Topic: Percentages		Year 10	Tier H	TERM 1

What do I need to know?

- Be able to convert between fractions, decimals and percentages confidently.
- Find basic percentages with and without a calculator.
- Calculate percentage increase and decrease.
- Solve problems involving simple and compound interest and use reverse percentages to fine original values.

How do I recognise this topic?

- Typically involves the following key words: **percent, percentage change, increase, decrease, interest, multiplier.**
- Look for the **%** symbol.
- You may see real life applications involving find the value of items on sale, bank account and prices increasing or decreasing.

General Tips

- Work out basic percentages such as 50%, 10%, 1%, 5% and add them together to get the amount you need.
- When working with percentage **increase, add** the percentage increase to 100%, then divide by 100 to get your **multiplier.**
- When working with percentage **decrease, subtract** the percentage increase from 100%, then divide by 100 to get your **multiplier.**
- When calculating **percentage change**, find the difference then divide by the starting amount to get a decimal, multiply by 100 to convert it to a percentage.
- With compound interest, find the **multiplier** and use index notation to calculate multiple years/months/ect.

Worked Example

Increase 500 by 20% (Non Calc):

10% of 500 = 50
so 20% of 500 = 100
500 + 100 = 600

Decrease 800 by 17% (Calc):

100%-17%=83%
83% ÷ 100 = 0.83
0.83 x 800 = 664

The multiplier for increasing by 12% is 1.12
The multiplier for decreasing by 12% is 0.88
The multiplier for increasing by 100% is 2.

Simple:

£1000 invested for 3 years at 10% simple interest.
10% of £1000 = £100
Interest =

Compound:

A bank pays 5% compound interest a year. Bob invests £3000. How much will he have after 7 years.

Reverse Percentages

A jumper was priced at £48.60 after a 10% reduction. Find its original price.

100% - 10% = 90%
90% = £48.60
1% = £0.54
100% = £54

Percentage Change

A games console is bought for £200 and sold for £250.

% change = ——

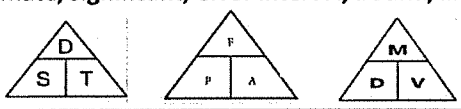
Topic: Accuracy and Bounds		Year 10	Tier H	TERM 1

What do I need to know?

- Use approximations to estimate the value of a calculation and check your answer.
- Correctly use inequality signs including $\leq \geq \neq \approx$
- Use inequality notation to specify error intervals due to truncation or rounding.
- Identify upper and lower bounds and use them to calculate maximum and minimum figures.

How do I recognise this topic?

- Look for the following key words: **round, estimate, approximate, significant, error interval, bound, limit.**
- Look for the use of the symbols $\leq \geq \neq \approx$
- Questions may include calculations involving the triangles:
- You may need to find a **maximum** or **minimum** value.



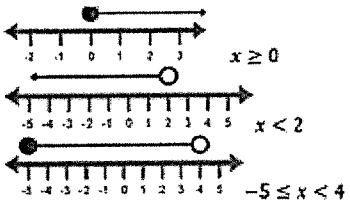
General Tips

- An inequality says that two values are **not equal**. means that a is not equal to b.
- Inequalities can be shown on a number line.
- **Open circles** are used for numbers that are **less than or greater than**
- **Closed circles** are used for numbers that are **less than or equal or greater than or equal**
- To **approximate** means to find a reasonable estimate of an answer by rounding.

To find the **upper and lower bound**, follow these steps:

1. Half the degree of accuracy specified.
2. Add to get the upper bound.
3. Subtract to get the lower bound.

Worked Example



Find the lower and upper bound of 450 to the nearest 10.

1. Half the degree of accuracy = 10 ÷ 2 = 5.
2. Upper bound = 450 + 5 = 455.
3. Lower bound = 450 – 5 = 445.

Find the lower and upper bound of 5.7 to 1 decimal place.

1. Half the degree of accuracy = 0.1 ÷ 2 = 0.05.
2. Upper bound = 5.7 + 0.05 = 5.75.
3. Lower bound = 5.7 – 0.05 = 5.65.

Estimate 62.88×28.97

Step 1 Round to the nearest ten.

$62.88 \rightarrow 60$

$28.97 \rightarrow 30$

Step 2 Multiply the rounded numbers.

$60 \times 30 = 1{,}800$

So, a good estimate for the product is 1,800.

An average clementine weighs 74g to the nearest gram.
A net contains 12 clementines.
The net weighs 20g to the nearest gram.

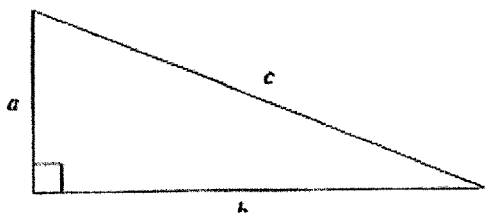
What is the maximum possible weight of the net of clementines.

Clem max = 74.5

net max = 20.5

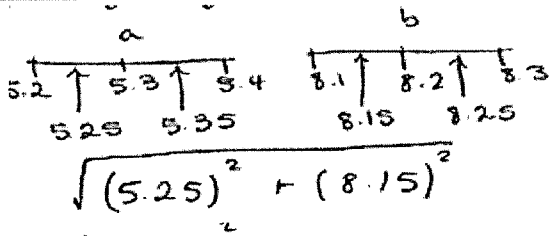
$12 \times 74.5 + 20.5$

914.5 g



a = 5.3 cm correct to the nearest mm
b = 8.2 cm correct to the nearest mm

Calculate the lower bound for c.
You must show all your working.
Give your answer to 3 significant figures.



$\sqrt{(5.25)^2 + (8.15)^2}$

$a^2 + b^2 = c^2$

9.67 cm

Topic: Surds		Year 10	Tier H	TERM 1

What do I need to know?

- To simplify surds.
- To add, subtract, multiply and divide surds.
- To expand brackets involving surds.
- To rationalise the denominator of a fraction involving a surd.

How do I recognise this topic?

- Surds are typically non-square numbers inside a square root sign. (E.g.: $\sqrt{\ }$, $\sqrt{\ }$, etc)
- Surds are normally involved in non-calculator exam questions which involve Pythagoras and trigonometry.
- When a question asks for an **exact answer** and part of the calculation involves square rooting.

General Tips

- Try to simplify any surds beforehand, so they have the same surd component.
- Quick recall of square numbers will help with simplifying surds.
- Sometimes it is helpful to replace the surd with a letter like to better understand the simplifying process. (E.g: $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ ( ) $\sqrt{\ }$)

Worked Example

Simplify/rationalise the following

a) $\sqrt{\ }$	**b)** $\sqrt{\ }$ $\sqrt{\ }$	**c)** $\sqrt{\ }$ $\sqrt{\ }$
Split into two factors, one of them being a square number $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$	Multiply/divide as expected $\sqrt{\ }$ $\sqrt{\ }$ Simplify whenever possible! $\sqrt{\ }$	Simplify the surds first $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ Simplify further $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$

d) $\sqrt{\ }$ $\sqrt{\ }$	**e)** $\frac{\ }{\sqrt{\ }}$	**f)** $\frac{\ }{\sqrt{\ }}$
Multiply the factor ($\sqrt{\ }$) by each part of the bracket, then combine at the end $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$ $\sqrt{\ }$	**Rationalise** the denominator by multiplying the fraction by the surd on the denominator $\frac{\sqrt{\ }}{\sqrt{\ }}$ $\frac{\sqrt{\ }}{\sqrt{\ }}$ Multiply fractions and simplify as needed $\frac{\sqrt{\ }}{\sqrt{\ }\ \sqrt{\ }}$	**Rationalise** the denominator by multiplying by the conjugate, then simplify as much as possible $\frac{\ }{\sqrt{\ }}$ $\frac{\sqrt{\ }}{\sqrt{\ }}$ $\frac{\sqrt{\ }}{\sqrt{\ }\ \sqrt{\ }}$ $\frac{\sqrt{\ }}{\ }$ $\frac{\sqrt{\ }}{\ }$ $\sqrt{\ }$

Topic: Forming and solving linear equations	Year 10	Tier H	TERM 1

What do I need to know?

- Solve linear equations where letter appears once eg 3x+5=20
- Solve linear equations where letter appears on both sides of the equation eg 5a+8=3a+18
- Solve linear equations including brackets eg 2(x-1)=10
- Construct and solve linear equations

How do I recognise this topic?

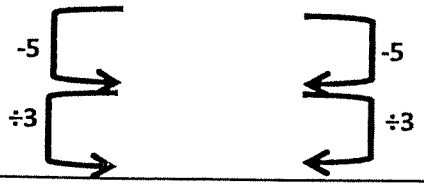
- Check for words like 'solve', 'construct', 'form', 'Find the value of '
- Questions often have diagrams where lengths are labelled with letters
- Questions often involve area , perimeter, angles,....

Step by Step Guide / General Tips

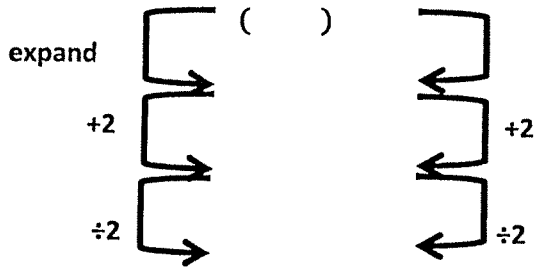
- Use inverse operations to solve the linear equations.
- So if you see +5 then -5 from each side of the equation
- Remember that the equation has to be balanced – so operate on both sides in the SAME way
- Next , making the equations and then solving them.
- Make sure you read the diagram very carefully: is the shape a rectangle? A triangle ? A square? Other shape?
- What key words do you see? Area ? Perimeter ? Angles involved?
- Write down the formulae that you might use
- Make an equation and solve it--- remember to think about the answers in context.

