AQA GCSE

Required Practical Activities

Recall tests

Paper 1

Biology 4.1 Cell Biology – RPA Microscopy

Biology 4.1 Cell Biology – RPA Microbiology (biology only)

Biology 4.1 Cell Biology – RPA Osmosis

Biology 4.2 Organisation – RPA Enzymes

Biology 4.2 Organisation – RPA Food Tests

Chemistry 4.4 Chemical Changes – RPA Making Salts

Chemistry 4.4 Chemical Changes – RPA Neutralisation (chemistry only)

Chemistry 4.4 Chemical Changes – RPA Electrolysis

Chemistry 4.5 Energy Changes – RPA Temperature Changes

Physics 4.1 Energy – RPA Specific Heat Capacity

Physics 4.1 Energy – RPA Insulation (physics only)

Physics 4.2 Electricity – RPA Resistance

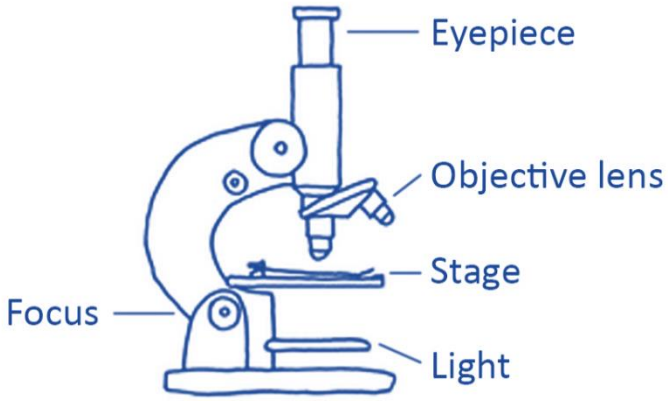
Physics 4.2 Electricity – RPA I-V characteristics

Physics 4.3 Particle Model – RPA Density

Biology 4.1 Cell Biology – RPA Microscopy

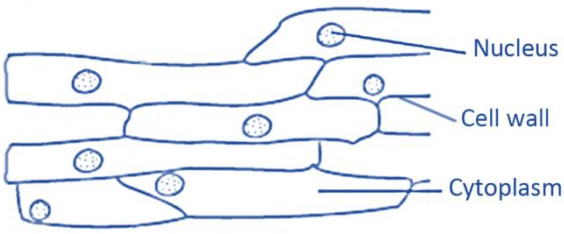
Light microscopes let us see very small structures such as the cells in an onion skin.

① Draw a labelled diagram of a microscope.



② Describe how you could prepare an onion skin to be investigated under a microscope.

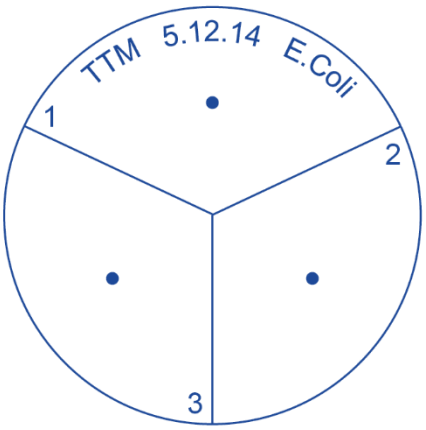
- peel off a thin layer of epidermal tissue from the inner surface
- use forceps to put this thin layer flat onto a drop of water on a microscope slide
- put two drops of iodine solution onto the onion tissue
- carefully lower a coverslip onto the slide
- view and sketch the cells at different magnifications
- expected result:



Biology 4.1 Cell Biology – RPA Microbiology (biology only)

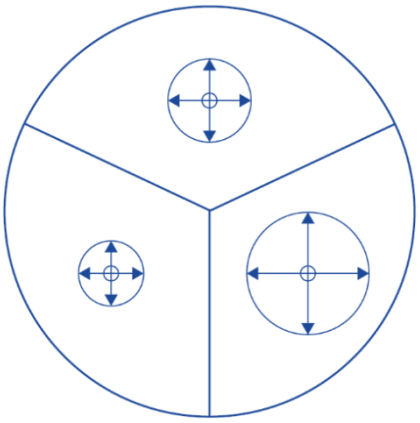
Bacteria responded differently to different antiseptics and disinfectants.

