FOUNDATION FOR GROWTH

WOOTTON PARK

'Ipsum quod faciendum est diutius'

Year 9 Knowledge Maps

Term 5 and 6

Name:
Tutor Group:

Subject: English | Term: 6 | Topic: End of Year Exam Revision - Writing

WOOTTON PARK

'Ipsum quod faciendum est diutius durant'

English Language Paper 1 Section B
Descriptive and Narrative Writing

The key to great descriptive and narrative writing is PLANNING! You can use some of these tips to help you plan a great creative response.

1) Structuring a Story

Most fictional (and non-fictional) stories follow a recognisable pattern. One pattern that is familiar to readers is the five-stage story arc. This structure is also used in films and television shows. A five-stage story arc takes the reader through the following stages:

exposition - an opening that hooks the reader and sets the scene

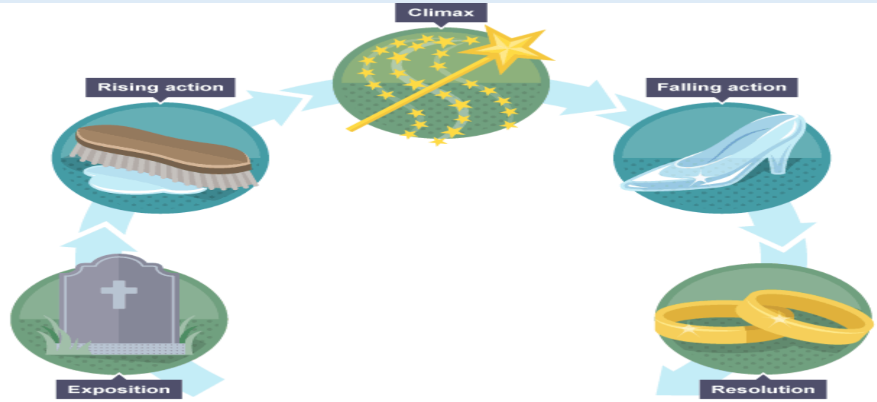
rising action - builds tension

climax, or turning point - the most dramatic part of the story

falling action - realises the effects of the climax

resolution - the story is concluded

Think back to the last book you read - where were the five points to the story?



2. Box Planning

When exploring the image in the question, you could use box planning to help focus your descriptions or narratives on different elements or focus areas

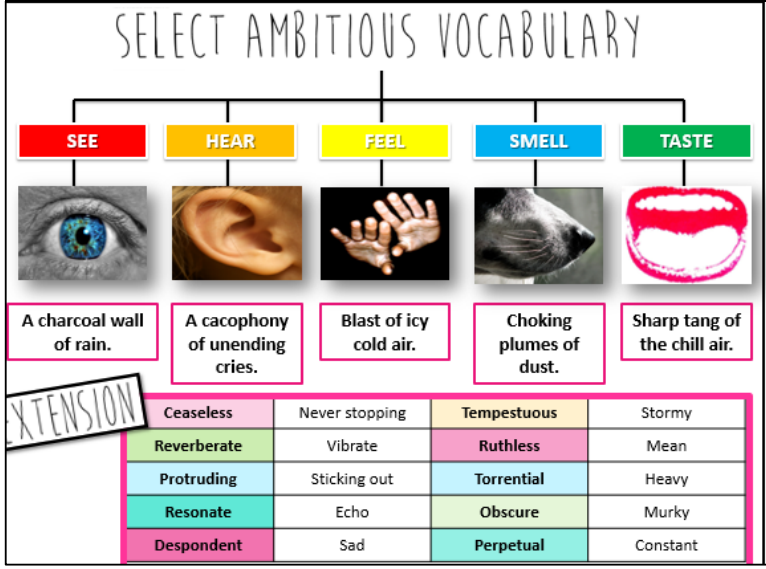
3) Selecting your Vocabulary Carefully

Linguistic Devices:

Metaphor
Simile
Personification
Allusion
Figurative language
Imagery
Sensory detail
Alliteration
Sibilance
Assonance

Structural Devices:

Simple/complex sentences
Foreshadowing
Flashback
Temporal shifts
Macro/Micro focus
Paragraphing for effect



SELECT AMBITIOUS VOCABULARY

SEE	A charcoal wall of rain.
HEAR	A cacophony of unending cries.
FEEL	Blast of icy cold air.
SMELL	Choking plumes of dust.
TASTE	Sharp tang of the chill air.

EXTENSION

Ceaseless	Never stopping	**Tempestuous**	Stormy
Reverberate	Vibrate	**Ruthless**	Mean
Protruding	Sticking out	**Torrential**	Heavy
Resonate	Echo	**Obscure**	Murky
Despondent	Sad	**Perpetual**	Constant

Subject: English	Term: 6	Topic: End of Year Exam Revision - Writing

English Language Paper 2 Section B
Discursive Writing

The key to great discursive writing is PLANNING! You can use some of these tips to help you plan a great response.

Introduction to writing non-fiction

Texts that deal with facts, opinions and the real world are usually described as non-fiction. Different text types, or forms of non-fiction have particular **conventions**. These are the typical or expected features of a form and include structure, language and tone. For example, a newspaper article usually has a headline, uses formal language and takes a serious tone. A political speech usually addresses the audience directly, includes persuasive language and often has a rousing tone.

With all writing tasks it is important to consider:

- the conventions of the form
- your intended audience (reader)
- the purpose of your writing

Example Question

Trump has stated that he believes a fifth of teachers should carry weapons and be trained in marksmanship to combat school shootings.

Write a **letter** to **Donald Trump**, **arguing your point of view on this statement.**

Success Criteria

- ➢ Persuasive techniques
- ➢ Interesting structural features
- ➢ Matched to the TAP
- ➢ Engaging vocabulary
- ➢ Engaging writing
- ➢ Discourse markers
- ➢ Language techniques
- ➢ Personality comes through
- ➢ Paragraphs

- ➢ Sentence starters
- ➢ A **range** of punctuation
- ➢ Paragraphs
- ➢ Variety of sentence types/lengths
- ➢ Standard English
- ➢ Accurate spelling
- ➢ Sophisticated vocabulary

LANGUAGE EXAMPLES	STRUCTURE EXAMPLES
Word classes (verbs, adverbs, adjectives, nouns, pronouns)	Juxtaposition/ Contrasts
Imagery (olfactory, gustatory, auditory, visual, tactile, kinaesthetic, colour, nature)	Tension
Metaphor	Narrative Voice
Simile	Suspense
Personification	Punctuation
Alliteration	Paragraphing
Tense (past, present, future)	Sentence Types (simple, compound, complex)
Irony	Sentence Functions (declarative, interrogative, imperative, exclamative)
Hyperbole	Lists
Dialogue	Sentence Lengths
Statistics/Facts	Semantic Fields
Emotive Language	Repetition
Triplets	Cliff-hanger
Anecdotes	Cyclical structure
Rhetorical Questions	Expert Opinions
Puns	

Subject: English	Term: 6	Topic: End of Year Exam Revision – A Christmas Carol

The Plot

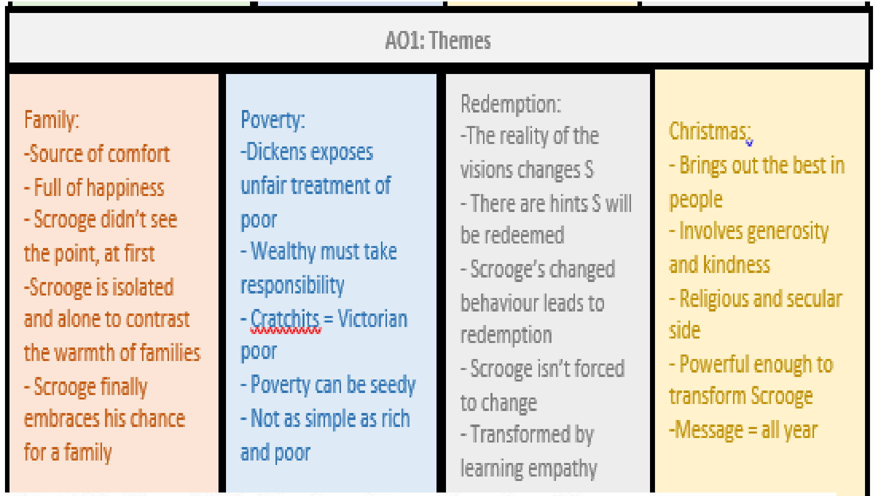
Stave 1: Scrooge and Bob are both working late on Christmas Eve. Scrooge turns down Fred's invitation, scorns the charity collectors and reluctantly gives Bob Christmas Day off. Scrooge slowly makes his way home and sees Marley's face in his door knocker. Later that evening, Marley's ghost appears. Marley warns Scrooge that he must change his ways to avoid the same fate. He explains that he'll be visited by three spirits.

Stave 2: The Ghost of Christmas Past appears. Scrooge is taken to the village where he grew up and sees his younger self in school: alone at Christmas. Scrooge then sees happier Christmases: his sister Fan coming to take him home and a party organised by his old boss, Fezziwig. Scrooge is then shown his split from Belle, before being shown Belle's family, who remind Scrooge of missed opportunities

Stave 3: The Ghost of Christmas Present arrives. Scrooge and the Ghost stop at the Cratchit's house on Christmas Day. Scrooge learns Tiny Tim will die. Scrooge and the Ghost see people all over the world enjoying Christmas, in spite of their isolation. They then visit Fred's house. The guests at his party make fun of Scrooge and his attitude towards Christmas. The Ghost reveals two starving children: Ignorance and Want. The ghost warns Scrooge to beware of them.

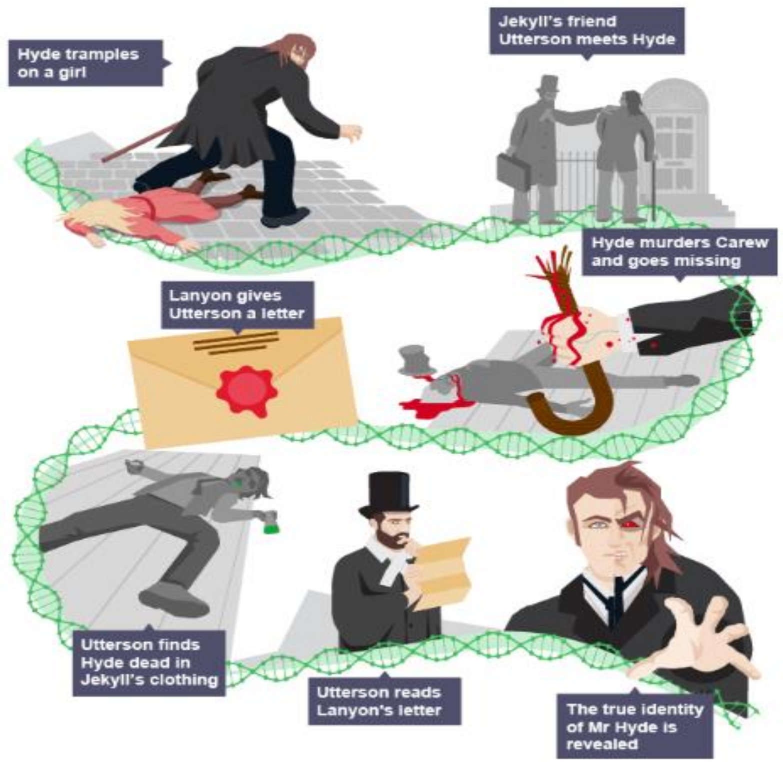
Stave 4: The Ghost of Christmas Yet to Come collects Scrooge. The Ghost silently shows Scrooge the uncaring reaction of some people to an unknown man's death. Scrooge sees a group of thieves trying to sell the dead man's belongings, including the shirt from his corpse. Scrooge is shown a corpse under a bed sheet and a woman rejoicing that her debt collector is dead. Scrooge and the Ghost visit the Cratchits again. He's upset to find out that Tiny Tim has died. The Ghost takes Scrooge to a graveyard and points to a grave with Scrooge's name on it. Scrooge promises the Ghost that he will honour Christmas and change the course of his life.

Stave 5: Scrooge finds himself back in his own bed on Christmas Day. Scrooge has completely changed. He laughs, dances and wishes passers-by a Merry Christmas. He buys the Cratchits a huge turkey then joins Fred and his friends for Christmas dinner. The next day Scrooge gives Bob a pay rise. We're told that Tiny Tim will survive, and that Scrooge celebrates Christmas for the rest of his life.



AO1: Themes			
Family: -Source of comfort - Full of happiness - Scrooge didn't see the point, at first -Scrooge is isolated and alone to contrast the warmth of families - Scrooge finally embraces his chance for a family	Poverty: -Dickens exposes unfair treatment of poor - Wealthy must take responsibility - Cratchits = Victorian poor - Poverty can be seedy - Not as simple as rich and poor	Redemption: -The reality of the visions changes S - There are hints S will be redeemed - Scrooge's changed behaviour leads to redemption - Scrooge isn't forced to change - Transformed by learning empathy	Christmas: - Brings out the best in people - Involves generosity and kindness - Religious and secular side - Powerful enough to transform Scrooge -Message = all year

Dr Jekyll and Mr Hyde - Key plot details



Subject: English	Term: 6	Topic: End of Year Exam Revision – A Christmas Carol

AO3 : Context			
Religion: Society was very religious, and many Victorians feared God's punishment for not abiding to the strict moral code but Dickens believed good Christians should be humble, charitable, faithful and selfless, rather than merely appearing religious. Christmas was becoming more secular; Dickens wanted to spread the message that charity, forgiveness and generosity should be all year round.	Poverty: John Malthus argued that poverty was inevitable and there wasn't enough money to go around. Dickens, in contrast believed that the rich just needed to be more generous. Dickens knew about the plight of the poor, having grown up in poverty, and wanted to raise awareness; hence the sympathetic Cratchits.	Charity / Education: Industrial Revolution created a huge gap between rich and poor; however, it encouraged selfishness from the rich. Dickens believed in collective responsibility and Scrooge's change echoes this. He also thought education could prevent crime, poverty and disease.	Society: Industrial Revolution created jobs and drew large numbers of people together, which resulted in poor living conditions amongst the poor. The population grew rapidly and conditions worsened. Overcrowding, like the slums in Stave 4, led to hunger, disease and crime. The slums were scary places for the rich, like Scrooge. Children suffered the worst and it was very difficult to escape poverty. Dickens aimed to raise awareness for the poor: discouraging the rich's ignorance.

Language and Structure

Things to look out for in Dicken's writing:

Structure- chronological order BUT the spirits are able to manipulate time! Foreshadowing. Repetition and hyperbolic lists, and a circular structure where Scrooge starts and finishes in the same place but as a dramatically different person and his journey to realisation drives the story.

Language- sensory language, questions, omniscient narrator, similes, metaphors, symbolism, juxtaposition and a lot of symbolism.

Subject: Maths – 9D, A & B (Higher)	Term: 5&6	Topic: Year 9 Units 6, 7 & 8

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Overview

In these next two terms, learners will be studying three units which will include the topics of graphs, area and volume and transformations.

Key skills:

Graphs
Prior knowledge check
Linear graphs
More linear graphs
Graphing rates of change
Real-life graphs
Line segments
Quadratic graphs
Cubic and reciprocal graphs
More graphs

Area and volume
Prior knowledge check
Perimeter and area
Units and accuracy
Prisms
Circles
Sectors of circles
Cylinders and spheres
Pyramids and cones

Key Terms:

Unit 6:
Linear equation
Parabola
Gradient
Midpoint
Distance-time graphs
Velocity-time graphs
Perpendicular
Cubic
Reciprocal
Asymptotes

Unit 6:
Cylinders
Surface area
Volume
Sphere
Cone
Sector
Arc
Lower and upper Bound
π

Unit 6:

$$\text{Average speed} = \frac{\text{total distance}}{\text{total time}}$$

Make sure your units match.

Key point 5

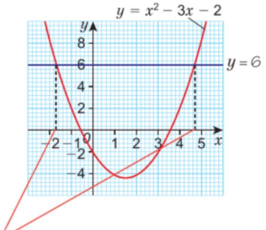
A **distance–time graph** represents a journey.
The vertical axis represents the *distance* from the starting point.
The horizontal axis represents the *time* taken.

Key point 1

A **linear equation** generates a straight-line (linear) graph.
The equation for a straight-line graph can be written as $y = mx + c$ where m is the gradient and c is the y-intercept.

Example 3

Here is the graph of $y = x^2 - 3x - 2$.
Use the graph to solve the equation $x^2 - 3x - 8 = 0$.
Give your answers correct to 1 decimal place.



Rearrange the equation so that one side is $x^2 - 3x - 2$.

$$+6\ \begin{array}{l} x^2 - 3x - 8 = 0 \\ x^2 - 3x - 2 = 6 \end{array}\ +6$$

$-8 + 6 = -2$

Find where $y = x^2 - 3x - 2$ intersects $y = 6$.

Read off the x-values.

$x = -1.7$
$x = 4.7$

A **velocity–time graph** has time on the x-axis and velocity on the y-axis.
The gradient is the rate of change of velocity, or acceleration.
A positive gradient means an object is speeding up.

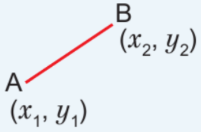
$$\text{Acceleration} = \frac{\text{change in velocity}}{\text{time}}$$

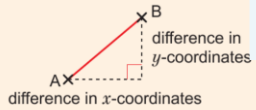
The area under a velocity–time graph is the distance travelled.

When two lines are **perpendicular**, the product of the gradients is −1.
When a graph has gradient m, a graph perpendicular to it has gradient $\frac{-1}{m}$.

The coordinates of the **midpoint** of a line segment are

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$





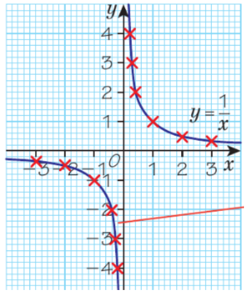
Example 4

Draw the graph of $y = \frac{1}{x}$, where $x \neq 0$, for $-3 \leqslant x \leqslant 3$.

x	−3	−2	−1	$-\frac{1}{2}$	$-\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	3
y	$-\frac{1}{3}$	$-\frac{1}{2}$	−1	−2	−4	4	2	1	$\frac{1}{2}$	$\frac{1}{3}$

Make a table with x-values from −3 to 3. Do not include 0.

Work out the y-values and complete the table.



The x and y axes are **asymptotes** to the curve. An asymptote is a line that the graph gets very close to, but never actually touches.