Worked Example

Solving a linear equation with letter appearing once.

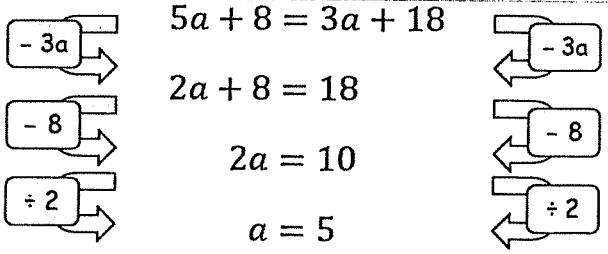


Solving a linear equation with brackets.



Solving a linear equation with letter appearing one both sides on the equation.

- **Try to have all the 'a' terms on one side of the equation**
- **Try to have the numbers on the other side of the equation.**



Construct and solve an equation **Find the value of x**

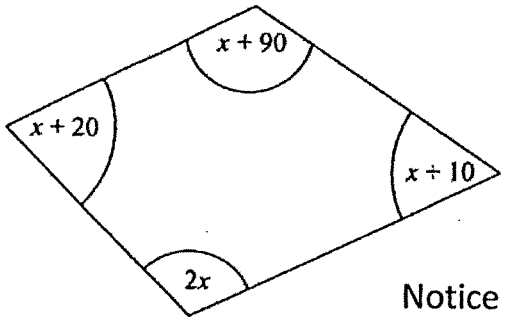


Diagram NOT accurately drawn

Notice the angles are labelled.
The angles sum for a quadrilateral is 360 degrees

Topic: Probability – Combined Events		Year 10	Tier Foundation	TERM 1

What do I need to know?

- Calculating probabilities of combined events using sample spaces, Venn diagrams and tree diagrams

How do I recognise this topic?

- Key words: Probability, chance, sample space, two way table, Venn diagram, tree diagram.
- P(Outcome) is the probability of an outcome happening. E.g. P(5) is the probability of getting a 5.

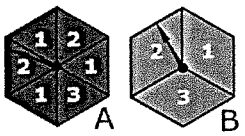
Step by Step Guide / General Tips

- To calculate probability = $\frac{\text{number of ways it can happen}}{\text{total number of outcomes}}$

Worked Example

Worked Example: Sample Space

Two spinners are spun. The table below shows the sum of the scores:



spinner B \ spinner A	1	2	1	3	1	2
1	2	3	2	4	2	3
2	3	4	3	5	3	4
3	4	5	4	6	4	5

What is the probability of getting these totals:

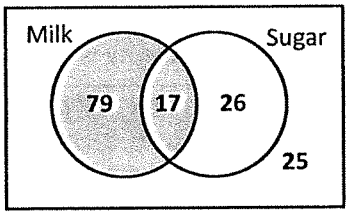
a) **A 4?** (Clue: how many sums of 4's are there?) $\frac{6}{18}$

b) **A multiple of 3** (a number in the 3 times table) $\frac{6}{18}$

c) **An even number** $\frac{10}{18}$

Worked Example: Venn Diagram

A café records how people take their coffee and displays the information in a Venn Diagram.

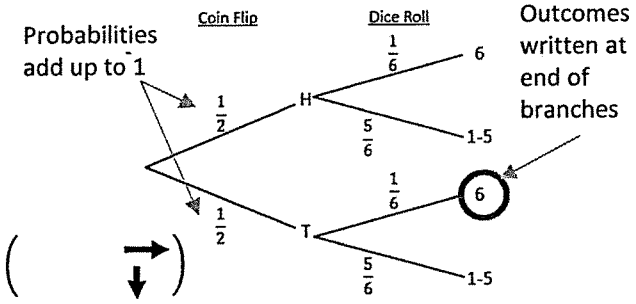


a) **How many people took part in the survey?**
(Clue – add all the numbers together)
79 + 17 + 26 + 25 = 147

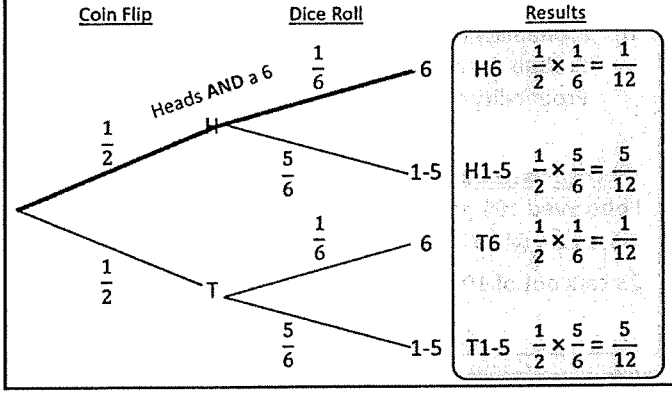
b) **What is the probability of choosing a customer who takes milk in their coffee?**
79 + 17 = 96 customers
Probability = $\frac{96}{147}$

Worked Example: Tree Diagram

John flips a coin and Jane rolls a dice.

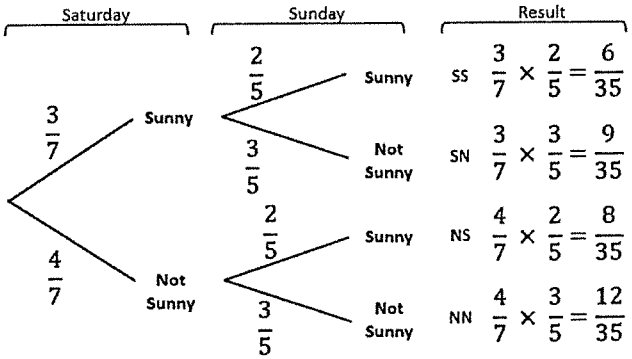


To find the combined probability we multiply across the branches.



Worked Example: Tree Diagram

The probability is it sunny on Saturday is 3/7
The probability it is sunny on Sunday is 2/5
Draw a tree diagram showing the probabilities and results.



What is the probability of:

a) **It being sunny on both days?** ___

b) **It being sunny on Saturday and not sunny on Sunday?** ___

c) **It being sunny on only one day?**
Sunny on Saturday and not on Sunday = ___
Not sunny on Saturday but sunny on Sunday: ___

___ ___ ___

Topic: Probability – Single Events		Year 10	Tier Foundation	TERM 1

What do I need to know?

- Know the key words associated with the probability scale
- How to calculate probability
- Relative frequency

How do I recognise this topic?

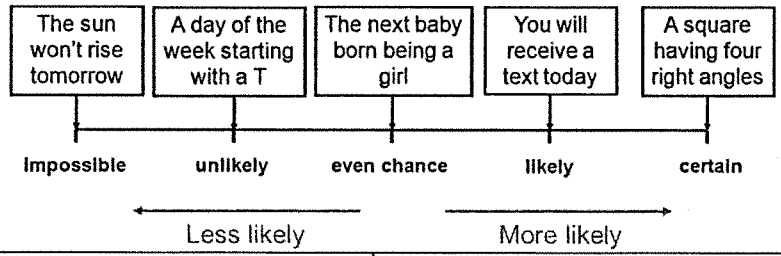
- Key words: Probability, chance, experiment, trials, outcome, relative frequency
- P(Outcome) is the probability of an outcome happening. E.g. P(5) is the probability of getting a 5.

Step by Step Guide / General Tips

- Probability is the chance or likelihood of an event happening.
- Probability is on a scale of 0 to 1.
- It is written as fraction, decimal or a percentage but never as a ratio.
- To calculate probability = $\frac{\text{number of ways it can happen}}{\text{total number of outcomes}}$
- P(Outcome) is the probability of an outcome happening. E.g. P(5) is the probability of getting a 5.
- Mutually exclusive events cannot happen at the same time e.g. the red and green lights on traffic lights will never show at the same
- In an experiment or survey, relative frequency is the number of times the event occurs divided by the number of trials.

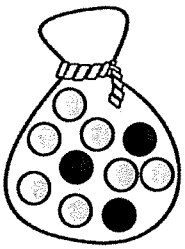
Worked Example

Probability Scale:



Worked example 1

Jem picks a counter randomly from the bag.



What is the probability of getting a:

a) Yellow counter?

—

b) Black counter?

—

c) Yellow or black counter?

1 or 100%

Worked example 2

Looking at the letters from the word:

MATHEMATICS

Calculate:

P(M) = —

P(T or S) = —

P(Not an M) = —

P(vowel) = —

P(number) =

Worked example 3

Counters labelled A, B, C, D and E are placed in a bag. The table shows the probabilities of picking each letter at random.

Letter	A	B	C	D	E
Probability	0.07	0.15	0.26		0.18

a) Calculate the missing probability in the table

b) Calculate the probability of a B or C

a) Probabilities in the table add up to 1
$0.07 + 0.15 + 0.26 + ? + 0.18 = 1$
$0.66 + ? = 1$
$1 - 0.66 = \underline{0.34}$

b) Probability of B = 0.15
Probability of C = 0.26
Probability of B or C = $0.15 + 0.26 = \underline{0.41}$

Worked example 4

I observed 100 passing cars and found that 23 of them were red, what is the relative frequency?

23 cars out of 100 = ——

Topic: Rounding, Estimating and Conversions	Year 10	Tier Foundation	TERM 1

What do I need to know?

