

Name and Tutor group:



# Year 8 Knowledge Organiser

## Term 4

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## CORSHAM CHARACTER

### INTELLECTUAL VALUES

The pursuit of truth,  
knowledge and  
understanding.

Be reflective. Be curious. Be  
open-minded. Be creative.



### PERFORMANCE VALUES

Maximum effort, maximum  
focus.

Be resilient. Always Persevere.  
Contribute to Teamwork.  
Be ambitious.



# DREAM BELIEVE ACHIEVE

# Knowledge Organiser – Year 8 Art

## WHERE WE LIVE

EXAMPLES OF FINAL OUTCOMES:



### YOU WILL LEARN:

Skills to produce a mark-making biro study of a building, which will inform techniques required to create a mixed media study inspired by John Piper. You will learn how to design and create a clay gargoyle.



### Why am I learning this?

The foundation skills in this project will enable you to tackle the varied concepts, artists, techniques and processes throughout Year 8. You will build on your knowledge and skills with each project as they increase in difficulty, enabling you to express yourself in a confident way.

## CONTEXTUAL KNOWLEDGE:

John Piper



**John Piper** made artwork often inspired by landscapes and architecture. He used a range of processes to make expressive and energetic landscapes, often exaggerating the formal qualities of line, texture and colour.

**Gothic Architecture** is most familiar as the architecture of many of the great cathedrals, abbeys and churches of Europe. Its characteristics include the pointed arch, the ribbed vault and the flying buttress.

## Homework Tasks:

Tick when complete ✓

1. Continuous line drawing of a building
2. Gothic window drawing
3. John Piper research page
4. John Piper style house
5. Design a gargoyle in style of an animal.



**HOW WELL AM I DOING?**



Marking Your Work - Meeting Expectations

**NYM**

**NOT YET MET = Yellow Dot**

**M**

**MET = Green Dot**

**EX**

**EXCEEDING = Blue Dot**

## Keywords

Gothic

Architecture

Monochrome

Mark-making

Sculpture

Gargoyle

A style of architecture prevalent in western Europe in the 12th–16th centuries characterized by pointed arches, rib vaults, and flying buttresses.

The art or practice of designing and constructing buildings.

Monochrome means one colour.

Different lines, patterns and textures.

Three-dimensional art made by one of four basic processes: carving, modelling, casting, constructing.

A grotesque carved human or animal face or figure projecting from the gutter of a building, typically acting as a spout to carry water clear of a wall.

Information about Gothic Architecture:

[https://www.youtube.com/watch?time\\_continue=1&v=vrdkLY8WWho&embeds\\_referring\\_eui=https%3A%2F%2Fuk-powerpoint-officeapps.live.com%2F&source\\_ve\\_path=MTM5MTE4LDM2ODQyLDI4NDY2&feature=emb\\_logo](https://www.youtube.com/watch?time_continue=1&v=vrdkLY8WWho&embeds_referring_eui=https%3A%2F%2Fuk-powerpoint-officeapps.live.com%2F&source_ve_path=MTM5MTE4LDM2ODQyLDI4NDY2&feature=emb_logo)

## Year 8 Spreadsheets

### Why do we use Spreadsheets?

Spreadsheets are used to store information and data. Once we have our information in a spreadsheet we can run powerful calculations, make graphs and charts and **analyse** patterns.

Uses of spreadsheets:

- \* Budget tracker
- \* Stock tracking of a business
- \* Money use in a business
- \* Teacher may use it to keep a record of **students** grades

### Spreadsheet layout

- Rows of cells are horizontal and have a number at the side
- Columns of numbers are vertical and have a letter at the top

### Cell reference

A cell reference is the name given to a cell to uniquely identify it. E.g. E4  
An **absolute cell reference** ensures that 1 cell always remains constant even when autofill is used.  
E.g. \$E\$4

### Sort & Filter

Sorting data organises it in a

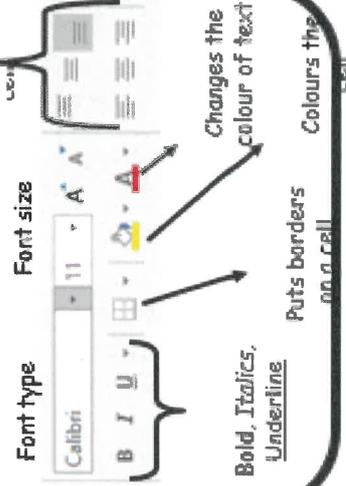


Sort & Filter specific way e.g. alphabetically

Filtering data makes it easy for us to find one specific piece of data without having to look through every piece of data

### Formatting Cells

Changes the way text is displayed in a



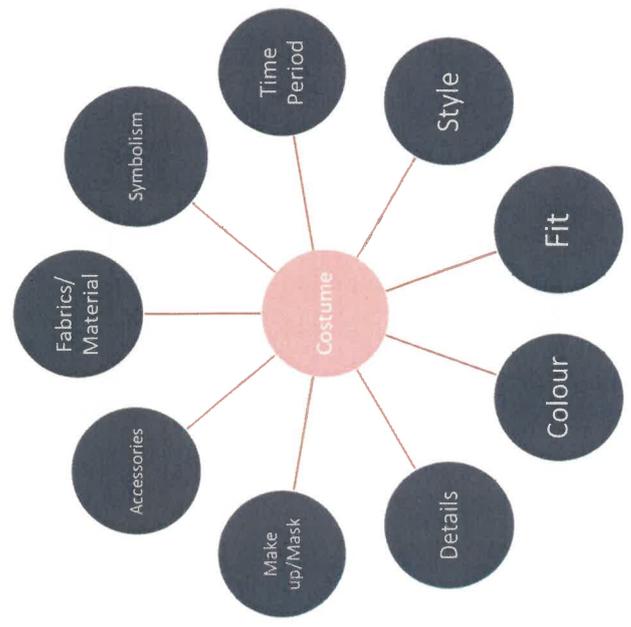
### Formulas

Only use when creating a calculation between 2 cells.

E.g.

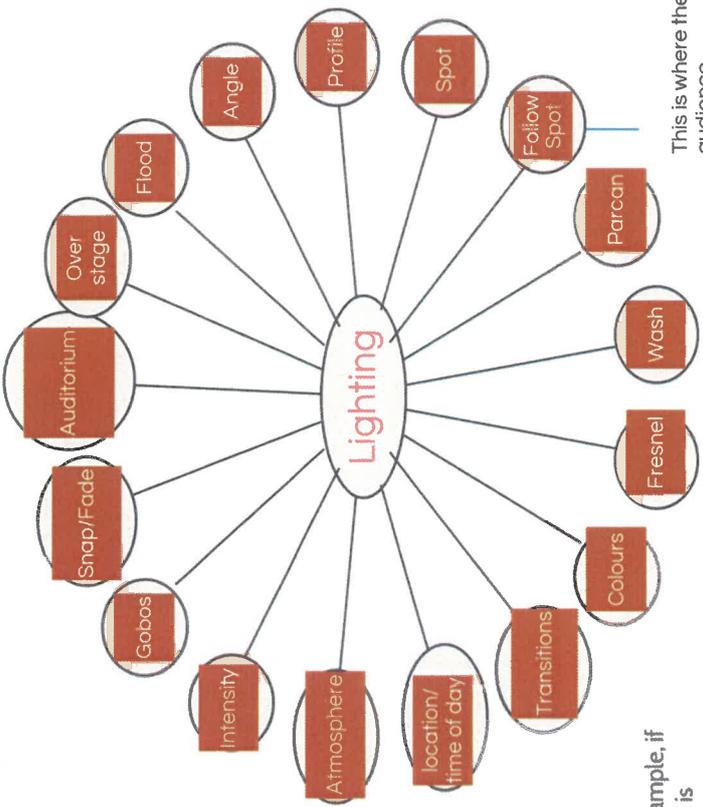
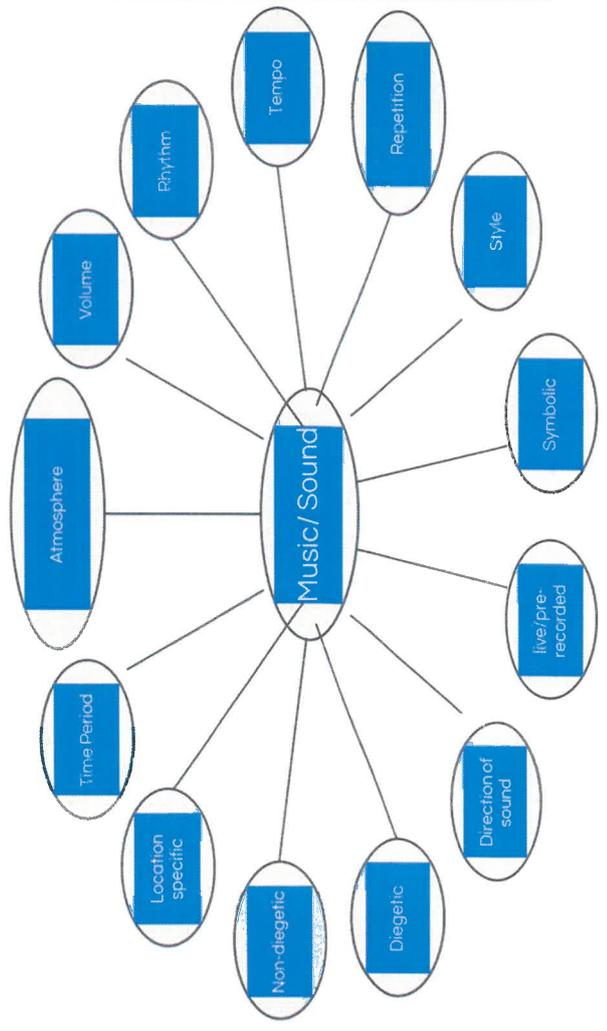
- = A1 + B1 (adds)
- = A1 - B1 (subtracts)
- = A1 \* B1 (multiplies)
- = A1 / B1 (divides)

**Year 8**  
**Live Theatre Review**  
**Term 4**  
**Knowledge Organiser**



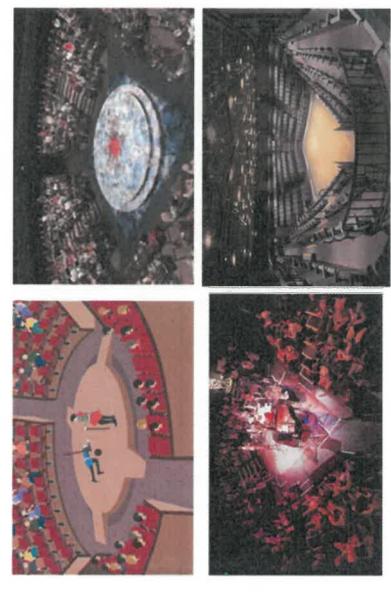
Diegetic sound is sound that the characters on stage can hear. For example, if a telephone rings on stage and a character answers it, then the sound is diegetic: the character on stage has heard the telephone.