Subject: Maths – 9D, A & B (Higher)	Term: 5&6	Topic: Year 9 Units 6, 7 & 8

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Websites and further reading

- Pearson Active Learn: http://pearsonactivelearn.com
- Maths Watch: http://mathswatch.co.uk/
- BBC Bitesize: http://www.bbc.co.uk/education/subjects/zqhs34j
- Numeracy and Foundation level practice questions and answers: https://corbettmaths.com/5-a-day/gcse1/
- Maths quiz: http://www.educationquizzes.com/ks3/maths/
- KS3 online tests: http://www.romsey.hants.sch.uk/maths/ks3onlinetests.htm

Unit 7:

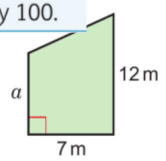
Key point 6

The upper bound is half a unit greater than the rounded measurement.
The lower bound is half a unit less than the rounded measurement.

$12.5 \leqslant x < 13.5$
lower bound — upper bound

Example 1

This trapezium has area 70 m². Find the length of the shorter parallel side.



$70 = \frac{1}{2}(a + 12) \times 7$ — Substitute the values of h, b and A into the formula $A = \frac{1}{2}(a + b)h$

$\frac{70}{7} = 10 = \frac{1}{2}(a + 12)$ — Divide both sides by 7.

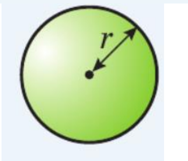
$2 \times 10 = 20 = a + 12$ — Multiply both sides by 2.

$a = 8$ cm

Key point 2

To convert from cm² to mm², multiply by 100.
To convert from mm² to cm², divide by 100.

For a sphere of radius r
Surface area = $4\pi r^2$
Volume = $\frac{4}{3}\pi r^3$



Example 3

A circle has area 50 m². Find its radius, to the nearest cm.

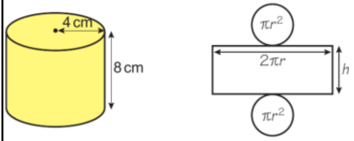
$50 = \pi r^2$ — Substitute $A = 50$ into the area formula.

$\frac{50}{\pi} = r^2$ — Rearrange to make r^2 the subject.

$\sqrt{\frac{50}{\pi}} = r$ — Square root both sides to find r.

$r = 3.99$ m $= 399$ cm

Calculate the total surface area of this cylinder. Give your answer to 1 d.p.



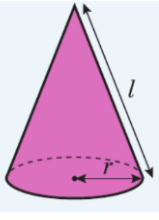
Sketch a net.
Each circle has area πr^2.
The length of the rectangle is the circumference of the circle, $2\pi r$.
The width of the rectangle is the height of the cylinder, h.

Area of each circle $= \pi \times 4^2 = 16\pi$

Area of rectangle $= 2\pi rh = 2 \times \pi \times 4 \times 8 = 64\pi$

Surface area $= 2 \times 16\pi + 64\pi$ — Two circles plus rectangle.
$= 32\pi + 64\pi$
$= 96\pi$
$= 301.6$ cm²

Volume of pyramid = $\frac{1}{3}$ area of base × vertical height
Volume of cone = $\frac{1}{3}$ area of base × vertical height
$= \frac{1}{3}\pi r^2 h$

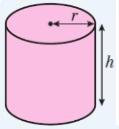


Curved surface area of a cone = πrl,

Total surface area of a cone = $\pi rl + \pi r^2$

The total surface area of a cylinder is $2\pi r^2 + 2\pi rh$

For any circle
circumference = π × diameter
$C = \pi d$ or $C = 2\pi r$

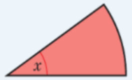


The volume of a cylinder of radius r and height h is $V = \pi r^2 h$

The formula for the area, A, of a circle with radius r is $A = \pi r^2$.

Key point 15

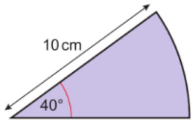
For a sector with angle x° of a circle with radius r
Arc length $= \frac{x}{360} \times 2\pi r$
Area of sector $= \frac{x}{360} \times \pi r^2$



Communication hint
An **arc** is part of a circle.

Example 4

Work out
a the arc length
b the perimeter
c the area of this sector.
Give your answers to 3 s.f.



a Arc length $= \frac{x}{360} \times 2\pi r$
$= \frac{40}{360} \times 2 \times \pi \times 10$ — Write the formula, substitute the angle x and radius.
$= 6.98$ cm (3 s.f.)

b Perimeter $= 6.98 + 10 + 10$ — Perimeter = arc length + 2 radii
$= 27.0$ cm (3 s.f.)

c Area $= \frac{x}{360} \times \pi r^2$
$= \frac{40}{360} \times \pi \times 100$ — Write the formula, substitute the angle x and radius.
$= 34.9$ cm² (3 s.f.)

Subject: Maths – 9D, A & B (Higher)	Term: 5&6	Topic: Year 9 Units 6, 7 & 8

WOOTTON PARK

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Key skills:

Transformations and constructions
- Prior knowledge check
- 3D solids
- Reflection and rotation
- Enlargement
- Transformations and combinations of transformations
- Bearings and scale drawings
- Constructions 1
- Constructions 2
- Loci

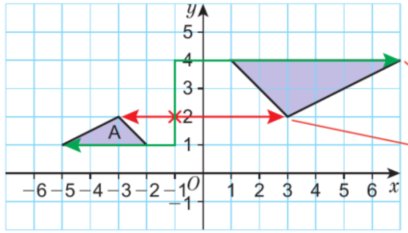
Key Terms:

Unit 8:	Reflection	Centre of enlargement
Front elevation	Rotation	Column vector
Side elevation	Translation	Resultant vector
Plan	Transformation	Bearings
Object	Enlargement	Scale
Image	Scale factor	Bisector

Unit 8:

Reflections and rotations are types of transformation.
Transformations move a shape to a different position.
To describe a reflection, you need to give the equation of the mirror line.

Enlarge triangle A by scale factor −2 about centre (−1, 2).



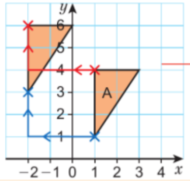
Count the squares from the centre of enlargement.

Instead of 1 down, 4 left, go 2 up, 8 right.

Instead of 2 left, go 4 right.

A **negative scale factor** takes the image to the opposite side of the centre of enlargement.

Translate triangle A by the vector $\begin{pmatrix}-3\\2\end{pmatrix}$.

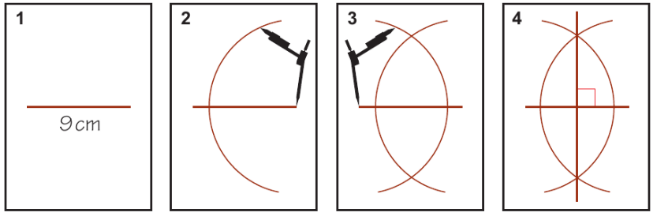


Move each point on the original shape 3 squares left and 2 squares up.

A bearing always has three digits, for example 090°.

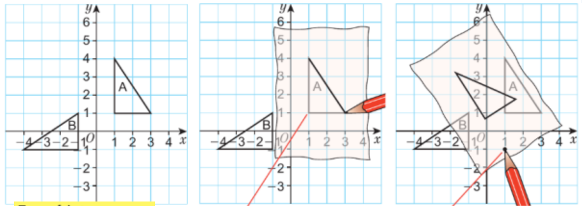
Draw an angle of 80°.
Construct the **angle bisector**.

Draw a line 9 cm long. Construct its **perpendicular bisector**.



The shortest path from a point to a line is perpendicular to the line.

Describe the rotation that takes shape A onto shape B.



Exam hint
The question is worth 3 marks which means you need to give 3 pieces of information about the transformation.

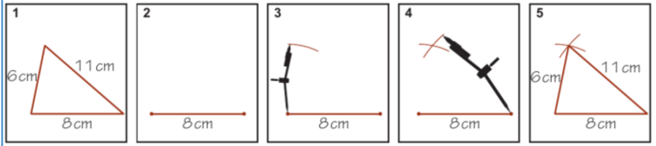
Trace the shape.

Rotate the tracing paper about a fixed point with your pencil. Repeat for different positions until your tracing ends up on top of the image.

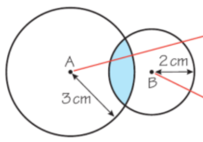
Rotation anticlockwise 90° about (1, −1)

Give the direction, angle and centre of rotation.

Construct a triangle with sides 11 cm, 8 cm and 6 cm.



A and B are two points 4 cm apart.
Shade the points that are less than 3 cm from A and less than 2 cm from B.



Draw a circle at A with radius 3 cm. All the points inside this circle are less than 3 cm from A.

Draw a circle at B with radius 2 cm. All the points inside this circle are less than 2 cm from B

Shade the region which satisfies both rules.

When a shape is enlarged by scale factor k, the area is enlarged by scale factor k^2.

Subject: Science	Term: 5 & 6	Topic: Biology - Organisation and the digestive system

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Topics Covered

Biology – Organisation and the digestive system

Biology Separates only in italics!!

Code	Topic
B3.1	Tissues and organs
B3.2	The human digestive system
B3.3	The chemistry of food
B3.4	Catalysts and enzymes
B3.5	Factors affecting enzymes
B3.6	How the digestive system works
B3.7	Making digestion efficient
B4.1	The blood
B4.2	The blood vessels
B4.3	The heart
B4.4	Helping the heart
B4.5	Breathing and gas exchange
B4.6	Tissues and organs in plants
B4.7	Transport systems in plants
B4.8	Evaporation and transpiration
B4.9	Factors affecting transpiration

Remember you can use Kerboodle to help you revise from the textbook.

3.1 Tissues and organs

During the development of an multicellular organism cells **differentiate**, which means they change so that they can do a particular job.

A **tissue** is a group of cells with similar structure and function working together. E.g. muscle tissue is made up of muscle cells.

An **organ** is a collection of tissues, each one can contains several different tissues to perform a particular function, e.g. the stomach:

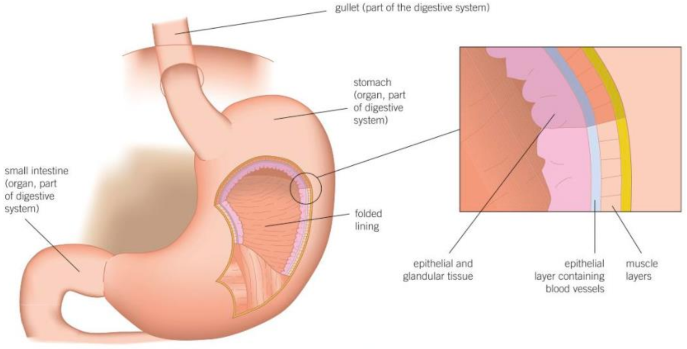


Figure 3 *The stomach contains several different tissues, each with a different function in the organ*

An o**rgan system** is when a groups of organs work together to perform a specific function, e.g. the digestive system needs the stomach, large intestines, small intestines, etc.

3.2 The human digestive system

The function of the digestive system is to break food down into molecules that can be absorbed into the blood stream so that they can be transported around the body to where they are needed.

Enzymes are biological catalysts that speed up the break down of food molecules.

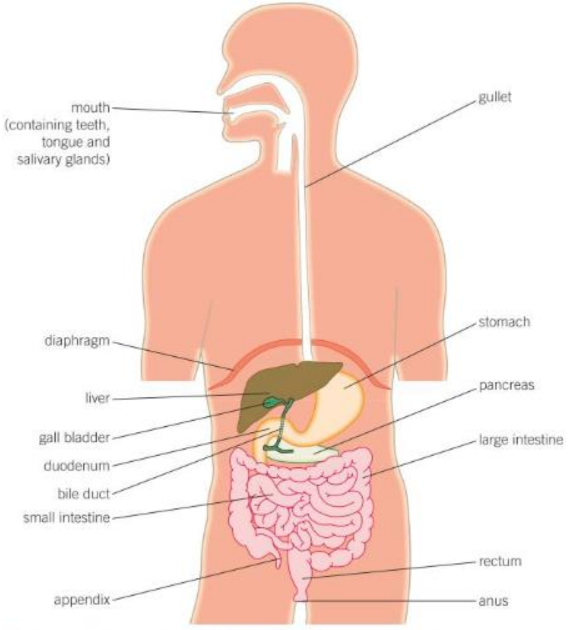


Figure 1 *The main organs of the human digestive system*

3.3 The chemistry of food

Carbohydrates provide us with fuel that makes all of the other reactions in our bodies possible. Carbohydrates are made from **carbon, hydrogen and oxygen.** Carbohydrates are made up of sugars, the most well known is glucose, $C_6H_{12}O_6$. Theses everyday "sugars" are known as **simple sugars**.

Lipids are oils and fate and are the most efficient energy store in your body. Lipids are made from 3 molecules of **fatty acids** to make a molecules of **glycerol.**

Proteins are used form building cells and tissues and are made up of long chains called **amino acids**.

Subject: Science	Term: 5 & 6	Topic: Biology - Organisation and the digestive system

'Ipsum quod faciendum est diutius durant'

Topics Covered

Biology – Organisation and the digestive system

Biology Separates only in italics!!

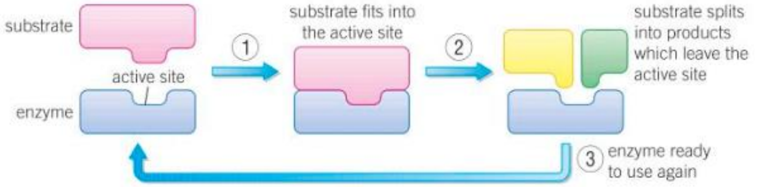
Code	Topic
B3.1	Tissues and organs
B3.2	The human digestive system
B3.3	The chemistry of food
B3.4	Catalysts and enzymes
B3.5	Factors affecting enzymes
B3.6	How the digestive system works
B3.7	Making digestion efficient
B4.1	The blood
B4.2	The blood vessels
B4.3	The heart
B4.4	Helping the heart
B4.5	Breathing and gas exchange
B4.6	Tissues and organs in plants
B4.7	Transport systems in plants
B4.8	Evaporation and transpiration
B4.9	Factors affecting transpiration

Remember you can use Kerboodle to help you revise from the textbook.

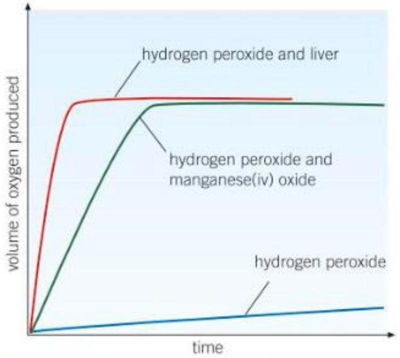
3.4 Catalysts and enzymes

Catalysts are enzymes that can speed up chemical reactions but it is not used in the reaction. This means a catalyst can be used again and again and again. We have several catalysts in our bodies called **enzymes**, which help speed up the process of digestion.

Enzymes are large protein molecules. The shape of an enzyme is vital to its function. The chains are folded to produce a molecule with the **active site**. An active site is has a unique shape so it can bind to a specific substrate molecule.



Enzymes do not change a reaction in any way, they just make it happen faster. Enzymes, therefore, control the **metabolism**.

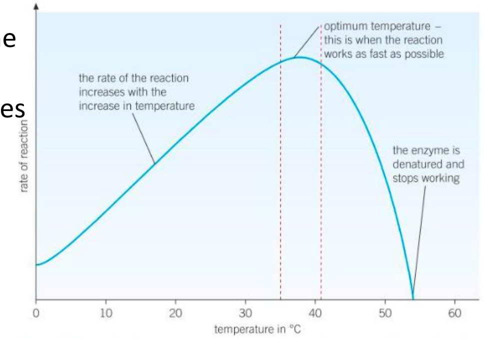


3.5 Factors affecting enzymes

How well an enzyme can break down its substrate depends on several factors. Two of the main factors are temperature and pH.

The graph shows the effect of temperature on the rate of a reaction where an enzyme is involved. You will see that it works best between at certain temperature. Note this temperature is that of the human body. Any hotter and the enzyme denatures and dies. Therefore the enzyme can no longer work.

This denaturing can also occur when the pH isn't right for that enzyme.



3.6 How the digestive system works

Digestive enzymes are different to most enzymes in your bodies. Most enzymes work *inside* the cells, whereas digestive enzymes work *outside* the cells.

Carbohydrate + carbohydrase → Glucose

Amylase is an example of an enzyme that can catalyse the digestion of carbohydrates.

Protease + protein → Amino acids

Lipids + lipase → glycerol + fatty acids

3.7 Making digestion efficient

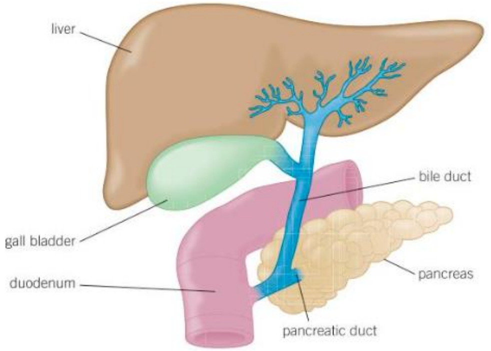
We need to keep pH constant in our bodies in particular places, this is so that digestion and other bodily functions can work correctly.

To do this we needs to change the pH in our digestive system.

For protein to be digested it needs an acidic pH. Your stomach produces a concentrated solution of hydrochloric acid and this allows protease enzymes to work effectively. Due to this acidic pH, the stomach also releases mucus to protect the stomach lining from the acid.

Once the food leaves the stomach it enters the small intestines, here we need enzymes made by the pancreas that prefer an alkaline pH. To do this the liver makes an alkali liquid called **bile**. Bile is stored in the gall bladder until needed.

When food is released into the small intestines from the stomach the bile neutralises the acid and provides an alkaline environment for digestion to continue.



Subject: Science	Term: 5 & 6	Topic: Biology - Organisation and the digestive system

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4.1 The blood

The blood is made up of a liquid called the **plasma.** This plasma carried **red blood cell, white blood cells** and **platelets.**

Plasma transports all of your blood cells and other substances around your body such as; carbon dioxide to the lungs, **urea** (from the breakdown of proteins) to the kidneys to be turned into urine and soluble products of digestion.

Red-blood cells pick up oxygen from your lungs and carry it to the cells. Red blood cells are good at their job because they are biconcave discs so they have a high surface area to volume ratio. They have lots of **haemoglobin** that binds to the oxygen and no nucleus to make room for haemoglobin.