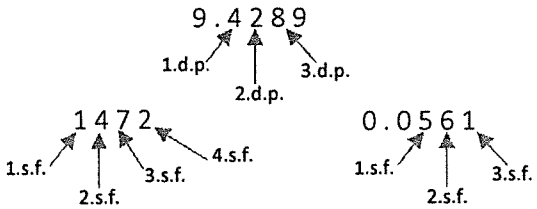
- To round to the nearest whole number and a given number of decimal places and significant figures
- Use rounding approximations to estimate a calculation
- Know key metric conversions of length, area, volume and capacity

How do I recognise this topic?

- Key words: Round, estimate, approximate, decimal place, significant figure, units.

Step by Step Guide / General Tips

- When rounding – 5 or more, let it soar ↑
  – 4 or less, let it rest ↓
- Decimal places (d.p.) are the digits after the decimal point
- We count significant figures (s.f.) from the first non-zero digit.
- When estimating a calculation we round every number to 1.s.f.



Worked Example

Rounding to nearest whole number and decimal places

Round 2.3581 to..

e.g. Nearest whole number

2.3581

2|.3581 — 5 or above? No

= 2

e.g. one decimal place

2.3581 (1.d.p.)

2.3|581 — 5 or above? Yes

= 2.4

e.g. Two decimal places

2.3581 (1.d.p., 2.d.p.)

2.35|81 — 5 or above? Yes

= 2.36

e.g. three decimal places

2.3581 (1.d.p., 2.d.p., 3.d.p.)

2.358|1 — 5 or above? No

= 2.358

Rounding to the nearest significant figure

Round the following to one significant figure:

e.g. 1472 (1.s.f.)

1|472 — 5 or above? No

= 1000

e.g. 0.0561 (1.s.f.)

0.05|61 — 5 or above? Yes

= 0.06

Round the following to two significant figures:

e.g. 1472 (1.s.f., 2.s.f.)

14|72 — 5 or above? Yes

= 1500

e.g. 0.0561 (1.s.f., 2.s.f.)

0.056|1 — 5 or above? No

= 0.056

Estimate the following calculations

e.g. Estimate 45 x 34

Round to 1.s.f: 45 x 34 → 50 x 30

= 1500

e.g. Estimate $\frac{x}{-}$

Round to 1.s.f

x 2

x

e.g. Estimate 129 + 42 x 4.5

1. Round each number to 1.s.f.
2. Use BIDMAS to estimate

≈ 100 + 40 x 5
= 100 + 200
= 300

e.g. Estimate $\sqrt{\ }$

What is the closest square number to 50?

Square numbers:
1, 4, 9, 16, 25, 36, 49, 64
50 is closest to 49

e.g. $\sqrt{\ } \approx \sqrt{\ }$ 7

Metric Conversions

Length
1 cm = 10 mm
1 m = 100 cm
1 km = 1000 m

Mass
1 kg = 1000 g
1 tonne = 1000 kg

Capacity
1 cl = 10ml
1 litre = 1000 ml
1 litre = 100 cl

Topic: Area and surface area		Year 10	Tier Foundation	TERM 1

What do I need to know?

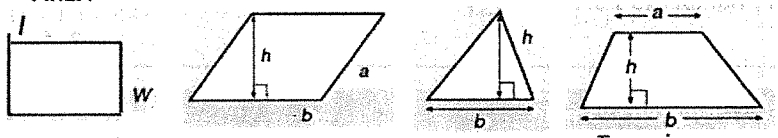
- To remember and apply the formula for the area of a rectangle, triangle, parallelogram and trapezium.
- To work out the surface area of cubes, cuboids, triangular prisms and cylinders (prisms).
- To work out the surface area of spheres and cones, given the formula.

How do I recognise this topic?

- Look for the key word "area" and "surface area".
- 2D shapes typically involve area and 3D solids deal with surface area.

General Tips

- Identify that the question is asking you to work out "area" and/or "surface area".
- *AREA*



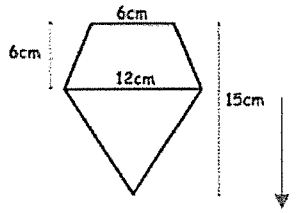
Rectangle $= l \times w$ | *Parallelogram* $= b \times h$ | *Triangle* $= \frac{1}{2}bh$ | *Trapezium* $= \frac{1}{2}(a+b)h$

- Split any shapes into the above basic shapes and work out the area separately, then add/subtract as needed.

Worked Example

Area

Bea makes a logo for a club in school.

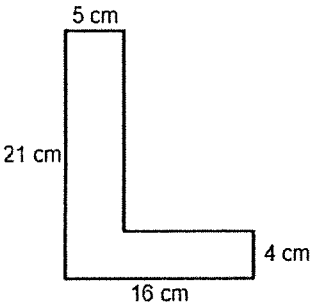


Work out the area of the logo.

Step 3
15-6 = 9cm

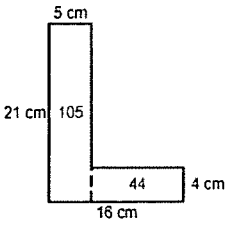
Step 1- trapezium and triangle
Step 2- ½ (a+b)h and ½bh
Step 3 – ½(6+12)x6 + ½ x 12 x 9 = 54 + 54 = 108
Step 4 – 108cm²

Work out the area of the shape below.



The answer is Area = 149 cm²

Split the shape into two rectangles, and find the area of each rectangle.

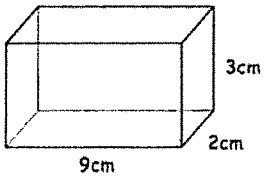


$$\text{Area} = 21 \times 5 + 4 \times 11$$
$$= 105 + 44$$
$$= 149 \text{ cm}^2$$

Surface Area

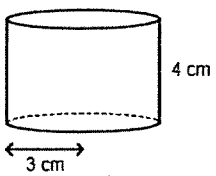
Step 1 – cuboid
Step 2 – 6 rectangular faces
formula l x w
Step 3- front 9x3 = 27
back 9x3 = 27
top 9x2 = 18
bottom 9x2 =18
side 1 = 2x3 =6
side 2 = 2x3 =6
total surface area = 102
Step 4 – 102cm²

Shown below is solid cuboid.



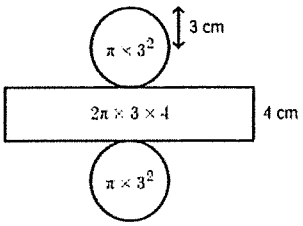
Work out the total surface area of the cuboid.

Find the surface area of the cylinder with a radius of 3 cm and height of 4 cm, as shown on the diagram below.



Give your answer correct to 1 decimal place.

The surface area of a cylinder is made of 2 circles and a rectangle, where the width of the rectangle is the circumference of the circle.



$$\text{Surface area} = 2 \times \pi \times 3^2 + 2\pi \times 3 \times 4$$
$$= 131.9 \text{ cm}^2$$

AQA- Bioenergetics B4

1. PHOTOSYNTHESIS

Photosynthesis as an **endothermic** reaction in which energy is transferred from the environment to the **chloroplasts** by light.

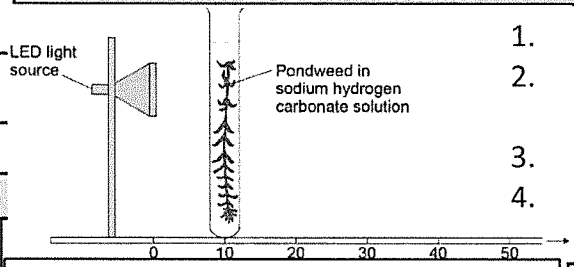
Word :	Carbon dioxide + Water -> Glucose + Oxygen
Symbol:	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

2. USES OF GLUCOSE

Photosynthesis produces glucose, plants use this glucose in a variety of ways:

- Used for **respiration**
- Converted into insoluble starch for **storage – this can be tested for using a iodine test (turns black)**
- Used to produce fat or oil for **storage**
- Used to produce **cellulose**, which strengthens the cell wall
- Used to produce amino acids for **protein synthesis**.

3. MEASURING THE RATE OF PHOTOSYNTHESIS

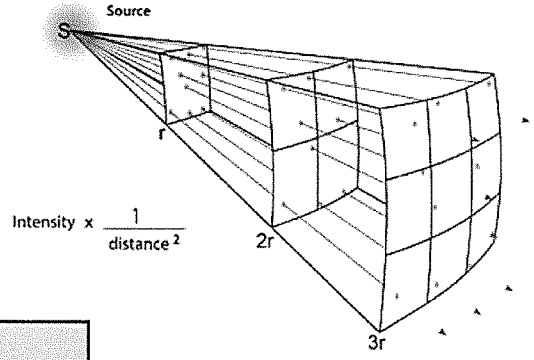


1. Set up apparatus as shown, turn on the light source
2. Count and record the number of oxygen bubbles produced in 1 minute
3. Repeat 3 times, calculate a mean
4. Move the test tube in 10cm intervals away from the light source and repeat

Independent = distance from light source;
dependent = number of bubbles produced,
control = length of pondweed, type of pondweed, volume of water

4. Inverse square law (HT)

Light intensity is inversely proportional to distance squared

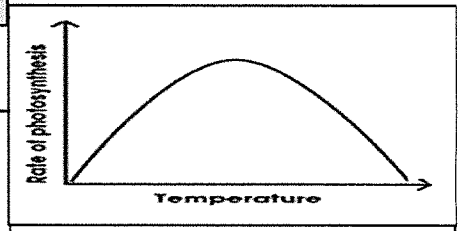


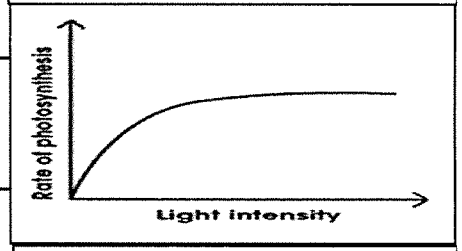
6. GREENHOUSE CONDITIONS (HT)

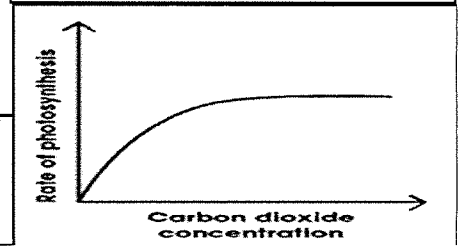
Limiting factors are important in the economics of enhancing the conditions in greenhouses, to gain the maximum rate of photosynthesis while still maintaining profit.

