AQA Combined Science 8464 and AQA GCSE Physics 8463 | 14 questions, 36 marks

GCSE science required practicals

This practical online

Name: _____ **Date:** _____ **Score:** _____ / 36

Aim: To find the density of regular solids, irregular solids and a liquid by measuring their mass and volume.

Equipment: Top-pan balance (reading to 0.1 g); Ruler marked in mm, or vernier callipers; Regularly shaped solids (for example a metal cuboid and cube); Irregular objects (for example a pebble and a rubber stopper); Displacement (eureka) can; Measuring cylinders (10 cm^3, 50 cm^3 and 100 cm^3); Beaker of water; Thread; The liquid to be tested (for example cooking oil); Paper towels.

Results

Ruby found the mass and volume of five objects. She has not finished the brass cube row, so two values are shown as X and Y, and the pebble's density is shown as Z.

Object	How the volume was found	Mass in g	Volume in cm^3	Density in g/cm^3
Aluminium block, 5.0 cm × 3.0 cm × 2.0 cm	Ruler	81.3	30.0	2.71
Brass cube, each side 2.0 cm	Ruler	68.0	X	Y
Granite pebble	Displacement can	48.6	18.5	Z
Rubber stopper	Measuring cylinder	22.8	15.0	1.52
Glass marble	Measuring cylinder	12.5	5.0	2.50

Questions

1 Name the measuring instrument Ruby should use to find:

a. the mass of the aluminium block

b. the length of each side of the block.

(2 marks)

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2 Describe how Ruby used the displacement can to find the volume of the granite pebble. (2 marks)

3 Explain how Ruby should read the measuring cylinder to get an accurate volume. (2 marks)

4 Give one hazard in this practical and describe how to reduce the risk. (2 marks)

5 Calculate the values of X and Y for the brass cube. Show your working. (3 marks)

6 Calculate the value of Z, the density of the granite pebble. Give your answer to 3 significant figures. (2 marks)

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7 Mohammed measured the density of cooking oil. He wrote down:

mass of empty measuring cylinder = 62.4 g
mass of measuring cylinder with oil = 108.4 g
volume of oil = 50.0 cm^3

Calculate the density of the cooking oil. Show your working. (3 marks)

8 The density of the aluminium block is 2.71 g/cm^3. Write this density in kg/m^3. (2 marks)

9 **Higher tier**

A brass weight is a cuboid measuring 45 mm by 30 mm by 12 mm. Its mass is 0.137 kg.

Calculate its density in kg/m^3. Give your answer to 3 significant figures. Show your working. (4 marks)

10 Ruby measured the volume of the pebble three times with the displacement can. She got 18.5 cm^3, 18.0 cm^3 and 19.0 cm^3.

Calculate the mean volume and say whether her readings are repeatable. (2 marks)

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11 Ruby's first try with the displacement can gave a pebble volume that was too small. Suggest one reason why, and how she could stop it happening.

(2 marks)

12 **Higher tier**

Ruby measured each side of the 2.0 cm brass cube with a ruler marked in millimetres. Explain why her value for its density could be quite far from the true value, and suggest a better instrument.

(2 marks)

13 Ruby wants to find the volume of a cork using a measuring cylinder of water. The cork floats. Describe how she could still find its volume.

(2 marks)

14 Plan an investigation to find out how the density of salt water depends on the mass of salt dissolved in it.

(6 marks)

End of questions | Total 36 marks | The answers sheet has the full method as revision notes.

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