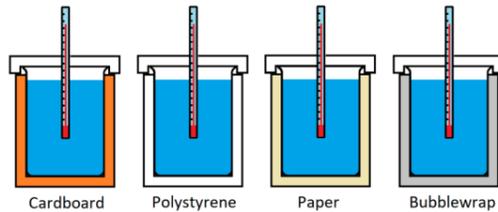


Paper 1

REQUIRED PRACTICALS

Thermal Insulation (Physics Only)

4 Beakers with different insulation had 100ml of 90°C water added and were left for 5 minutes to find the temperature change.



What is the independent variable in this experiment?

What is the dependant variable?

Why should you draw a bar chart?

Name 3 control variables?

How can you reduce the effect of random errors?

The cardboard insulation was repeated 5 times with the following temperature drops, 12°C, 13°C, 12°C, 13°C, 4°C. What is the mean?

The paper insulation was repeated 5 times with the following temperature drops, 10°C, 12°C, 12°C, 10°C, 11°C.

What is the mean?

What is the uncertainty?

What is the range?

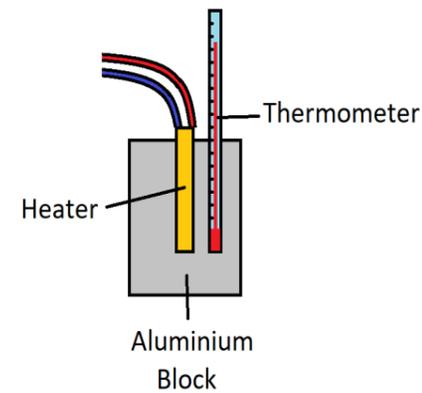
Are the results precise or reproducible?

What was the resolution of the thermometer?

Specific Heat Capacity

What is specific heat capacity? What is its unit?

Draw the circuit diagram for this experiment including an ammeter and voltmeter



How do you calculate to power of the heater?

How much energy would a 18W heater transfer in 10 minutes?

Why is a drop of water around the thermometer helpful?

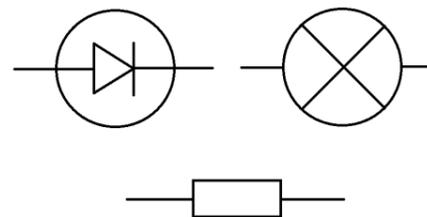
Rearrange the equation to make specific heat capacity the subject

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{temperature change}$$

Why is the experimental result usually too high? What can be done to make it more accurate?

IV Characteristics

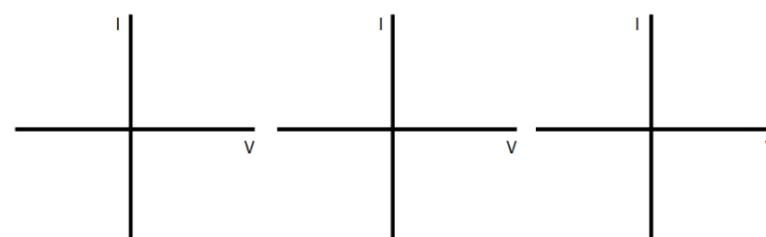
Draw a circuit diagram to produce the IV characteristic of a filament lamp. Include an ammeter, a voltmeter and a way to vary the current and potential difference for the filament lamp.



How can you make the readings on the ammeter and voltmeter go negative?

How can you prevent the current from going too high through the diode?

Draw the IV Characteristics of the 3 components



An ohmic conductor

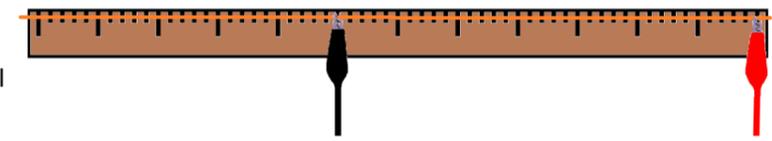
A diode

A filament lamp

Explain the shape of each IV characteristic.

Resistance

What equation links potential difference, current and resistance?