5. LIMITING FACTORS OF PHOTOSYNTHESIS (HT)

Factor	Describe how the rate of photosynthesis is affected:	Explain how the rate of photosynthesis is affected:
Temperature	As temperature increases, the rate of photosynthesis increases, up to a point, then the rate of photosynthesis decreases again.	A higher temperature provides more energy for the reaction. However, if the temperature increases too much, then the enzymes become denatured and the rate of reaction will decrease.
Light intensity	As light intensity increases so does the rate of photosynthesis, the rate then levels off.	A higher light intensity provides energy for the reaction. The rate levels off as another factor is limiting the rate of photosynthesis (such as CO_2/temperature/chlorophyll)
CO_2 concentration	The rate of photosynthesis will increase when a plant is given higher concentrations of carbon dioxide, the rate then levels off.	A higher CO_2 concentration means there are more reactants for the process. The rate levels off as another factor is limiting the rate of photosynthesis (such as light intensity/ temperature/ chlorophyll)
Amount of chlorophyll	The higher the amount of chlorophyll, the higher the rate of photosynthesis, the rate then levels off	Another factor could limit the rate of photosynthesis. This could be light intensity, temperature or the carbon dioxide concentration







AQA
Bioenergetics B4

7. Respiration is an **exothermic** process that happens continuously inside the **mitochondria** of the cells of all living organisms, to release the **energy** needed for all living processes .

Organisms need energy to:

- **Move**: to enable muscles to contract
- **Maintain a steady body temperature**
- Carry out **chemical reactions:** to build larger molecules

8. AEROBIC RESPIRATION

Aerobic respiration requires oxygen. Aerobic respiration is more efficient than anaerobic respiration, as the glucose is completely **oxidised**.

Word equation:	Glucose + Oxygen -> Carbon dioxide + Water
Symbol equation:	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

11. HOW DOES THE BODY RESPOND TO EXERCISE?

When you exercise, your body responds to an increased demand for energy.

Response:	**Explanation:**
Heart rate increases	• Pump blood faster around the body • Carry more oxygen to working muscles • Working muscles use this oxygen to carry out aerobic respiration, to release energy
Breathing rate/breath volume increase	• More oxygen enters the blood stream, to travel to the working muscles, to carry out aerobic respiration. • Oxygen can break down lactic acid.

12. METABOLISM- the sum of all the reactions in a cell or the body

Energy transferred by respiration in cells is used for the processes of metabolism that synthesise new molecules.

Examples of metabolic processes:
Conversion of glucose to starch, glycogen and cellulose.
The formation of lipid molecules from a molecule of glycerol and three molecules of fatty acid.
The use of glucose and nitrate ions to form amino acids which in turn are used to synthesise proteins.
Respiration
Breakdown of excess proteins to form urea for excretion

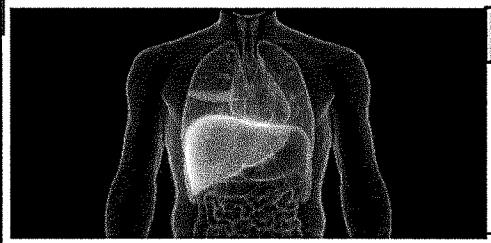
9. ANAEROBIC RESPIRATION IN ANIMALS

If insufficient oxygen is supplied, anaerobic respiration takes place in the muscles. Anaerobic respiration is less efficient than aerobic respiration, as the glucose is **not** completely oxidised.

Word equation:	Glucose -> Lactic acid

Lactic acid:

The incomplete oxidation of glucose causes a build up of lactic acid, causing muscles to become fatigued and stop contracting efficiently. It also creates an **oxygen debt,** where extra oxygen is needed after exercise to react with the accumulated lactic acid and remove it from the cells.



The liver:

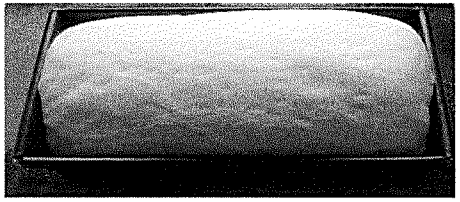
Blood flowing through the muscles transports the lactic acid to the liver where it is converted back into glucose.

10. ANAEROBIC RESPIRATION IN PLANTS/MICRO-ORGANISMS

Anaerobic respiration in micro-organisms produces different products than in humans. Anaerobic respiration in yeast cells is called **fermentation**

Word equation:	Glucose -> Carbon Dioxide + Ethanol

Economic uses of fermentation:



Baking- Yeast carries out fermentation, producing carbon dioxide, causing the bread to rise.

Brewing- Yeast carries out fermentation, which produces ethanol.

1

Structure of an Atom

The nuclear model of the atom consists of a nucleus containing protons and neutrons. Electrons orbit in shells around the nucleus.

Protons + Neutrons = 7

Protons = 3

$^{7}_{3}Li$

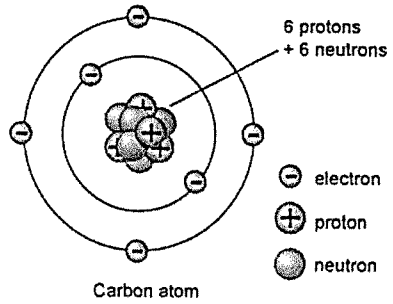
3 Protons, 4 Neutrons, 3 Electrons

2

Useful Definitions

Radioisotope: An atom with an unstable nucleus.
Radioactive Decay: A radioisotope emitting radiation from its nucleus.
Radioactivity is a random process: We can't predict when the next decay will happen.
Radioactive decay produces nuclear radiation – radiation emitted from the nucleus.
The nuclear radiation emitted may be an alpha particle, beta particle, gamma ray or a neutron. Neutron radiation: the release of a high-speed neutron from the nucleus.
Alpha particles: A helium nucleus made up of 2 protons and 2 neutrons.
Beta particles: A neutron in the nucleus emits an electron and becomes a proton.
Gamma rays: Emitted from a nucleus. These are very high-energy electromagnetic waves. They have no charge and no mass.

Atom: Structure



Carbon atom

3

Isotopes

Isotopes of an element have the same number of protons, but different numbers of neutrons.

Electrons

If electrons gain energy, they can move further from the nucleus. They can return to their original level by emitting electromagnetic radiation.

4

Properties of Radiation

Type of Radiation	Ionising Power	Penetrating Power	Absorbed by
Alpha (α)	Most	Least	Paper, skin, a few cm of air
Beta (β)	Moderately	Moderately	Thin aluminium, a few m of air
Gamma (γ)	Least	Most	Thick lead, concrete

5

Nuclear Equations

Alpha decay

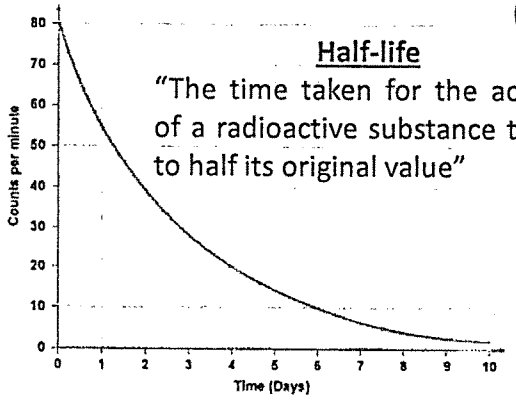
$^{4}_{2}He$

Beta Decay

$^{0}_{-1}e$

- Write in the alpha or beta particle.
- Make the top row add up.
- Make the bottom row add up.

6



Half-life

"The time taken for the activity of a radioactive substance to fall to half its original value"

7

Half-life (Higher Tier)

The proportion of the original activity changes as follows:

1 half life = 1/2
2 half lives = 1/4
3 half lives = 1/8

To calculate the proportion remaining after x half lives: $1/2^{x}$

8

Uses of Ionising Radiation in Medicine

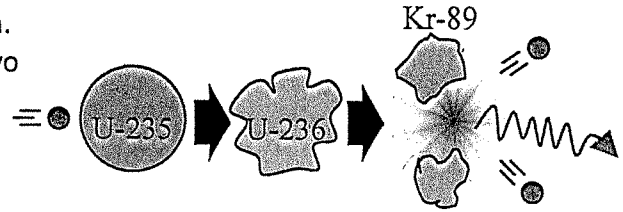
- X-rays are used to check for broken bones.
- Medical Tracers are injected and travel round the body in the blood.
- Radiotherapy is the use of gamma rays to kill cancer cells.

