Edexcel IGCSE Physics

Chapter 5 - Solids, Liquids and Gases

Practical Flashcards

1. Investigate Density

What equipment is required?

What equipment is required?

- Balance
- Ruler
- Regular solid
- Irregular solid
- Measuring cylinder

Define density

Define density.

Density is the mass per unit volume of an object/material.

Give the equation for density, including all SI units

Give the equation for density, including all SI units

density (kg/m³) = mass (kg) / volume (m³)

$$\rho = m/V$$

How is mass measured?

How is mass measured?

Using a calibrated spring balance or Newton-meter.

How can you measure the volume of a regular solid?

How can you measure the volume of a regular solid?

- Take appropriate length measurements (eg. height, diameter)
- Apply an appropriate formula to calculate the volume

Give examples of regular solids

Give examples of regular solids

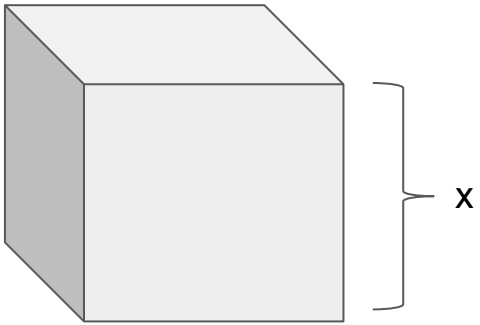
- Cube
- Prism (triangular, cylindrical, rectangular)
- Pyramid
- Cone
- Sphere

Give the formula for the volume of a cube

Give the formula for the volume of a cube

Volume = length^3

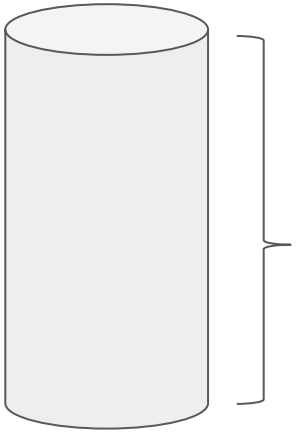
$V = x^3$

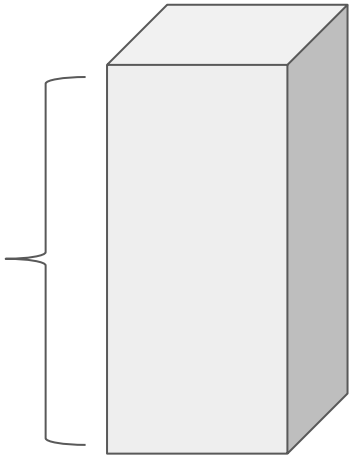


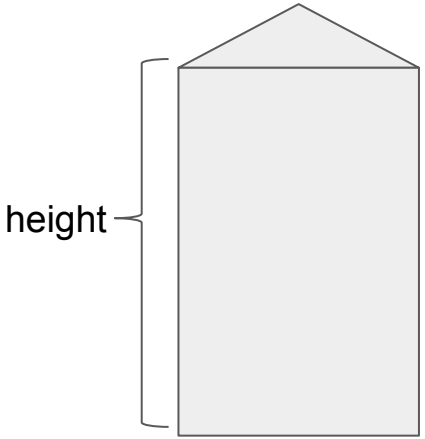
Give the formula for the volume of a prism