① Draw a diagram of the petri dishes you could use to investigate the effect of antiseptics or antibiotics on bacterial growth.



before experiment

2 measurements of each clear zone



after 48 h

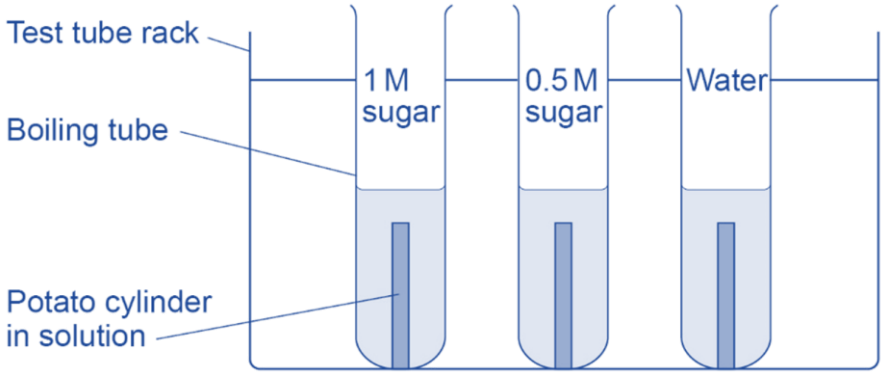
② Describe how you could investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition.

- nutrient agar plate with e. coli bacteria
- put a different antiseptic (i.e. mouthwash, TCP, antiseptic cream) onto a filter paper disc each
- place the filter papers onto the agar plate using forceps and secure the lid
- put the agar plate into an incubator at 25 °C for 48 hours
- measure the diameter of the clear zone around each disc by placing the ruler across the centre of the disc
- measure again at 90° to the first measurement so that the mean diameter can be calculated

Biology 4.1 Cell Biology – RPA Osmosis

Osmosis is the movement of water through a selectively permeable membrane from an area of high concentration of water to an area of lower concentration of water. Plant tissues, such as potato, can be used to investigate osmosis.

① Draw a labelled diagram of an experiment to investigate the effect of a range of concentrations of sugar solutions on the mass of potato cylinders.



② Describe how you could conduct the investigation of osmosis in potato tissue.

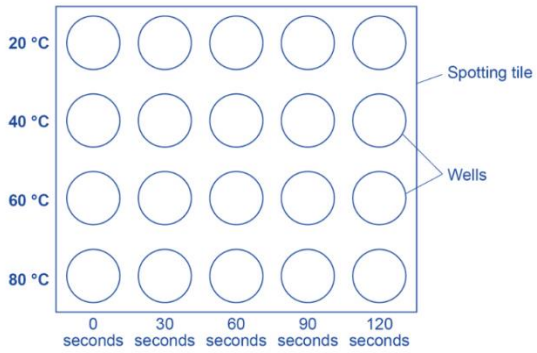
- cut three potato cylinders of the same diameter and length
- measure the length using a ruler
- determine the mass of each potato cylinder using scales
- add one potato cylinder to a tube of 10 cm^3 of 1 M sugar solution, one to a tube of 10 cm^3 of 0.5 M sugar solution and a tube of 10 cm^3 distilled water
- leave the potato cylinders in the boiling tubes overnight in the test tube rack
- re-measure the length and mass of each cylinder
- draw a graph of change in mass against concentration of sugar solution

Biology 4.2 Organisation – RPA Enzymes

The enzyme amylase controls the breakdown of starch in our digestive system. We are able to simulate digestion, using solutions of starch and amylase in test tubes, and find the optimum conditions required.

