Density

All answers to calculations should be to 2 significant figures.

1. State the definition of density

Density is the amount of mass per unit volume

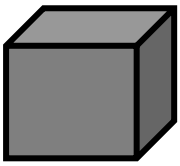
2. Write the equation which links mass, volume and density.

$$Density = \frac{mass}{volume}$$

3. Using the equation above fill in the table below.

Density (kg/m^3)	Mass (kg)	Volume (m^3)
4.0	2.0	0.50
50	5.0	0.1
3.6	9.0	2.5
0.84	5.2	6.2

4.



Write a method to explain how to calculate the density of a regular shaped object such as the one on the left.

Measure the dimensions of the object using a ruler, vernier calliper or micrometer.

Calculate the volume by multiplying length x width x depth

Record the mass of the object on a balance

Calculate density by dividing the mass by the volume

5.

Write a method to explain how to calculate the density of an irregular shaped object such as the stone on the left.

Record the mass of the object on a balance

Place the stone in a measuring cylinder of water, recording the volume of water before and after.

Calculate the volume of the stone by subtracting the volume after from volume before

Calculate density by dividing the mass by the volume

6. Scientists are working on a new material which has low density, but excellent strength. The material has a density of 0.3kg/m^3 and a mass of 600g. Calculate the volume of material present.

$$Density = \frac{Mass}{Volume}$$

$$Volume = \frac{Mass}{Density}$$

$$Volume = \frac{0.6kg}{0.3kg/m^3} = 2.0m^3$$

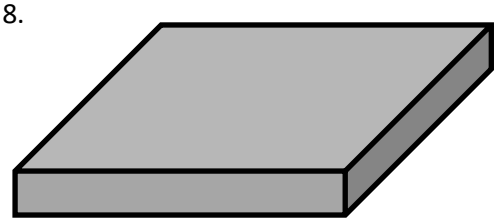
7. Gold has a density of 19300kg/m^3, a bar of gold has a volume of 0.012m^3. Calculate the mass of the bar of gold.

$$Density = \frac{Mass}{Volume}$$

$$Mass = Density\ x\ Volume$$

Mass = 19300 x 0.012 = 231.6kg ; 230kg

8.



Concrete has a density of 2300kg/m^3. A concrete slab has a mass of 1500g and dimensions of 25cm x 30cm. Calculate the thickness of the slab.

$$Density = \frac{Mass}{Volume}$$

$$Volume = \frac{Mass}{Density} = \frac{1.5kg}{2300kg/m^3} = 6.52\ x\ 10^{-4}m^3$$

Volume = Length x Width x Thickness (Depth)

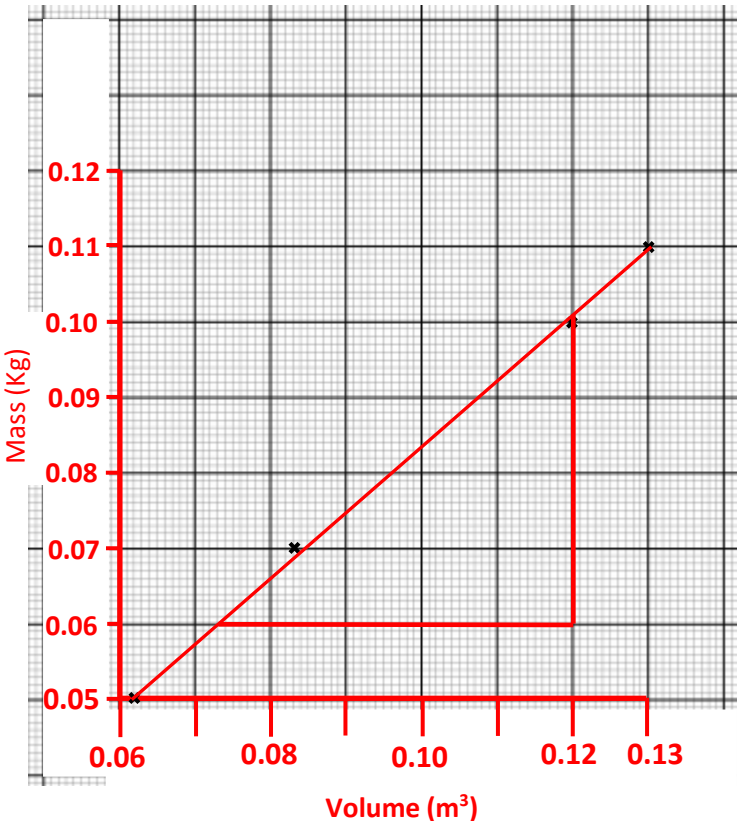
$$Thickness\ (Depth) = \frac{Volume}{Length\ x\ Width} = \frac{6.52\ x\ 10^{-4}m^3}{0.25m\ x\ 0.3m} = 8.69\ x\ 10^{-3}m$$

9. The Teacher asked Rehma to carry out an experiment recording the mass and volume of different coins in data table.

Mass (Kg)	Volume (m^3)
0.05	0.062
0.07	0.083
0.10	0.12
0.11	0.13

9a. Using the graph paper on the right, plot a graph. Put mass on the Y axis and volume on the X axis.

Once you have plotted your points, draw a line of best fit.



9b. Calculate the average density of the coins using the graph on the right

Calculate the gradient of the graph on the right. Draw two lines to form a triangle.

Change in mass (Y) = 0.101-0.060 = 0.041kg

Change in volume = 0.120-0.073= 0.047m^3

Gradient of graph, which gives average density= 0.041/0.047 = 0.87kg/m^3