White-blood cells have a nucleus and are part of the body's defence system. Some white blood cells (lymphocytes) form antibodies against microorganisms, some form antitoxins against poisons and some (phagocytes) engulf and digest bacteria and viruses.

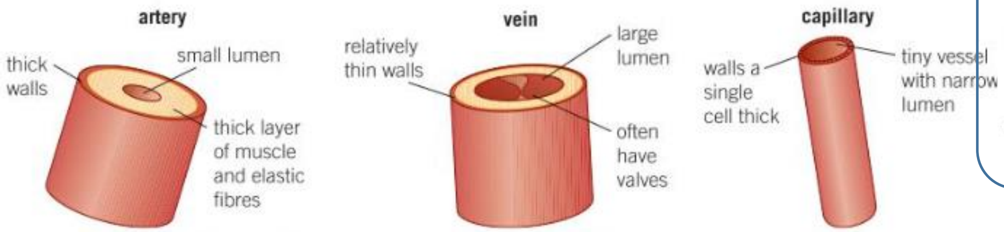
Platelets have no nucleus and are important to help the blood clot.

4.2 The blood vessels

There are three types of blood vessels;

1. **Arteries** – carry blood away from the heart
2. **Veins** – carry blood away from organs to your heart.
3. **Capillaries** – link arteries and veins.

Our bodies have a **double circulatory system**. One transport system carries blood from your heart to your lungs and back. The other transport system carries blood from your heart to all other organs of your body and back again.



4.3 The heart

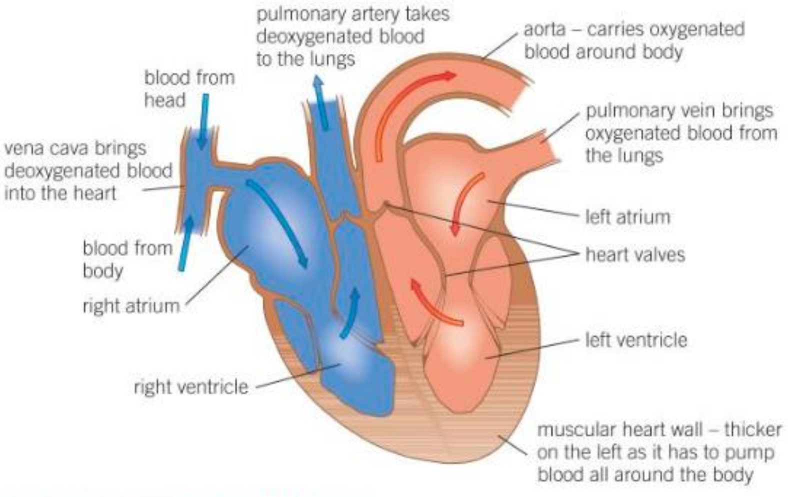


Figure 1 *The structure of the heart*

4.4 Helping the heart

Hearth valves have to withstand a lots of pressure. Overtime they may leak or become stiff. People who suffer this may become breathless and without treatment, will eventually die. Doctors can operate and replace faulty valves.

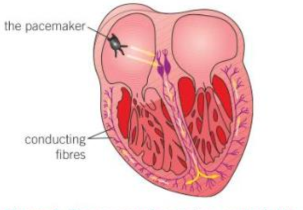
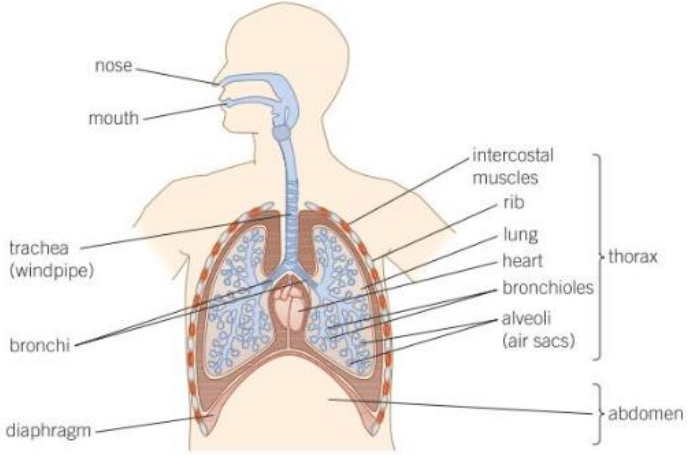


Figure 1 *The pacemaker region controls the basic rhythm of your heart*

Pacemakers can be used to solve the problem of the heart beating out of rhythm. The pacemaker sends and electrical signal to the heart to stimulate it and make it beat more regularly.

Artificial hearts are temporary but can support your natural heart until it is replaced. By 2015 almost 1500 people had an artificial heat sustaining their lives. Most of these patients have to stay in hospital until a transplant is found. Sometimes artificial hearts can be used to give diseased hearts a rest so that they can recover.

4.5 Breathing and gas exchange



Gas exchange occurs in the alveoli of the lungs. Here the oxygen in the air in the lungs diffuses across the membrane of the alveoli and into the bloodstream.

The alveoli are good at this because they are thin, they have lots of capillaries and they have a huge surface area.

When we inhale the ribs move up and out and the diaphragm flattens, the **volume** of the chest **increases**. Increased volume means **lower pressure** in the chest so atmospheric air is drawn into the lungs. This is because the atmospheric air is at a higher pressure.

When we exhale the ribs fall and the diaphragm moves up, the **volume** of the chest gets **smaller**. This causes the volume to decrease and therefore the pressure increases. Having a higher pressure in the chest then outside of the body the air is forces out of the lungs.

Subject: Science	Term: 5 & 6	Topic: Biology - Organisation and the digestive system

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Topics Covered

Biology – Organisation and the digestive system

Biology Separates only in italics!!

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B4.8	Evaporation and transpiration
B4.9	Factors affecting transpiration

Remember you can use Kerboodle to help you revise from the textbook.

4.6 Tissues and organs in plants

Epidermal tissues in plants cover the surfaces and protect them. These are often waxy and protect the leaves.

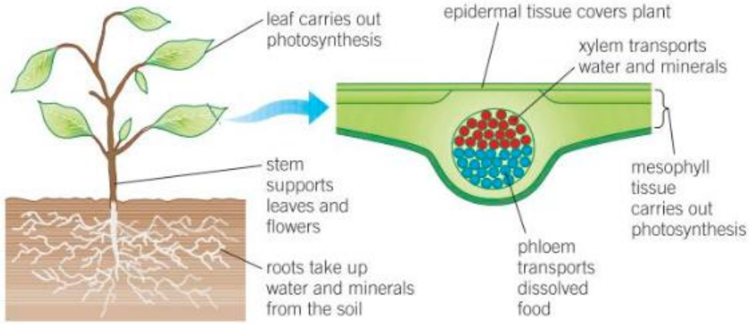
Palisade mesophyll tissue contains lots of chloroplasts, which carry out photosynthesis.

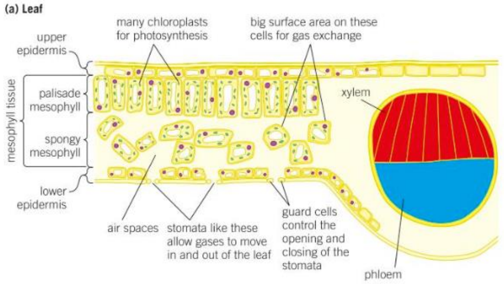
Spongy mesophyll tissue contains some chloroplasts for photosynthesis but also has big air spaces for the easy diffusion of gas.

Xylem and **phloem** tissues transport water and food around the plant.

Plant organs

The leaves, stems, roots are all plant organs as they have specific jobs to do. They are made up of tissues.





4.7 Transport systems in plants

Phloem is used to transport sugars made by photosynthesis from the leaves to the rest of the plant. It is a living tissue. The movement of dissolved sugars from the leaves to the rest of the plant is called **translocation**.

Xylem is used to transport water and mineral ions from the soil around the plant to the stem and the leaves. Mature xylem cells are not living.

Figure 3 *The phloem and xylem are arranged in vascular bundles in the stem*

4.8 Evaporation and transpiration

Water is lost all over the plant. Water in the leaves evaporates through the **stomata** which cover the bottoms of the leaves. This can be reduced about **guard cells**. Guard cells open and close the stomata to reduce the evaporation of water from the leaves. This loss of water vapour is known as transpiration.

4.9 Factors affecting transpiration

The conditions of the environment can affect the rate of transpiration. These include the temperature, humidity, the amount of air movement and light intensity. Anything that increases the rate of photosynthesis affects the rate of transpiration.

To reduce water loss plants have certain adaptations. These include a waxy, waterproof layer to prevent the water from being evaporated. Stomata are also mostly found on the underside of the leaf to protect them from direct light energy from the sun.

If too much water is lost the plant may wilt or the stomata close and stop photosynthesis.

Topics Covered

Biology – Communicable diseases

Biology Separates only in italics!!

Code	Topic
B5.1	Health and disease
B5.2	Pathogens and disease
B5.3	*Growing bacteria in the lab*
B5.4	*Preventing bacterial growth*
B5.5	Preventing infections
B5.6	Viral diseases
B5.7	Bacterial diseases
B5.8	Diseases caused by fungi and protists
B5.9	Human defence responses
B5.10	*More about plant diseases*
B5.11	*Plant defence responses*

Remember you can use Kerboodle to help you revise from the textbook.

5.1 Health and disease

Communicable (infectious) diseases are caused by **pathogens** such as bacteria and viruses.
Non-communicable diseases cannot be transmitted from on person to another.
These are both major causes of ill health, but other factors can impact on health such as; diet, stress and life situations (where you live, gender, financial status, ethnicity etc.). Life situations are often the hardest to control, particularly in early and late life.

5.2 Pathogens and disease

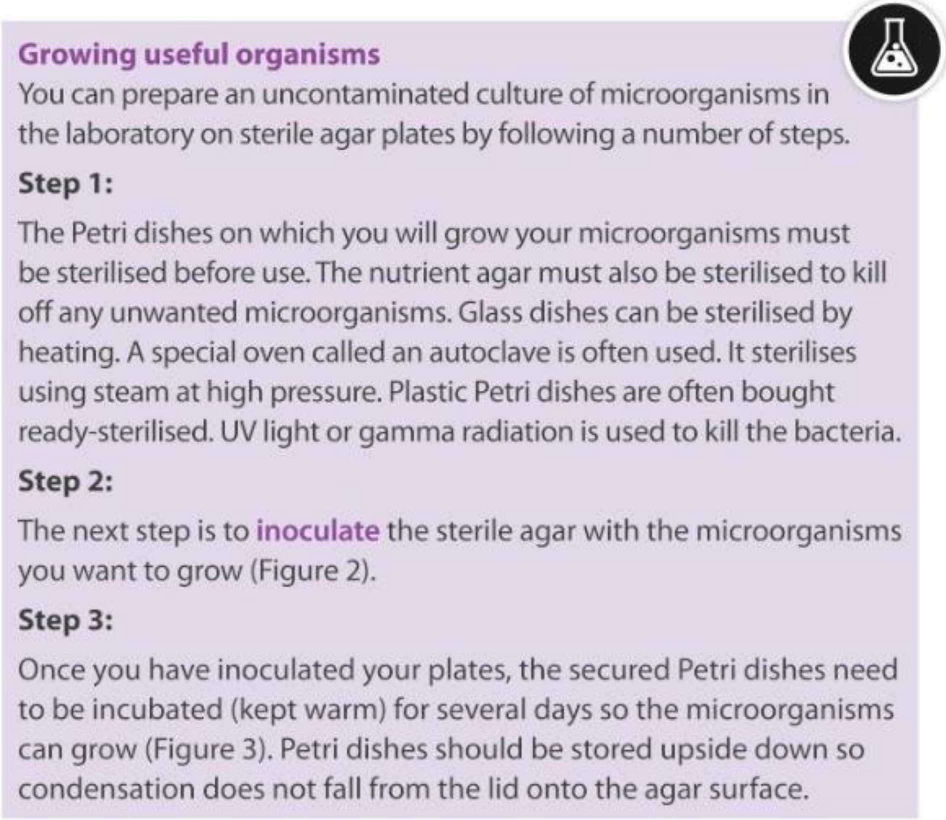
Microorganisms that cause disease are called **pathogens**. Pathogens may be bacteria, virus, protists, or fungi, and they infect plants and animals.
Bacteria and viruses are different because bacteria are single-celled organisms that can produce toxins as they reproduce. Viruses are even smaller than bacteria and reproduce inside cells causing again toxins to be released and cells to be damaged.

How are pathogens spread?

- By air (including droplet infection)
- Direct contact
- By water

5.3 Growing bacteria in the lab

*Bacteria are the most commonly cultured microorganisms. They divide rapidly and easily by simple cell division (**binary fission**).*
*To culture (grow) microorganisms you need a **culture medium**, a gel or liquid with nutrients to allow the microorganism an energy source.*
*Most commonly **agar gel** is used.*



Growing useful organisms

You can prepare an uncontaminated culture of microorganisms in the laboratory on sterile agar plates by following a number of steps.

Step 1:

The Petri dishes on which you will grow your microorganisms must be sterilised before use. The nutrient agar must also be sterilised to kill off any unwanted microorganisms. Glass dishes can be sterilised by heating. A special oven called an autoclave is often used. It sterilises using steam at high pressure. Plastic Petri dishes are often bought ready-sterilised. UV light or gamma radiation is used to kill the bacteria.

Step 2:

The next step is to **inoculate** the sterile agar with the microorganisms you want to grow (Figure 2).

Step 3:

Once you have inoculated your plates, the secured Petri dishes need to be incubated (kept warm) for several days so the microorganisms can grow (Figure 3). Petri dishes should be stored upside down so condensation does not fall from the lid onto the agar surface.

Subject: Science | Term: 5 & 6 | Topic: Biology - Organisation and the digestive system

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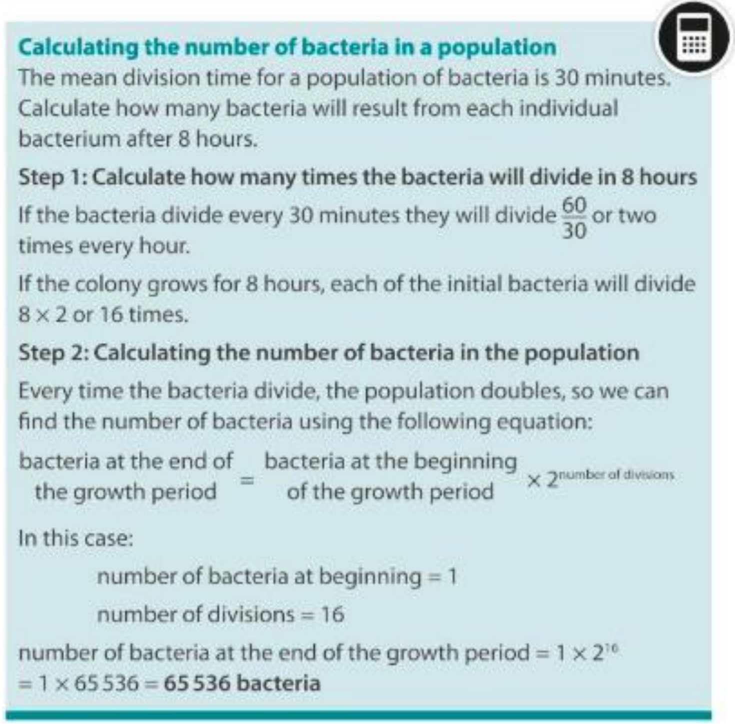
5.4 Preventing bacterial growth



Calculating the number of bacteria in a population

The mean division time for a population of bacteria is 30 minutes. Calculate how many bacteria will result from each individual bacterium after 8 hours.

Step 1: Calculate how many times the bacteria will divide in 8 hours

If the bacteria divide every 30 minutes they will divide $\frac{60}{30}$ or two times every hour.

If the colony grows for 8 hours, each of the initial bacteria will divide 8×2 or 16 times.

Step 2: Calculating the number of bacteria in the population

Every time the bacteria divide, the population doubles, so we can find the number of bacteria using the following equation:

$$\text{bacteria at the end of the growth period} = \text{bacteria at the beginning of the growth period} \times 2^{\text{number of divisions}}$$

In this case:

number of bacteria at beginning = 1

number of divisions = 16

number of bacteria at the end of the growth period $= 1 \times 2^{16}$
$= 1 \times 65\,536 =$ **65 536 bacteria**

There are a number of ways to prevent the growth of bacteria:

- *Raise or lower the temperature*
- *Use of chemicals to stop the growing*
- *Disinfectants to kill them*
- *Antibiotics to kill bacteria inside our bodies*

5.5 Preventing infections

Ignaz Semmelweis was a doctor in the mid-1850s. During this time many women in hospital died from childbed fever a few days after giving birth. Semmelweis noticed that his medical students went straight from dissecting a dead body to delivering a baby without washing their hands. This meant he then insisted on all students washing their hands between each patient reducing the amounts of deaths. This is one way of preventing the spread of infection. Other discoveries include:

- Louis Pasteur developing vaccines
- Joseph Lister used antiseptic chemicals in operating theatres
- The microscope allowed it to be possible for us to study pathogens

5.6 Viral diseases

There are many viral diseases that can be mild or potentially deadly. There are several you must know about:

Measles - fever and red skin rash. It is spread by the inhalation of droplets from coughs or sneezes. It can causes blindness and brain damage. There is no treatment but we can vaccinate.

HIV/AIDS – Many do not know they are infected with HIV, because the virus only causes a mild, flu-like illness to begin with. HIV attacks the immune cells and continually damages the immune system. It is spread by direct sexual contact and the exchange of body fluids such as blood or breast milk. There is no cure and no vaccination.

Tobacco Mosaic virus – TMV is a plant virus that causes a pattern on many types of plant leaf causing the leaves to be destroyed and the plant can no longer photosynthesise. This causes a drop in crop yield.

5.7 Bacterial diseases

There are many bacterial diseases that can be mild or potentially deadly. There are several you must know about:

Salmonella – Salmonella is a bacteria that lives in the gut and can be found on raw meat, eggs and egg products; many describe it as food poisoning. Symptoms include fever, cramps, vomiting and diarrhoea. In the UK all poultry are vaccinated against Salmonella to control the spread.