① State the equipment used and draw a labelled diagram of an experiment to investigate the effect of temperature on the enzyme amylase.

- boiling tubes
- water bath
- spotting tiles
- pipettes
- stop clock
- starch solution
- amylase solution
- iodine solution



② Describe how you could conduct the investigation of the effect of temperature on the enzyme amylase.

- mix same volume of 1% starch solution 20°C with amylase solution 20°C
- after 30 seconds, add a drop of the starch and amylase mixture to a drop of iodine solution in one well of a spotting tile
- repeat every 30 seconds until the iodine solution no longer changes colour
- repeat the experiment at 40 °C and at 60 °C and at 80 °C

Biology 4.2 Organisation – RPA Food Tests

We know that each dish is usually made up of one or more ingredients, called nutrients. Different food items contain different types of nutrients.

① State the equipment and chemicals used to tests different foods for carbohydrates, proteins and fat.

- food to be tested
- a pestle and mortar
- a stirring rod
- a filter funnel and filter paper
- test tubes
- Benedict's solution
- iodine solution
- Sudan III stain solution
- Biuret solution

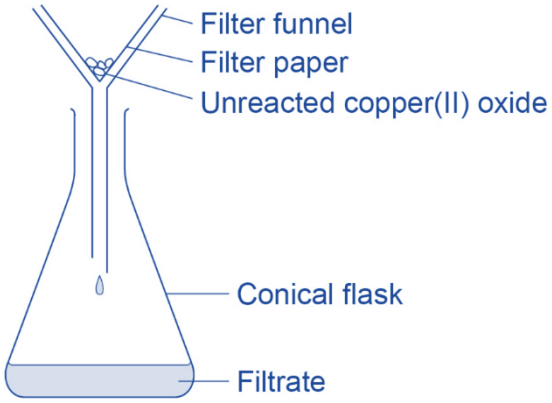
② Describe how you could use qualitative reagents to test for a range of carbohydrates, proteins and fat.

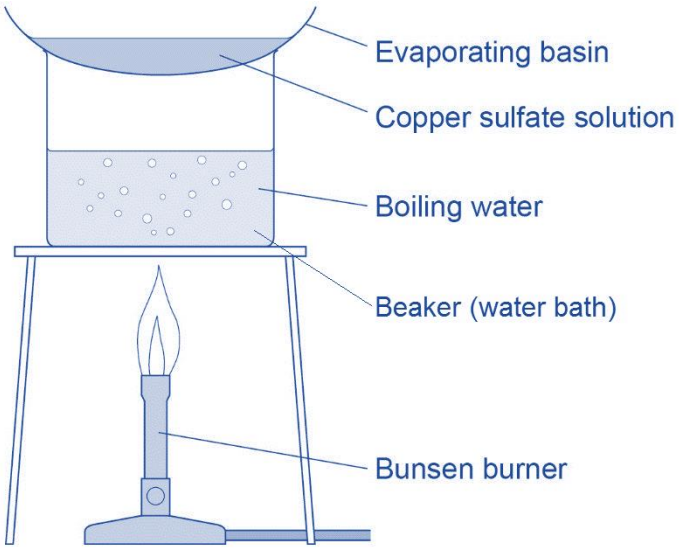
- grind up food samples and mix with water
- filter using a funnel with filter paper to obtain a clear solution
- use Benedict's solution in a hot water bath to test for sugar: if sugar is present, the solution will turn green, yellow or red after a few minutes
- use iodine solution to test for starch: if starch is present, a blue-black colour will appear
- use Sudan III stain solution to test for fat: if fat is present, a red-stained oil layer will separate out
- use Biuret solution to test for proteins: if proteins are present, the solution will turn pink or purple

Chemistry 4.4 Chemical Changes – RPA Making Salts

A salt is any compound formed by the neutralisation of an acid by a base.