Non-diegetic sound is any sound that a character cannot hear, but instead creates the mood or atmosphere for the performance. For example, if a piece of music is played to accompany a scene (called underscoring), but cannot be heard by the characters, then it is non-diegetic.



This is where the audience surrounds the stage which is either square or circular. There are often entrances and exits around the auditorium.

**THEATRE-IN-THE-ROUND**



**Colour**  
 Colour filters are known as 'Gels'. These are placed in front of the lens to colour the individual beam of light. Many different 'Gels' would be used in a theatre production and the colours blended to create the right effect.

**Gobos**  
 'Gobo' are metal stencils that are placed over the lens of a light to project shapes or words.

## Year 8 Food and Nutrition- Knowledge Organiser

Nutrient/ Food group	Functions - Why do we need it?	Sources - Where they are found
Carbohydrates	These give us energy. Sugary ones give us quick release energy. Starchy ones give us slow release.	Bread, rice, pasta, potatoes
Protein	Needed for the growth and repair of our bodies and can also be used for energy.	Meat, fish, dairy products, tofu, soya, Quorn, nuts, seeds, lentils
Fat	These keep us warm, protect us and provides our bodies with energy	Butter, oil, processed foods e.g. crisps, chips, chocolate, cake.
Water	Keeps us hydrated and keeps our body's working properly.	Fruit and vegetables, water, fruit juices, milk.
Vitamins	These are needed generally to keep us healthy. They allow all the chemical reactions in our body and protect us from diseases.	Fruit, vegetables, cereals, dairy products
Minerals	Helps build bones and teeth and allow muscles to work properly.	Green vegetables, dairy products and red meat
Fibre	These are needed to keep our digestive system working (help us go to the toilet) and helps to fill us up.	Wholegrain cereals, brown rice, pasta, bread, fruit and vegetables

### Healthy eating

The Eatwell guide shows how much of what we eat in total should come from each of the five food groups.

Oils and Spreads	Fruits and Vegetables	Meat, eggs and pulses	Starchy foods	Dairy foods
Butter, Vegetable oil, Margarine	Apples, Bananas, Oranges, Pepper Carrots, Cabbage Spinach, Frozen peas	Chicken, fish, Lentils Chickpeas, beans	Bread, Potatoes Pasta, Rice, Cereals	Milk, Cheese, Yogurt

### Keywords

Hygiene  
Safety  
Vegetarian  
Vegan  
Nutrient  
Food Allergy

Organoleptic  
Cross - contamination  
Food Intolerance  
Coeliac Disease

**What is Energy balance**  
Energy in = energy out

**Why is it important to keep it balanced?**  
To maintain a healthy weight and allow the body to stay healthy and work efficiently

Special diet	Type	Reason for following diet	Foods to avoid
Lifestyle/ religion	Vegan	<ul style="list-style-type: none"> <li>Religion</li> <li>Don't like the taste</li> <li>Don't want to eat animals</li> <li>Ethical reasons</li> <li>Cost of meat</li> <li>Texture of meat</li> </ul>	Anything from an animal, honey
	Vegetarian		Meat and fish products
	Pescatarian		Any meat products
Allergy & intolerance	Lactose	<ul style="list-style-type: none"> <li>Intolerance</li> </ul>	milk, cheese, yoghurt, chocolate, butter etc
	Coeliac	<ul style="list-style-type: none"> <li>Allergy</li> </ul>	wheat, bread, pasta, barley, oats
Health	High Fibre	<ul style="list-style-type: none"> <li>Recommended by doctor</li> <li>Healthier</li> </ul>	White rice, pasta, bread, processed foods.
	Low Sugar	<ul style="list-style-type: none"> <li>Weight loss</li> <li>Healthier</li> <li>Diabetic</li> </ul>	Biscuits, cakes, sweets, fizzy drinks, processed food
	Low Fat	<ul style="list-style-type: none"> <li>Weight loss</li> <li>Healthier</li> <li>High Cholesterol</li> </ul>	Crisps, chips, sausage rolls, cakes, biscuits.

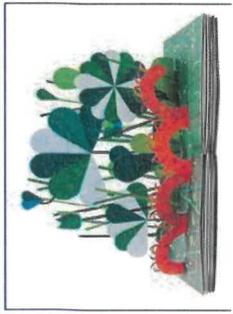
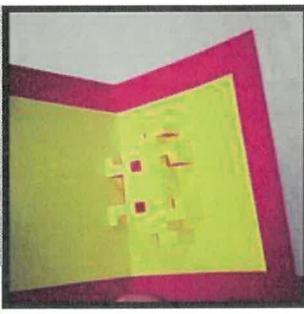
# Year 8 Graphics: Pop-up book

# DESIGN AND TECHNOLOGY

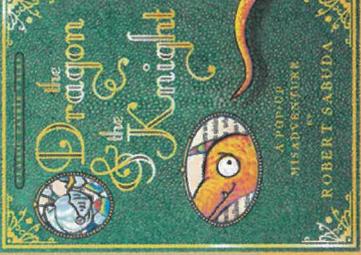
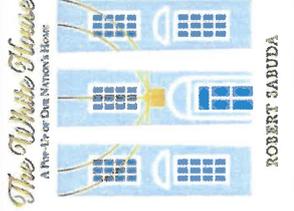
## Tools, Techniques, Materials and Equipment

Paper		A compliant material made from wood pulp.
Board		Used for packaging, model making, photography and greeting cards.
Colour Rendering		A colour technique used for professional finish in DT.
Scoring		A method to create accurate folds.
Craft knife		To accurately cut paper.

**Keywords**  
 Robert Sabuda  
 Product  
 Image  
 Analyse  
 Paper Sizes  
 Typography  
 Fonts  
 Printing  
 Processes  
 Story Board  
 Card  
 Mechanisms  
 Card Modelling  
 Shading  
 Rendering  
 Rotary  
 V-fold  
 Internal  
 Stand  
 Mouth and Slide



**Robert Sabuda**  
 The American illustrator who creates pop-up books.


**What is good design?**  
 Clear ideas  
 Annotations  
 Measurements  
 Content  
 Presentation  
 Balance

**Maths in DT:**  
 Multiplication  
 Divide  
 Add / Subtract  
 Measurement conversion  
 Ratios  
 Percentages  
 Surface area

**Health and Safety in DT:**

- Listen to your teacher's instructions
- Always wear an apron
- Long hair should be tied back
- Don't use equipment you are not trained on
- Always stand up during practical lessons
- When using machines, always wear safety glasses
- Only use the stop button in an emergency
- Work quietly and be sensible and careful at all times






# KS3 YEAR 8 D&T RESISTANT MATERIALS

## Orthographic Drawing

### Tools and Equipment

Measuring and marking	
Steel rule	An accurate tool for measuring and marking out
Try square	A tool used to check right angles on wood or plastic
Template	A template is a tool used to mark out shapes repeatedly
Jig	A tool used to control the location and/or motion of another tool

### Shaping and finishing

Metal file	Used to shape or smooth wood, metal or plastic
Glass paper	An abrasive paper used to smooth the surface or edges of wood
Disc sander	A machine used to smooth the edges of materials

### Mechanical Devices

#### Motion

LINEAR MOTION

ROTARY MOTION

RECIPROCATING MOTION

OSCILLATING MOTION

#### Linkages

Parallel Motion Linkage

Parallel Motion Linkage

Ball Crank Linkage

#### Forces

compression

tension

bending

torision

shear

#### Gears

#### Pulleys

10 kg

10 kg

Force

#### Cams

Types of cams are used for different tasks:

Eccentric cam

Pear cam

Small cam

Heart-shaped cam

Cutting	
Tenon saw	A hand saw with a stiff back used to cut straight lines in wood – back saw action
Coping saw	A hand saw used to cut complex shapes in wood and plastic
Scroll saw	A machine saw used to cut complex shapes in wood and plastic
Bench hook	Held against the front edge of a bench or table to support work
Pillar drill	A machine used to make holes in materials
Chisel	Used for carving or cutting a hard material such as wood, stone, or metal by hand
Laser cutter	CAM: Laser cutting is the use of a high-powered laser to cut, etch and engrave your material

### Traditional wood joints:

- Butt Joint
- Lap / Rebate Joint
- Finger Joint
- Dovetail Joint
- Mitre Joint

### Maths in DT:

- Multiplication
- Divide
- Add / Subtract
- Measurement conversion
- Ratios
- Percentages
- Surface area

### What is good design?

- Clear ideas
- Annotations
- Measurements
- Content
- Presentation
- Balance

### Keywords

- Research
- Design
- Evaluation
- Wood joint
- Mechanical
- Pulley
- Linkage
- Lever
- Motion
- Force

### Health and Safety in DT:

- Listen to your teacher's instructions
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- When using machines, always wear safety glasses
- Only use the stop button in an emergency
- Work quietly and be sensible and careful at all times



# KS3 YEAR 8

## Tools and Equipment

Measuring and marking	
Measuring Tape	Fabric tape measure used to measure
Tailor's chalk	A temporary mark on fabric
Template / Pattern	A template / pattern is a tool used to mark out shapes repeatedly

## Constructing

Sewing needle	Helps to sew fabric together
Embroidery needle	A needle with a larger eye to accommodate embroidery thread
Sewing machine	Machine sews fabric together
Pins	A temporary method to hold fabric in place
Tacking stitch	A temporary stitch to hold fabric together

## Textiles Dyes:

### Natural Dyes

- Plants
- Food / spices
- Grass / tree bark / leaves
- Onions / beetroot
- Cochineal

### Chemical Dyes

Dyes which are man-made using chemicals: consistent and vibrant.