Gonorrhoea – This is a **sexually transmitted disease (STD)** which are spread from person to person through sexual contact. Symptoms include a thick yellow/green discharge from the sexual organs and pain during urination. 10% of men and 50% of women experience no symptoms at all. If it remains untreated it can cause pelvic pain, infertility and ectopic pregnancies. A baby born to infected mothers may have severe eye infections and may become blind. It is treated with antibiotics or the spread can be reduced by using condoms.

5.8 Diseases caused by fungi and protists

Fungal diseases are very uncommon in people; athletes foot is one, there is a human fungal disease that can attack the lungs and brain of someone who is already ill. Most fungal diseases are in plants.
Rose black spot is a fungal disease on rose plants that cause purple or black spots to develop on leaves reducing the amount of photosynthesis the plant can carry out.

Protists are a type of single-celled organism that can cause a range of diseases in animals and plants. They are relatively rare but the diseases they cause are very serious and dangerous. The most well known protest disease is **Malaria**.
Mosquitos carry the disease and will infect a human when feeding on blood. The protists travel around the human body and affect the liver and damage red blood cells. Malaria causes recurrent episodes of fever and shaking when the protists burst out the blood cells. If malaria is diagnosed quickly it can be treated using a combination of drugs. Many countries don't have access to these drugs so the spread is prevented using insecticides, removing standing water and travellers taking antimalarial drugs.

Subject: Science | Term: 5 & 6 | Topic: Biology - Organisation and the digestive system

5.9 Human defence responses

Skin defences

- Skin covers your body and acts as a barrier
- Skin produces antimicrobial secretions to destroy pathogens
- Skin is covered with microorganisms that help keep you healthy

Respiratory and digestive defences

- The nose is full of hairs and mucus to trap pathogens
- The trachea and bronchi also secrete mucus to trap pathogens
- The stomach produces acids and this destroys pathogens in the mucus

The immune system – internal defences

White blood cells have three main roles to destroy pathogens. They can ingest microorganisms, release antibodies and antitoxins to fight infection.

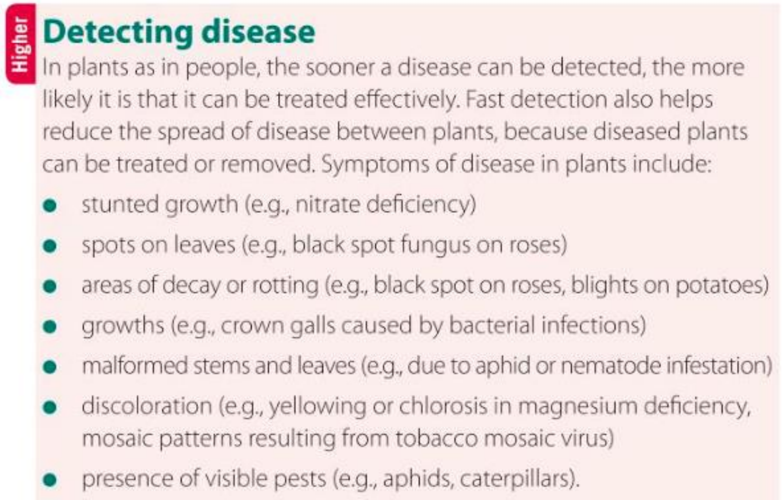
5.10 More about plant diseases

Plants are vulnerable to viruses, bacteria and fungi but they are also attacked by pests that can also causes a lot of damage.

***Aphids** are one group of insect pests that have sharp mouthparts that penetrate into the phloem vessels so they can feed on the sugar-rich phloem sap. They attack in huge numbers and deprives the plant of the products of photosynthesis. They can be destroyed using pesticides.*

Figure 1 *Aphids can destroy plants, but ladybirds destroy aphids*

*Some plant diseases are the result of mineral deficiencies in the soil. They are non-communicable. An example is **chlorosis**, this is where the plant cannot get enough magnesium and the leaves cannot make enough chlorophyll making the leaves yellow and unable to effectively photosynthesis.*



Higher

Detecting disease

In plants as in people, the sooner a disease can be detected, the more likely it is that it can be treated effectively. Fast detection also helps reduce the spread of disease between plants, because diseased plants can be treated or removed. Symptoms of disease in plants include:

- stunted growth (e.g., nitrate deficiency)
- spots on leaves (e.g., black spot fungus on roses)
- areas of decay or rotting (e.g., black spot on roses, blights on potatoes)
- growths (e.g., crown galls caused by bacterial infections)
- malformed stems and leaves (e.g., due to aphid or nematode infestation)
- discoloration (e.g., yellowing or chlorosis in magnesium deficiency, mosaic patterns resulting from tobacco mosaic virus)
- presence of visible pests (e.g., aphids, caterpillars).

5.11 Plant defence responses

Physical barriers

- *Cellulose cell walls to strengthen the plant*
- *Tough waxy cuticle to act as a barrier*
- *Bark on trees*
- *Leaf fall in autumn will fall off the tree when the leaves drop*

Chemical barriers

- *Many plants produce antibacterial chemicals that protect against invading pathogens.*

Defence against herbivores

- *Plants don't just defend themselves against microorganisms. They defend themselves against large and small animals that want to eat them.*

Poisons to deter herbivores, for example, foxgloves, deadly nightshade and yew. Animals quickly learn to avoid eating plants that make them feel unwell.	Thorns to make it unpleasant or painful for large herbivores to eat them, for example, brambles, cacti and gorse. Thorns are unlikely to deter insects.	Hairy stems and/or leaves deter insects and larger animals from feeding on them or laying their eggs on the leaves or stems, for example, lamb's ears, and some pelargoniums. Some plants combine hairs with poisons, for example, nettles.

Subject: Science	Term: 4	Topic: Chemistry – Chemical calculations

Topics Covered
Chemistry – Chemical calculations
Chemistry Separates only in italics!!

Code	Topic
C4.1	Relative mases and moles
C4.2	Equations and calculations
C4.3	From masses to balancing equations
C4.4	*The yield of a chemical reaction*
C4.5	*Atom economy*
C4.6	Expressing concentrations
C4.7	*Titrations*
C4.8	*Titration calculations*
C4.9	*Volumes of gases*
C5.1	The reactivity series
C5.2	Displacement reactions
C5.3	Extracting metals
C5.4	Salts from metals
C5.5	Salts from insoluble bases
C5.6	Making more salts
C5.7	Neutralisation and the pH scale
C5.8	Strong and weak acids

4.1 Relative masses and moles

Instead of using actual masses of atoms, we use relative masses (compared with Carbon which has a mass of exactly 12).

Relative atomic mass (A_r) – The average mass of an atom of an element compared to Carbon-12.

Relative formula mass (M_r) – The total of the relative atomic masses of a substance (added up in the ratio shown in the chemical).

Examples:

H_2O (A_r Hydrogen = 1, A_r Oxygen = 16) M_r = (2 x 1) + 16 = 18	**Al_2O_3** (A_r Aluminium = 27, A_r Oxygen = 16) M_r = (2 x 27) + (3 x 16) = 102

Mole – The amount of substance in the relative atomic or formula mass of a substance in grams.

Avogadro constant – The number of atoms, or ions in a mole of any substance (6.02×10^{23} per mol)

Calculating moles

Number of moles = mass (g) / A_r

Or

Number of moles = mass (g) / M_r

Examples

Q: How many moles of helium atoms are there in 0.02g of helium? **A**: Moles = Mass / A_r = 0.02 / 4 = 0.005 moles	**Q:** How many moles of sulphuric acid are there in 19.6g of sulphuric acid (H_2SO_4)? **A**: M_r of H_2SO_4 = (2x1) + 32 + (4x16) Moles = Mass / M_r = 19.6 / 98 = 0.2 moles

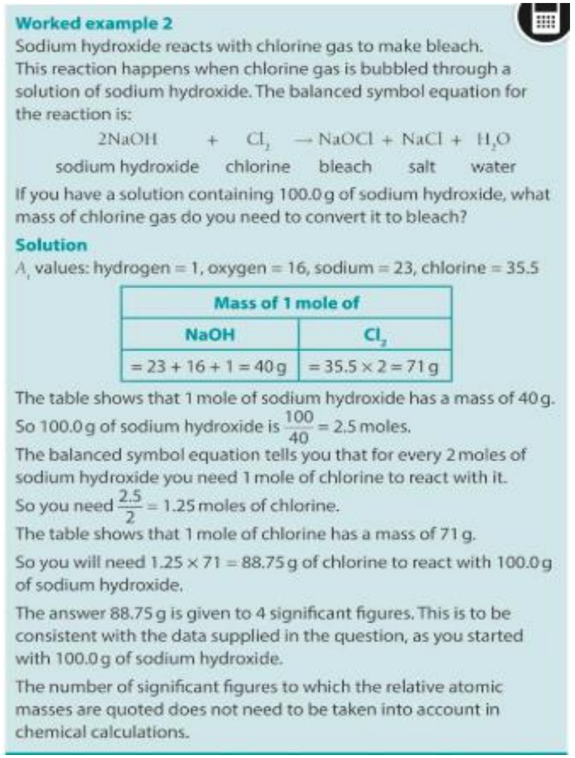
4.2 Equations and calculations

Chemical equations tell us how reactants combine to form products.

Balanced equations tell us the number of atoms of each elements present in the reactants and products. These number of atoms in the reactants and products must be the same.

Example: $H_2 + Cl_2 \rightarrow HCl$ Not balanced
$H_2 + Cl_2 \rightarrow 2HCl$ Balanced

We can use balanced symbol equations to calculate the masses of reactants and products in a chemical reaction.



Worked example 2

Sodium hydroxide reacts with chlorine gas to make bleach. This reaction happens when chlorine gas is bubbled through a solution of sodium hydroxide. The balanced symbol equation for the reaction is:

$2NaOH$	+	Cl_2	$\rightarrow NaOCl$	+ $NaCl$	+ H_2O
sodium hydroxide		chlorine	bleach	salt	water

If you have a solution containing 100.0 g of sodium hydroxide, what mass of chlorine gas do you need to convert it to bleach?

Solution

A_r values: hydrogen = 1, oxygen = 16, sodium = 23, chlorine = 35.5

Mass of 1 mole of	
NaOH	Cl_2
= 23 + 16 + 1 = 40 g	= 35.5 × 2 = 71 g

The table shows that 1 mole of sodium hydroxide has a mass of 40 g.

So 100.0 g of sodium hydroxide is $\frac{100}{40} = 2.5$ moles.

The balanced symbol equation tells you that for every 2 moles of sodium hydroxide you need 1 mole of chlorine to react with it.

So you need $\frac{2.5}{2} = 1.25$ moles of chlorine.

The table shows that 1 mole of chlorine has a mass of 71 g.

So you will need $1.25 \times 71 = 88.75$ g of chlorine to react with 100.0 g of sodium hydroxide.

The answer 88.75 g is given to 4 significant figures. This is to be consistent with the data supplied in the question, as you started with 100.0 g of sodium hydroxide.

The number of significant figures to which the relative atomic masses are quoted does not need to be taken into account in chemical calculations.

Subject: Science	Term: 4	Topic: Chemistry – Chemical calculations

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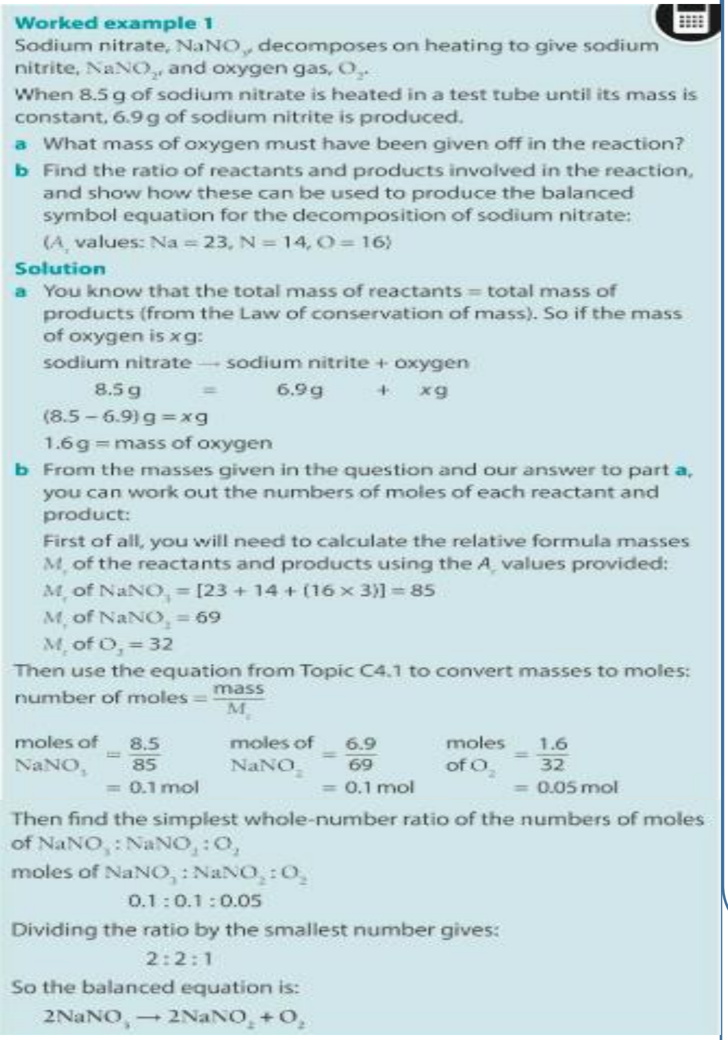
4.3 From masses to balancing equations

You can deduce balanced equations from the masses of substances involved in a chemical reaction.



Worked example 1

Sodium nitrate, $NaNO_3$, decomposes on heating to give sodium nitrite, $NaNO_2$, and oxygen gas, O_2.

When 8.5 g of sodium nitrate is heated in a test tube until its mass is constant, 6.9 g of sodium nitrite is produced.

a What mass of oxygen must have been given off in the reaction?

b Find the ratio of reactants and products involved in the reaction, and show how these can be used to produce the balanced symbol equation for the decomposition of sodium nitrate:
(A_r values: Na = 23, N = 14, O = 16)

Solution

a You know that the total mass of reactants = total mass of products (from the Law of conservation of mass). So if the mass of oxygen is x g:

sodium nitrate → sodium nitrite + oxygen
8.5 g = 6.9 g + x g
(8.5 – 6.9) g = x g
1.6 g = mass of oxygen

b From the masses given in the question and our answer to part **a**, you can work out the numbers of moles of each reactant and product:

First of all, you will need to calculate the relative formula masses M_r of the reactants and products using the A_r values provided:

M_r of $NaNO_3 = [23 + 14 + (16 \times 3)] = 85$
M_r of $NaNO_2 = 69$
M_r of $O_2 = 32$

Then use the equation from Topic C4.1 to convert masses to moles:

$$\text{number of moles} = \frac{\text{mass}}{M_r}$$

$$\text{moles of } NaNO_3 = \frac{8.5}{85} = 0.1\ \text{mol} \qquad \text{moles of } NaNO_2 = \frac{6.9}{69} = 0.1\ \text{mol} \qquad \text{moles of } O_2 = \frac{1.6}{32} = 0.05\ \text{mol}$$

Then find the simplest whole-number ratio of the numbers of moles of $NaNO_3 : NaNO_2 : O_2$

moles of $NaNO_3 : NaNO_2 : O_2$
0.1 : 0.1 : 0.05

Dividing the ratio by the smallest number gives:
2 : 2 : 1

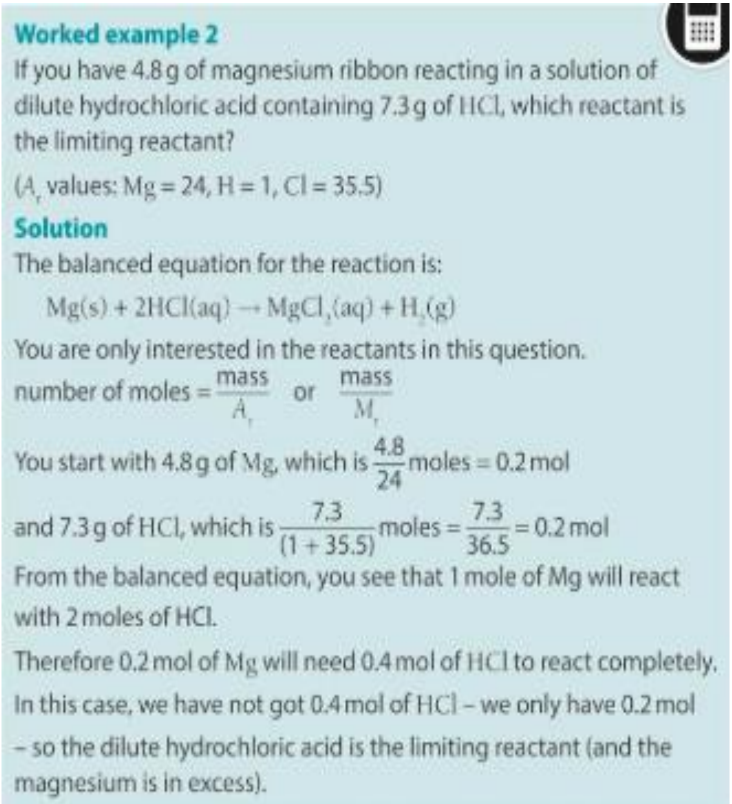
So the balanced equation is:

$$2NaNO_3 \longrightarrow 2NaNO_2 + O_2$$

4.3 Cont..

The reactant that gets used up first in a reaction is called the limiting reactant. This is the reactant that is NOT in excess.

This then means, the amounts of products formed in a chemical reaction are determined by the limiting reactants.



Worked example 2

If you have 4.8 g of magnesium ribbon reacting in a solution of dilute hydrochloric acid containing 7.3 g of HCl, which reactant is the limiting reactant?

(A_r values: Mg = 24, H = 1, Cl = 35.5)

Solution

The balanced equation for the reaction is:

$$Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$$

You are only interested in the reactants in this question.

$$\text{number of moles} = \frac{\text{mass}}{A_r} \text{ or } \frac{\text{mass}}{M_r}$$

You start with 4.8 g of Mg, which is $\frac{4.8}{24}$ moles = 0.2 mol

and 7.3 g of HCl, which is $\frac{7.3}{(1 + 35.5)}$ moles = $\frac{7.3}{36.5}$ = 0.2 mol

From the balanced equation, you see that 1 mole of Mg will react with 2 moles of HCl.

Therefore 0.2 mol of Mg will need 0.4 mol of HCl to react completely.

