

Density and Pressure

Problems by Topic (2012-2016)

Edexcel International GCSE

- 2 A student measures the density of water.
She uses a measuring cylinder and an electronic balance.



(a) State the equation linking density, mass and volume. (1)

(b) A correct unit for density is (1)

- A g/cm
- B kg/cm
- C g/cm²
- D g/cm³

(c) Complete the table to show what is measured by an electronic balance. (1)

Measuring instrument	What it measures
measuring cylinder	volume
electronic balance	

(d) Describe how the student should use each instrument to make her measurements as accurate as possible.

(4)

Measuring cylinder

Electronic balance

(e) The student wants to make sure her experiment is a fair test.

(i) State **one** factor that she should keep the same throughout her experiment.

(1)

(ii) Why is it important that she keeps this factor constant?

(1)

January 2012

5 Kalpana finds a small stone.

To help her identify the type of stone, Kalpana decides to find its density.

Kalpana explains why she thinks this will help.



The density will be the same, whatever the size of the stone, as long as the type of rock is the same.

Her friend, Christine, disagrees.

Bigger stones will have a higher density because they are heavier.



(a) Who is correct – Kalpana or Christine?

(2)

Explain your answer.

(b) Kalpana uses a measuring cylinder to find the volume of water displaced by the stone.

She has three measuring cylinders to choose from.



(i) Which measuring cylinder would give the most precise measurement? Explain your answer.

(2)

- (ii) The most precise measuring cylinder may not give an accurate reading.
Suggest why.

(1)

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- (c) The table shows the measurements that Kalpana makes.

Mass of stone in g	Volume of stone in cm ³
54	23

- (i) State the equation linking density, mass and volume.

(1)

- (ii) Calculate the density of the stone.

State your answer to an appropriate number of significant figures.

Give the unit.

(3)

Density = Unit

(d) (i) How can Kalpana use her value of density to identify the type of stone?

(2)

(ii) Kalpana may still be unsure about the type of stone.

Suggest why.

(1)

(Total for Question 5 = 12 marks)

January 2013

6 A student uses a digital calliper to measure the diameter of a knitting needle.



The digital calliper gives readings to the nearest 0.01 mm.

(a) The student measures the diameter of the knitting needle eight times.

These are her readings.



- (i) Circle the anomalous reading. (1)

- (ii) Calculate the average value for the diameter of the knitting needle. (3)

average diameter = mm

(b) The student finds more knitting needles, some of which are shown in the photographs.

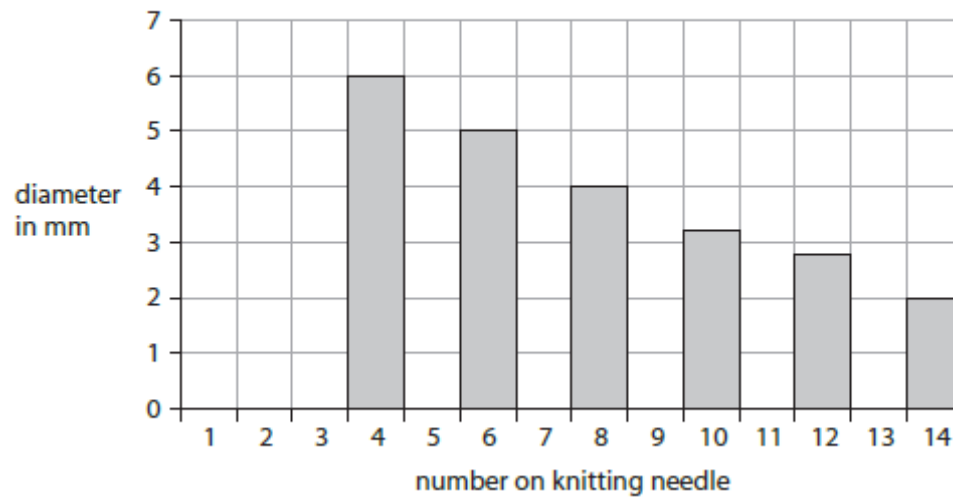


Each knitting needle is marked with a number that indicates its size.