### Fibre Categories:

#### Natural Fibres

#### Plant based natural fibres:

- Cotton
- Linen
- Flax
- Coir (coconut)

#### Animal based natural fibres:

- Wool
- Angora
- Silk

#### Man-made Fibre

- Polyester
- Acrylic
- Nylon

### Fabric Construction:

- Woven
- Knitted
- Bonded



## What is good design?

Clear ideas

- Annotations
- Measurements
- Content
- Presentation
- Balance

## Maths in DT:

- Multiplication
- Divide
- Add / Subtract
- Measurement conversion
- Ratios
- Percentages
- Surface area

## Elements that make up Islamic Design:

- Calligraphy
- Floral
- Geometry

## Keywords

- Islamic
- Religion
- Design
- Product analysis
- Research
- Evaluation
- Stitch
- Scissors
- Sewing machine
- Customer
- Environment
- Function
- Material
- Seam allowance
- Hem
- Tie-Dye
- Printing
- Tessellate
- UCD
- Mordant

## Cutting

Fabric shears		Scissors used for cutting fabric
Thread scissors		Scissors used for cutting thread
Stitch ripper		Used for removing sewn stitches from fabric
Pinking shears		Creates a zig zag cut edge for decoration to prevent fraying

## Adding Colour

Tie-dye		A type of resist dye
Batik		A type of resist dye which uses wax
Block Printing		Engraved wooden blocks to produce repeat patterns
Fabric paint / pens		Paint / pens which can be applied to fabrics

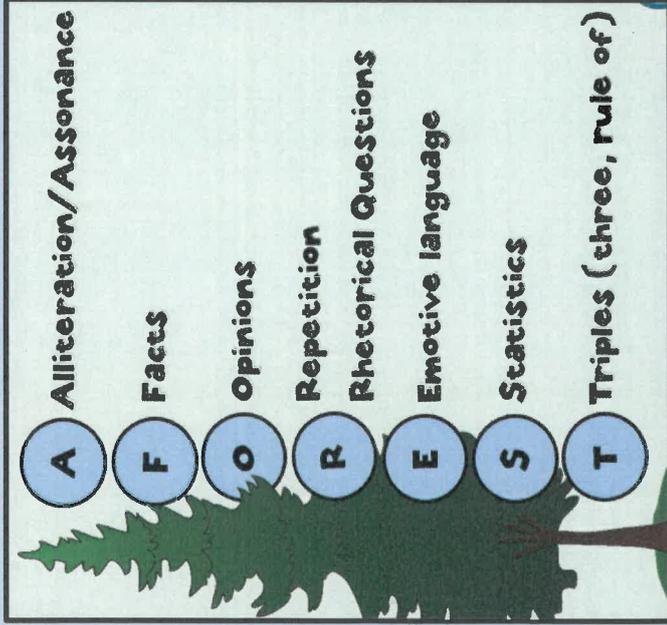
	<b>A</b> is for <b>Aesthetics</b>
	<b>C</b> is for <b>Cost</b>
	<b>C</b> is for <b>Customer</b>
	<b>E</b> is for <b>Environment</b>
	<b>S</b> is for <b>Size</b>
	<b>S</b> is for <b>Safety</b>
	<b>F</b> is for <b>Function</b>
	<b>M</b> is for <b>Material</b>



## Health and Safety in DT:

- Listen to your teacher's instructions
- Always wear an apron
- Long hair should be tied back
- Don't use equipment you are not trained on
- Work quietly and be sensible and careful at all times

**PERSUASIVE TECHNIQUES**



**A Alliteration/Assonance**

**F Facts**

**O Opinions**

**R Repetition**

**R Rhetorical Questions**

**E Emotive language**

**S Statistics**

**T Triples (three, rule of)**

**SPEECH**

- ✓ Open with a welcome/greeting
- ✓ Lots of first person (I, me, we, our)
- ✓ Lots of second person (you, your)
- ✓ Outline what the speech will be about
- ✓ Offer a personal anecdote
- ✓ Make 3/4 key points and expand on them
- ✓ Conclusion to summarise ideas
- ✓ End acknowledging the audience

**WRITING TO PERSUADE**

**Think about the TAP**

**T**ext type – what should the style and layout look like?

**A**udience – who are you writing for?

**P**urpose – are you trying to...

**Persuade? Argue? Advise? Inform?**



**Text**

**Types:**

Article

Leaflet

Letter

Review

Report

Speech

**ENGLISH LANGUAGE DEFINITIONS**

**Adjective:** a word that describes a noun.

**Adverbs:** words that give extra information about the verb.

**Connective:** a word that joins parts of a sentence together.

**Emotive Language:** Language used to create a particular emotion in the reader.

**Figurative Language:** Using language techniques to describe something in a non-literal way.

**Noun:** a naming word.

**Pronouns:** a word that can replace a person's name to refer to them.

**Verb:** a doing word.

**CONNECTIVES/DISCOURSE MARKERS:**

Position	Addition
Firstly	Furthermore
Secondly	Additionally
Meanwhile	In addition
Finally	<b>Contrast/Compare</b>
In conclusion	Although
<b>Emphasis</b>	Whereas
Importantly	Alternatively
Notably	Similarly
Significantly	Equally

**FIGURATIVE LANGUAGE DEFINITIONS**

**Alliteration:** use of the same consonant at the beginning of adjacent or closely connected words.

**Hyperbole:** exaggeration to emphasise a point.

**Metaphor:** comparing one thing to another, directly, in a way that isn't literally true.

**Onomatopoeia:** a word whose sound suggests its meaning.

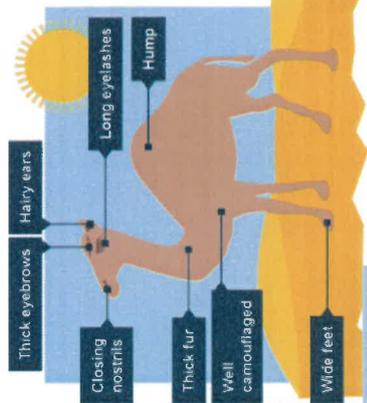
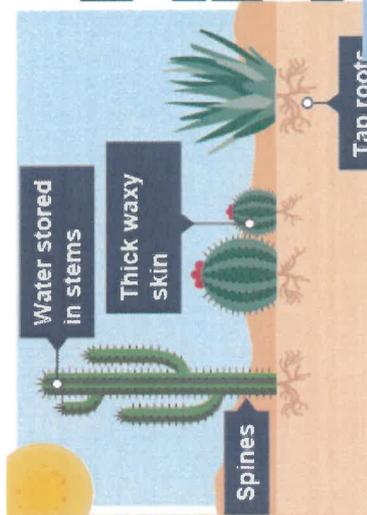
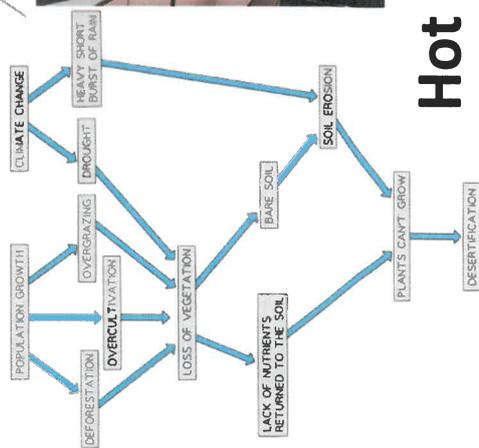
**Personification:** giving human qualities to non-human things.