In this case, we have not got 0.4 mol of HCl – we only have 0.2 mol – so the dilute hydrochloric acid is the limiting reactant (and the magnesium is in excess).

4.4 The yield of a chemical reaction

The yield of a chemical reaction describes how much product is made.

The percentage yield of a chemical reaction tells you how much product is made compared with the maximum amount that could be made (100%).

The following equation can be used to calculate percentage yield:

$$\text{percentage yield} = \frac{\text{actual mass of product produced}}{\text{maximum theoretical mass of product possible}} \times 100\%$$

Factors which affect the yield of a product of a chemical reaction include product left behind in the apparatus, reversible reactions not going to completion, some reactants may produce unexpected reactions, and losses in separating the products from the reaction mixture.

4.5 Atom economy

It is important to maximise atom economy in industrial processes to conserve the Earth's resources and minimise pollution.

The atom economy of a reaction can be calculated using the equation below:

$$\text{percentage atom economy} = \frac{\text{relative formula mass of the desired product from equation}}{\text{sum of the relative formula masses of the reactants from equation}} \times 100\%$$

4.6 Expressing concentrations

The concentration of a solution can be calculated using the equation below. You may need to concert volumes from cm^3 to dm^3 (dividing by 1000).

$$\text{concentration (g/dm}^3\text{)} = \frac{\text{amount of solute (g)}}{\text{volume of solution (dm}^3\text{)}}$$

To calculate the mass of solute in a certain volume of solution of known concentration:

1. Calculate the mass (g) of the solute in $1dm^3$ ($1000\ cm^3$) of solution.
2. Calculate the mass (g) of solute in $1cm^3$ of solution.
3. Calculate the mass (g) of solute there is in the given volume of the solution.

A more concentrated solution has more solute in the same volume of solution than a less concentrated solution

Subject: Science | Term: 4 | Topic: Chemistry – Chemical calculations

4.7 Titrations

Titration is used to measure accurately what volumes of acid and alkali react together completely.

The point at which a reaction between an acid and alkali is complete is called the end point of the reaction.

You use an acid/base indicator to show the end point of the reaction between an acid and alkali.

To calculate the concentration of a solution in mol/dm^3, given the mass of solute in a certain volume:

- Calculate the mass (g) of solute in 1cm^3 of solution.
- Calculate the mass (g) of solue in 1000cm^3 of solution.
- Convert the mass (g) to moles (where moles = mass/M$_r$)

4.8 Titration calculations

You can use titrations to find the unknown concentration of a solution.

To do this, you need to know the accurate concentration of one solution, then once the end point is established, the balanced equation gives you the number of moles in a certain volume of solution.

This value is multiplied up to give the concentration in mol/dm^3.

5.1 The reactivity series

Ores are rocks from which it is economical to extract the metals they contain.

Most metals in ores are chemically bonded to other elements in compounds. Many of these metals have been **oxidised**. So to extract the metals from their oxides, the metal oxide must be **reduced**. To understand how this is done, you need to know about the **reactivity series**.

We can use the reactivity of metals with water and acid to put together the order of reactivity.

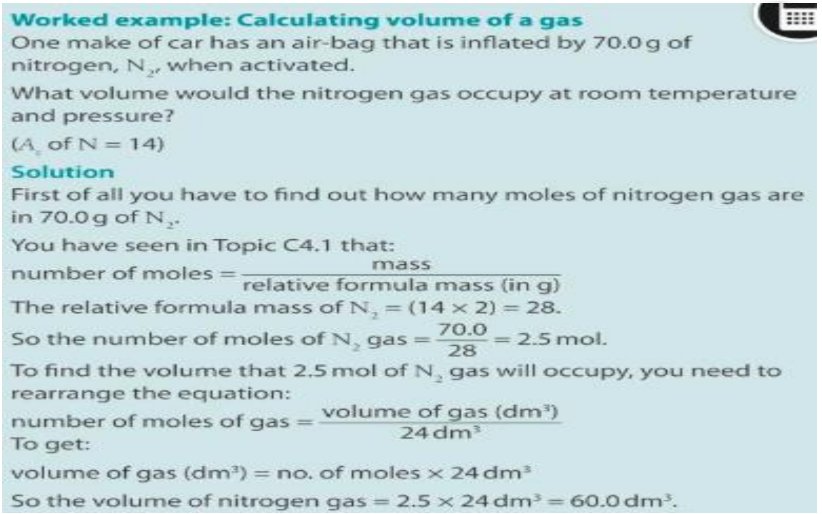
4.9 Volumes of gases

A certain volume of gas always contains the same number of gas molecules under the same conditions.

The volume of 1 mole of any gas at room temperature and pressure is 24 dm^3.

You can use the molar gas volume and balanced symbol equations to calculate the volumes of gaseous reactants or products.

$$\text{number of moles of gas} = \frac{\text{volume of gas (dm}^3\text{)}}{24\,\text{dm}^3} = \frac{\text{volume of gas (cm}^3\text{)}}{24\,000\,\text{cm}^3}$$



Worked example: Calculating volume of a gas

One make of car has an air-bag that is inflated by 70.0 g of nitrogen, N_2, when activated.

What volume would the nitrogen gas occupy at room temperature and pressure?

(A_r of N = 14)

Solution

First of all you have to find out how many moles of nitrogen gas are in 70.0 g of N_2.

You have seen in Topic C4.1 that:

$$\text{number of moles} = \frac{\text{mass}}{\text{relative formula mass (in g)}}$$

The relative formula mass of $N_2 = (14 \times 2) = 28$.

So the number of moles of N_2 gas $= \frac{70.0}{28} = 2.5$ mol.

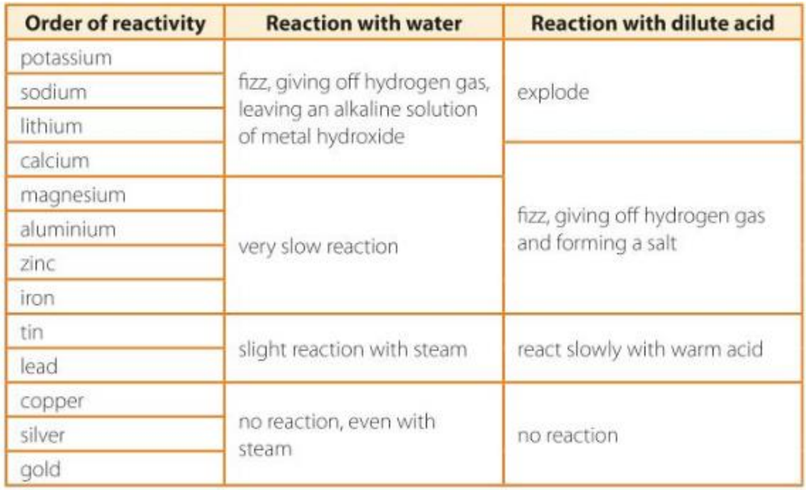
To find the volume that 2.5 mol of N_2 gas will occupy, you need to rearrange the equation:

$$\text{number of moles of gas} = \frac{\text{volume of gas (dm}^3\text{)}}{24\,\text{dm}^3}$$

To get:

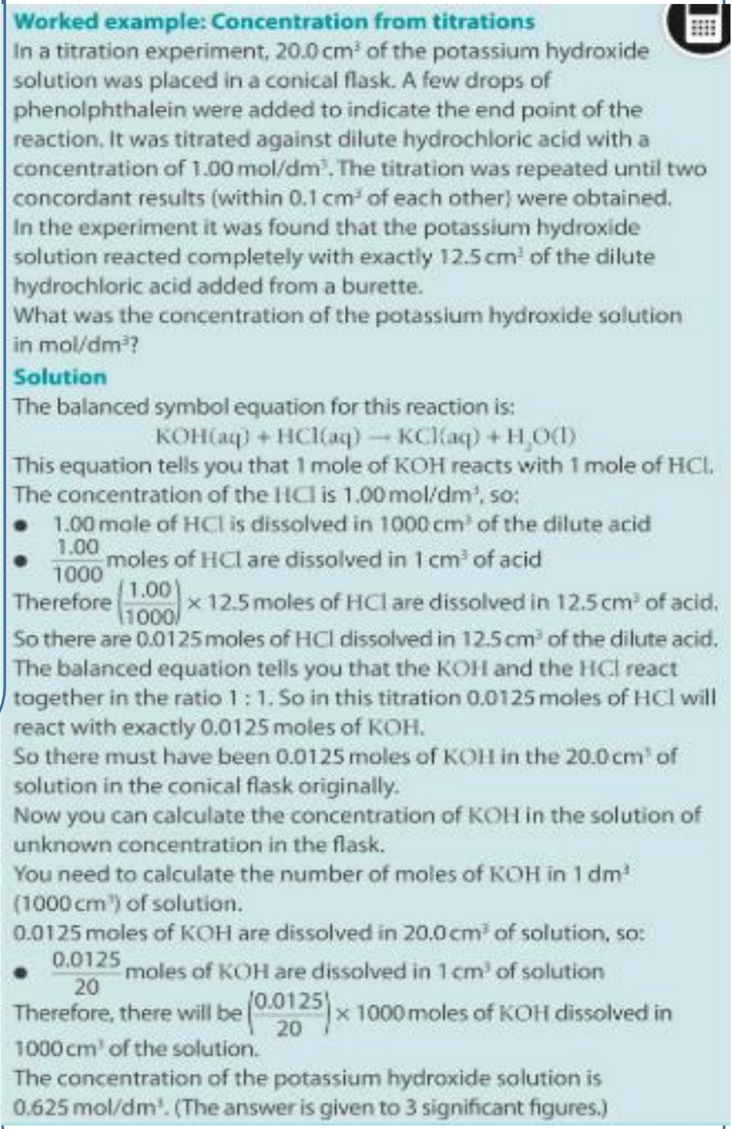
volume of gas (dm^3) = no. of moles × 24 dm^3

So the volume of nitrogen gas = 2.5 × 24 dm^3 = 60.0 dm^3.



Order of reactivity	Reaction with water	Reaction with dilute acid
potassium	fizz, giving off hydrogen gas, leaving an alkaline solution of metal hydroxide	explode
sodium		
lithium		
calcium		fizz, giving off hydrogen gas and forming a salt
magnesium	very slow reaction	
aluminium		
zinc		
iron		
tin	slight reaction with steam	react slowly with warm acid
lead		
copper	no reaction, even with steam	no reaction
silver		
gold		

4.8 Titration calculation cont..



Worked example: Concentration from titrations

In a titration experiment, 20.0 cm^3 of the potassium hydroxide solution was placed in a conical flask. A few drops of phenolphthalein were added to indicate the end point of the reaction. It was titrated against dilute hydrochloric acid with a concentration of 1.00 mol/dm^3. The titration was repeated until two concordant results (within 0.1 cm^3 of each other) were obtained.

In the experiment it was found that the potassium hydroxide solution reacted completely with exactly 12.5 cm^3 of the dilute hydrochloric acid added from a burette.

What was the concentration of the potassium hydroxide solution in mol/dm^3?

Solution

The balanced symbol equation for this reaction is:

$$KOH(aq) + HCl(aq) \rightarrow KCl(aq) + H_2O(l)$$

This equation tells you that 1 mole of KOH reacts with 1 mole of HCl.

The concentration of the HCl is 1.00 mol/dm^3, so:

- 1.00 mole of HCl is dissolved in 1000 cm^3 of the dilute acid
- $\frac{1.00}{1000}$ moles of HCl are dissolved in 1 cm^3 of acid

Therefore $\left(\frac{1.00}{1000}\right) \times 12.5$ moles of HCl are dissolved in 12.5 cm^3 of acid.

So there are 0.0125 moles of HCl dissolved in 12.5 cm^3 of the dilute acid.

The balanced equation tells you that the KOH and the HCl react together in the ratio 1 : 1. So in this titration 0.0125 moles of HCl will react with exactly 0.0125 moles of KOH.

So there must have been 0.0125 moles of KOH in the 20.0 cm^3 of solution in the conical flask originally.

Now you can calculate the concentration of KOH in the solution of unknown concentration in the flask.

You need to calculate the number of moles of KOH in 1 dm^3 (1000 cm^3) of solution.

0.0125 moles of KOH are dissolved in 20.0 cm^3 of solution, so:

- $\frac{0.0125}{20}$ moles of KOH are dissolved in 1 cm^3 of solution

Therefore, there will be $\left(\frac{0.0125}{20}\right) \times 1000$ moles of KOH dissolved in 1000 cm^3 of the solution.

The concentration of the potassium hydroxide solution is 0.625 mol/dm^3. (The answer is given to 3 significant figures.)

Subject: Science	Term: 4	Topic: Chemistry – Chemical calculations

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5.2 Displacement reactions

A more reactive metal will displace a less reactive metals from an aqueous solution of one of its salts. E.g.

Magnesium + copper sulphate → magnesium sulphate + copper

$Mg_{(s)} + CuSO_{4(aq)} \rightarrow MgSO_{4(aq)} + Cu_{(s)}$

An **ionic equation** shows only the atoms and ions that change in a reaction:

$Mg_{(s)} + Cu^{2+}{}_{(aq)} \rightarrow Mg^{2+}{}_{(aq)} + Cu_{(s)}$

In this displacement reaction Copper has been reduced as it has gained 2 electrons and Magnesium has been oxidised as it lost 2 electrons.

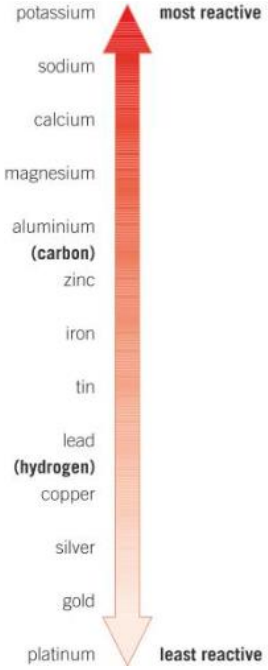
Remember, Oil Rig; Oxidation Is Loss, Reduction Is Gain

5.3 Extracting metals

Metal ores are rock that contains metal. Whether it is worth extracting depends on:

- How easy it is to extract it from its ore
- How much metal the ore contains
- The changing demands for a particular metal

Any metal below hydrogen in the reactivity is so unreactive that they are found, alone, in the ground. The metals between Hydrogen and Carbon are extracted by reducing the metal oxide with carbon. Above carbon the metals can be extracted using hydrogen or electrolysis.



5.4 Salts from metals

Metals + Acid → Salt + Hydrogen

Iron + Hydrochloric acid → Iron chloride + Hydrogen

$Fe_{(s)} + 2HCl_{(aq)} \rightarrow FeCl_{2(aq)} + H_{2(g)}$

Pure crystals of salt (iron chloride) can be obtained from the solution. We can do this by evaporating water from the solution by heating until crystallisation is reached.

The acid provides the negative ions present in all salts:

- The salts formed when you react a metal with hydrochloric acid, HCl, are always *chlorides* (containing Cl^- ions)
- Sulphuric acid, H_2SO_4, makes *sulphates* (containing SO_4^{2-} ions)
- Nitric acid, HNO_3, always makes *nitrates* (containing NO_3^- ions)

5.5 Salts from insoluble bases

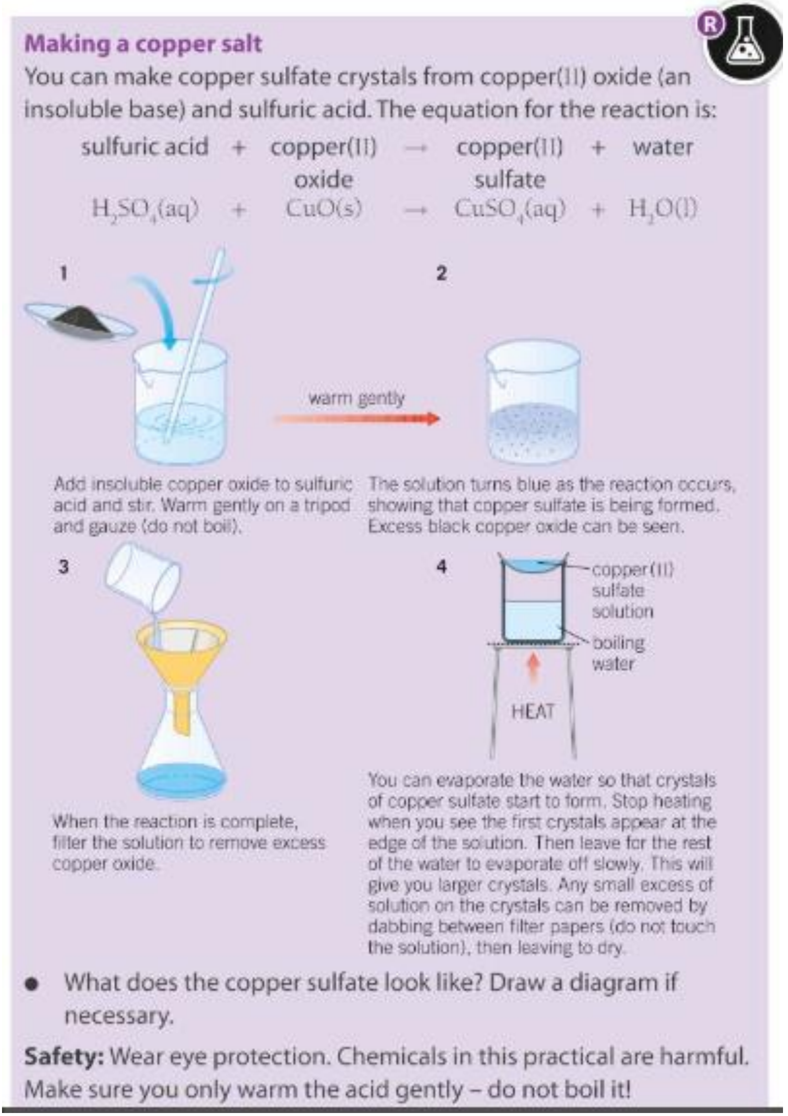
When you react an acid with a base, a salt and water are formed. The general equation which describes this **neutralisation** reaction is:

Acid + Base → Salt + Water

Hydrochloric acid + Solid Iron → Iron chloride + Water

$6HCl_{(aq)} + Fe_2O_{3(s)} \rightarrow 2FeCl_{3(aq)} + 3H_2O_{(l)}$

The charges on common positive ions	**The charges on common negative ions**
ions of Group 1 metals = +1 (e.g., Li^+, Na^+, K^+)	ions of Group 7 non-metals = –1 (e.g., F^-, Cl^-, Br^-, I^-)
ions of Group 2 metals = +2 (e.g., Mg^{2+}, Ca^{2+})	nitrate ions = –1, NO_3^-
aluminium ion = +3, Al^{3+}	sulfate ions = –2, SO_4^{2-}
ammonium ion = +1, NH_4^+	
transition metals = variable (size of positive charge given by the roman numeral in the name, e.g., copper(II) ion, Cu^{2+}, or iron(III) ion, Fe^{3+})	



Making a copper salt

You can make copper sulfate crystals from copper(II) oxide (an insoluble base) and sulfuric acid. The equation for the reaction is:

sulfuric acid + copper(II) oxide → copper(II) sulfate + water

$H_2SO_4(aq) + CuO(s) \rightarrow CuSO_4(aq) + H_2O(l)$

1 Add insoluble copper oxide to sulfuric acid and stir. Warm gently on a tripod and gauze (do not boil).

2 The solution turns blue as the reaction occurs, showing that copper sulfate is being formed. Excess black copper oxide can be seen.