① Draw a labelled diagram showing how the apparatus used to prepare pure dry copper sulfate crystals could be arranged.





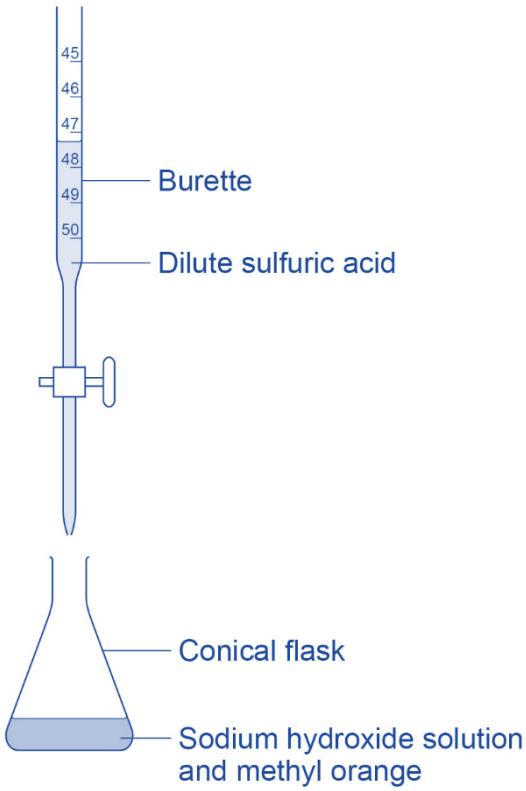
② Describe how you could prepare pure dry copper sulfate crystals.

- react sulfuric acid and copper (III) oxide powder to prepare an aqueous solution of a salt
- filter the unreacted base from the reaction
- evaporate the filtrate to leave a concentrated solution of the salt
- which will crystallise as it cools and evaporates further
    - when dry the copper sulfate crystals will have a high purity

Chemistry 4.4 Chemical Changes – RPA Neutralisation (chemistry only)

A reaction of an acid with an alkali to form neutral products is called neutralisation.

① Draw a labelled diagram of the apparatus used to determine the concentration of solutions of a strong acid and a strong alkali by titration.



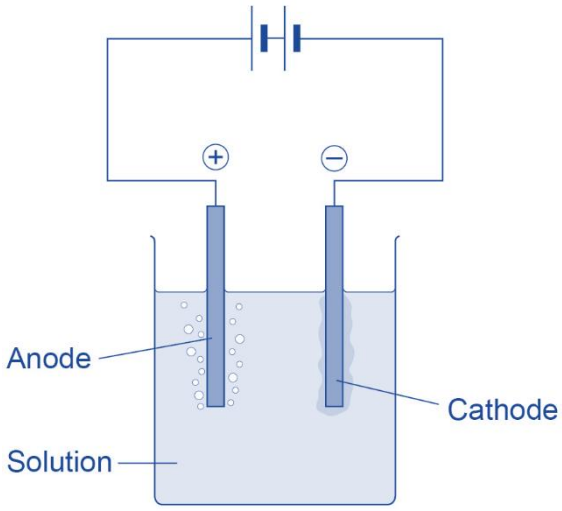
② Describe how you could use the apparatus to determine the concentration of solutions of a strong acid and a strong alkali.

- pipette a volume of sodium hydroxide of known concentration into a conical flask
- add a few drops of methyl orange indicator
- add sulfuric acid from burette until the indicator changes colour
- measure volume of acid used
- calculate the concentration of the acid

Chemistry 4.4 Chemical Changes – RPA Electrolysis

Electrolysis is the process by which ionic substances are broken down into simpler substances when an electric current is passed through them.

① Draw a labelled diagram of the apparatus used to investigate the elements formed at each electrode when different salt solutions are electrolysed.