Any additional exposure to ionising radiation increase the risk of cancer, but the benefits of these treatments outweigh the risks.

Nuclear Fission

9

- A **large**, unstable nucleus absorbs a neutron.
- It becomes more unstable and splits into two **smaller nuclei**
- This releases **energy**
- Additional **neutrons** are released.



The additional neutrons can lead to more fissions, this is a **chain reaction.**

10

Hazards of Radiation

Ionising Radiation

Damages cells which leads to mutations. This can cause cells to become cancerous.

Contamination:

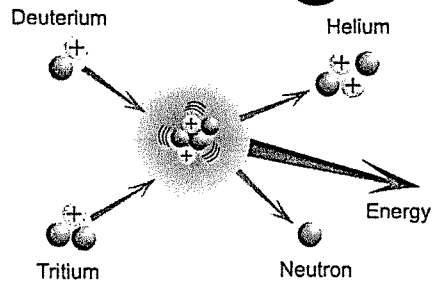
Radioactive materials on or in the body. This causes exposure to radiation over a long period of time until the materials are removed.
Contamination can be prevented by the use of safety clothing and equipment.

Irradiation:

Exposure to radiation. This only happens when you are near a radioactive source and stops when you move away from it.
Irradiation can be reduced by shielding (see table on previous page) and protective clothing.

Nuclear Fusion

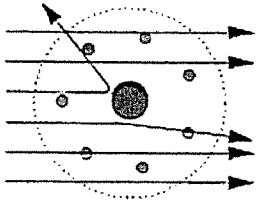
11



Nuclear fusion is the joining of **small, light nuclei** to form **a heavier nucleus.** Fusion is the energy source for stars. So far we have not yet been able to produce the **temperature** and **pressure** conditions required for fusion to occur on Earth.

12

Rutherford's Alpha Particle Scattering Experiment

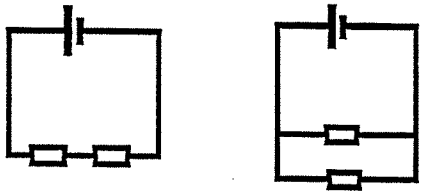


Rutherford aimed a beam of alpha particles at a thin sheet of gold foil.

- Most of the particles passed straight through showing most of the atom was empty space,
- Some were deflected showing mass and charge were concentrated in the nucleus.
- Very few were deflected by large amounts, showing the nucleus was very small in comparison to the atom.
- This provided **new evidence** in support of the **nuclear model** – the **Plum Pudding** model was rejected.

7. Circuit Rules

Series vs. Parallel



Current

Series – The same in every part of the circuit

Parallel – Split between the branches

Potential Difference

Series – Shared between components

Parallel – The same in each branch

Resistance

Series – Add up all resistances to get the total

Parallel – Resistance decreases when another branch is added. The current has another path to flow through.

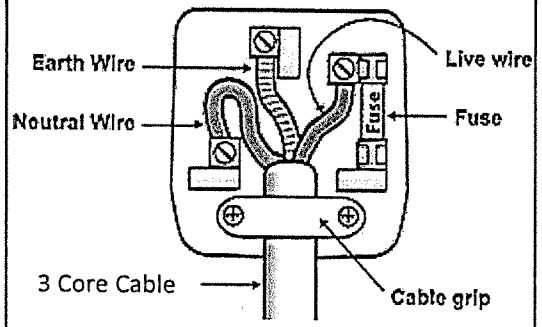
8. Domestic Electricity

UK Mains is:

AC – 50 Hz

230 V

Plugs



Live (Brown) 230V: Carries the current into the appliance.

Neutral (Blue) 0V: Completes the circuit – provides a route for the current to flow out of the appliance.

Earth (Green) 0V: Carries the current safely to Earth if there is a fault in the appliance

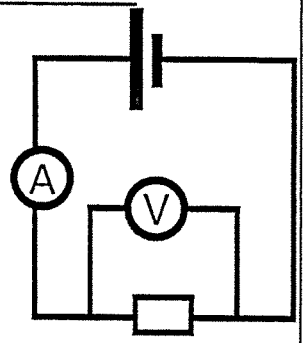
Fuse: Melts if the current gets too high – protects the circuit.

9. Dangers of Electricity

(3 Marks)

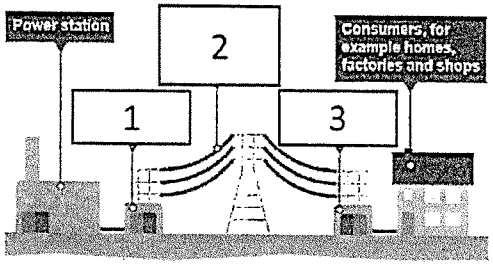
If there is a potential difference between a person and a conductor,
a current will flow through the conductor
into the Earth

10. Measuring Resistance



Connect the circuit as shown. The ammeter must be connected in series and the voltmeter in parallel.
Connect your crocodile clips so that the length of wire you are testing is 10cm long.
Turn on your power pack, note the ammeter and voltmeter readings in the table, AND IMMEDIATELY TURN OFF THE POWER PACK.
Move your crocodile clips, so the next length of wire you are testing is 20cm long.
Repeat step 3 and increase the length of your wire by 10cm each time, making sure you turn the power pack off when you are not using it.
At each length, record the values on the ammeter and voltmeter
Calculate and record the resistance for each length of wire using the equation:

$$\text{resistance in } \Omega = \frac{\text{potential difference in V}}{\text{current in A}}$$



1.Step up transformer	Increase the voltage of the AC
2.High voltage transmission cables	High voltage reduces energy loss
3.Step down transformer	Decreases the voltage of the AC

11. National Grid

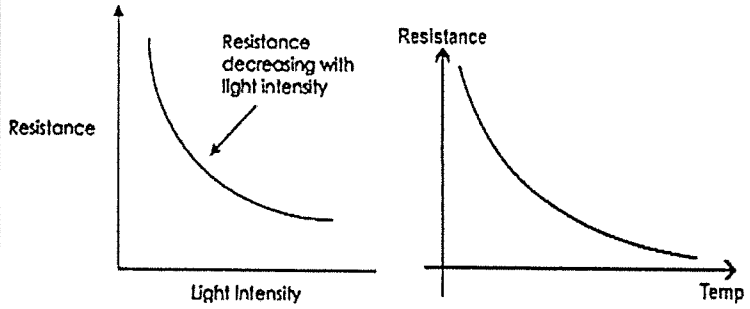
A system of cables and transformers linking power stations to consumers.

Step-Up Transformer

Increase voltage to reduce current. Less energy is lost as heat. This is more efficient.

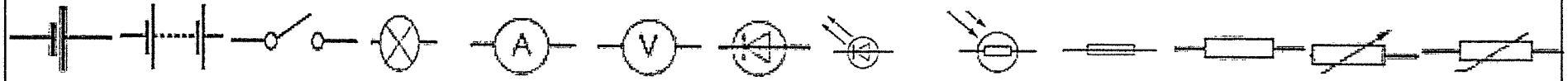
Step-Down Transformer

Reduces voltage to make it safe for domestic use.



Physics 2 - Electricity

1. Circuit Symbols



Cell	Battery	Switch	Lamp	Ammeter	Voltmeter	Diode	LED	LDR	Fuse	Resistor	Variable resistor	Thermistor
Store of chemical energy	Two or more cells in series	Breaks circuit, stopping current	Lights when current flows	Measures current	Measures potential difference	Current flows one way	Emits light when current flows	Resistance low in bright light	Melts when current is too high	Affects the size of current flowing	Allows current to be varied	Resistance low at high temp

2. Circuits Definitions & Units

Current (Amps - A)– Rate of flow of charge

Potential Difference (Volts - V)– Energy used by a cell

Resistance (Ohms - Ω)– Opposition to current

Charge (Coulombs - C) – Work is done when charge flows

3. Equations to Learn

Potential Difference = Current x Resistance

Charge Flow = Current x Time

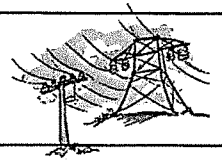
In series circuits: $R_{total} = R_1 + R_2$

Power = Potential Difference x Current

Power = $(Current)^2$ x Resistance

Energy = Power x Time

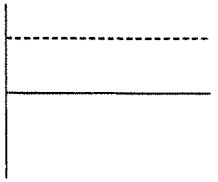
Energy Transferred = Charge flow x Potential Difference



4. AC/DC

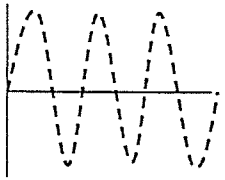
DC: Direct Current

This is current that only flows in one direction.



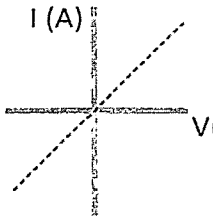
AC: Alternating Current

This is current that constantly switches direction



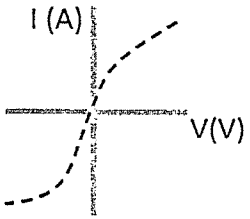
5. Ohm's Law and I-V Graphs

"Current is directly proportional to voltage"



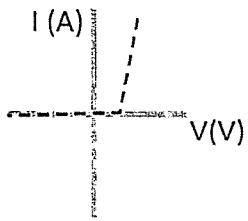
- Straight Line
- Through Origin

6. Non-Ohmic Conductors



As temperature increases, resistance increases

Filament Lamp



Resistance is very high in one direction

Diode

C4 Knowledge Organiser

1. METAL OXIDES

Metal + oxygen → metal oxide
Eg sodium + oxygen → sodium oxide
The reaction are **oxidation** reactions because the metals gain oxygen.

