Density the mass per unit volume

Science – Junior Cert

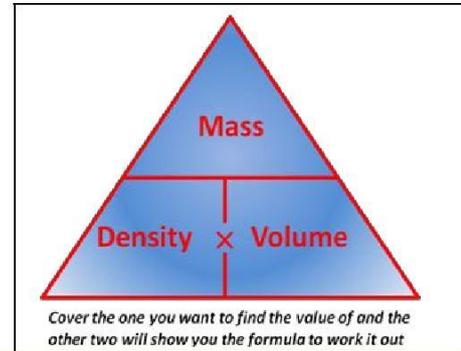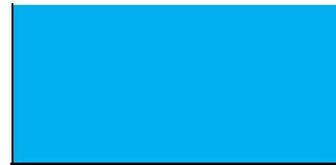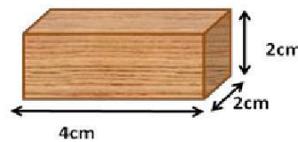# Quick Notes

Density the mass per unit volume

Density the mass per unit volume (kgm^{-3})

- More often given as **grams per cm^3**
- Calculated by **dividing mass by volume**
- You can be asked to find mass or volume of a substance if you are given its density.
- Use the triangle on the right to work out the formula
- Cover the one you want to know and you are left with the formula you need
  - **Mass = density × volume**
  - **Volume = mass ÷ density**
  - **Density = mass ÷ volume**

Cover the one you want to find the value of and the other two will show you the formula to work it out

Measure the Density of a Regular Solid

2cm

2cm

4cm

Mass = 14.4 g

Volume = 2 x 2 x 4 = 16 cm^3

Density = M/V = 14.4/16

0.9 g cm^{-3}

- Measure the **mass using a balance**
- **Calculate:** the volume using the **appropriate formula** e.g. cube **volume = length × width × height**
- **Calculate: Density = mass ÷ volume**

Measure the Density of an Irregular Solid (stone)

- Take a stone
- Measure the **mass using a balance** *(250 g)*
- Measure the **volume** of the stone by **displacement of water**
- *Volume of water = 100 cm^3*
- *Volume of water plus stone = 150 cm^3*
- *Volume of stone = 150 -100 = 50 cm^3*
- **Calculate** the density
- **Density = mass ÷ volume = 250 g ÷ 50 cm^3 = 5 gcm^{-3}**

Irregular object (Stone)

Balance 250.0 g

250 cm³

200

150   Volume of Stone
   150 − 100 = 50

100

Irregular Solid   50
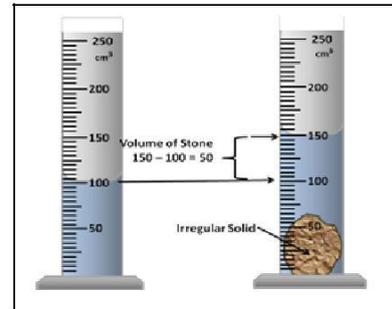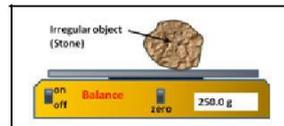
Measure the Density of a Liquid (water)

- Measure the **volume** of the water using a **graduated cylinder** *(remember have your eye level with the mark and measure from the bottom of the meniscus)*
- Record the volume *(200 cm^3)*
- Place a beaker on the balance and zero it
- Carefully pour the liquid into the beaker
- Record the mass of the liquid *(200g)*
- **Calculate** the density of the liquid
- **Density = mass ÷ volume = 200g ÷ 200 cm^{-3} = 1 gcm^{-3}**
- **The density of water is 1 gcm^{-3}**

Result: for Alcohol

- 200 cm^3 weighs 160 g
- Density = 160g ÷ 200 cm^3 = 0.8 gcm^{-3}

Conclusion: Different liquids have different densities

Empty beaker on zeroed balance

Balance   0.0 g

Meniscus   250 cm

200
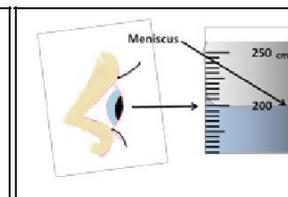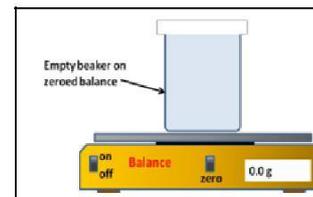
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