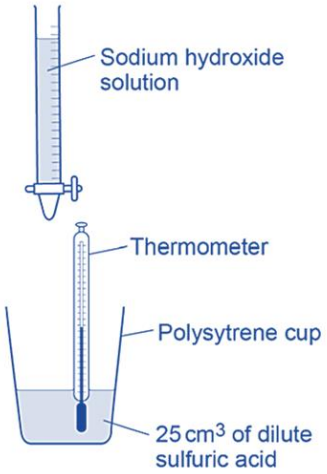
② Describe how you could use the apparatus to identify the element formed at the positive and negative electrode in each case.

- set up the apparatus and switch on the power supply
- positively charged ions (metal ions and hydrogen ions) move to the negative electrode
- negatively charged ions (halogens, oxy-anions) move to the positive electrode
- use litmus paper near the positive electrode to check for acids
- examine the negative electrode to check for metal coating
- check for bubbling at both electrodes to see if gases are formed

Chemistry 4.5 Energy Changes – RPA Temperature Changes

Exothermic reactions transfer heat to the surroundings. Endothermic reactions take in heat from the surroundings.

① Draw a labelled diagram of the apparatus used to investigate the temperature changes which take place when an acid is neutralised by an alkali.



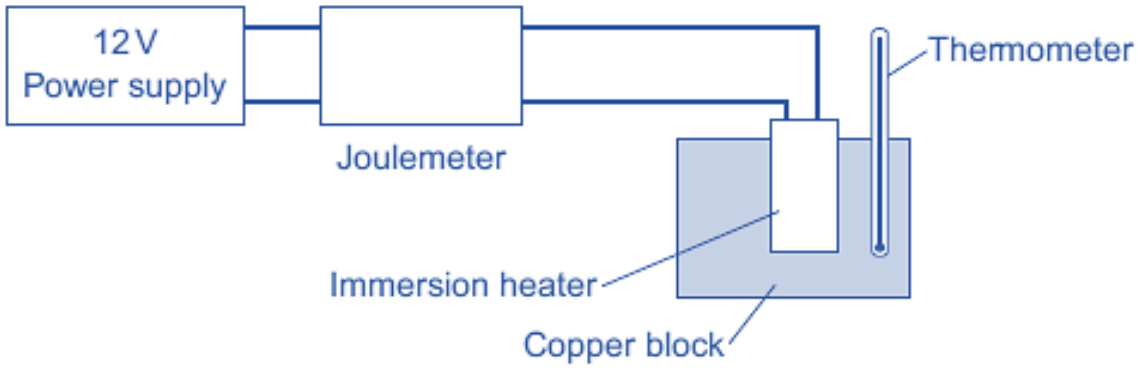
② Describe how you could investigate the temperature changes which take place when an acid is neutralised by an alkali.

- measure a volume of hydrochloric acid into a polystyrene cup
- record the temperature
- add a given volume of sodium hydroxide solution
- record the temperature
- repeat, using the same volume of sodium hydroxide solution each time, until the temperature decreases again
- plot a graph of temperature against total volume of sodium hydroxide
- draw to intersecting lines of best fit
- where the lines meet indicates the volume of sodium hydroxide needed to neutralise the hydrochloric acid

Physics 4.1 Energy – RPA Specific Heat Capacity

The specific heat capacity of copper can be determined by experiment.

① Draw a labelled diagram showing how the apparatus used to determine the specific heat capacity of copper should be arranged.



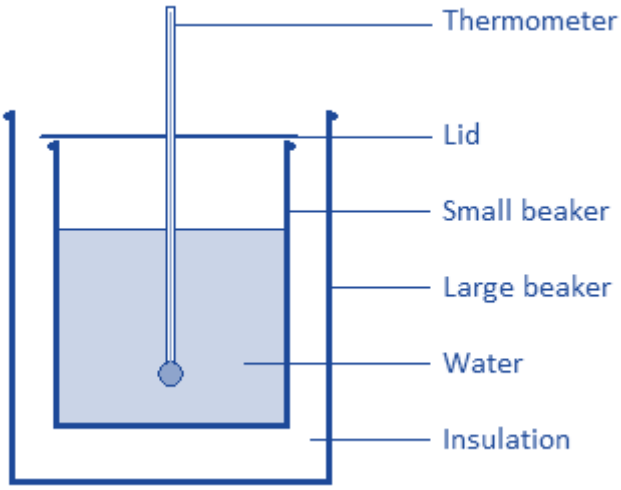
② Describe how you could use the apparatus you drew to determine the specific heat capacity of copper.