3 When the reaction is complete, filter the solution to remove excess copper oxide.

4 You can evaporate the water so that crystals of copper sulfate start to form. Stop heating when you see the first crystals appear at the edge of the solution. Then leave for the rest of the water to evaporate off slowly. This will give you larger crystals. Any small excess of solution on the crystals can be removed by dabbing between filter papers (do not touch the solution), then leaving to dry.

- What does the copper sulfate look like? Draw a diagram if necessary.

Safety: Wear eye protection. Chemicals in this practical are harmful. Make sure you only warm the acid gently – do not boil it!

Subject: Science	Term: 4	Topic: Chemistry – Chemical calculations

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Topics Covered
Chemistry – Chemical calculations
Chemistry Separates only in italics!!

Code	Topic
C4.1	Relative mases and moles
C4.2	Equations and calculations
C4.3	From masses to balancing equations
C4.4	*The yield of a chemical reaction*
C4.5	*Atom economy*
C4.6	Expressing concentrations
C4.7	*Titrations*
C4.8	*Titration calculations*
C4.9	*Volumes of gases*
C5.1	The reactivity series
C5.2	Displacement reactions
C5.3	Extracting metals
C5.4	Salts from metals
C5.5	Salts from insoluble bases
C5.6	Making more salts
C5.7	Neutralisation and the pH scale
C5.8	Strong and weak acids

5.6 Making more salts

There are two other important reactions you can use to make salts:

- Reacting solutions of an acid and an alkali together
- Reacting an acid with a carbonate (usually added as the solid)

Acid + Alkali → Salt + Water

Hydrochloric acid + Sodium hydroxide → Sodium chloride + Water

$HCl_{(aq)} + NaOHl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(g)}$

When you react an acid with an alkali, you need to be able to tell when the acid and alkali have completely reacted. It is not obvious by just observing the reaction. No gas is given off during the reaction, also there is no excess insoluble base visible in the reaction mixture when excess has been added so you need to use an acid/base indicator to help to decide when the reaction is complete.

To complete a pure, dry sample of crystals of the salt you would:

- Carry out the titration with the indicator added to see how much acid reacts completely with the alkali
- Run that volume of acid into the solution of alkali again, but this time without the indicator
- Then crystallise and dry the crystals of salt from the reaction mixture

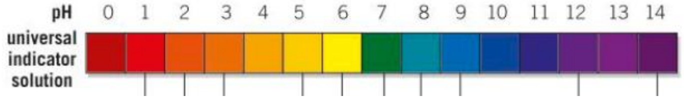
Acid + Carbonate→ Salt + Water + Carbon dioxide

Hydrochloric acid + Calcium carbonate → Calcium chloride + Water + Carbon dioxide

$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$

5.7 Neutralisation and the pH scale

Soluble hydroxides are called **alkalis**. Their solutions are alkaline. E.g. Sodium Hydroxide solution.
Bases, which include alkalis, are substances that can neutralise acids. E.g. Metal oxides and metal hydroxides.
Acids, include citric acid, sulphuric acid and ethanoic acid.
Pure water is **neutral**; it is neither acid nor alkaline.
We use indicators that change colour when added to acids and alkalis. Litmus is a well-known indicator.
We use the **pH scale** to show how acidic or alkaline something is. Alternatively, a pH meter can be used.



5.8 Strong and weak acids

Weak acids include ethanoic acid, citric acid and carbonic acid.
Strong acids include hydrochloric acid, nitric acid and sulphuric acid.
Acids must dissolve in water before they show their acidic properties. That is because in water all acids ionise (split up). Their molecules split up to form $H^+_{(aq)}$ ions and negative ions. For example:

$HCl_{(aq)} \rightarrow H^+_{(aq)} + Cl^-_{(aq)}$

Strong acids ionise *completely* in solution, but weak acids do not.
The concentration of an acid is to do with the amount of solute within a volume of solution. More solute in a particular volume means it is more concentrated, but not necessarily stronger.

Subject: Science	Term: 5 & 6	Topic: Physics – Molecules and matter

Topics Covered

Physics – Molecules and matter

Physics Separates only in italics!!

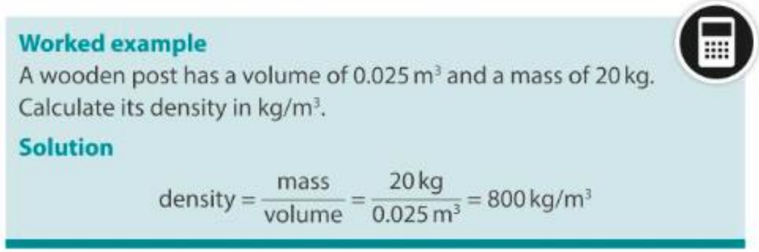
Code	Topic
P6.1	Density
P6.2	States of matter
P6.3	Changes of state
P6.4	Internal energy
P6.5	Specific latent heat
P6.6	Gas pressure and temperature
P6.7	*Gas pressure and volume*
P7.1	Atoms and radiation
P7.2	The discovery of the nucleus
P7.3	Changes in the nucleus
P7.4	More about alpha, beta and gamma radiation
P7.5	Activity and half-life
P7.6	*Nuclear radiation in medicine*
P7.7	*Nuclear fission*
P7.8	*Nuclear fusion*
P7.9	*Nuclear issues*

Remember you can use Kerboodle to help you revise from the textbook.

6.1 Density

The density of substance is defined as its mass per unit volume. It has the unit of kilogram per cubic metre, kg/m³

$$\boldsymbol{Density}, \boldsymbol{\rho} = \frac{\boldsymbol{mass}, \boldsymbol{m}\ (kilograms, kg)}{\boldsymbol{volume}, \boldsymbol{V}\ (metres^3, m^3)}$$



Worked example

A wooden post has a volume of 0.025 m³ and a mass of 20 kg. Calculate its density in kg/m³.

Solution

$$\text{density} = \frac{\text{mass}}{\text{volume}} = \frac{20\,\text{kg}}{0.025\,\text{m}^3} = 800\,\text{kg/m}^3$$

Measuring the density of a solid object

To measure the mass of the object you use an electronic balance.

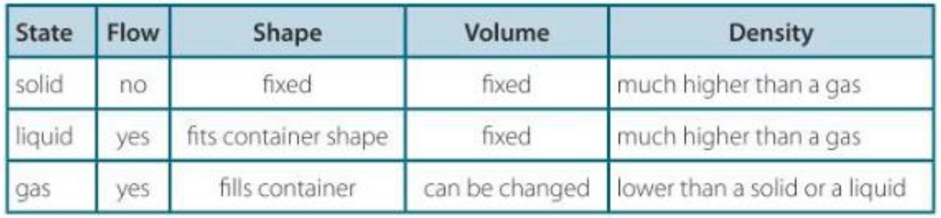
To find the volume of a regular solid, measure its dimensions using the most appropriate ruler and then use the equation above.

Measuring the density of a liquid

Use a measuring cylinder to measure the volume of a liquid.

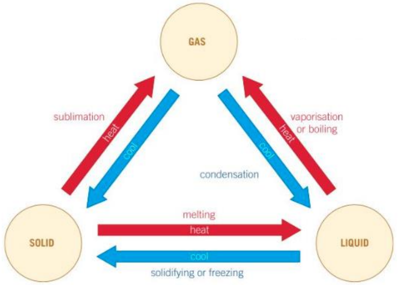
Measure the mass of an empty beaker using a balance. Remove the beaker from the balance and pour the liquid from the measuring cylinder into the beaker. Use the balance again to measure the total mass of the beaker and the liquid. You can calculate the mass of the liquid by subtracting the mass of the empty beaker from the total mass of the beaker and the liquid.

6.2 States of matter



State	Flow	Shape	Volume	Density
solid	no	fixed	fixed	much higher than a gas
liquid	yes	fits container shape	fixed	much higher than a gas
gas	yes	fills container	can be changed	lower than a solid or a liquid

A substance can change from on state to another, changes of state are examples of **physical changes** because no new substances are produced.



Conservation of mass is when the mass of the substance is conserved when it changes state.

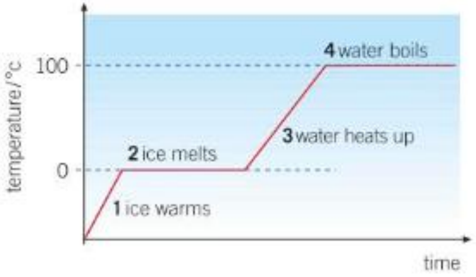
Kinetic theory of matter is the idea of how and why particles move in different states of matter.

6.3 Changes of state

Melting and **boiling points** are the temperatures at which a substance turns from a solid to a liquid, then liquid to gas.

Freezing and **condensing points** are the temperatures at which a substance turns from liquid to solid and gas to liquid.

Changing state is all to do with particles in a state gaining or losing energy.



Subject: Science	Term: 5 & 6	Topic: Physics – Molecules and matter

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6.4 Internal energy

The energy stored by the particles of a substance is called the substance's **internal energy**. This is the energy of the particles that is caused by their individual motion and positions. Internal energy of the particles is the sum of:

- The kinetic energy they have due to their individual motions relative to each other, and
- The potential energy they have due to their individual positions relative to each other

Comparing the particles in solids, liquids and gases

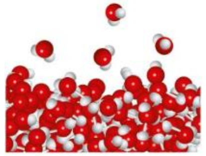


Figure 2 Molecules in water

In a solid, particles are arranged in a 3D structure

- Strong forces of attraction
- Each particle vibrates in a fixed position
- When heated the particles' energy stores increase and they vibrate more. Enough heat causes melting and the molecules break away

In a liquid, the forces of attraction are weaker so

- The forces of attraction are strong enough to stop the particles moving away from each other completely at the surface
- When a liquid is heated some particles gain enough energy to break away from the surface

In a gas, the forces of attraction are so weak they are insignificant

- The particles move at high speeds in random directions

6.5 Specific latent heat

Specific latent heat of fusion L_F, of a substance is the energy needed to change the state of 1 kg of a substance from a solid to a liquid.

$$\boldsymbol{Specific\ latent\ heat\ of\ fusion}, \boldsymbol{L_F}\ (\frac{J}{kg}) = \frac{energy, E\ (\boldsymbol{joules}, \boldsymbol{J})}{mass, m\ (\boldsymbol{kilogram}, \boldsymbol{kg})}$$

Specific latent heat of vaporisation L_V, of a substance is the energy needed to change the state of 1 kg of a substance from a liquid to vapour

$$\boldsymbol{Specific\ latent\ heat\ of\ vaporisation}, \boldsymbol{L_V}\ (\frac{J}{kg}) = \frac{energy, E\ (\boldsymbol{joules}, \boldsymbol{J})}{mass, m\ (\boldsymbol{kilogram}, \boldsymbol{kg})}$$

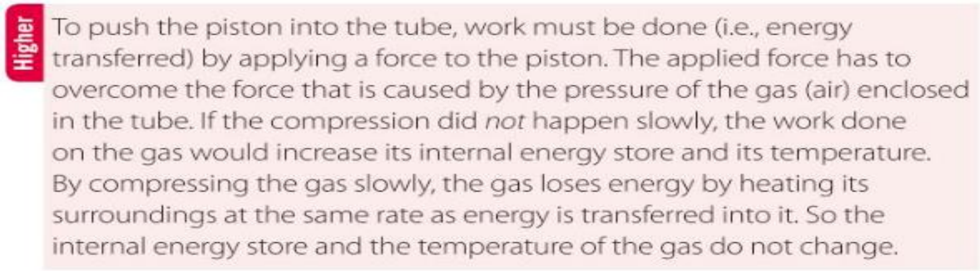
6.6 Gas pressure and temperature

Increasing the temperature of any sealed gas container increases the pressure of the gas inside it. This is because:

- The energy transferred to the gas when its heated increases the kinetic energy of its molecules. So the average kinetic energy of the gas molecules increases when the temperature of the gas is increased
- The average speed of the molecules increase when the kinetic energy increases, and the molecules on average hit the container surfaces with more force and more often. So the pressure of the gas increases.

6.7 Gas pressure and volume

The volume of a fixed mass of gas depends n its pressure and on its temperature. A gas can be compressed or expanded by pressure changes.



Higher

To push the piston into the tube, work must be done (i.e., energy transferred) by applying a force to the piston. The applied force has to overcome the force that is caused by the pressure of the gas (air) enclosed in the tube. If the compression did *not* happen slowly, the work done on the gas would increase its internal energy store and its temperature. By compressing the gas slowly, the gas loses energy by heating its surroundings at the same rate as energy is transferred into it. So the internal energy store and the temperature of the gas do not change.

Explanation of the variation of pressure with volume

For a fixed mass of gas, the number of gas molecules is constant. If the temperature is constant, the average speed f the molecules is constant.

If the volume of a fixed mass of gas at constant temperature is reduced, the gas pressure increases because:

- *The space the molecules move in is smaller, so they don't travel as far between each impact with the surface of their container*
- *The molecules hit the surfaces more often, so the number of impacts per second increases. So the total force of the impacts per square metre of surface area increases*

Boyle's Law

Boyle's Law states that the pressure of a given mass of an ideal gas is inversely proportional at a constant temperature.

$$\boldsymbol{Pressure}, \boldsymbol{p}\ \boldsymbol{x}\ \boldsymbol{volume}, \boldsymbol{V} = \boldsymbol{constant}$$

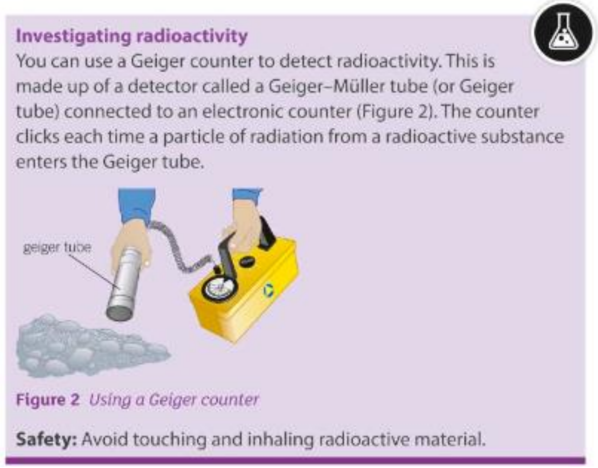
Subject: Science | Term: 5 & 6 | Topic: Physics – Molecules and matter

7.1 Atoms and radiation

Three types of radiation:

- **Alpha radiation, α** is stopped by paper
- **Beta radiation, β** is stopped by aluminium
- **Gamma radiation, γ** is stopped by many centimetres of lead

Substances emit radiation because they have an unstable nucleus. They become more stable once radiation has been emitted. When an unstable nucleus is emitting radiation we describe it as decaying.



Investigating radioactivity

You can use a Geiger counter to detect radioactivity. This is made up of a detector called a Geiger–Müller tube (or Geiger tube) connected to an electronic counter (Figure 2). The counter clicks each time a particle of radiation from a radioactive substance enters the Geiger tube.

Figure 2 *Using a Geiger counter*

Safety: Avoid touching and inhaling radioactive material.

7.2 The discovery of the nucleus

Ernest Rutherford discovered that alpha and beta radiation is made up of different types of particles. Rutherford conducted many experiments with the assistance of Geiger and Marsden. Rutherford's nuclear model of the atom was accepted because it:

- Agreed with the measurements of Geiger and Marsden
- Explained radioactivity in terms of changes that happen to an unstable nucleus when it emits radiation
- Predicted the existence of the neutron, which was later discovered

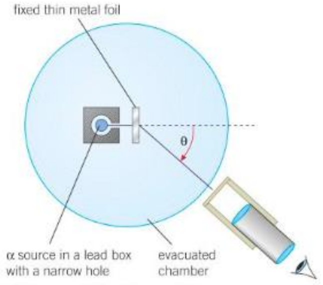


Figure 1 *Alpha (α) particle scattering*

7.3 Changes in the nucleus

The **atomic number** of a nucleus is the number of protons in it. It has the symbol Z. Atoms of the same element have the same number of protons. The **mass number** of a nucleus is the number of protons plus neutrons in it. It has the symbol A. **Isotopes** are atoms of the same element with different numbers of neutrons. The isotopes of an elements have nuclei with the same number of protons but a different number of neutrons.

α emission – is made up of 2 protons plus 2 neutrons. It is usually represented by the symbol $^{4}_{2}\alpha$. When an unstable nucleus emits an α particle:

- Its atomic number goes down by 2, and its mass number goes down by 4
- The mass and the charge of the nucleus are both reduced

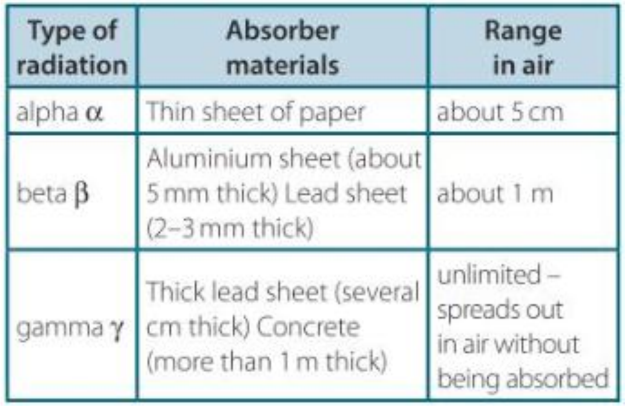
β emission – is an electron created and emitted by a nucleus that has too many neutrons compared with its protons. When an unstable nucleus emits a β particle:

- The atomic number of the nucleus goes up by 1, and its mass number is unchanged
- The charge of the nucleus is increased, and the mass of the nucleus is unchanged

γ emission – a γ-ray is electromagnetic radiation from the nucleus of an atom. It is uncharged and has no mass. So its emission does not change the number of protons or neutrons in a nucleus. So the mass and the charge of the nucleus are both unchanged.