**Sibilance:** use of the 's' sounds in quick succession.

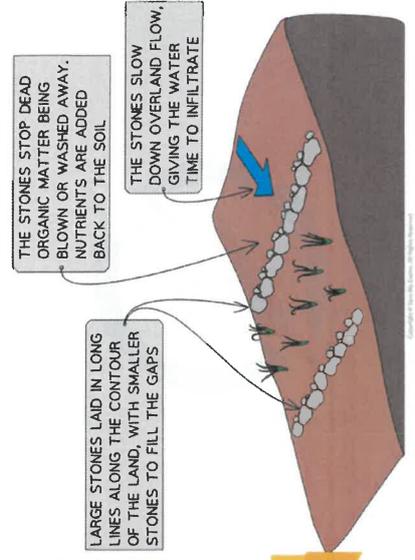
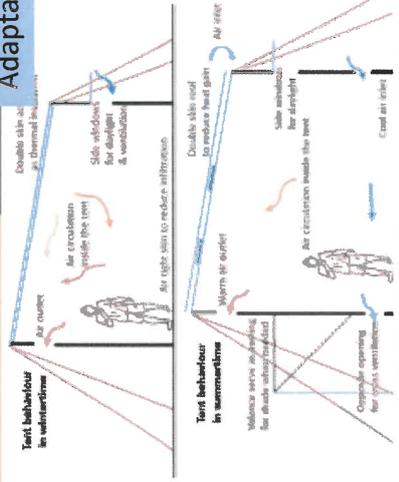
**Simile:** a comparison of two things that uses the words 'like' or 'as'.

**Key Terms:**  
 Tropics of Cancer  
 Tropics of Capricorn  
 Arid  
 Abiotic  
 Biotic  
 Ecosystem  
 Photosynthesis  
 Food chain  
 Adaptation  
 Xerophyte  
 Desertification  
 Irrigation  
 Sustainability

**Causes of Desertification:**

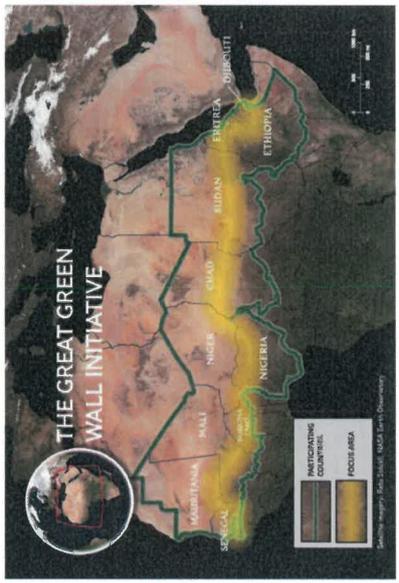


**Adaptations:**



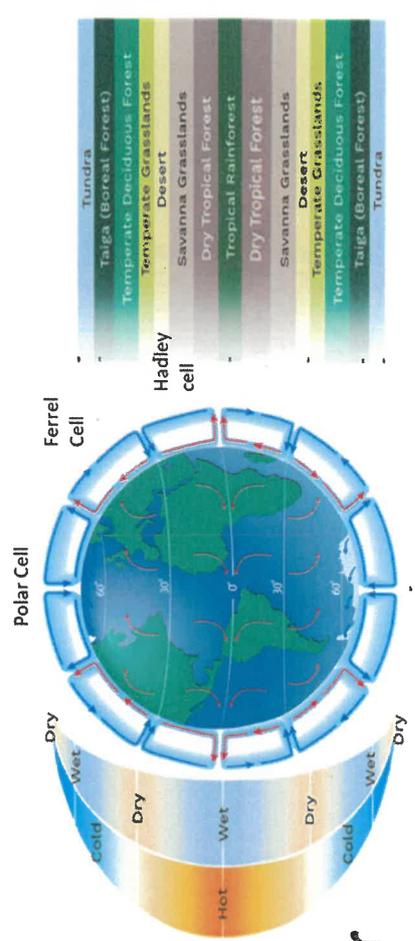
**Small-Scale Solutions:**

- Terracing
- Rainwater harvesting
- Agroforestry
- Drought-resistant crops



**Evaluation of the Great Green Wall:**

- ✓ Large-scale reforestation
- ✓ Boosts local economies
- X Slow progress
- X Expensive and difficult to maintain



**Hot Deserts Knowledge Organiser**

## Enquiry: How much has democracy changed?

**Outline:** During the 19<sup>th</sup> century, many people began to realise that they were not listened to by the government because they didn't have the right to vote. This led to many pressure groups being set up to try and gain equality for all though everyone having the vote. However, this was not easily achieved.

Date	Event	Description
1819	Peterloo massacre	18 people were killed and 400-700 were injured during a demonstration of 60,000 in Manchester. Protesters had been asking for the right to vote.
1832	Great Reform Act	More people given the right to vote from the middle class, but still now working class people
1882	Women's Property Act	Women were now allowed to keep their property when they married.
1903	WSPU set up	The Pankhurst family set up a pressure group to campaign for the right to vote for women as they believed that progress was too slow.
1913	Death of Emily Davison	Davison was killed by the king's horse during a race called the Epsom Derby. She was carrying a suffragette flag when she was hit.
1918	Representation of the People Act.	All men over 21 and women over the age of 30 who owned property were given the vote. It wasn't until 1928 that all women over 21 had the vote.



**Furthering learning**  
Want to find out more about the fight for democracy in the UK?



**Prior learning?**  
Democracy  
Patriarchy  
Revolution

## History – Year 8 Knowledge Organiser Topic 4

### The Six Points PEOPLE'S CHARTER.

1. The House of Commons should be elected by universal suffrage.  
2. The House of Lords should be elected by universal suffrage.  
3. The franchise should be extended to all men over 21.  
4. The franchise should be extended to all men over 21.  
5. The franchise should be extended to all men over 21.  
6. The franchise should be extended to all men over 21.

### Key individuals



**Samuel Bamford.** He was an eye witness to the Peterloo Massacre. His written account gained sympathy for those who were killed or injured.



**William Cuffay.** Born in the West Indies, Cuffay worked as a leading Chartist, campaigning for the right to vote. He became President of the London Chartists.



**Millicent Fawcett.** Led a pressure group called the NUWSS who campaigned peacefully for the vote for women. Her famous quote was "Courage calls to courage everywhere"



**Emmeline Pankhurst.** Set up the WSPU which was a more militant pressure group aiming at gaining the vote for women. Her famous quote was "Deeds, not words."



### Key vocabulary:

**Act:** a law passed by parliament.

**Chartists:** a pressure group who fought for the right to vote for working class men. They were famous for their People's Charter.

**Constituency:** an area of a country which is represented in parliament by an elected MP

**Democracy:** a system where people have the right to choose the government through elections.

**Direct action:** acts which a pressure group uses to gain attention for a cause, like boycotts or marches.

**Disenfranchised:** when you are unable to vote because you are banned from doing so.

**Franchise:** the right to vote.

**Massacre:** the killing of several people at once, whether deliberately or by accident.

**Militant:** using confrontational or violent methods to achieve your aims for a cause.

**Parliament:** where laws are made . MPs in the House of Commons and peers in the House of Lords vote to pass these laws.

**Pressure group:** an organisation which aims to improve lives, like the Chartists, the WSPU or the NUWSS.

**Reform:** a change that intends to improve something.

**Suffrage:** the right to vote.

**Suffragette:** nickname given to those in the WSPU. They tended to use more militant tactics to achieve their goals.

**Suffragist:** nickname given to those in the NUWSS. They tended to use more peaceful methods to achieve their goals.

**Terrorism:** violent actions which hurt and scare people; often the aim is to achieve political goals.



## Enquiry: How much has democracy changed?

### Historical skill focus: change & continuity

- How have people's lives changed over time?
- How have people's lives stayed the same over time?



## History – Year 8 Knowledge Organiser Topic 4



### Section A: Can you explain change and continuity?

Answer the question below: You could write one or two paragraphs to explain fully.

How far did the right to vote change during the 19<sup>th</sup> and 20<sup>th</sup> centuries?

Remember to mention:	Areas you could mention include:	Starting sentences
Changes AND Continuities	Votes for middle class Votes for working class Votes for women	During the 19 <sup>th</sup> and 20 <sup>th</sup> centuries, there were many changes in how much power people had such as... However, some aspects of power did stay the same such as...

Point = A key change was...

Evidence = The important parts of this change included...

Explain = This was an important change because...

### Developing

I can identify key changes and key areas of continuity.  
I can describe key changes and areas of continuity.



### Secure

I can explain the key changes/continuity areas in a PEE paragraph  
I can begin to think about the extent of change.  
I can use some historical knowledge to support my answer.

### Exceeding

I can explain the key changes/continuity areas in a PEEL paragraph  
I can use detailed historical knowledge to support my answer.  
I can begin to use factors that affect change/continuity such as the economy, politics, religion...

# YEAR 8 - DEVELOPING NUMBER... Fractions & Percentages

@whisto\_maths

## What do I need to be able to do?

By the end of this unit you should be able to:

- Convert between FDP less than and more than 100
- Increase or decrease using multipliers
- Express an amount as a percentage
- Find percentage change

## Keywords

- Percent:** parts per 100 – written using the % symbol  
**Decimal:** a number in our base 10 number system. Numbers to the right of the decimal place are called decimals.  
**Fraction:** a fraction represents how many parts of a whole value you have.  
**Equivalent:** of equal value.  
**Reduce:** to make smaller in value.  
**Growth:** to increase/ to grow.  
**Integer:** whole number, can be positive, negative or zero.  
**Invest:** use money with the goal of it increasing in value over time (usually in a bank)

## Convert FDP



70/100 → This also means 70 ÷ 100 → 70 out of 100 squares → 70 'hundredths' - 7 'tenths' → 0.7 → 70 hundredths = 70%

Using a calculator → →  $\frac{70}{100}$  → S-D → Convert to a decimal → × 100 converts to a percentage

Be careful of recurring decimals  
 e.g.  $\frac{1}{3} = 0.333333$   
 $\frac{1}{3} = 0.\dot{3}$   
 The dot above the 3

## Fraction/ Percentage of amount



Find  $\frac{3}{5}$  of £60 → → £36

Remember  $\frac{3}{5} = 60\%$   
 10% of £60 = £6  
 50% of £60 = £30  
 60% of £60 = £36