- measure energy transferred from the heater using joulemeter
- determine mass of the block using electric balance
- measure temperature change using thermometer
- calculate specific heat capacity using $\Delta E = mc\Delta\theta$
- repeat practical and calculate a mean
- insulate block to reduce heat lost to surrounding

Physics 4.1 Energy – RPA Insulation (physics only)

The effectiveness of different materials as thermal insulators can be determined by experiment.

① Draw a labelled diagram showing how the apparatus used to determine the effectiveness of different materials as thermal insulators should be arranged.



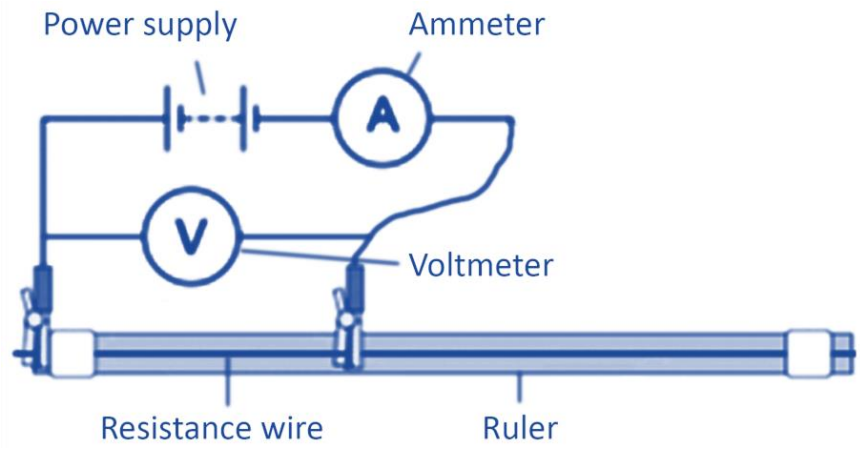
② Describe how you could use the apparatus you drew to determine the effectiveness of different materials as thermal insulators.

- boil water in a kettle and into a beaker wrapped in insulating material
- use lid to reduce heat lost to surroundings
- record the temperature of the water using the thermometer every 3 minutes using a stopwatch
- repeat for different insulating materials
- draw cooling curves by plotting temperature against time
- lowest gradient is the best insulator

Physics 4.2 Electricity – RPA Resistance

The specific heat capacity of copper can be determined by experiment.

① Draw a labelled diagram showing the circuit used to investigate how the resistance of a wire depends on its length.



② Describe how you could use the circuit you drew to investigate how the resistance of a wire depends on its length.

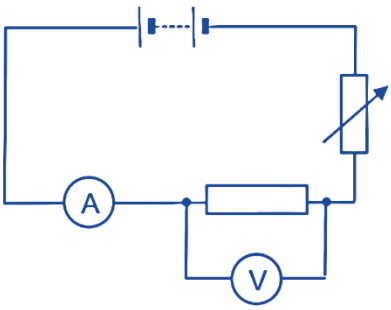
- measure potential difference and current using the voltmeter and ammeter for different lengths of wire from 10 cm to 90 cm
- calculate the resistance for each measurement using $R = \frac{V}{I}$
- plot resistance in Ω against length of wire in cm
- switch off power supply between readings so the wire doesn't get too hot

Physics 4.2 Electricity – RPA I-V characteristics

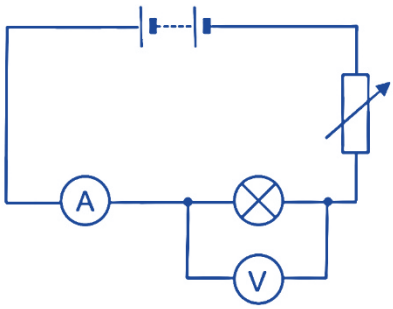
What happens to the current through a component when the potential difference across it changes?