2. REACTIVITY SERIES

The reactivity of a metal is related to its tendency to form positive ions
Carbon and hydrogen are non-metals but are included in the reactivity series as they can be used to extract some metals from their ores

Displacement reactions:
A more reactive metal can displace a less reactive metal from a compound, for example:

Silver nitrate	+	sodium chloride	→	sodium nitrate	+	silver chloride

Higher Tier Only:
Ionic equation: A balanced **ionic equation** shows the reacting **ions** in a chemical reaction.
Balanced symbol equation: $Mg + CuSO_4 \rightarrow MgSO_4 + Cu$
Ionic equation: $Mg + Cu^{2+} + SO_4^{2-} \rightarrow Mg^{2+} + SO_4^{2-} + Cu$

3. EXTRACTION OF METALS:

Metals less reactive than carbon can be extracted from their oxides by reduction with carbon. E.g. Copper Oxide + Carbon → Copper + Carbon Dioxide
Reduction involves the loss of oxygen

4. OXIDATION & REDUCTION:

OIL RIG:
Oxidation Is Loss (of electrons) Reduction Is Gain (of electrons

Half equation: A type of symbol equation which shows how individual ions or atoms gain or lose electrons

5. REACTIONS OF ACIDS

DEFINITIONS:
Acid- Produce hydrogen ions (H^+) in aqueous solutions.
Alkali- A soluble base- Aqueous solutions of alkalis contain hydroxide ions (OH^-).
Base- substance that neutralises an acid - insoluble metal oxides or metal hydroxides
(HT): Strong acid- Completely ionised in aqueous solutions e.g. hydrochloric, nitric and sulphuric acids.
(HT): Weak acid- Only partially ionised in aqueous solutions e.g. ethanoic acid, citric acid

6. REACTIONS OF METALS & ACIDS

Metal + Acid → Salt + Hydrogen
Magnesium + Hydrochloric Acid → Magnesium Chloride + Hydrogen

(HT) Reactions between metals and acids are redox reactions as the metal donates electrons to the hydrogen ions. This displaces hydrogen as a gas while the metal ions are left in the solution.

7. PH SCALE & NEUTRALISATION REACTIONS

You can use universal indicator or a pH probe to measure the acidity or alkalinity of a solution against the pH scale.
Acids = Have a pH 1-6
Neutral solutions have a pH of 7
Alkalis = Have a pH of 8-14
In neutralisation reactions, hydrogen ions react with hydroxide ions to produce water:
$H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$
Alkali + Acid → Salt + Water
Sodium hydroxide + Hydrochloric Acid → Sodium Chloride + Water
Calcium Carbonate + Sulphuric Acid → Calcium Sulphate + Water + Carbon Dioxide

7. MAKING SOLUBLE SALTS – REQUIRED PRACTICAL

Soluble salts can be made from reacting acids with solid insoluble substances (e.g. metals, metal oxides, hydroxides and carbonates).

1. Add the solid to the acid until it is in excess.
2. Filter off excess solid.
3. Heat solution up on a Bunsen burner to increase the concentration of the salt.
4. Allow to crystallise to produce solid salts by placing on window sill for 24 hours.

8. NAMING SALTS: Salt name is dependent upon the acid used
Hydrochloric acid → chloride
Sulphuric acid → sulphate
Nitric acid → nitrate

9. ELECTROLYSIS

DEFINITIONS:

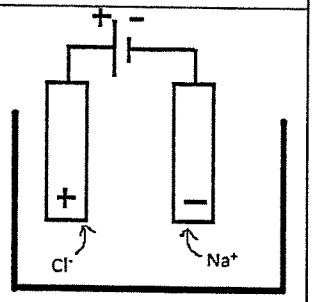
Electrolysis- Splitting a compound using electricity
Anode - Positive electrode
Cathode- Negative electrode
Cations- Positive ions, attracted to the cathode
Anions- Negative ions, attracted to the anode
Electrolyte- solution containing ions that move

Positive
Anode
Negative
Is
Cathode

PROCESS:

Passing an electric current though an electrolyte causes the ions to move to the electrodes.
E.g. In the electrolysis of molten lead bromide, lead is produced at the negative electrode and bromine is produced at the positive electrode.

10. ELECTROLYSIS OF MOLTEN COMPOUNDS

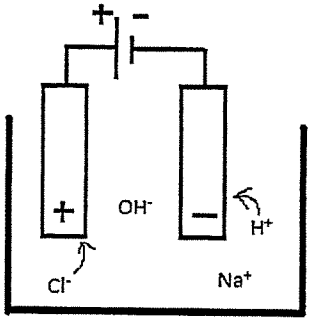


In molten compounds, a positive and negative ion is present.
The metal ion is produced at the negative electrode.
The non-metal ion is produced at the positive electrode.

HT ONLY: You can display what is happening at each electrode using half-equations:
Eg At the negative electrode (cathode): $Pb^{2+} + 2e^- \rightarrow Pb$
Eg At the positive electrode (anode): $2Br^- \rightarrow Br_2 + 2e^-$

USES: Metals can be extracted from molten compounds using electrolysis.
This process is used when the metal is too reactive to be extracted by reduction with carbon.
The process is expensive due to large amounts of energy needed to produce the electrical current. Example: aluminium is extracted in this way.

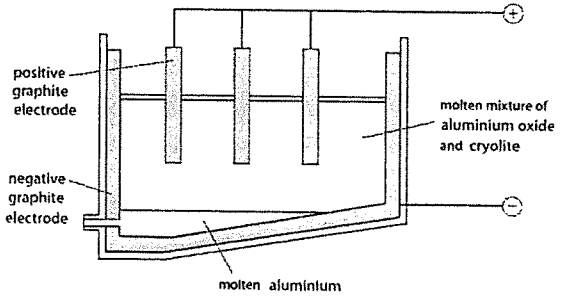
11. ELECTROLYSIS OF AQUEOUS COMPOUNDS



In aqueous compounds (dissolved in water), you have two positive ions and two negative ions present.
Metal will be produced at the negative electrode if it is less reactive than hydrogen.
Hydrogen will be produced at the negative electrode if the metal is more reactive than hydrogen.
If you have a halide ion (Cl^-, I^-, Br^-) then you will get chlorine, bromine or iodine formed at the positive electrode. If a halide ion is not present, oxygen is formed at the positive electrode.

HT ONLY: You can display what is happening at each electrode using half-equations:
Eg At the negative electrode (cathode): $2H^+ + 2e^- \rightarrow H_2$
Eg At the positive electrode (anode): $2Cl^- \rightarrow Cl_2 + 2e^-$

12. ELECTROLYSIS OF ALUMINIUM OXIDE



Aluminium oxide is mixed with cryolite to lower its melting point.

Molten aluminium is formed at the negative electrode because the Al^{3+} ions are attracted to the negative electrode.

Oxygen is formed at the positive electrode because O^{2-} ions are attracted to the positive electrode.
The positive electrodes have to be replaced regularly as the oxygen reacts with the carbon (in graphite) to form carbon dioxide which is released into the atmosphere.

HT ONLY: You can display what is happening at each electrode using half-equations:
At the negative electrode (cathode): $Al^{3+} + 3e^- \rightarrow Al$
Eg At the positive electrode (anode): $2O^{2-} \rightarrow O_2 + 4e^-$

GCSE Trilogy Knowledge Organisers – P4 Atomic Structure / Radioactivity

1

Structure of an Atom

The nuclear model of the atom consists of a nucleus containing protons and neutrons. Electrons orbit in shells around the nucleus.

Protons + Neutrons = 7

Protons = 3

$^{7}_{3}Li$

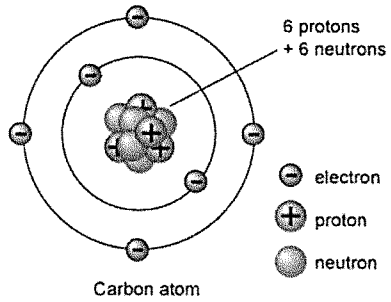
3 Protons, 4 Neutrons, 3 Electrons

2

Useful Definitions

Radioisotope: An atom with an unstable nucleus.
Radioactive Decay: A radioisotope emitting radiation from its nucleus.
Radioactivity is a random process: We can't predict when the next decay will happen.
Radioactive decay produces nuclear radiation – radiation emitted from the nucleus.
The nuclear radiation emitted may be an alpha particle, beta particle, gamma ray or a neutron. Neutron radiation: the release of a high-speed neutron from the nucleus.
Alpha particles: A helium nucleus made up of 2 protons and 2 neutrons.
Beta particles: A neutron in the nucleus emits an electron and becomes a proton.
Gamma rays: Emitted from a nucleus. These are very high-energy electromagnetic waves. They have no charge and no mass.

Atom: Structure



Carbon atom

3

Isotopes

Isotopes of an element have the same number of protons, but different numbers of neutrons.

Electrons

If electrons gain energy, they can move further from the nucleus. They can return to their original level by emitting electromagnetic radiation.