7.4 More about alpha, beta and gamma radiation

Radiation can knock electrons out of atoms. The atoms become charged because they lose electrons. The process is called **ionisation.** When an object is exposed to ionising radiation it is said to be **irradiated**, but does not become radioactive.

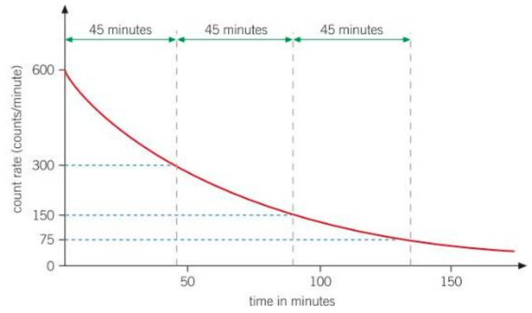


Type of radiation	Absorber materials	Range in air
alpha α	Thin sheet of paper	about 5 cm
beta β	Aluminium sheet (about 5 mm thick) Lead sheet (2–3 mm thick)	about 1 m
gamma γ	Thick lead sheet (several cm thick) Concrete (more than 1 m thick)	unlimited – spreads out in air without being absorbed

7.5 Activity and half-life

The **activity** of a radioactive source is the number of unstable atoms in the source that decay per second. The unit of activity is the Becquerel (Bq), which is 1 decay per second.

The **Geiger** counter can monitor the activity of a radioactive sample. You need to measure the **count rate** from the sample. The count rate is the number of counts per second. This is proportional to the activity of the source.



The average time taken for the count rate to fall by half is always the same. This time is called the **half-life**. The half-life shown on the graph is 45 minutes.

Subject: Science	Term: 5 & 6	Topic: Physics – Molecules and matter

Topics Covered

Physics – Molecules and matter

Physics Separates only in italics!!

Code	Topic
P6.1	Density
P6.2	States of matter
P6.3	Changes of state
P6.4	Internal energy
P6.5	Specific latent heat
P6.6	Gas pressure and temperature
P6.7	*Gas pressure and volume*
P7.1	Atoms and radiation
P7.2	The discovery of the nucleus
P7.3	Changes in the nucleus
P7.4	More about alpha, beta and gamma radiation
P7.5	Activity and half-life
P7.6	*Nuclear radiation in medicine*
P7.7	*Nuclear fission*
P7.8	*Nuclear fusion*
P7.9	*Nuclear issues*

Remember you can use Kerboodle to help you revise from the textbook.

7.6 Nuclear radiation in medicine

Some examples that describe how nuclear radiation is used in medicine:

- *Radioactive tracers are used to trace the flow of a substance through an organ. The tracer contains a radioactive isotope that emits gamma radiation as it can be detected outside the system. E.g. doctors can find out if a patients kidney is blocked.*
- *Gamma cameras are used to take images of internal body organs.*
- *Gamma radiation can be used to destroy cancerous tumours.*
- *Radioactive implants are used to destroy cancer cells in some tumours.*

7.7 Nuclear fission

Energy is released in a nuclear reactor because of nuclear fission.

In induced fission, the nucleus of an atom is struck by a neutron, causing the nucleus to split into two smaller fragment nuclei of roughly equal size and to release several neutrons. When fission occurs it releases:

- *2/3 neutrons at high speeds*
- *Energy*

Chain reactions can release several neutrons, which can cause other fissionable nuclei to split.

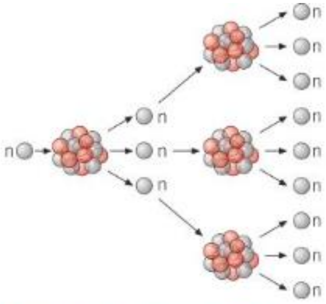
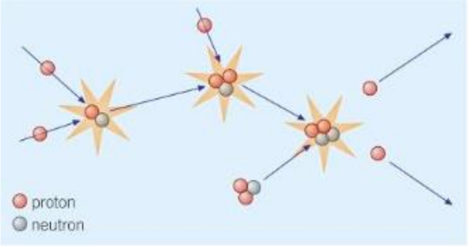


Figure 2 *A chain reaction in a nuclear reactor*

7.8 Nuclear fusion

*Two small nuclei release energy when they are fused together to form a single larger nucleus, this is called **nuclear fusion**. Some f the mass of the small nuclei is converted to energy. Some of this energy is transferred as nuclear radiation from the large nucleus that's formed.*



- *When two protons fuse together, they form a 'heavy hydrogen' nucleus, ^2_1He.*
- *2 more protons collide separately with two ^2_1He nuclei and turn them into heavier nuclei.*
- *The 2 heavier nuclei collide to form the helium nucleus ^4_2He*
- *The energy released at each stage is carried away as the kinetic energy of the product nucleus and other particles emitted*

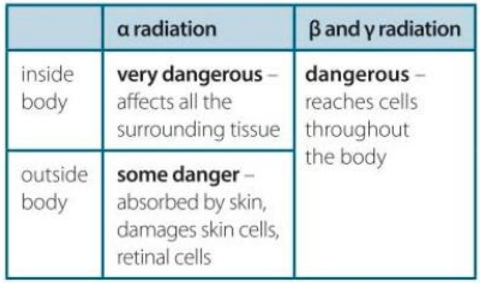
7.9 Nuclear issues

Radioactive substances are found naturally around us and this can be known as background radiation. Background radiation in the air is caused mostly by radon gas that seeps through the ground from radioactive substances in rocks deep underground.

Nuclear waste

Used fuel rods are hot and very radioactive. After they are removed from a reactor they are stored in big tanks of water for up to a year. Then the fuel rods are opened up and uranium and plutonium are removed chemically, then stored in sealed containers so they can be used again.

Table 2 *Risks of α, β, and γ radiation*



	α radiation	β and γ radiation
inside body	**very dangerous** – affects all the surrounding tissue	**dangerous** – reaches cells throughout the body
outside body	**some danger** – absorbed by skin, damages skin cells, retinal cells	

Subject: Spanish	Term: 5 & 6	Topic: Viva GCSE; Módulo 3

FOUNDATION FOR GROWTH
WOOTTON PARK
'Ipsum quod faciendum est diutius durant'

Key Content 1 – Mi gente *(My people)* ☐

Talking about family members

Using TENER and SER (to have and to be) to describe physical and personality attributes

Using other parts of the verb to say what youf family and Friends do.

Possessive Adjectives

Key Content 2 – ¿Cómo es? *(What is he/she/it like?)* ☐

Describing photographs

Describing other people

Agreeing different adjectives.

Key Content 3 – ¿Qué haces con tu móvil?*(What do you do with your phone?)* ☐

Describing phone apps and activities

Saying what you do online and when

Giving advantages and disadvantages of social media

Key Content 4 – ¿Qué estás haciendo?*(What do are you doing?)* ☐

Using the present continuous

Making arrangements for the near future

Key Content 5 – ¿Te gusta leer?*(Do you like reading?)* ☐

Genres of Reading material

Discussing opinions on Reading

Saying whether you prefer reading on paper or in digital format

Key Content 5 – ¿Te llevas bien con tu familia?*(Do you get on well with your family?)* ☐

Describing personal relationships

Understanding problems and solutions

Activities *(you may complete some or all of these…)*

- Creating a family tree ☐
- Describing a set of photographs ☐
- Creating a safety guide to social media ☐
- Writing a book review ☐

Websites and further reading:

Search on www.quizlet.com for 'Viva GCSE, M3'
Use the third module in your textbook and on www.pearsonactivelearn.com

Mi familia, mis amigos y la tecnologia

Key Vocabulary (See Textbook pages 64/65) *For revision you need to be able to understand all the texts on the double pages*

Practise vocabulary at home and/or with a friend at school

Tick off the modules above as you complete them, and make sure you can still do these topics for the End of Unit test. Look over your learning and complete anything missing at home each week:

Look, cover, write, check…

You need: **Family members☐ Friends ☐ Adjectives for people☐ Physical Description☐ The present continuous☐ TENER/SER/ESTAR ☐ Tecnhnology Vocab☐ Advantages & Disadvantages☐ Reading☐**

High Frequency Words: *Estoy (I am), Tengo (I have), Soy (I am), Leo (I read), Prefiero (I prefer), Hay (There is/are), Me llevo bien con (I get on well with), Una (des)ventaja es (a (dis)advantage is)*

YEAR 9/10 TERM 5 & 6 (FOUNDATION)

¿Qué aplicaciones usas?	What apps do you use?		
Uso… para…	I use… (in order) to…	divertido/a	fun
subir y ver vídeos	upload and watch videos	peligroso/a	dangerous
compartir fotos	share photos	práctico/a	practical
pasar el tiempo	pass the time	rápido/a	quick
organizar las salidas con mis amigos	organise to go out with my friends	fácil de usar	easy to use
contactar con mi familia	contact my family	popular	popular
descargar música	download music	útil	useful
chatear	chat	gratis	free
aprender idiomas	learn languages	adictivo/a	addictive
controlar mi actividad física	monitor my physical activity	mi red social preferida	my favourite social network
publicar mensajes	post messages	una pérdida de tiempo	a waste of time
Es / No es…	It is / It isn't…	la mejor app	the best app
cómodo/a	handy / convenient	Estoy enganchado/a a…	I am hooked on…

¿Qué estás haciendo?	What are you doing?		
Estoy…	I am…	leyendo	reading
tocando la guitarra	playing the guitar	durmiendo	sleeping
hablando por teléfono	talking on the phone	escribiendo	writing
jugando con mi móvil	playing on my phone	pensando en salir	thinking of going out
comiendo pizza	eating pizza	actualizando mi página de Facebook	updating my Facebook page
tomando el sol	sunbathing	editando mis fotos	editing my photos
esperando a…	waiting for…		
viendo una peli	watching a film		

¿Quieres salir conmigo?	Do you want to go out with me?		
No puedo porque…	I can't because…	quedarme en casa	to stay at home
está lloviendo	it's raining	dar una vuelta	to go for a wander
tengo que…	I have to …	¡Qué pena!	What a shame!
visitar a (mi abuela)	visit (my grandmother)	¿A qué hora quedamos?	What time shall we meet?
cuidar a (mi hermano)	look after (my brother)	¿Dónde quedamos?	Where shall we meet?
quiero…	I want…	En la plaza Mayor.	In the main square.
subir mis fotos	to upload my photos	Vale	OK

¿Qué te gusta leer?	What do you like reading?		
los tebeos / los cómics	comics	las novelas de amor	romantic novels
los periódicos	newspapers	las historias de vampiros	vampire stories
las revistas	magazines	las biografías	biographies
las novelas de ciencia ficción	science fiction novels		

¿Con qué frecuencia lees?	How often do you read?		
todos los días	every day	una vez al año	once a year
a menudo	often	nunca	never
de vez en cuando	from time to time	un ratón de biblioteca	a bookworm
una vez a la semana	once a week	un(a) fan del manga	a manga fan
dos veces al mes	twice a month		

¿Qué es mejor, e-books o libros en papel?	What is better, e-books or paper books?		
Los e-books…	E-books…	Las páginas…	The pages…
cuestan menos que los libros tradicionales	cost less than traditional books	no tienen números	don't have numbers
son más…	are more…	una ventaja	an advantage
transportables	portable	una desventaja	a disadvantage
ecológicos	environmentally-friendly	Leer en formato digital…	Reading in digital format…
cansan la vista	tire your eyes	protege el planeta	protects the planet
usan batería	use battery	es más barato	is cheaper
		depende de…	depends on…
		la energía eléctrica	electricity

La familia	Family		
el padre	father	el primo	male cousin
la madre	mother	la prima	female cousin
el padrastro	step-father	el sobrino	nephew
la madrastra	step-mother	la sobrina	niece
el hermano	brother	el marido	husband
la hermana	sister	la mujer	wife
el hermanastro	step-brother	el hijo	son
la hermanastra	step-sister	la hija	daughter
el abuelo	grandfather	el nieto	grandson
la abuela	grandmother	la nieta	granddaughter
el tío	uncle	mayor / menor	older / younger
la tía	aunt		

¿Cómo es?	What is he/she like?		
Tiene los ojos…	He/She has… eyes	Tiene…	He/She has…
azules	blue	pecas	freckles
verdes	green	Lleva…	He/She wears…
marrones	brown	gafas	glasses
grises	grey	barba	a beard
grandes	big	bigote	a moustache
pequeños	small	Es…	He/She is…
Tiene el pelo…	He/She has… hair	alto/a	tall
moreno	dark-brown	bajo/a	short
castaño	mid-brown, chestnut	delgado/a	slim
rubio	blond	gordito/a	chubby
rojo	red	gordo/a	fat
corto	short	calvo/a	bald
largo	long	moreno/a	dark-haired
rizado	curly	rubio/a	fair-haired
liso	straight	castaño/a	brown-haired
ondulado	wavy	pelirrojo/a	red-haired
		No es ni gordo/a ni delgado/a	He/She is neither fat nor thin

¿Cómo es de carácter?	What is he/she like as a person?		
Como persona, es…	As a person, he/she is…	tímido/a	shy
optimista	optimistic	divertido/a	fun
pesimista	pessimistic	serio/a	serious
trabajador(a)	hard-working	gracioso/a	funny
perezoso/a	lazy	generoso/a	generous
hablador(a)	chatty	fiel	loyal

¿Te llevas bien con tu familia y tus amigos?	Do you get on well with your family and friends?		
Me llevo bien con…	I get on well with…	Me divierto con…	I have a good time with…
No me llevo bien con…	I don't get on well with…	Me peleo con…	I argue with…

¿Cómo es un buen amigo / una buena amiga?	What is a good friend like?		
Un buen amigo / una buena amiga es alguien que…	A good friend is someone who…	te hace reír	makes you laugh
te ayuda	helps you	te dice la verdad	tells you the truth
te apoya	supports you	Conocí a…	I met…
te conoce bien	knows you well	mi mejor amigo/a	my best friend
te acepta	accepts you	hace (cuatro) años	(four) years ago
		tenemos mucho en común	we have a lot in common

YEAR 9/10 TERM 5 & 6 (HIGHER)

¿Qué aplicaciones usas?	What apps do you use?		
Uso … para…	I use … (in order) to…	una red social	a social network
ver mis series favoritas	watch my favourite series	amplio/a	extensive
organizar las salidas con mis amigos	organise to go out with my friends	cómodo/a	convenient
controlar mi actividad física /	monitor my physical activity / my	divertido/a	fun
las calorías	calorie intake	necesario/a	necessary
contactar con mi familia	get in touch with my family	peligroso/a	dangerous
chatear con mis amigos	chat with my friends	práctico/a	practical
La tengo desde hace … meses.	I've had it for … months	rápido/a	quick
Es una aplicación buena para…	It's a good app for…	fácil de usar	easy to use
buscar y descargar música	looking for and downloading music	popular	popular
pasar el tiempo / el rato	passing the time	útil	useful
sacar / editar / personalizar fotos	taking / editing / personalising photos	gratis	free
compartir / subir fotos	sharing / uploading photos	un canal de comunicación	a channel / means of communication
estar en contacto	keeping in touch	una pérdida de tiempo	a waste of time
conocer a nueva gente	meeting new people	Soy / Es adicto/a a…	I am / He/She is addicted to…
subir y ver vídeos	uploading and watching videos	Estoy / Está enganchado/a a…	I am / He/She is hooked on…
chatear y mandar mensajes	chatting and sending messages	Lo único malo es que…	The only bad thing is that …
Es / No es…	It is / It isn't…	te engancha	it gets you hooked

¿Qué estás haciendo?	What are you doing?		
Estoy…	I am…	está lloviendo	it's raining
actualizando mi página de Facebook	updating my Facebook page	tengo que…	I have to…
editando mis fotos	editing my photos	salir	go out
Estás / Está / Están…	You are / He/She is / They are…	visitar a (mi abuela)	visit (my grandmother)
escuchando música	listening to music	cuidar a (mi hermano)	look after (my brother)
esperando a (David)	waiting for (David)	hacer los deberes	do homework
descansando	relaxing	quiero…	I want to…
pensando en salir	thinking about going out	subir mis fotos a…	upload my photos to…
preparando algo para merendar	preparing something for tea	quedarme en casa	stay at home
repasando para un examen	revising for an exam	¡Qué rollo!	What a pain!
tomando el sol	sunbathing	¿A qué hora quedamos?	What time shall we meet?
haciendo footing	jogging	¿Dónde quedamos?	Where shall we meet?
haciendo el vago	lazing about	en la Plaza Mayor	in the main square
leyendo	reading	debajo de	underneath
viendo una peli	watching a film	detrás de	behind
escribiendo	writing	delante de	in front of
¿Quieres salir conmigo?	Do you want to go out with me?	enfrente de	opposite
No puedo porque…	I can't because…	al lado de	next to

¿Qué te gusta leer?	What do you like reading?		
los blogs	blogs	las novelas de ciencia ficción	science fiction novels
los tebeos / los cómics	comics	las novelas de amor	romantic novels
los periódicos	newspapers	las historias de vampiros	vampire stories
las revistas	magazines	las biografías	biographies
las poesías	poems		

¿Con qué frecuencia lees?	How often do you read?		
cada día / todos los días	every day	una vez a la semana	once a week
a menudo	often	dos veces al mes	twice a month
generalmente	generally	una vez al año	once a year
de vez en cuando	from time to time	nunca	never

La familia	Family		
el padre / la madre	father / mother	el primo / la prima	male cousin / female cousin
el padrastro / la madrastra	step-father / step-mother	el sobrino / la sobrina	nephew / niece
el hermano / la hermana	brother / sister	el marido / la mujer	husband / wife
el hermanastro / la hermanastra	step-brother / step-sister	el hijo / la hija	son / daughter
el abuelo / la abuela	grandfather / grandmother	el nieto / la nieta	grandson / granddaughter
el bisabuelo / la bisabuela	great grandfather / great grandmother	mayor / menor	older / younger
el tío / la tía	uncle / aunt		