Give the formula for the volume of a prism

Volume = area of face x height







Give the formula for the area of a square

Give the formula for the area of a square

$$\text{Area} = \text{length}^2$$

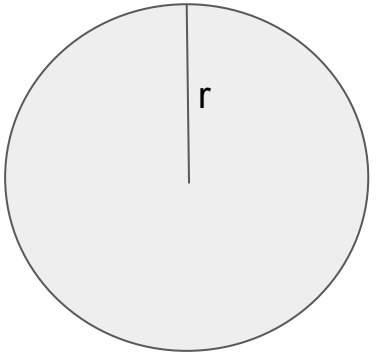
$$A = x^2$$

Give the formula for the area of a circle

Give the formula for the area of a circle

Area = π x radius^2

$A = \pi r^2$

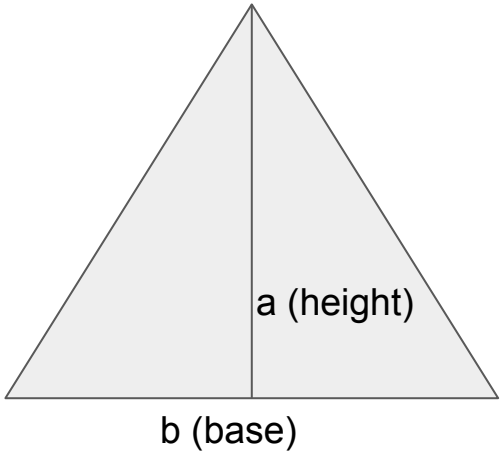


Give the formula for the area of a triangle

Give the formula for the area of a triangle

Area = ½ x base x height

A = ½ab



Give the formula for the volume of a sphere

Give the formula for the volume of a sphere

$$\text{Volume} = 4/3 \times \pi \times \text{radius}^3$$

$$V = 4/3\pi r^3$$

Describe how to work out the density of a regular solid object

Describe how to work out the density of a regular solid object

1. Use a scale/balance to measure its mass
2. Use a ruler to take appropriate length measurements
3. Use an appropriate equation to calculate the volume
4. Use ρ = m/V to calculate the density

How would you find the volume of an irregular solid?

How would you find the volume of an irregular solid?

By **submersion.**

Describe how submersion is used to work out volume

Describe how submersion is used to work out volume

- Fill a beaker with water and read off the volume
  - Submerge the object in the water
  - Read off the new volume in the beaker
- The change in volume is equal to the volume of the object

What precaution must be taken when using submersion?

What precaution must be taken when using submersion?

No water may leave the beaker, so be careful to avoid splashing/spilling.

How can submersion be used if the object floats?

How can submersion be used if the object floats?

Hold the object down so it is just submerged (but take care that your fingers don’t enter the water).

Describe how to work out the density of an irregular solid object

Describe how to work out the density of an irregular solid object

- Use a scale/balance to measure its mass
- Use submersion in a beaker of water to calculate its volume
- Use ρ = m/V to calculate the density

How can you work out the mass of a liquid?

How can you work out the mass of a liquid?

Place a beaker on a balance and zero the device. Pour the liquid into the beaker and read off its mass.

How can you work out the volume of a liquid?

How can you work out the volume of a liquid?

Pour it into a beaker/measuring cylinder and read off the volume.

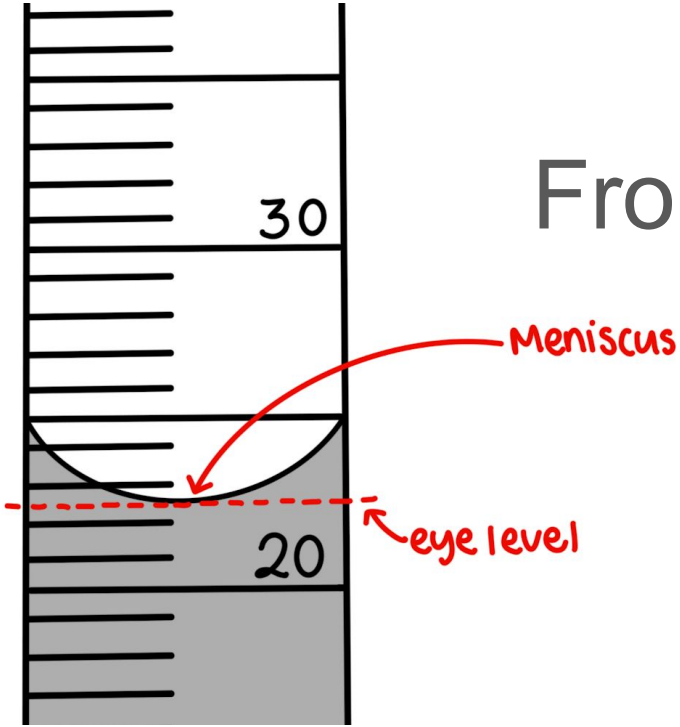
How can you calculate the density of a liquid?

