
GCSE Physics required practical activity 5: Density

Student sheet

| Required practical activity | Apparatus and techniques |
|---|--------------------------|
| <p>Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids.</p> <p>Volume should be determined from the dimensions of a regularly shaped object and by a displacement technique for irregularly shaped objects.</p> <p>Dimensions to be measured using appropriate apparatus such as a ruler, micrometre or Vernier callipers.</p> | AT 1 |

Identifying a substance from its density.

There are three activities. In each one you are going to measure the density of something and use the value to find out what the substance is. You will be expected to work as accurately as possible.

In one activity you will determine the density of a regular shaped object using a ruler and balance. In another activity you will measure the mass of an object in the same way, but you will measure its volume from the amount of water it displaces.

In the third activity you will find the density of a liquid.

| Learning outcomes |
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| 1 |
| 2 |
| Teachers to add these with particular reference to working scientifically |

Activity 1: Regular shaped objects

Method

You have access to the following:

- 30 cm ruler marked off in mm
- digital balance
- regular shaped objects

You should read these instructions carefully before you start work.

1. Measure the length, width and height of each of the objects.
2. Record your results in a table. Include columns for volume, mass, density and substance.
3. Measure the mass of each object using the digital balance, and record the results.
4. Calculate and record the volumes (length x width x height).
5. Calculate and record the densities (mass \div volume).
6. Use this table to identify the substance each object is made from.

| Substance | aluminium | zinc | iron | copper | gold |
|---------------------------|-----------|------|------|--------|------|
| Density g/cm ³ | 2.7 | 7.1 | 7.9 | 8.9 | 19.3 |

Activity 2: Irregular shaped objects.

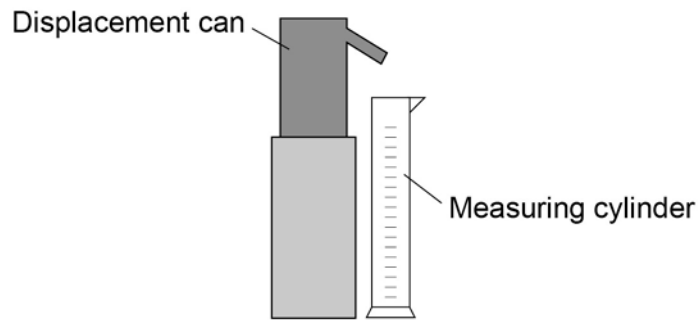
Method

You have access to the following:

- digital balance
- displacement can and something to stand it on (eg a brick)
- various measuring cylinders
- beaker of water and an extra empty beaker
- paper towels
- cotton or thin string
- irregularly shaped objects

You should read these instructions carefully before you start work.

1. Measure the mass of one of the irregular shaped objects.



2. Record your result in a table. It will need extra columns for the volume, density and substance.
3. Place a displacement can on a brick. Put an empty beaker under the spout and fill the can with water. Water should be dripping from the spout.
4. When the water has stopped dripping, place a measuring cylinder under the spout. Choose the measuring cylinder you think will give the most precise reading.
5. Tie the object to a piece of cotton and very carefully lower it into the displacement can so that it is completely submerged. Collect all of the water that comes out of the spout in the measuring cylinder.
6. Measure and record the volume of the collected water; this is equal to the volume of the object.
7. Calculate and record the density of the object. Try to find out what substance it is made from.
8. Repeat for some of the other objects. Remember to refill the can each time.

Activity 3 – liquids

Method

You have access to the following:

- digital balance
- 250 ml beaker
- 100ml measuring cylinder
- suitable liquid eg sugar solution.

You should read these instructions carefully before you start work.

1. Measure the mass of the empty beaker.
2. Record your results in a table. Your table will also need columns for the mass of the beaker with the liquid in, the mass of the liquid, the volume of the liquid and the density.
3. Pour about 100 ml of liquid into the measuring cylinder. Measure and record the volume.
4. Pour this liquid into the beaker. Measure and record the mass of the beaker and liquid.
5. Calculate and record the volume of the liquid.
6. Calculate the density of the liquid.
7. The density of water is 1 g/cm^3 . Determine the mass of sugar per cm^3 dissolved in the water, assuming the sugar does not affect the volume of the water.