Each number corresponds to a set diameter, as shown in the table.

Number on knitting needle	Diameter in mm
14	2.00
12	2.75
10	3.25
8	4.00
6	5.00
4	6.00

The student displays this data as a chart.



(i) Name the type of chart used by the student. (1)

(ii) Explain why the data is best displayed using this chart rather than another type of graph. (2)

(iii) Describe the relationship between the number on a knitting needle and its diameter. (2)

(c) The knitting needles are not uniform in shape.
Describe how the student could measure the volume of a non-uniform shape. (4)

7 The photograph shows a car tyre that needs to be inflated.



Author: Ildar Sagdejev

The tyre exerts a pressure on the road of 270 kPa.

The area of the tyre touching the road is 0.016 m².

(a) (i) State the equation linking pressure, force and area.

(1)

(ii) Calculate the force exerted on the road by the tyre.

Give the unit.

(4)

force = unit

(b) Use ideas about molecules to explain why the air inside the tyre exerts pressure.

(3)

(c) Air is pumped into the tyre to inflate it.

This increases the temperature and the pressure of the air in the tyre.

Use ideas about molecules to explain why the air pressure in the tyre increases.

(3)

(Total for Question 7 = 11 marks)

9 The volume of a piece of brass is 16.3 cm^3 .

A student measures its mass using an electronic balance.

The mass of the brass is 138 g.

(a) (i) State the equation linking density, mass and volume.

(1)

(ii) Calculate the density of brass.

Give the unit.

(3)

density = unit

(b) The student notices that the electronic balance has a zero error, so it shows mass readings that are all slightly too small.

This means that the density value is

(1)

- A incorrect and slightly too large
- B incorrect and slightly too small
- C correct because the student used three significant figures
- D correct because the mass of the block is more than zero

(Total for Question 9 = 5 marks)

January 2015

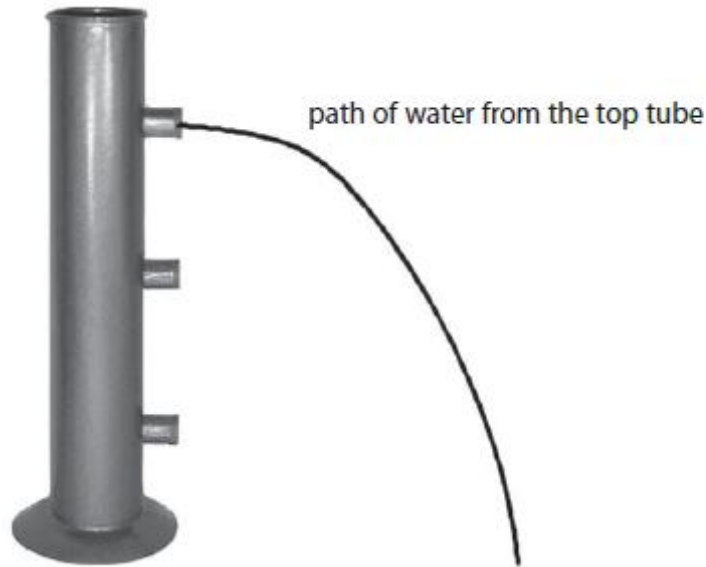
6 This question is about pressure in a liquid.

(a) A teacher uses this apparatus to demonstrate pressure difference in water.

The apparatus is hollow and has three short tubes at different depths.

The teacher completely fills the apparatus with water.

Water comes out of all the tubes.



(i) State the relationship between pressure difference, height, density and g .

(1)

(ii) The diagram shows the path of water coming from the top tube.

Complete the diagram by drawing the paths of water you would expect to see from the other two tubes.

(2)

(iii) Explain the pattern of the paths of water from the tubes.

(2)

(b) In another demonstration, the teacher uses this container.

The container is made of glass and each section has a different shape.

The teacher pours water into the container until it reaches the level shown in the left-hand section.



(i) Complete the diagram by drawing the water levels in the other four sections.

(1)

(ii) Explain why the water fills the container in the way you have shown.

(2)

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(Total for Question 6 = 8 marks)

January 2016