Remember  $\frac{3}{5} = 60\% = 0.6$   
 60% of £60 =  $0.6 \times 60 = £36$

## Convert FDP < and > 100%

100 hundredths = 100%  
 10 tenths = 100%  
 40 hundredths = 40%  
 4 tenths = 40%  
 140 hundredths = 140%  
 14 tenths = 140%

$100\% + 40\% = 1 + 0.4 = 140$

## Percentage decrease: Multipliers

→ Decrease by 58% → 42%

$100\% - 58\% = 42\%$   
 $100 - 0.58 = 0.42$  ← Multiplier Less than 1

## Percentage increase: Multipliers

→ Increase by 12% → 112%

$100\% + 12\% = 112\%$   
 $100 + 0.12 = 112$  ← Multiplier More than 1

## Express as a % - Non-calculator

Percent – per hundred

→ 7 per every 10 are orange →  $\frac{7}{10}$  → This means that 70 per every 100 are orange →  $\frac{70}{100}$  → 70%

→ 27 per every 50 shaded →  $\frac{27}{50}$  → 54 per every 100 shaded →  $\frac{54}{100}$  → 54%

Denominator 100      Equivalent fractions

## Express as a % - Calculator

→ Rosie  $\frac{13}{30}$  →  $\frac{13}{30}$  → × 100 → 43.333...% → 43%

Can't use equivalence easily to find 'per hundred'

This is the same as 13 ÷ 30

Decimal percentages are still a percentage

## Percentage change

I bought a phone for £200. A year later sold it for £125.

→ All values of change compare to the ORIGINAL value

Percentage loss:  $\frac{75}{200} \times 100 = 37.5\%$

I bought a house for £180,000, I later sold it for £216,000.

→ Percentage profit:  $\frac{36000}{180000} \times 100 = 20\%$

Money made (profit value)

$\frac{\text{Difference in value}}{\text{Original value}} \times 100$

## Choose appropriate method

The language and wording of the question is the key

Have you represented the question in a bar model?  
 Can you use a calculator?

# YEAR 8 - DEVELOPING NUMBER...

# Standard Form

@whisto\_maths

## What do I need to be able to do?

By the end of this unit you should be able to:

- Write numbers in standard form and as ordinary numbers
- Order numbers in standard form
- Add/ Subtract with standard form
- Multiply/ Divide with standard form
- Use a calculator with standard form

## Keywords

**Standard (index) Form:** A system of writing very big or very small numbers

**Commutative:** an operation is commutative if changing the order does not change the result

**Base:** The number that gets multiplied by a power

**Power:** The exponent — or the number that tells you how many times to use the number in multiplication

**Exponent:** The power — or the number that tells you how many times to use the number in multiplication

**Indices:** The power or the exponent.

**Negative:** A value below zero.

## Positive powers of 10

1 billion — 1 000 000 000

$$10 \times 10 = 10^9$$

Addition rule for indices  $10^a \times 10^b = 10^{a+b}$

Subtraction rule for indices  $10^a \div 10^b = 10^{a-b}$

## Standard form with numbers > 1

Any number between 1 and less than 10  $\rightarrow A \times 10^n$  ← Any integer

**Example**

$$3.2 \times 10^4$$

$$= 3.2 \times 10 \times 10 \times 10 \times 10$$

$$= 32000$$

**Non-example**

$$0.8 \times 10^4$$

$$5.3 \times 10^{07}$$

## Negative powers of 10

0.001	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
$1 \times \frac{1}{1000}$	$10^1$	$10^0$	$10^{-1}$	$10^{-2}$	$10^{-3}$
$1 \times 10^{-3}$	0	0	0	0	1

Any value to the power 0 always = 1

Negative powers do not indicate negative solutions

## Numbers between 0 and 1

0.054	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
$= 5.4 \times 10^{-2}$	$10^0$	$10^{-1}$	$10^{-2}$	$10^{-3}$
	0	0	5	4

A negative power does not mean a negative answer — it means a number closer to 0

## Order numbers in standard form

$10^2$	$10^1$	$10^0$	$10^{-1}$	$10^{-2}$	$10^{-3}$	$10^{-4}$
$6.4 \times 10^{-2}$	$2.4 \times 10^2$	$3.3 \times 10^0$	$1.3 \times 10^{-1}$			
0.064	240	1	0.13			

Look at the power first will the number be > or < than 1

Use a place value grid to compare the numbers for ordering

## Mental calculations

$$6.4 \times 10^2 \times 1000$$

Not in Standard Form

$$= 6.4 \times 10^2 \times 10^3$$

Use addition for indices rule

$$= 6.4 \times 10^5$$

$$(2 \times 10^3) \div 4$$

Divide the values

$$= (2 \div 4) \times 10^3$$

$$= 0.5 \times 10^3$$

$$8 \times 10^5 \times 3$$

Not in Standard Form

$$= 24 \times 10^5$$

$$= 2.4 \times 10^1 \times 10^5$$

Use addition for indices rule

$$= 2.4 \times 10^6$$

Remember the layout for standard form

Any number between 1 and less than 10  $\rightarrow A \times 10^n$  ← Any integer

## Addition and Subtraction

Tip: Convert into ordinary numbers first and back to standard form at the end

Method 1

$$6 \times 10^5 + 8 \times 10^5$$

$$= 600000 + 800000$$

$$= 1400000$$

$$= 1.4 \times 10^6$$

Method 2

$$= (6 + 8) \times 10^5$$

$$= 14 \times 10^5$$

$$= 1.4 \times 10^1 \times 10^5$$

$$= 1.4 \times 10^6$$

This is not the final answer

More robust method  
Less room for misconceptions  
Easier to do calculations with negative indices  
Can use for different powers

Only works if the powers are the same

## Multiplication and division

$$\frac{1.5 \times 10^5}{0.3 \times 10^3}$$

Division questions can look like this

For multiplication and division you can look at the values for A and the powers of 10 as two separate calculations

$$(1.5 \times 10^5) \div (0.3 \times 10^3)$$

Revisit addition and subtraction laws for indices — they are needed for the calculations

$$(15 \div 0.3) \times 10^5 \div 10^3$$

$$= 5 \times 10^2$$

Addition law for indices

$$a^m \times a^n = a^{m+n}$$

Subtraction law for indices

$$a^m \div a^n = a^{m-n}$$

## Using a calculator

Input 14 and press  $\times 10^x$  Then press 5 (for the power)  
Press  $\times$   
Input 39 and press  $\times 10^x$  Then press 3 (for the power)  
Press  $=$

$$14 \times 10^5 \times 39 \times 10^3$$

Use a calculator to work out this question to a suitable degree of accuracy

This gives you the solution



Click calculator for video tutorial

To put into standard form and a suitable degree of accuracy

Press **SHIFT** **SETUP** and then press 7 for sci mode

Choose a degree of accuracy so in most cases press 2

Answer:  $5.5 \times 10^8$

# YEAR 8 - DEVELOPING NUMBER...

# Number Sense

@whisto\_maths

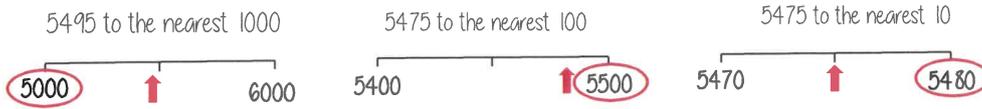
## What do I need to be able to do?

- By the end of this unit you should be able to:
- Round numbers to powers of 10 and 1 sf
  - Round numbers to any dp
  - Estimate solutions
  - Calculate using order of operations
  - Calculate with money, units of measurement and time

## Keywords

- Significant:** Place value of importance  
**Round:** Making a number simpler but keeping its value close to what it was  
**Decimal:** Place holders after the decimal point  
**Overestimate:** Rounding up — gives a solution higher than the actual value  
**Underestimate:** Rounding down — gives a solution lower than the actual value  
**Metric:** A system of measurement  
**Balance:** The amount of money in a bank account  
**Deposit:** Putting money into a bank account.

## Round to powers of 10 and 1 sig. figure R If the number is halfway between we "round up"



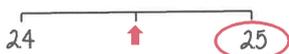
- 370 to 1 significant figure is 400
- 37 to 1 significant figure is 40
- 3.7 to 1 significant figure is 4
- 0.37 to 1 significant figure is 0.4
- 0.00037 to 1 significant figure is 0.0004

Round to the first non-zero number

## Round to decimal places R 2.46192

- \*To 1dp\* — to one number after the decimal
- \*To 2dp\* — to two numbers after the decimal

2.46192 (to 1dp) - Is this closer to 2.4 or 2.5



2.46192 (to 2dp) - Is this closer to 2.46 or 2.47



Focus on the numbers after the decimal point

2.46192 This shows the number is closer to 2.5

2.46192 This shows the number is closer to 2.46

## Estimate the calculation

Round to 1 significant figure to estimate

$$4.2 + 6.7 \approx 4 + 7 \approx 11$$

This is an **overestimate** because the 6.7 was rounded up more

$$21.4 \times 3.1 \approx 20 \times 3 \approx 60$$

This is an **underestimate** because both values were rounded down

It is good to check all calculations with an estimate in all aspects of maths — it helps you identify calculation errors.

## Order of operations R

**Brackets** Operations in brackets are calculated first

**Other** operations e.g powers, roots,

**Multiplication/ Division**

They are carried out in the order from left to right in the question

**Addition/ Subtraction**

They are carried out in the order from left to right in the question

## Calculations with money

**Debit** - You have £0 or more in an account

**Credit** - You have less than £0 in an account



Using a calculator — ensure you are working in the correct units.