4

Properties of Radiation

Type of Radiation	Ionising Power	Penetrating Power	Absorbed by
Alpha (α)	Most	Least	Paper, skin, a few cm of air
Beta (β)	Moderately	Moderately	Thin aluminium, a few m of air
Gamma (γ)	Least	Most	Thick lead, concrete

5

Nuclear Equations

Alpha decay

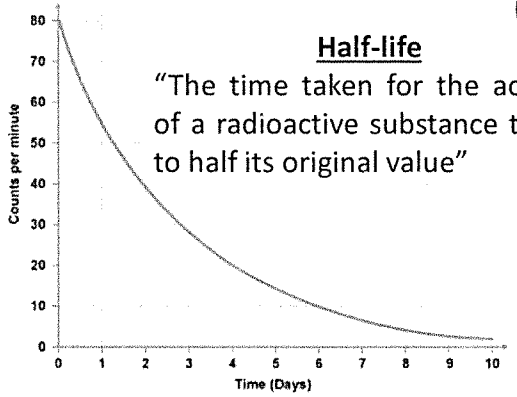
$^{4}_{2}He$

Beta Decay

$^{0}_{-1}e$

- Write in the alpha or beta particle.
- Make the top row add up.
- Make the bottom row add up.

6



Half-life

"The time taken for the activity of a radioactive substance to fall to half its original value"

7

Half-life (Higher Tier)

The proportion of the original activity changes as follows:

1 half life = 1/2
2 half lives = 1/4
3 half lives = 1/8

To calculate the proportion remaining after x half lives: $1/2^{x}$

8

Uses of Ionising Radiation in Medicine

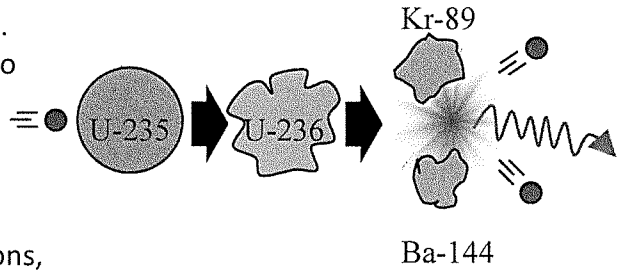
- X-rays are used to check for broken bones.
- Medical Tracers are injected and travel round the body in the blood.
- Radiotherapy is the use of gamma rays to kill cancer cells.

Any additional exposure to ionising radiation increase the risk of cancer, but the benefits of these treatments outweigh the risks.

Nuclear Fission

9

- A **large**, unstable nucleus absorbs a neutron.
- It becomes more unstable and splits into two **smaller nuclei**
- This releases **energy**
- Additional **neutrons** are released.



The additional neutrons can lead to more fissions, this is a **chain reaction**.

10

Hazards of Radiation

Ionising Radiation

Damages cells which leads to mutations. This can cause cells to become cancerous.

Contamination:

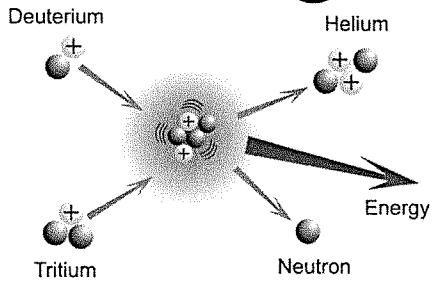
Radioactive materials on or in the body. This causes exposure to radiation over a long period of time until the materials are removed.
Contamination can be prevented by the use of safety clothing and equipment.

Irradiation:

Exposure to radiation. This only happens when you are near a radioactive source and stops when you move away from it.
Irradiation can be reduced by shielding (see table on previous page) and protective clothing.

Nuclear Fusion

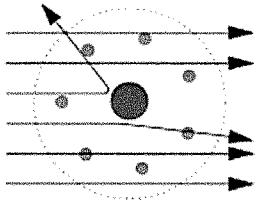
11



Nuclear fusion is the joining of **small, light nuclei** to form **a heavier nucleus**. Fusion is the energy source for stars. So far we have not yet been able to produce the **temperature** and **pressure** conditions required for fusion to occur on Earth.

12

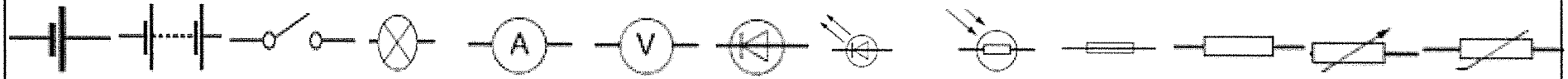
Rutherford's Alpha Particle Scattering Experiment



Rutherford aimed a beam of alpha particles at a thin sheet of gold foil.

- Most of the particles passed straight through showing most of the atom was empty space,
- Some were deflected showing mass and charge were concentrated in the nucleus.
- Very few were deflected by large amounts, showing the nucleus was very small in comparison to the atom.
- This provided **new evidence** in support of the **nuclear model** – the **Plum Pudding** model was rejected.

1. Circuit Symbols



Cell	Battery	Switch	Lamp	Ammeter	Voltmeter	Diode	LED	LDR	Fuse	Resistor	Variable resistor	Thermistor
Store of chemical energy	Two or more cells in series	Breaks circuit, stopping current	Lights when current flows	Measures current	Measures potential difference	Current flows one way	Emits light when current flows	Resistance low in bright light	Melts when current is too high	Affects the size of current flowing	Allows current to be varied	Resistance low at high temp

2. Circuits Definitions & Units

Current (Amps - A)– Rate of flow of charge

Potential Difference (Volts - V)– Energy used by a cell

Resistance (Ohms - Ω)– Opposition to current

Charge (Coulombs - C) – Work is done when charge flows

3. Equations to Learn

Potential Difference = Current x Resistance

Charge Flow = Current x Time

In series circuits: $R_{total} = R_1 + R_2$

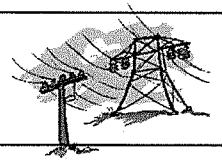
Power = Potential Difference x Current

Power = $(Current)^2$ x Resistance

Energy = Power x Time

Energy Transferred = Charge flow x Potential Difference

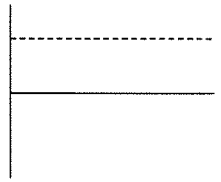
Physics 2 - Electricity



4. AC/DC

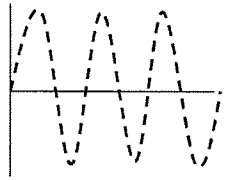
DC: Direct Current

This is current that only flows in one direction.



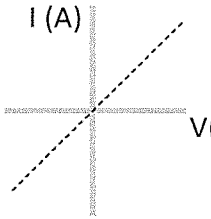
AC: Alternating Current

This is current that constantly switches direction



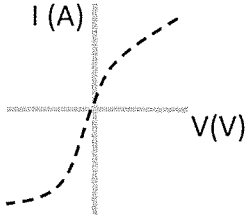
5. Ohm's Law and I-V Graphs

"Current is directly proportional to voltage"



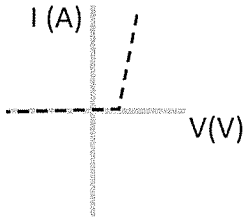
- Straight Line
- Through Origin

6. Non-Ohmic Conductors



As temperature increases, resistance increases

Filament Lamp

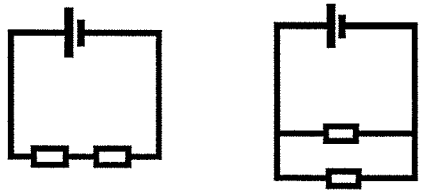


Resistance is very high in one direction

Diode

7. Circuit Rules

Series vs. Parallel



Current

Series – The same in every part of the circuit

Parallel – Split between the branches

Potential Difference

Series – Shared between components

Parallel – The same in each branch

Resistance

Series – Add up all resistances to get the total

Parallel – Resistance decreases when another branch is added. The current has another path to flow through.

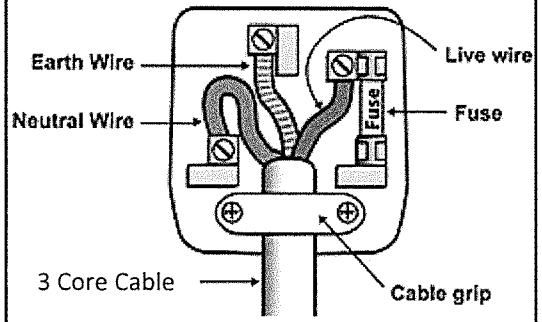
8. Domestic Electricity

UK Mains is:

AC – 50 Hz

230 V

Plugs



Live (Brown) 230V: Carries the current into the appliance.

Neutral (Blue) 0V: Completes the circuit – provides a route for the current to flow out of the appliance.

Earth (Green) 0V: Carries the current safely to Earth if there is a fault in the appliance

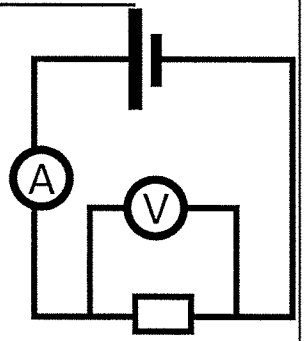
Fuse: Melts if the current gets too high – protects the circuit.

