

**Genetic inheritance**  
List some features you can inherit from your parents

Eye colour	Weight
Hair colour	Skin colour
Height	

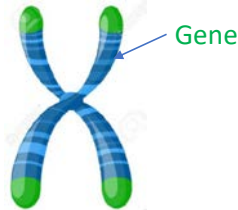
**Environment and inheritance**

How does the environment affect variation?

Environmental factors such as diet can affect your height and weight. If you are malnourished you're more likely to be small in height and lower in weight.

Characteristics like hair colour can be changed through dying your hair.

**Chromosomes**  
Draw and label a chromosome, label a gene and describe what an allele is



An allele is a different form of the same gene. This can be recessive or dominant. Dominant alleles are always expressed (shown) over recessive alleles.

**9B1 Inheritance  
Essential Knowledge Sheet**

**Selective breeding**

List the stages of selective breeding

1	Select parents with the desired features
2	Breed these together
3	Pick the offspring with the desired features
4	Breed these together
5	Continue this until all offspring have the desired features

**Punnet square diagram**

Both parents are carrier's of cystic fibrosis. What are the chances that their children will inherit the condition? Draw a punnet square to show your working

f is the cystic fibrosis allele

		mother	
		F	f
father	F	FF	Ff
	f	Ff	ff

25% chance that the child will have cystic fibrosis (ff)

## Adaptations of the lungs

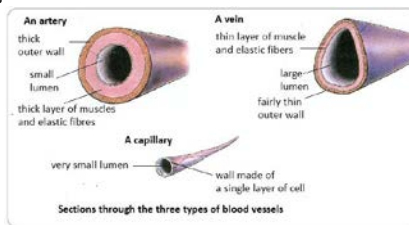
How are the lungs adapted for efficient gas exchange? The diagram may help you



- One cell thick so a short diffusion path
- Lots of alveoli increases the surface area
- Good blood supply for rapid exchange of substances

## Blood vessel structure

Draw and label a diagram of an artery, vein and capillary



## 9B2 Respiration Essential Knowledge Sheet

### Aerobic respiration

Answer the following questions:

What is the word equation for aerobic respiration?

Glucose + oxygen => carbon dioxide + water + energy

Where does the glucose for respiration come from?

Food from our digestive system

Where does the oxygen for aerobic respiration come from?

Breathing – the respiratory system

### Anaerobic respiration

Answer the following questions:

What is the word equation for anaerobic respiration?

Glucose => lactic acid + energy

When do people use anaerobic respiration?

During high intensity exercise and at high altitudes

Which microorganisms use anaerobic respiration?

Yeast

What do they produce?

Ethanol

## Breathing vs respiration

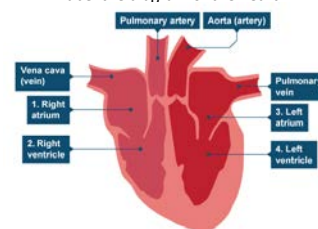
Summarise the difference between breathing and respiration

Breathing is also known as ventilation. Breathing is a physical process when we take oxygen into our lungs and remove carbon dioxide.

Respiration is a chemical process that happens in every cell in the body. Respiration releases energy in the mitochondria.

## The Heart

Label the diagram of the heart



## The effect of exercise

What happens to your heart rate during exercise?

Increases

Why does this happen?

To pump more blood around the body, carrying more oxygen to cells for respiration and carrying away more carbon dioxide from cells

Why might we get cramp?

Build up of lactic acid from anaerobic respiration

What is an oxygen debt?

The amount of oxygen we have to repay to break down lactic acid into carbon dioxide and water so that we can get rid of it

How can you tell if someone is fitter?

Their resting heart rate will be lower and not rise as much during exercise

## Photosynthesis

Answer the following questions:

Where does photosynthesis happen?

Palisade cells in the leaf

Word equation:

Carbon dioxide + water => glucose + oxygen

Why do plants need to perform photosynthesis?