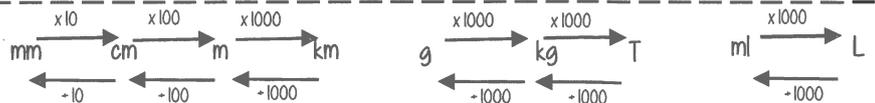
$$\begin{aligned} \text{£ } 130 + 50\text{p} &= 130 + 50 \quad (\text{in pence}) \\ &= 130 + 0.50 \quad (\text{in pounds}) \end{aligned}$$

Money calculations are to 2dp

$$\text{£ } 1 = 100\text{p}$$



## Units are important: Useful Conversions



## Metric measures of length

Kilo = 1000 x meter      Centi =  $\frac{1}{100}$  x meter

Milli =  $\frac{1}{1000}$  x meter

## Time and the calendar



**1 Year** — the amount of time it takes Earth to go around the sun **365** (and a quarter) days

**Leap Year** — 366 days (every 4 years)



**12 Months** — one year = 52 weeks

31 days — Jan, March, May, July, Aug, Oct, Dec

30 days — April, June, Sept, Nov

28 days — Feb (29 leap year)

**1 week** — 7 days

Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday

**1 day** — 24 hours

**1 hour** — 60 minutes

**1 minute** — 60 seconds

Use a number line for time calculations!

## Units of weight/ capacity

Weight = g, kg, t

Capacity (volume of liquid) = ml, L

Onalogue Clock



12-hour clock

- Use am (morning) and pm (afternoon)
- Only use hour times up to 12

Digital Clock (24-hour times)

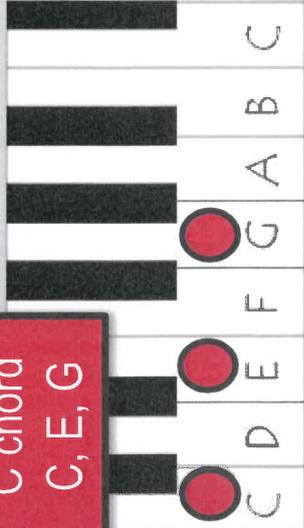


24-hour clock

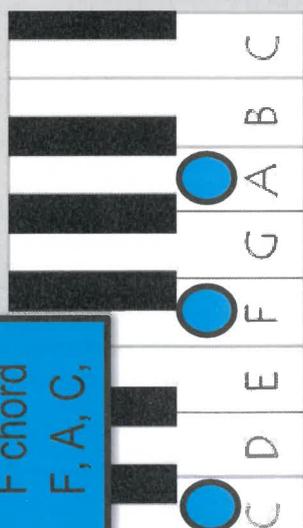
- 0-11 (morning hours)
- 12-23 (afternoon hours)

**Chord** – two or more notes played at the same time

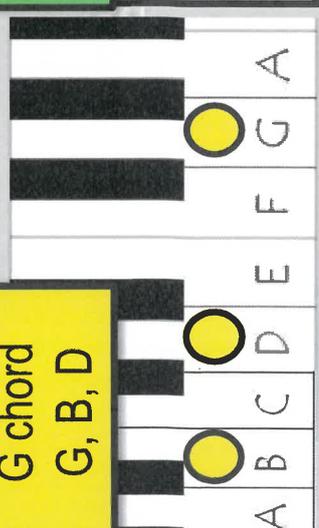
**C chord**  
C, E, G



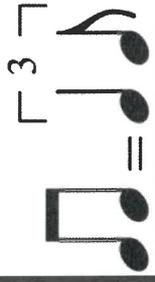
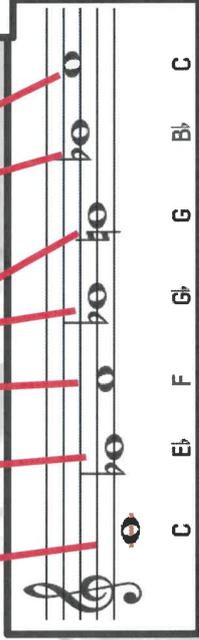
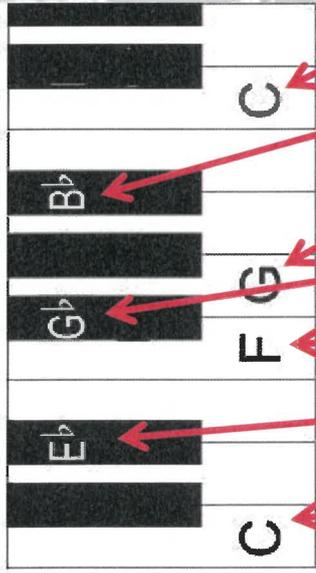
**F chord**  
F, A, C,



**G chord**  
G, B, D



**Blues Scale** – a scale used for improvising



Swing rhythm

**Improvising** – making up music on the spot

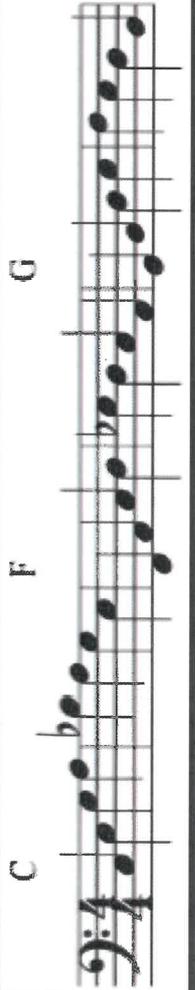
Blues Lyrics follow AAB structure

**A** Mmmm, standin' at the crossroad, I tried to flag a ride

**A** Standin' at the crossroad, I tried to flag a ride

**B** Didn't nobody seem to know me, everybody pass me by

**Walking Bass Line** – uses the most important notes from the chords



**12-bar blues chords in C**

C ///	C ///	C ///	C ///
F ///	F ///	C ///	C ///
G ///	F ///	C ///	C ///

**12-Bar Blues Progression**

I ///	I ///	I ///	I ///
IV ///	IV ///	I ///	I ///
V ///	IV ///	I ///	I ///

**Tonic** – 1<sup>st</sup> **I** (C chord)

**Subdominant** – 4<sup>th</sup> **IV** (F chord)

**Dominant** – 5<sup>th</sup> **V** (G chord)



**RS Dept. Knowledge Organiser: Suffering**

**Name:** \_\_\_\_\_

**1. Suffering and Evil**

Evil is a cause of human suffering. There are two types of evil:

- **moral evil** - the acts of humans which are considered to be morally wrong
- **natural evil** - natural disasters, such as earthquakes or tsunamis

These two types of evil can work together, e.g. human evil can make natural evil worse. If natural evil, e.g. a drought brought on by lack of rainfall, causes crops to fail, the policies of a government can make the food shortages for the poorest people worse (moral evil).

**2. Problem of Evil and Suffering.**

For theists, the existence of evil and suffering creates a problem for God. As they believe that God is all-powerful and all-loving, God has the capability to stop all suffering, but either God can't or chooses not to. This is called the Inconsistent Triad.

- God has given people **free will** – the ability to choose between right and wrong for themselves. God has shown people how they should live (e.g. the Ten Commandments; Jesus' life and teaching), but it is up to them to decide whether or not to follow God's instructions.
- The story of humanity's battle with good and evil is told in the story of Adam and Eve in the Garden of Eden. Adam and Eve chose to disobey God by eating the fruit of the tree of knowledge of good and evil. This is called **the Fall**. Some people believe that as a result of Adam and Eve's first sins, each human is born with a tendency towards evil. This is called **Original Sin**.
- The belief in **karma** causes some people to believe that suffering is the consequence of our actions, either in this life, or the previous one. People who believe this believe that we are responsible for our actions and will be rewarded or punished, depending on how good or bad our actions are.
- For atheists, there is no problem of evil and suffering as they do not believe in an all-powerful being who could potentially intervene to stop all the evil and suffering on the earth.

**3. Suffering of Jesus**

The death of Jesus had a purpose and many Christians feel hope when they reflect on the suffering of Christ. It reminds them that Jesus can understand physical and mental suffering that all humans go through. It also shows that there can be a purpose to suffering. The death of Jesus on the cross wasn't the end of the story, as Christians believe he rose again three days later. The Resurrection shows that God can triumph over evil. This helps give Christians hope, as they might think God has a plan, even if they don't know what it is. It can also give Christians hope that the suffering won't go on forever and good things will come to those who have faith in God.

**Key Terms 1:**

**Agnostic:** someone who believes it is impossible to prove or disprove the existence of God

**Atheist:** someone who does not believe in God

**Crucifixion:** the killing of Jesus on the cross, an ancient form of execution

**Dukkha:** The Buddhist concept of suffering, unsatisfactoriness

**Evil:** Something that is morally wrong or unjust, doing the wrong thing

**Free will:** The ability to act based on your own decisions

**Karma:** the sum of a person's actions, influencing the life you go into after death

**Omnibenevolent:** All loving

**Omnipotent:** All powerful

**Omnipresent:** Always present, present everywhere

**Omniscient:** All knowing

**Original Sin:** a consequence of the actions of Adam and Eve in the Garden of Eden as a result of their disobedience

**Parable:** a simple story that contains a moral or meaning, used by Jesus to teach

4. Suffering of Job. This story tells of a man, Job, who has his faith tested. Satan claims that Job only believes in God because he is successful and doesn't suffer. God gives Satan permission to test Job's faith by making him suffer. Satan does this by:

Despite all the different ways that Satan causes Job to suffer, Job's faith in God never waivers, despite never knowing why he went through the suffering. "I was born with nothing, and I will die with nothing. The Lord gave and now He has taken away. May his name be praised!" As a result of his continued faith, everything Job had lost is restored.