Rearrange the equation for resistance and give all units

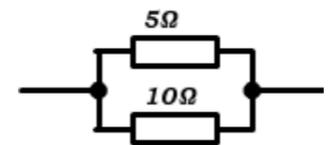
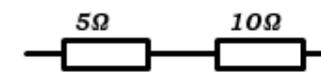
Draw the circuit diagram including ammeters and voltmeters to find...

The resistance on a wire

The resistance of 2 resistors in series

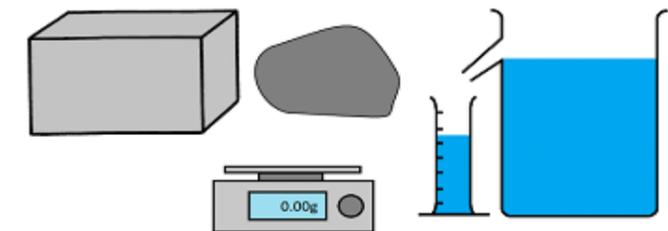
The resistance of 2 resistors in parallel

What is the total resistance in the 2 diagrams



Density

What is the equation for density?
What is the unit?



What is the equation for the volume of a regular object?

How do you convert cm³ to m³?

What is the volume (in m³) of a regular object, height 3cm, width 4cm, length 5cm?

How do you find the volume of an irregular object using a displacement can?

If gold has a density of 19.3g/cm³ what is this in kg/m³?

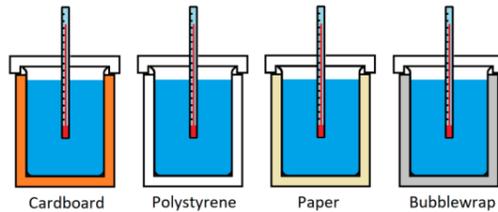
What volume of the gold would have a mass of 100kg?

Paper 1

REQUIRED PRACTICALS

Thermal Insulation (Physics Only)

4 Beakers with different insulation had 100ml of 90°C water added and were left for 5 minutes to find the temperature change.



What is the independent variable in this experiment?

Type of insulation

What is the dependant variable?

Temperature change in 5 minutes

Why should you draw a bar chart?

Type of insulation is a categoric variable

Name 3 control variables? **Volume of water, thickness of insulation, start temperature.**

How can you reduce the effect of random errors?

Repeat and calculate a mean

The cardboard insulation was repeated 5 times with the following temperature drops, 12°C, 13°C, 12°C, 13°C, 4°C. What is the mean?

12.5°C or 13°C if rounded (ignore anomaly)

The paper insulation was repeated 5 times with the following temperature drops, 10°C, 12°C, 12°C, 10°C, 11°C.

What is the mean? 11°C

What is the uncertainty? ± 1°C

What is the range? 10-12°C

Are the results precise or reproducible?

Precise

What was the resolution of the thermometer?

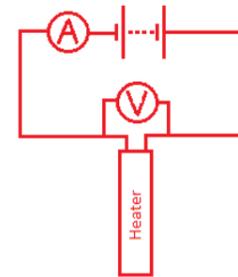
1°C

Specific Heat Capacity

What is specific heat capacity? What is its unit?

The amount of energy required to raise 1kg of a substance by 1°C (Unit J/kg °C)

Draw the circuit diagram for this experiment including an ammeter and voltmeter



How do you calculate to power of the heater?

Power (W) = potential difference (V) x current (A)

How much energy would a 18W heater transfer in 10 minutes?

10 minutes x 60 = 600s 18W x 600s = 10,800J

Why is a drop of water around the thermometer helpful?

Provides a good thermal contact with the metal block

Rearrange the equation to make specific heat capacity the subject

change in thermal energy = mass x specific heat capacity x temperature change

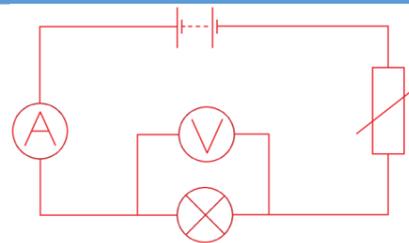
$$\text{specific heat capacity} = \frac{\text{energy transferred}}{\text{mass x temperature rise}}$$

Why is the experimental result usually too high? What can be done to make it more accurate?