① Draw a circuit diagram to investigate the behaviour of a resistor, a lamp and a diode. In each one you are going to measure electric current in the component as you change the potential difference across it.

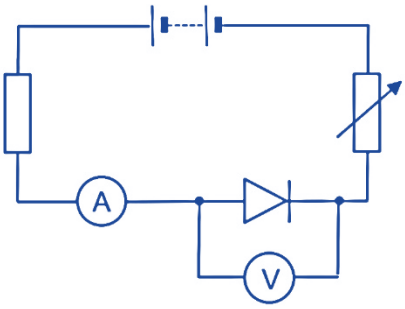
Resistor



Lamp

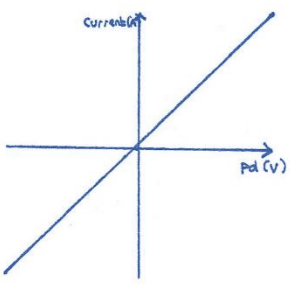


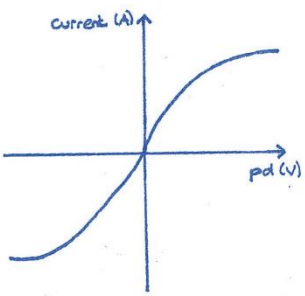
Diode

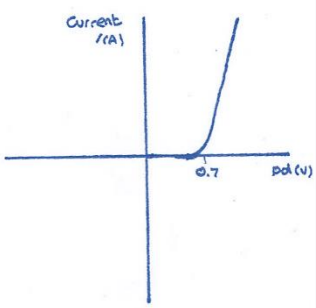


② Describe how you could use the circuits you drew to investigate the I-V characteristics of a filament lamp, a diode and a resistor at constant temperature.

- record the readings on the ammeter and voltmeter
- adjust the variable resistor and record the new ammeter and voltmeter readings
- repeat this to obtain several pairs of readings
- repeat for negative values
- plot a graph of current in *A* against potential difference in *V*
- expected graphs for resistor, lamp and diode:





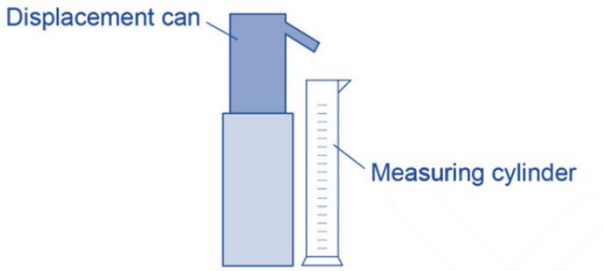


Physics 4.3 Particle Model – RPA Density

Density is a characteristic property of a substance. The density of a substance is the relationship between the mass of the substance and how much space it takes up.

① List / sketch the equipment you could use to determine the density of regular and irregularly shaped objects.

- balance
- ruler for regular shaped objects
- displacement can and measuring cylinder for irregular shaped objects



② Describe the methods used to calculate the densities of the regular and irregular shaped objects.

regular shaped object (i.e. cube):

- measure mass using a balance
- measure length, width and height of cube's sides using a ruler
- calculate volume ($m \times w \times h$)
- calculate density using $\rho = \frac{m}{V}$

irregular shaped object (i.e. small statue):

- measure mass using a balance
- immerse in water in displacement can
- use measuring cylinder to measure volume of water displaced
- volume of water displaced = volume of object
- calculate density using $\rho = \frac{m}{V}$