- Attacking his servants
- Stealing his animals
- Killing all his children
- Making Job sick

Some Christians believe suffering is a test of faith and won't expect to know why they have been caused to suffer.

5. Responding to Suffering - Parable of the Sheep and Goats. Jesus taught his followers to 'love your neighbour as yourself' and this teaching is contained in the Parable of the Sheep and Goats. In the parable, Jesus explains that the righteous people (sheep) who helped those in need will be rewarded with spending eternity in heaven. Those who have ignored people in need will spend eternity in hell as a punishment. Jesus says that helping people in need is the same as helping Jesus himself. Ignoring people who are going through suffering is not an option. This is why many Christians support charities such as Christian Aid and aim to reduce the suffering of others as much as possible.

6. Suffering in Buddhism. Suffering is a natural part of life. When Siddhartha left the palace in which he lived, the three people he saw were an old man, an ill man and a dead person. This taught him that people suffer in life. The Four Noble Truths are a summary of the Buddha's teachings. It is these truths that the Buddha taught to his first disciples after he was enlightened.

1. All existence is dukkha (suffering)
2. The cause of dukkha is craving.
3. Stopping suffering comes with the stopping craving
4. Following the Eightfold Path can bring an end to suffering

The Buddha taught that craving is ultimately caused by greed, ignorance & hatred.

The Buddha taught that the way to get rid of the desire that causes suffering is to free yourself from being attached to it. Buddhists believe that following the Eightfold Path will help them to reach enlightenment. This will end the cycle of suffering. Buddhists also believe in karma or 'intentional action'.

Buddhists try to perform good actions, e.g. based in generosity and compassion. They avoid performing bad actions, e.g. based on greed and hatred. Actions also determine where they will be reborn in the next life. Good actions with good intentions can mean being born as a human. Bad actions with bad intentions can mean rebirth as an animal, or into a hell realm. Buddhists believe that they should help those who are suffering and may work with charities to help bring an end to those going through suffering.



1. Right View
2. Right Intention
3. Right Speech
4. Right Action
5. Right Livelihood
6. Right Effort
7. Right Mindfulness
8. Right Concentration

#### Key Terms 2:

**Resurrection:** Rising from the dead, being restored to life

**Righteous:** morally right or justifiable, doing the right thing

**Sin:** An immoral act, going against God's law

**Suffering:** Undergoing pain or distress

**The Fall:** The disobedience of Adam and Eve, which resulted in sin being in the world

**Theist:** Someone who believes in God

#### Key Quotes:

"The righteous person may have many troubles, but the LORD delivers him from them all."  
*Psalms 34:19*

"Not only so, but we also glory in our sufferings, because we know that suffering produces perseverance."  
*Romans 5:3*

"The root of suffering is attachment."  
*The Buddha*

"All conditioned things are impermanent" — when one sees this with wisdom, one turns away from suffering."  
*The Buddha*

# B2 Chapter 9: Ecosystems

## Knowledge organiser

### Respiration

- Respiration is the process in which energy is released from the molecules of food which you eat
- Respiration happens in the mitochondria of the cell
- Aerobic respiration** involves oxygen, it is more efficient as all of the food is broken down to release energy  
glucose + oxygen → carbon dioxide + water
- The glucose is transported to the cells in the blood **plasma**
- The oxygen is transported to the cells in **red blood cells**, by binding with **haemoglobin**
- Carbon dioxide is a waste product and is transported from the cells to the lungs to be exhaled
- Anaerobic respiration** is a type of respiration which does not use oxygen, it is used when the body cannot supply the cells with enough oxygen for aerobic respiration
- Anaerobic respiration releases less energy than aerobic respiration  
glucose → lactic acid
- The **lactic acid** produced through anaerobic respiration can cause muscle cramps
- Lactic acid will build up if there is not enough oxygen present in the blood supply to break it down. This is known as an **oxygen debt**

### Fermentation

- Fermentation** is a type of anaerobic respiration which occurs in yeast
- Instead of producing lactic acid, yeast produces ethanol, which is a type of alcohol  
glucose → ethanol + carbon dioxide
- This process can be used to form alcohol to drink or to allow bread and cakes to rise

### Plant minerals

Plants need minerals for healthy growth, if they do not have enough of these minerals this is known as a **mineral deficiency**

Mineral	What is it used for?	What happens if there is not enough?
<b>nitrate</b> (contain nitrogen)	healthy growth	poor growth and older leaves yellow
<b>phosphates</b> (contain phosphorus)	healthy roots	poor growth, younger leaves look purple
<b>potassium</b>	healthy leaves and flowers	yellow leaves with deadpatches
<b>magnesium</b>	making chlorophyll	leaves will turn yellow

**Fertilisers** can be used to stop plants from suffering with mineral deficiencies

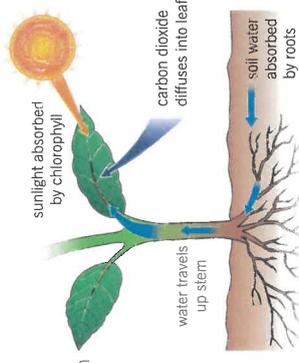
#### Key terms

Make sure you can write definitions for these key terms.

aerobic respiration    algae    anaerobic respiration    chlorophyll    mineral deficiency    fermentation    fertiliser    haemoglobin    lactic acid    magnesium  
 nitrates    oxygen debt    phosphates    photosynthesis    plasma    potassium    producer    red blood cells

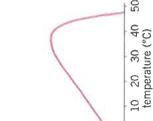
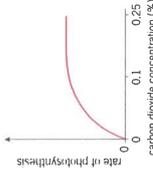
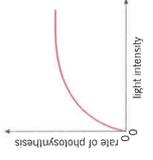
### Photosynthesis

- Photosynthesis** is the process which occurs in the chloroplasts to produce glucose using sunlight
- water + carbon dioxide + sunlight → glucose + oxygen
- Any organism that can use photosynthesis to produce its own food is known as a **producer**, these are not just limited to plants but can include other organisms such as **algae**



The rate of photosynthesis can be affected by:

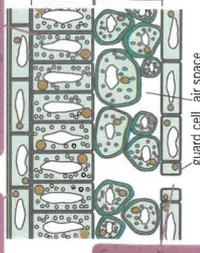
- Light intensity – the higher the light intensity the higher the rate of photosynthesis up to a point
- Carbon dioxide concentration – the higher the carbon dioxide concentration the higher the rate of photosynthesis up to a point
- Temperature – the optimum temperature is the temperature at which photosynthesis occurs at the highest rate, before and after this the rate will be less



### Leaves

- To best adapt for photosynthesis leaves have a number of adaptations
- They are thin to allow the most light through
- There is a lot of **chlorophyll** to absorb light
- They have a large surface area to absorb as much light as possible

**waxy layer** – to reduce water loss by evaporation



**stomata** – on the lower surface to reduce water loss by evaporation

### Natural selection

- Scientists believe that the organisms which we see on Earth today have gradually developed over millions of years, this is known as **evolution**
- Charles Darwin came up with the concept of **natural selection**, he said that only the best adapted animals will survive to pass on their **genes**, weaker animals will die out
  - Organisms with the best adaptations survive and reproduce, weaker organisms die out and do not pass on their genes
  - Over a long period of time the best adaptations continue to be passed on which can lead to a new species being formed
- One example of natural selection can be seen in giraffes; only the giraffes with the longest necks would be able to eat from trees, the ones with shorter necks would not be able to eat and die out
- This would mean that only the gene for long necks would be passed on, leading to all giraffes having long necks

### Extinction

- A species will become **extinct** when all of a species die out
- The **fossil record** shows us that animals have existed in the past which have now become extinct
- Extinction can be caused by:
  - Changes to the environment
  - Destruction of habitat
  - New diseases
  - Introduction of new predators
  - Increased **competition**
- When a species becomes extinct, the variety of species within an ecosystem is reduced, this is also known as a reduction in **biodiversity**
- The more diverse a **population** is, the more likely they are to survive environmental changes

### Punnet squares

Possible alleles from father

<b>B</b> (dominant allele for brown eyes)	<b>b</b> (recessive allele for blue eyes)
<b>Bb</b> Offspring will have brown eyes as B is dominant	<b>bb</b> Offspring will have blue eyes as both alleles are recessive
<b>b</b> (recessive allele for blue eyes)	<b>Bb</b> Offspring will have brown eyes as B is dominant
<b>bb</b> (recessive allele for blue eyes)	<b>bb</b> Offspring will have blue eyes as both alleles are recessive

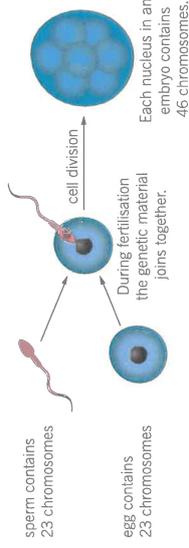
Possible alleles from mother

### Genetic modification

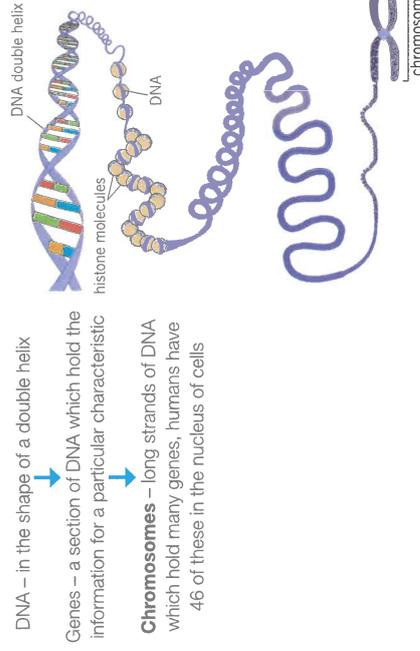
- Genetic modification** is the process which scientists can use in order to alter the genes of an organism
- Examples of this include altering cotton to produce higher yields, altering bacteria genes to produce medicines and altering crops to produce their own insecticides

### Inheritance

- Characteristics** are passed along from parents to their offspring
- Half of the genetic information comes from each parent, this is passed on through the sex cells in the process of fertilisation



- DNA** is the material which contains all of this genetic information



### Genetics

- For every characteristic an organism will have two **alleles**, this is two different genes which can code for the same characteristic, one is inherited from each parent
- Dominant** alleles will cause the characteristic to be displayed even if they are with another allele, this is represented by a capital letter
- Recessive** alleles will not be displayed as characteristics unless there are two of the same allele, they are the characteristic least likely to be shown, this is represented by a small letter
- We can predict the inheritance of characteristics using a **Punnet square**

### Key terms

Make sure you can write definitions for these key terms.