Thermal energy lost to the surrounding so more energy is required to increase the temperature of the block. Thermal insulation would reduce this error and give more accurate results.

IV Characteristics

Draw a circuit diagram to produce the IV characteristic of a filament lamp. Include an ammeter, a voltmeter and a way to vary the current and potential difference for the filament lamp.



How can you make the readings on the ammeter and voltmeter go negative?

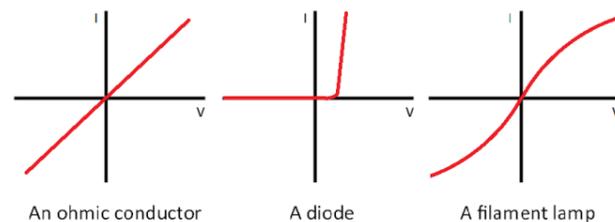
Reverse the connections to the electrical supply

How can you prevent the current from going too high through the diode?

Add a resistor to the circuit

Draw the IV Characteristics of the 3 components

Explain the shape of each IV characteristic.



3. The resistance in the filament lamp increases as the temperature of the filament increases

1. Resistance is constant so current directly proportional to resistance

2. Diode only allows current to flow in 1 direction and has a very high resistance in the reverse direction

Resistance

What equation links potential difference, current and resistance?

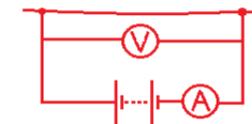
Potential difference = current x resistance

Rearrange the equation for resistance and give all units

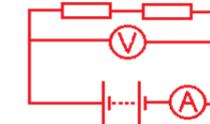
Resistance (Ω) = potential difference (V) / current (A)

Draw the circuit diagram including ammeters and voltmeters to find...

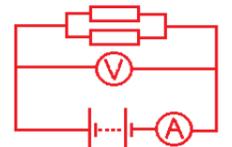
The resistance on a wire



The resistance of 2 resistors in series

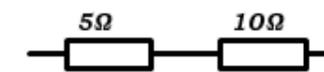


The resistance of 2 resistors in parallel

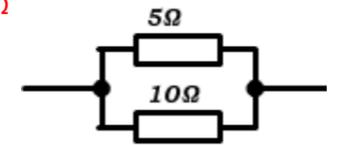


What is the total resistance in the 2 diagrams

15 Ω



less than 5 Ω

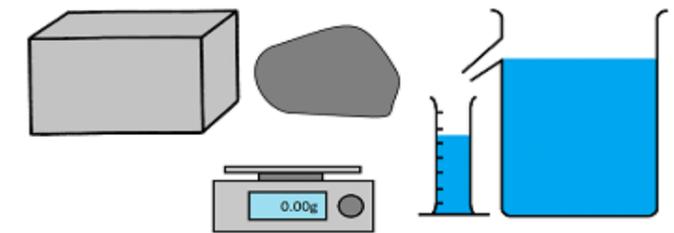


Density

What is the equation for density?

What is the unit?

$$\text{Density (kg/m}^3\text{)} = \frac{\text{Mass (kg)}}{\text{Volume (m}^3\text{)}}$$



What is the equation for the volume of a regular object?

Height (m) x Width (m) x Length (m)

How do you convert cm³ to m³?

÷ 1,000,000

What is the volume (in m³) of a regular object, height 3cm, width 4cm, length 5cm?

0.03m x 0.04m x 0.05m = 0.00006m³

How do you find the volume of an irregular object using a displacement can?

Carefully submerge the object in a full displacement can, catch the water in a measuring cylinder

If gold has a density of 19.3g/cm³ what is this in kg/m³?

19,300 kg/m³

What volume of the gold would have a mass of 100kg? **Volume = mass / density**

100 kg / 19,300 kg/m³ = 0.00518 m³