¿Qué es mejor, leer en papel o en la red?	What is better, reading paper books or online?		
Leer en formato digital…	Reading in digital format…	no ocupan espacio	don't take up space
protege el planeta	protects the planet	Una desventaja es…	One disadvantage is…
no malgasta papel	doesn't waste paper	el uso de batería	the battery use
cansa la vista	tires your eyes	Me gusta / prefiero…	I like / I prefer…
depende de la energía eléctrica	relies on electricity	tocar las páginas	to touch the pages
te permite llevar contigo miles	allows you to take thousands of books	pasar las páginas a mano	to turn the pages by hand
de libros	with you	escribir anotaciones	to write notes
cuesta mucho menos	costs a lot less	leer horas y horas	to read for hours and hours
fastidia porque no hay	is annoying because there is no	un ratón de biblioteca	a bookworm
numeración de páginas	page numbering	un fan del manga	a manga fan
Los libros electrónicos / Los e-books…	Electronic books / E-books…	un libro tradicional	a traditional book
son fáciles de transportar	are easy to transport	un libro de verdad	a real book
son más ecológicos / baratos	are more environmentally-friendly /		
	cheaper		

¿Cómo es?	What is he/she like?		
Tiene los ojos…	He/She has … eyes	bigote	a moustache
azules / verdes / marrones / grises	blue / green / brown / grey	Es…	He/She is…
grandes / pequeños / brillantes	big / small / bright	alto/a / bajo/a	tall / short
Tiene el pelo…	He/She has … hair	delgado/a / gordito/a / gordo/a	slim / chubby / fat
moreno / rubio / castaño / rojo	dark brown / blond / mid-brown / red	calvo/a	bald
corto / largo	short / long	moreno/a	dark-haired
rizado / liso / ondulado	curly / straight / wavy	rubio/a	fair-haired
fino / de punta	fine / spiky	castaño/a	brown-haired
Tiene…	He/She has…	pelirrojo/a	a redhead
la piel blanca / morena	fair / dark skin	español / española	Spanish
la cara redonda / alargada	a round / oval face	inglés / inglesa	English
los dientes prominentes	big teeth	peruano / peruana	Peruvian
pecas	freckles	Mide 1,60.	He/She is 1m60 tall.
Lleva…	He/She wears / has…	No es ni alto ni bajo.	He/She is neither tall nor short.
gafas	glasses	(No) Nos parecemos físicamente.	We (don't) look like each other.
barba	a beard		

¿Cómo es de carácter?	What is he/she like as a person?		
Como persona, es…	As a person, he/she is…	enérgico/a / animado/a /	energetic / lively / calm
optimista / pesimista	optimistic / pessimistic	tranquilo/a	
simpático/a / antipático/a	nice / nasty	pensativo/a	thoughtful
trabajador(a) / perezoso/a	hard-working / lazy	comprensivo/a	understanding
generoso/a / tacaño/a	generous / mean	honesto/a	honest
hablador(a) / callado/a	chatty / quiet	alegre	cheerful
divertido/a / gracioso/a / serio/a	fun / funny / serious	molesto/a	annoying
fiel / infiel	loyal / disloyal	ambicioso/a	ambitious
feliz / triste	happy / sad	egoísta	selfish
ordenado/a / caótico/a	tidy / chaotic	Está feliz / triste.	He/She is happy / sad.

¿Te llevas bien con tu familia?	Do you get on well with your family?		
(No) Me llevo bien con…porque…	I (don't) get on well with… because…	Me divierto con…	I have a good time with…
me apoya	he/she supports me	Me peleo con…	I argue with…
me acepta como soy	he/she accepts me as I am	Nos llevamos superbién.	We get on really well.
nunca me critica	he/she never criticises me	Nos llevamos como el perro y el gato.	We fight like cat and dog.
tenemos mucho en común	we have a lot in common	Nos divertimos siempre.	We always have a good time.

¿Cómo es un buen amigo / una buena amiga?	What is a good friend like?		
Un buen amigo es alguien que…	A good friend is someone who…	Conocí a mi mejor amigo/a…	I met my best friend…
te apoya	supports you	Nos conocimos	We met / got to know each other
te escucha	listens to you	Nos hicimos amigos	We became friends
te conoce bien	knows you well	Nos hicimos novios	We started going out
te acepta como eres	accepts you as you are	convivimos	we lived together
te quiere mucho	likes / loves you a lot	nos casamos	we got married
te da consejos	gives you advice	Es el amor de mi vida.	He/She is the love of my life.
te hace reír	makes you laugh	Tenemos … en común.	We have … in common.
no te critica	doesn't criticise you	nos gustan (las mismas cosas)	we like (the same things)
nunca te juzga	never judges you	nos encantan (las películas)	we love (films)

Subject: Geography (GCSE AQA)	Term: 5 and 6	Topic: Challenges of natural hazards – Climatic Hazards

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Key concept: Tectonic hazards Vs. Climatic Hazards

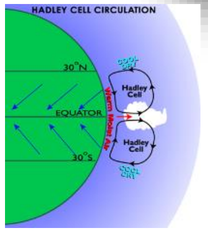
Natural hazards can be placed into two categories - **tectonic hazards** and **climatic hazards**.

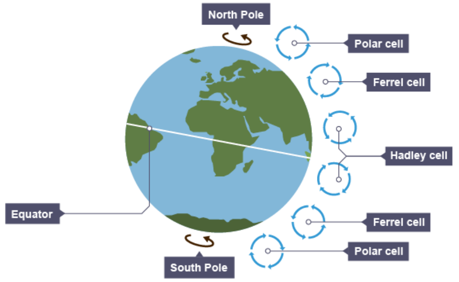
Tectonic hazards occur when the Earth's crust moves. For example, when the plates move, friction can cause them to become stuck. Tension builds until the plates release, which leads to an earthquake.

Climatic hazards occur when a region has certain weather conditions, for example heavy rainfall can lead to flooding.

Key concept: Climatic atmospheric circulation

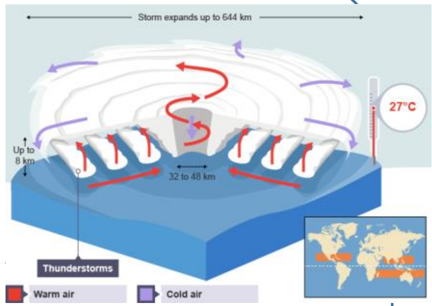
How does global circulation work?
The movement of air across the planet occurs in a specific pattern. The whole system is driven by the equator, which is the hottest part of the Earth. Air rises at the equator, leading to low pressure and rainfall. When the air reaches the edge of the atmosphere, it cannot go any further and so it travels to the north and south. The air becomes colder and denser, and falls, creating high pressure and dry conditions at around 30° north and south of the equator. Large cells of air are created in this way.
Air rises again at around 60° north and south and descends again around 90° north and south. The names of the cells are shown in the diagram.





Key concept: Tropical Storms

Tropical storms are immensely powerful and can travel up to speeds of 65 km/h. Resembling large whirlpools, they are made up of rotating, moist air, with wind speeds that can reach over 120 km/hr.



How tropical storms develop

•Tropical storms form between approximately 5° and 30° latitude because of easterly winds they initially move westward.
•The air above the warm ocean is heated. Once the ocean water reaches at least 27°C, the warm air rises quickly, causing an area of very low pressure.
•As the air continues to rise quickly it draws more warm moist air up from above the ocean leading to strong winds.
•The rapidly rising warm air spirals upwards, cools, condenses and large cumulonimbus clouds form.
•These clouds form the eye wall of the storm and produce heavy rainfall.
•In the centre of the storm, cold air sinks forming the eye of the storm - here, conditions are calm and dry.

Case Study – Typhoon Haiyan

- November 2013
- The Philippines
- Primary effects
- Secondary effects
- Immediate responses
- Long-term responses

- https://www.kerboodle.com/api/courses/58750/interactives/136589.html
- https://www.bbc.com/bitesize/guides/zpxgk7h/revision/1
- http://coolgeography.co.uk/gcsen/NH_Typhoon_Haiyan.php

Key terms:

Natural Hazard **Climatic hazard** **Tectonic hazard** **Tropical Storm** **Hurricane** **Cyclone** **Global atmospheric circulation**
Tropical Storms **Cumulonimbus clouds** **Latitude** **Primary effects** **Secondary effects** **Immediate responses** **Long-term responses**

Subject: History (GCSE AQA)	Term: 5 and 6	Topic: America Opportunity and Inequality 1920-1973

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Key concept 1: American people and the Boom

1. **The Boom**
    - Mass production – Ford
    - Benefits of the Boom
    - Inequalities in Wealth
2. **Social and Cultural Developments**
    - Entertainment
    - Women and flapper culture
3. **Divided Society**
    - Organised Crime and Prohibition
    - Causes of racial tension
    - Immigration
    - KKK
    - Red Scare

Chicago Sunday Tribune FINAL EDITION

JURY CONVICTS CAPONE

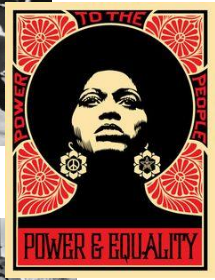
Thomas A. Edison Dies in Sleep at 84

Key concept 2: Bust – Americans' experience of the Depression and New Deal

1. **American society during the Depression**
    - Unemployment for farmers and businessmen
    - Hoover's responses and unpopularity
    - Roosevelt's election
2. **The effectiveness of the New Deal on different groups in society**
    - Successes/Limitations of the New Deal
    - Opposition from supreme court
    - Republicans and Radicals
    - Roosevelt's contribution as president
    - Popular culture
3. **Impact of the Second World War**
    - Economic recovery
    - Social Development (African Americans and Women)

Key concept 3: Post-War America

1. **Post-War American society and economy**
    - Consumerism and causes of prosperity
    - The American Dream
    - McCarthyism
    - Rock and Roll and Television
2. **Racial Tension and developments in the Civil Rights campaigns in 1950s and 60s**
    - Segregation laws
    - Martin Luther King Jr (Peaceful Protest)
    - Malcom X (Black Power Movement)
    - Civil Rights Acts 1964/68
3. **America and the 'Great Society'**
    - Social policy (Kennedy and Johnson)
    - Women's Movement (fight for equality)



Websites and further reading:

http://www.bbc.co.uk/schools/gcsebitesize/history/tch_wjec/usa19101929/2riseandfall1.shtml
https://www.bbc.com/bitesize/topics/zq2mn39/resources/1
AQA (1-9) Revision Guide America Opportunity and Inequality
AQA (1-9) Student book America Opportunity and Inequality
https://www.history.com/topics/great-depression/new-deal

Key vocabulary to define and learn:

Boom Bust Mass Production Social Development Flapper Organised Crime Prohibition Immigration Red Scare Ku Klux Klan Communism Prosperity McCarthyism Segregation American Dream Civil Rights Depression Republican Democrat Economy Okies Hobo Consumerism Black Power Bible Belt Supreme Court Congress

Subject: Computer Science	Term: 5	Topic: Binary and data representation

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Key topic 5: Binary and data representation

5.1 Introduction to binary

5.1.1 The binary number system – what is a digital 'bit' and how is it reflected in the actions of a transistor, encoding binary, the colossus machine.

5.1.2 How bits make up a byte. Other classifications for combinations of bits including, 'nibble' 'kilobyte', 'megabyte', 'gigabyte', 'terabyte' and their associations.

5.1.3 The difference between binary and denary; binary and denary place values.

5.1.4 Converting binary to denary and vice versa using various methodologies.

5.1.5 Bit number patterns.

5.2 Numbers and binary addition

5.2.1 The difference between integers and floating point numbers.

IP addresses and how they use 8bit, 16bit, 32 bit, 64bit number combinations.

5.2.2 Adding binary numbers and overflow using an 8bit overflow example.

5.2.3 Using sign and magnitude with integers to create negative binary numbers

Database uses, advantages and disadvantages over other data storage.

5.1.3 Explaining the difference between data, information and knowledge.

5.3 Hexadecimal and character sets

5.3.1 Understanding how hexadecimal sets can simplify binary

5.3.2 Exploring how hexadecimal colours are represented on computers

5.3.3 Converting hexadecimal to binary

5.3.4 Character sets, understanding how global standards are used; Character sets ASCII and Unicode

5.4 Encoding images

5.4.1 Understanding pixels and resolution of an image and its associated consequences with memory use.

5.4.2 Bitmap images, Jpeg, Gif and Png files and how they are stored in binary.

Vector graphics and how they differ. How are vector graphics used in society.

5.4.3 Colour depth and binary code.

5.4.4 Image metadata; filename, file format (.jpg/.gif/.png) dimensions, resolution, colour depth, time and date it was last taken, camera setting when the photo was taken, GPAS location.

5.4.5 Compressing images and how it changes attributes of the image file; file type, resolution, dimension, bit depth, lossy and lossless compression.

5.5 Encoding audio and video

5.5.1 Encoding digital audio; digital audio quality.

5.5.2 How sample rate affects the quality of the recording.

5.5.3 Bit depth; Uncompressed high quality recordings and their file formats. (PCM, WAV or AIFF)

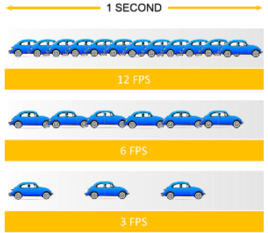
5.5.4 Bit rates; calculating bit rates,

5.5.5 Audio file compression and its benefits to streaming and downloading. Lossy or Lossless compression

5.5.6 Digital video; frames per second (fps).

Video compression

5.5.7 Codecs and how they use algorithms to compress video



Key vocabulary and acronyms to define and learn:

For key vocabulary visit the glossary at:

https://www.bbc.com/bitesize/guides/zwsbwmn/revision/1

Websites and further reading:

BBC bitesize database revision: https://www.bbc.com/bitesize/topics/zd2xsbk

Teach ICT: http://www.teach-ict.com/gcse_computing/ocr/212_computing_hardware/binary_logic/miniweb/index.php

Subject: Computer Science	Term: 6	Topic: Programming

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Key topic 6: Programming

6.1 Programming software and the IDE (integrated development environment)

6.1.1 Programming languages; human or machine readable, high level or low level.
6.1.2 Assemblers, compilers and interpreters; identify the roles of.
6.1.3 The difference between a process virtual machine and a system virtual machine.
6.1.4 The functions of an IDE; Code editor, other IDE tools
6.1.5 Programming errors; runtime errors, syntax errors, semantic errors. Debugging.

6.2 Introducing algorithms

6.2.1 What is an algorithm and how are they used in society
6.2.2 How to design an algorithm. Identifying and considering variables.
6.2.3 Using bubble sort to order sequential number list.
6.2.4 What is pseudocode and a flow chart and how and when is it used?
6.2.5 Syntax definition and how syntax errors can occur. Statements and expressions.

6.3 Algorithms and control flow

6.3.1 How control flow is used in algorithms
6.3.2 Sequence in algorithms
6.3.3 How to make IF, THEN and ELSE queries.
6.3.4 Iteration in an algorithm; infinite loops, count and condition controlled loops.

6.4 Constants, variables and data types

6.4.1 Identifying fixed and variable data values in an algorithm
6.4.2 Data types used in an algorithm
6.4.3 Numbers used in an algorithm; integers, floating point.
6.4.4 Character sets and strings used in algorithms
6.4.5 Assignment scope and declaration

6.5 Boolean logic

6.5.1 Logic gates in with true or false responses. Truth tables.
6.5.2 Using Boolean algebra. Drawing AND OR and NOT gates for an algorithm.

6.6 Data structure

6.6.1 The difference between static and dynamic data structures
6.6.2 How an array can be used to store data in an organised structure
6.6.3 2 (and 3) dimensional arrays and their use in game programming
6.6.4 +/- of Python compared to other programming languages.
6.6.5 Grouping together related items of data in python using dictionaries (record)

6.7 Functions procedures and modules

6.7.1 Understanding how modules are used within algorithms to compartmentalise sections
6.7.2 Customising modules within an algorithm and using parameters in programming

6.8 Development and testing

6.8.1 Software development life cycle; Requirements, Design, Implementation, Testing

6.9 BBC Micro:bit

6.9.1 Solving a problem by programming a microprocessor
6.9.2 Wearable technology incorporating microprocessors; LED jewellery, GPS jacket, tie that detects sound and lights up

Key vocabulary and acronyms to define and learn:

Variable, Micro:bit, compass, Bluetooth, repetition, data, information, accelerometer, processor, USB, connector, execute.

Websites and further reading:

BBC bitesize: https://www.bbc.com/bitesize/topics/zq6hvcw
BBC Micro:bit.org: https://microbit.org/
Coding key words glossary: https://code.org/curriculum/docs/k-5/glossary

Subject: Photography	Term: 5 and 6	Topic: Documentary Photography

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Key question 1: Documentary Photography

Documentary photography is used to record events or environments. It can be significant moments in society or an individuals everyday life. As an art form it can be emotive and inspiring, as well as informative. However should this be considered a reliable source for information on the subject matter recorded? Is it the artist/ photographs view of reality, is it the viewers perception of reality or is it fact. Consider the two images shown. Do you believe these to be taken in the moment or prepared prior? If so how does this impact your opinion of the photographs, or the subject matter shown

Key question 2: How to use a DSLR?

How to create movement?

How to create a blurred background?

Why might a photographer use these effects?

You will be using DSLR's in your photography lessons. To familiarize yourself with some of the functions and their uses, look at them images below and think about what functions you would need to create these effects.

Key question 3: Photoshop Skills

The image pictured shows a raw photograph and the end product after the Photoshop editing process.
Using your knowledge of Photoshop from Year 8, what sorts of changes have been made? What tools have been used to achieve these changes?
Do you prefer the raw image or the edited picture?
Does this process have an impact on our theme of documentary photography?

Websites and further reading:

BBC Bitesize:
http://www.bbc.co.uk/schools/gcsebitesize/art/practicalities/usingphotography1.shtml
Pinterest: Search "documentary photography"
Artists/ Photographers to consider: Chris Steele Perkins – The New Londoners and Akram Zaatari - Photography, People, and Modern Times.
Netflix: "Tales by Light" and "Abstract: The Art of Deisgn"
Youtube: Photoshop Tutorials – PHLEARN https://www.youtube.com/watch?v=qZ_xWcqOFIo

Key vocabulary to define and learn

Aperture
Exposure
ISO
Lighting
Shutter Speed
Depth of Field
Filters
Composition
Layers

30 Day Photography Challenge:

Follow the link below to a daily photographic task and submit all thirty images via email to Miss Garrett at the end of term one. Winner will have work displayed and win a photography related prize.
https://www.pinterest.co.uk/pin/478507529131108702/