To create glucose needed for respiration

## Plant reproduction

Describe how reproduction occurs in plants. Use the following keywords: pollination, pollen, stigma, style, ovary, fruit, ovule, seed

Fertilisation involves the fusion of the nucleus of the male gamete (pollen) with the nucleus of the female gamete (ovule).

Pollination happens when pollen moves from one flower to another or some plants can fertilise themselves with their own pollen.

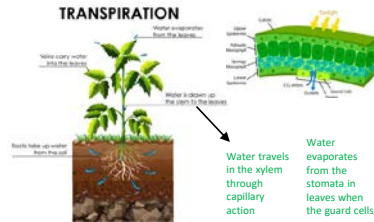
The pollen granule lands on the stigma and travels down the style in a pollen tube to the ovary.

Once this has happened the ovule starts to produce a seed or a fruit can form.

## Transpiration

Draw a diagram to show transpiration. Use the following key words:

Stomata, guard cell, xylem, capillary action



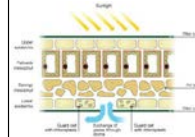
## Seed dispersal

List and explain the different types of seed dispersal

Type of dispersal	How it happens
Wind	The seed travels in the wind and lands in soil elsewhere
Animal	Animals eat the seed and eject it as waste elsewhere. They can also stick to the animal who can take it other places
Water	Seeds land in water (e.g. coconuts) and then transported elsewhere down the river
Bursting	Some plants burst open releasing their seeds. The seeds travel from the pressure when the plant bursts

## Adaptations

Describe how a plant is adapted for photosynthesis. The image should help.



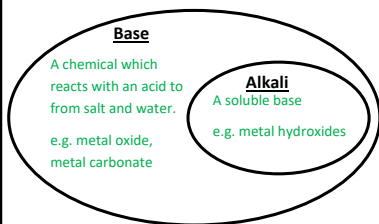
Palisade cells are close to the top of the leaf so that they absorb more sunlight.  
Lots of air spaces to increase surface area so more carbon dioxide can move in and oxygen out.  
Guard cells control the opening and closing of the stomata so can control the amount of carbon dioxide going in and can control the amount of water lost on a hot day.

## Rate of photosynthesis

What factors might speed up the rate of photosynthesis?

Increased temperature  
Increased light intensity  
Increased carbon dioxide  
Increased water

Complete the diagram with the correct definitions and give examples of each.



Give the missing masses to show conservation of mass in the reactions below:

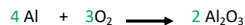
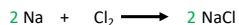
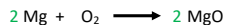
Carbon + Oxygen  $\longrightarrow$  carbon dioxide

12g      32g      44g

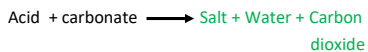
Magnesium + Oxygen  $\longrightarrow$  magnesium oxide

0.48g      0.32g      0.80g

Balance the following equations



Complete the general equations below:

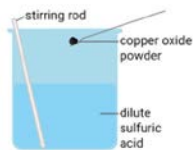


9C2—Chemical Reactions  
Essential Knowledge Sheet

Name the salt produced in each reaction

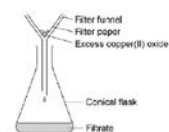
Acid	Base	Salt
Hydrochloric acid	Copper oxide	Copper chloride
Sulfuric acid	Sodium carbonate	Sodium sulfate
Nitric acid	Sodium hydroxide	Sodium nitrate

Use the diagrams to help you describe how to make a pure, dry sample of copper sulfate.



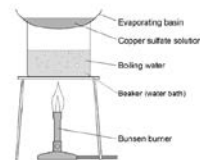
Add excess copper oxide to the sulfuric acid.

Stir to ensure that it has all reacted.



Filter off the excess copper oxide using a funnel and filter paper.

Pour the filtrate into an evaporating basin.



Place the evaporating basin over a beaker of water and heat until about half the liquid in the basin has evaporated.

Leave for a few days until crystals of copper sulfate form.

Pat crystals dry between 2 paper towels.

Metals are found on the left of the periodic table.