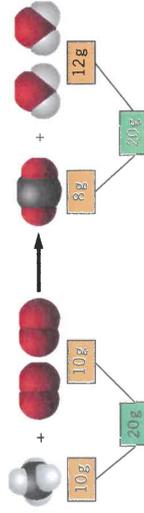
- allele
- biodiversity
- characteristics
- chromosome
- competition
- DNA
- dominant
- evolution
- extinct
- fossil record
- gene
- genetic modification
- mutation
- natural selection
- population
- Punnet square
- recessive

### Chemical reactions

- Word equations can represent a **chemical reaction**:
- The **reactants** are on the left side of the arrow and the **products** are on the right side of the arrow
- We use an arrow instead of an equals sign as it represents that the reactants are changing into a new substance
- In a reaction, the amount of each type of atom stays the same, however they are rearranged to form a new product

### Conservation of mass

- In a reaction the mass will be **conserved**, this means that the total mass of the reactants will be equal to the total mass of the products
- If it appears that some of the mass has been lost, this means that a gas has been produced and escaped, accounting for the lost mass



**Balanced symbol equations** show the amounts of all of the individual atoms in a reaction

- The symbols used are from the Periodic Table
- They also show:
  - Formulae of reactants and products
  - How the atoms are rearranged
  - Relative amounts of reactants and products



### Combustion

- Combustion** is the burning of a **fuel** in oxygen
- A fuel is a substance which stores energy in a chemical store
- Examples of fuels include petrol, diesel, coal and hydrogen
- When a carbon based fuel undergoes combustion, it will produce water and carbon dioxide
 

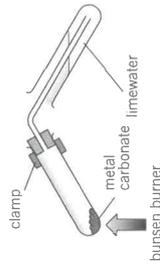
$\text{methane} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$
- Hydrogen can also be used as a fuel, this is much better than traditional fossil fuels as it does not produce carbon dioxide:
 

$\text{hydrogen} + \text{oxygen} \rightarrow \text{water}$

### Thermal decomposition

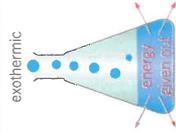
- A **thermal decomposition** reaction is one where the reactants are broken down (decomposition) using heat (thermal energy)
- An example of this is with metal carbonates:
 

$\text{zinc carbonate} \rightarrow \text{zinc oxide} + \text{carbon dioxide}$
- We can test for this carbon dioxide by bubbling the gas through limewater, if the limewater turns cloudy, the gas is carbon dioxide

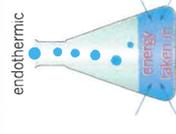


## Exothermic and endothermic reactions

- Exothermic** reactions involve a transfer of energy from the surroundings
- As energy is transferred to the surroundings this will show an increase in temperature
  - Examples of exothermic reactions include combustion, freezing, and condensing

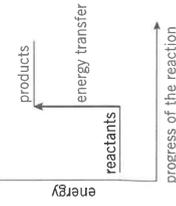
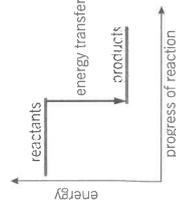


- Endothermic** reactions involve a transfer of energy from the surroundings to the reactants
- As energy is taken into the reactants a decrease in temperature will be shown
  - Examples of endothermic reactions include thermal decomposition, melting, and boiling



### Energy level diagrams

- Energy level diagrams** show the values of energy between the reactants and the products in a reaction
- If the energy is greater in the reactants than the products then the reaction is exothermic as energy has been given out to the surroundings
  - If the energy is lower in the reactants than the products then the reaction is endothermic as energy has been taken in from the surroundings



### Bond energies

- Energy must be used to break **chemical bonds**, meaning that this reaction is endothermic
- Energy is given out when chemical bonds are made, meaning that this reaction is exothermic
- To see if a reaction is endothermic or exothermic, you must find the difference in the energy needed to break and to make the bonds in the reaction
  - If the energy needed to break the bonds is less than the energy given out when making the bonds, the reaction is exothermic
  - If the energy needed to break the bonds is more than the energy released when making the bonds, the reaction is endothermic

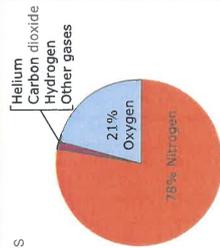
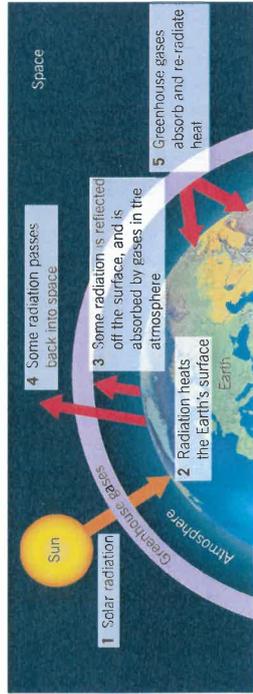
### Key terms

Make sure you can write definitions for these key terms.

balanced symbol equation    chemical bond    chemical reaction    combustion    exothermic    products    conserved    reactants    conservation of mass    decomposition    fuel    endothermic    energy level diagram    exothermic    products    conserved    reactants    conservation of mass    decomposition    thermal decomposition

### The atmosphere

- The air around us all of the time is known as the **atmosphere**, it is made up of a mixture of gases
- When the Sun heats the Earth's surface, some of the radiation is absorbed and some is reflected back into space
- Some of the gases in the atmosphere absorb radiation that is about to be reflected into space, this keeps the Earth at a warmer temperature than it would be without the atmosphere, this is needed as otherwise it would be too cold for life
- The gases in the atmosphere which absorb and trap this radiation are known as **greenhouse gases**, the most commonly known greenhouse gases are carbon dioxide and methane



### Extracting metals

- Metals are a **natural resource**, with most being found joined with other elements in compounds
- Naturally occurring metals and their compounds are known as **minerals**
- An **ore** is a naturally occurring rock which contains enough of a mineral to be worth extracting
- An example of an ore is Bauxite, which contains aluminium hydroxide

When metals are extracted they first have to be separated from other minerals in the ore, then they need to undergo a chemical reaction to separate them from the other element that they are joined to in a compound

If a metal is below carbon in the reactivity series, it can be extracted by reacting it with carbon in a displacement reaction  
As carbon is more reactive it will take the place of the metal in the compound, leaving the metal on its own:



If the metal is above carbon in the reactivity series, **electrolysis** can be used, this involves separating the metal by using electricity

#### Reactivity series

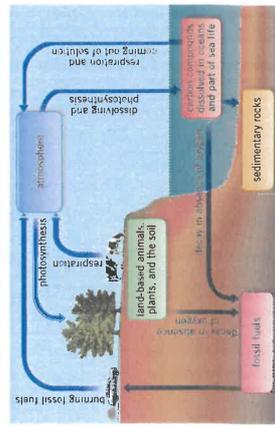
- magnesium
- aluminium
- carbon
- zinc
- iron
- lead
- copper

### Global warming

- Global warming** is the gradual increase in temperature of the Earth
- This is closely linked to the rise in carbon dioxide levels in the atmosphere

### The carbon cycle

- The **carbon cycle** is the processes by which carbon is naturally transferred to different stores through a range of natural processes
- Carbon is released into the atmosphere through **combustion of fossil fuels**, and animal **respiration**
- It is then reabsorbed by plants during **photosynthesis**



### Climate change

- Long term changes to weather patterns are known as **climate change**
- This can cause the ice caps to melt, leading to sea levels rising and flooding of low level land
- Graphs alone cannot confirm that humans are the cause, but the majority of scientists now believe that human activity is a very likely cause
- We can help to prevent climate change by:
  - Using renewable energy resources
  - Using cars less
  - Buying and wasting less resources

### Recycling

- Recycling** is the collecting and processing of materials that have been used so that the resources can be used again
- Recycling can have both advantages and disadvantages:

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Resources will last longer</li> <li>It uses less energy than extracting new materials</li> <li>It reduces waste and pollution</li> </ul>	<ul style="list-style-type: none"> <li>Separating rubbish can be seen as a nuisance</li> <li>The lorries collecting recycling produce pollution</li> <li>Some materials are easier to recycle than others</li> </ul>

#### Key terms

Make sure you can write definitions for these key terms.

atmosphere carbon cycle climate change combustion ore photosynthesis recycling respiration natural resource greenhouse gas mineral global warming fossil fuel electrolysis recycling respiration