How can you work out the density of a liquid?

- Use a scale/balance to measure its mass
- Read off the volume of liquid
- Use ρ = m/V to calculate the density

How should all readings be taken?

How should all readings be taken?



From the meniscus

2. Obtain a temperature-time graph to show the constant temperature during a change of state

What equipment is needed?

What equipment is needed?

- Crushed ice
- Boiling tube
- Thermometer
- Bunsen burner
- Tripod
- Gauze
- Beaker
- Kettle
- Stopwatch

Outline the method

Outline the method

1. Fill a beaker with boiling water and maintain temperature with a bunsen burner
2. Fill a boiling tube with crushed ice, take the original temperature and place in the beaker
3. Start the stopwatch
4. Take temperature readings every 30 seconds until the ice has visibly melted
5. Plot a graph of temperature against time

What should the graph show?

What should the graph show?

There should be a plateau when the ice is melting.

Why does the graph plateau?

Why does the graph plateau?

Because when the ice is melting, the energy goes into breaking the bonds (change of state) rather than increasing the temperature.

What safety precautions should be taken?

What safety precautions should be taken?

- Take care when pouring boiling water
- Ensure hair is tied back and no loose clothing hangs near the flame
- Ensure the safety flame is on when the burner is not in use
- Ensure gas taps are turned off

3. Investigate the specific heat capacity of materials

Define specific heat capacity

Define specific heat capacity

The energy needed to produce a temperature increase of 1°C in 1kg of a material.

What measurements must be taken to work out the specific heat capacity of a material?

What measurements must be taken to work out the specific heat capacity of a material?

- Mass
- Temperature change
- Energy supplied

What equation is used to calculate specific heat capacity?

What equation is used to calculate specific heat capacity?

$$E = mc\Delta\theta$$

Energy (J) = mass (kg) x specific heat capacity (J/kg°C) x change in temperature (°C)

How is the mass of an object measured?

How is the mass of an object measured?

Using a calibrated mass balance.

Describe the apparatus required for this experiment

Describe the apparatus required for this experiment

- Metal block with two slots
  - ➢ One slot for an electric heater, with voltmeter and ammeter attached
  - ➢ One slot for a thermometer
- Insulating container
- Heatproof mat

What can be done to improve the reading given by the thermometer?

What can be done to improve the reading given by the thermometer?

Add a few drops of water into the hole containing the thermometer to improve the thermal contact and ensure even heating.

How is the energy transfer worked out (power given)?

How is the energy transfer worked out (power given)?

When the power of the heater is given, multiply the power by the time the heater was used for.

Energy (J) = Power (W) x time (s)

How is the energy transfer worked out?

How is the energy transfer worked out using voltmeters and ammeters?

Record the current and voltage of the heater and run the experiment for a set period of time.

Energy (J) = current (A) x voltage (V) x time (s)

What readings are taken?

What readings are taken?

Temperature readings, at 1 minute intervals.

What graph do you plot with the data?

What graph do you plot with the data?

A graph of temperature against work done by the heater.

Why might the graph be non-linear?

Why might the graph be non-linear?

Thermal inertia means the block will initially heat up more slowly.

How can you overcome the error which causes the graph to be non-linear?

How can you overcome the error which causes the graph to be non-linear?

Heat the apparatus for 5 minutes to acclimatise before you start timing.

Describe the method used to determine the specific heat capacity of a metal

Describe the method used to determine the specific heat capacity of a metal

- Measure the mass of the metal
- Record the initial temperature using a thermometer
- Heat for 5 minutes to acclimatise, take V and I readings if necessary, and then start stopwatch. Take temperature readings every minute for 10 minutes
- Plot a graph of temperature against energy supplied (energy = VIt = Pt). Find the gradient.
- The gradient = 1/c so use the reciprocal (1/gradient) to find c

What safety precautions must be taken with this method?

What safety precautions must be taken with this method?

- Be careful when handling the metal after heating; it may be hot - allow it to cool for at least 10 mins before touching
- Ensure all electrical equipment is safe (wires insulated etc.)