Three properties of metals are: shiny, good conductors of heat and electricity, malleable, ductile

Non-metals are found on the right of the periodic table.

Three properties of a non-metal are: brittle, insulators, dull

Describe what you observe when each metal below reacts with water.

**Lithium** Floats on surface and fizzes. Universal indicator added to water will turn purple.

**Sodium** Floats on surface and fizzes. Forms a sphere. Universal indicator added to water will turn purple.

**Potassium** Floats on surface and fizzes. Produces a lilac flame. Universal indicator added to water will turn purple.

Complete the word equations below:

Sodium + water  $\longrightarrow$  sodium hydroxide + hydrogen

Potassium + water  $\longrightarrow$  potassium hydroxide + hydrogen

Caesium + water  $\longrightarrow$  caesium hydroxide + hydrogen

Place the metals below in order of reactivity:

Copper, sodium, magnesium, iron, zinc

sodium Most reactive

magnesium

zinc

iron

copper Least reactive



9C1—Reactivity of Metals  
Essential Knowledge Sheet

Complete the table below to show what happens when metals reacts with oxygen.

Metal	Observation	Product
Magnesium	Burns with a bright, white light	Magnesium oxide
Iron	Slowly forms an orange, crumbly layer	Iron oxide
Sodium	Quickly forms a grey coating	Sodium oxide

Complete the following equations to show metals reacting with acids:

Magnesium + hydrochloric acid  $\longrightarrow$  magnesium chloride + hydrogen

Zinc + sulfuric acid  $\longrightarrow$  zinc sulfate + hydrogen

Iron + nitric acid  $\longrightarrow$  iron nitrate + hydrogen

Calcium + sulfuric acid  $\longrightarrow$  calcium sulfate + hydrogen

What is meant by a displacement reaction?

A more reactive metal will displace a less reactive one from a compound.

Complete the equations below.

Magnesium + copper sulfate  $\longrightarrow$  magnesium sulfate + copper

Iron + magnesium sulfate  $\longrightarrow$  no reaction

Zinc + iron sulfate  $\longrightarrow$  zinc sulfate + iron

Describe the steps to turn fresh water into potable water.

Filter to remove solids

Sterilise using chlorine/ozone/uv light to kill bacteria

Give the two methods for how sea water is turned into potable water?

Distillation

Reverse Osmosis

Describe how distillation works.

Evaporate the water and then condense the steam to get pure water

Describe how reverse osmosis works.

Apply a large pressure and pass water through a semi permeable membrane

Describe a method that allows you to calculate the mass of solids dissolved in  $100 \text{ cm}^3$  of river water.

- 1) Measure the mass of an empty evaporating basin.
- 2) Add  $100 \text{ cm}^3$  of river water to the evaporating basin
- 3) Heat until all of the water is evaporated
- 4) Measure the mass of the solid and the evaporating basin
- 5) The mass of the solid is the difference between the mass at the start and end

Describe what type of pollution is caused from each pollutant gas.

Carbon Dioxide— Climate Change

Sulfur Dioxide— Acid Rain/Respiratory Issues

Nitrogen Oxides— Acid Rain

Carbon Monoxide— Toxic Gas

Soot (Particulates)- Global Dimming/Respiratory issues



9C3—Resources and pollutants

Essential Knowledge Sheet

Which 2 elements make up a hydrocarbon?

Hydrogen and Carbon

Describe the difference between complete and incomplete combustion.

Complete combustion is in enough oxygen

Incomplete combustion is in a limited supply of oxygen

Describe 4 effects of climate change.

Increase in temperature can lead to melting of polar ice caps.

Frequency and severity of storms

Changes to availability of water

Flooding and drought due to changes in weather patterns

Describe how a person could reduce their carbon footprint.

Change to greener energy sources and drive more efficient vehicles or change to an electric vehicle.

State whether the product of combustion of a hydrocarbon is formed from complete or incomplete combustion

Carbon Monoxide— Incomplete

Carbon Dioxide— Complete

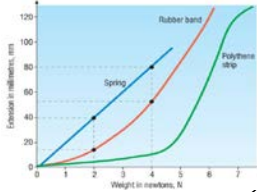
Water— Complete and Incomplete

Soot— Incomplete

## Electricity and Elasticity



This graph shows the extension of different elastic materials, under different loads.  
 Directly proportional – a graph will show this if the line of best fit is a straight line through the origin  
 The steel spring gives a straight line through the origin. This shows that the extension of the steel spring is directly proportional to the weight hung on it.



For example, doubling the weight from 2.0 to 4.0 N, doubles the extension from 40mm, to 80mm.

### Keywords and key features:

Series circuit:

Current in a series circuit stays the same.  
 Potential difference is shared between components

Parallel circuit:

Current in a parallel circuit splits between each branch.  
 Potential difference is the same across each branch.

### Circuit symbols and their purpose:

Component	symbol	purpose
Cell		Provides the power for the circuit
Battery		Provides the power for the circuit
Switch - open		Stops a circuit from working
Switch - closed		Makes a circuit work
Bulb/filament lamp		Glow when a circuit is complete
resistor		It slows down the flow of electrons
ammeter		Measures the current
voltmeter		Measures the potential difference

### Resistance of wires.

A longer wire has **more/less** resistance than a short one.

A wider wire has **more/less** resistance than a thin one.

### Key Formula and units:

Voltage from current and resistance:

$$V=IR$$

Voltage is measured in volts (V)

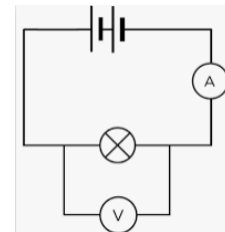
Current is measured in amps (A)

Resistance is measured in ohms ( $\Omega$ )

List the equipment needed to investigate how the amount of force affects the length of a spring.

Ruler, Spring, Clamp stand, Clamp, Boss, Weights

**Circuit Diagram:** The circuit that can be used to find the resistance of a bulb



# FORCES and MOTION

What is the definition of a force?

A force is a push or a pull that causes an object to **move faster or slower, change direction or change size or shape.**

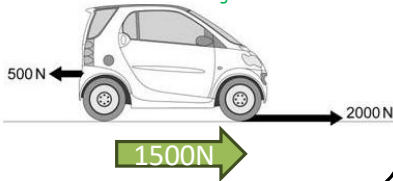
What are balanced forces and what do they cause?

Balanced forces are when all forces are equal. They cause an object to **be at rest or move at a constant speed.**

What are unbalanced forces and when do they occur?

Unbalanced forces are when there is a resultant force. They cause an object to **move faster or move slower or change direction**

Calculate the resultant force:  
2000N-500N=1500N to the right



Drag or air resistance acts against motion. It increased with speed – but decreases if the object is more **streamlined.**

Weight always acts downwards. It depends on the mass of the object.



Draw the missing forces in the 3 stages of a sky dive:

1. When jumping from plane:



2. When at terminal velocity:



3. When parachute released:



What are the equations for speed and what are the units:?

Speed = Distance ÷ time

$$v = \frac{d}{t}$$

Speed is measured in either m/s or km/h



What is terminal velocity?

The maximum constant speed an object falls at. It occurs when all the forces are balanced.

1. A car travels 500m in 20s. Calculate its speed:

2. A car travels at 20km/h. How far does it travel in 3 hours?

$$F v = \frac{d}{t}$$

$$I v = \frac{500m}{20s}$$

$$F n/a$$

$$A v = 25m/s$$

$$F v = \frac{d}{t}$$

$$I 20km/h = \frac{d}{3h}$$

$$F 20km/h \times 3h = d$$

$$A d = 60km$$

How does a distance time graph show:

Constant speed?  
Diagonal line

Stopped?  
Horizontal line

Acceleration?  
Line curving upwards

Link the letter to the description

Constant speed away B

Constant speed back C

Stationary A

Changing speed D