9. Dangers of Electricity

(3 Marks)

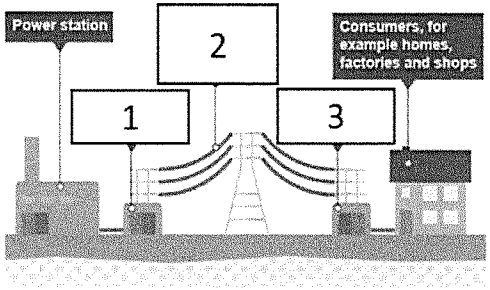
If there is a potential difference between a person and a conductor,
a current will flow through the conductor
into the Earth

10. Measuring Resistance



Connect the circuit as shown. The ammeter must be connected in series and the voltmeter in parallel.
Connect your crocodile clips so that the length of wire you are testing is 10cm long.
Turn on your power pack, note the ammeter and voltmeter readings in the table, AND IMMEDIATELY TURN OFF THE POWER PACK.
Move your crocodile clips, so the next length of wire you are testing is 20cm long.
Repeat step 3 and increase the length of your wire by 10cm each time, making sure you turn the power pack off when you are not using it.
At each length, record the values on the ammeter and voltmeter
Calculate and record the resistance for each length of wire using the equation:

resistance in Ω = potential difference in V / current in A



1.Step up transformer	Increase the voltage of the AC
2.High voltage transmission cables	High voltage reduces energy loss
3.Step down transformer	Decreases the voltage of the AC

11. National Grid

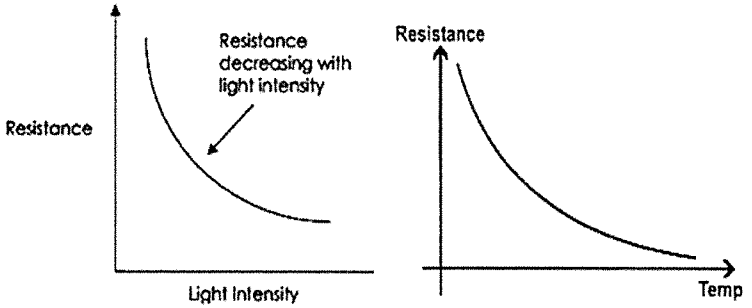
A system of cables and transformers linking power stations to consumers.

Step-Up Transformer

Increase voltage to reduce current. Less energy is lost as heat. This is more efficient.

Step-Down Transformer

Reduces voltage to make it safe for domestic use.



8. NAMING SALTS: Salt name is dependent upon the acid used
Hydrochloric acid → chloride
Sulphuric acid → sulphate
Nitric acid → nitrate

9. ELECTROLYSIS

DEFINITIONS:

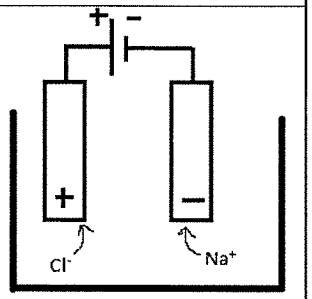
Electrolysis- Splitting a compound using electricity
Anode - Positive electrode
Cathode- Negative electrode
Cations- Positive ions, attracted to the cathode
Anions- Negative ions, attracted to the anode
Electrolyte- solution containing ions that move

Positive
Anode
Negative
Is
Cathode

PROCESS:

Passing an electric current though an electrolyte causes the ions to move to the electrodes.
E.g. In the electrolysis of molten lead bromide, lead is produced at the negative electrode and bromine is produced at the positive electrode.

10. ELECTROLYSIS OF MOLTEN COMPOUNDS

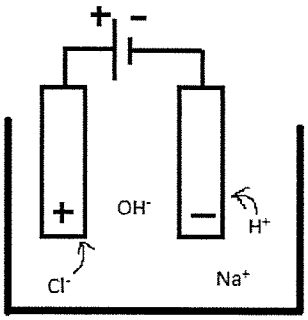


In molten compounds, a positive and negative ion is present.
The metal ion is produced at the negative electrode.
The non-metal ion is produced at the positive electrode.

HT ONLY: You can display what is happening at each electrode using half-equations:
Eg At the negative electrode (cathode): $Pb^{2+} + 2e^- \rightarrow Pb$
Eg At the positive electrode (anode): $2Br^- \rightarrow Br_2 + 2e^-$

USES: Metals can be extracted from molten compounds using electrolysis.
This process is used when the metal is too reactive to be extracted by reduction with carbon.
The process is expensive due to large amounts of energy needed to produce the electrical current. Example: aluminium is extracted in this way.

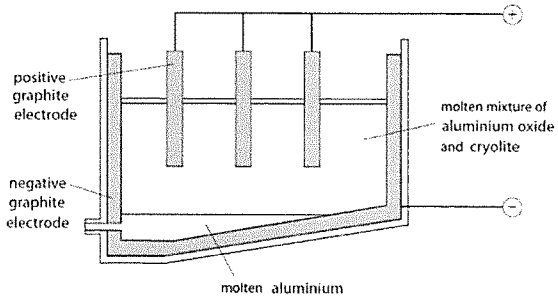
11. ELECTROLYSIS OF AQUEOUS COMPOUNDS



In aqueous compounds (dissolved in water), you have two positive ions and two negative ions present.
Metal will be produced at the negative electrode if it is less reactive than hydrogen.
Hydrogen will be produced at the negative electrode if the metal is more reactive than hydrogen.
If you have a halide ion (Cl^-, I^-, Br^-) then you will get chlorine, bromine or iodine formed at the positive electrode. If a halide ion is not present, oxygen is formed at the positive electrode.

HT ONLY: You can display what is happening at each electrode using half-equations:
Eg At the negative electrode (cathode): $2H^+ + 2e^- \rightarrow H_2$
Eg At the positive electrode (anode): $2Cl^- \rightarrow Cl_2 + 2e^-$

12. ELECTROLYSIS OF ALUMINIUM OXIDE



Aluminium oxide is mixed with cryolite to lower its melting point.

Molten aluminium is formed at the negative electrode because the Al^{3+} ions are attracted to the negative electrode.

Oxygen is formed at the positive electrode because O^{2-} ions are attracted to the positive electrode.
The positive electrodes have to be replaced regularly as the oxygen reacts with the carbon (in graphite) to form carbon dioxide which is released into the atmosphere.

HT ONLY: You can display what is happening at each electrode using half-equations:
At the negative electrode (cathode): $Al^{3+} + 3e^- \rightarrow Al$
Eg At the positive electrode (anode): $2O^{2-} \rightarrow O_2 + 4e^-$

C4 Knowledge Organiser

1. METAL OXIDES

Metal + oxygen → metal oxide
Eg sodium + oxygen → sodium oxide
The reaction are **oxidation** reactions because the metals gain oxygen.

2. REACTIVITY SERIES

The reactivity of a metal is related to its tendency to form positive ions
Carbon and hydrogen are non-metals but are included in the reactivity series as they can be used to extract some metals from their ores

Displacement reactions:
A more reactive metal can displace a less reactive metal from a compound, for example:

Silver nitrate	+ sodium chloride	→ sodium nitrate	+ silver chloride

Higher Tier Only:
Ionic equation: A balanced **ionic equation** shows the reacting **ions** in a chemical reaction.
Balanced symbol equation: $Mg + CuSO_4 \rightarrow MgSO_4 + Cu$
Ionic equation: $Mg + Cu^{2+} + SO_4^{2-} \rightarrow Mg^{2+} + SO_4^{2-} + Cu$

3. EXTRACTION OF METALS:

Metals less reactive than carbon can be extracted from their oxides by reduction with carbon. E.g. Copper Oxide + Carbon → Copper + Carbon Dioxide
Reduction involves the loss of oxygen

4. OXIDATION & REDUCTION:

OIL RIG:
Oxidation Is **L**oss (of electrons) Reduction Is Gain (of electrons

Half equation: A type of symbol equation which shows how individual ions or atoms gain or lose electrons

5. REACTIONS OF ACIDS

DEFINITIONS:
Acid- Produce hydrogen ions (H^+) in aqueous solutions.
Alkali- A soluble base- Aqueous solutions of alkalis contain hydroxide ions (OH^-).
Base- substance that neutralises an acid - insoluble metal oxides or metal hydroxides
(HT): Strong acid- Completely ionised in aqueous solutions e.g. hydrochloric, nitric and sulphuric acids.
(HT): Weak acid- Only partially ionised in aqueous solutions e.g. ethanoic acid, citric acid

6. REACTIONS OF METALS & ACIDS

Metal + Acid → Salt + Hydrogen
Magnesium + Hydrochloric Acid → Magnesium Chloride + Hydrogen

(HT) Reactions between metals and acids are redox reactions as the metal donates electrons to the hydrogen ions. This displaces hydrogen as a gas while the metal ions are left in the solution.

7. PH SCALE & NEUTRALISATION REACTIONS

You can use universal indicator or a pH probe to measure the acidity or alkalinity of a solution against the pH scale.
Acids = Have a pH 1-6
Neutral solutions have a pH of 7
Alkalis = Have a pH of 8-14
In neutralisation reactions, hydrogen ions react with hydroxide ions to produce water:
$H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$
Alkali + Acid → Salt + Water
Sodium hydroxide + Hydrochloric Acid → Sodium Chloride + Water
Calcium Carbonate + Sulphuric Acid → Calcium Sulphate + Water + Carbon Dioxide

7. MAKING SOLUBLE SALTS – REQUIRED PRACTICAL

Soluble salts can be made from reacting acids with solid insoluble substances (e.g. metals, metal oxides, hydroxides and carbonates).

1. Add the solid to the acid until it is in excess.
2. Filter off excess solid.
3. Heat solution up on a Bunsen burner to increase the concentration of the salt.
4. Allow to crystallise to produce solid salts by placing on window sill for 24 hours.

Half term 1 Tense consolidation / House and home

Quiz 1.1 – Mixed tenses

Ich spiele, er spielt, wir spielen	I play, he plays, we play
Man **kann** Fussball spielen	One can play football
Ich **habe** Fussball **gespielt**	I have played football
Letztes Wochenende **habe** ich Pommes **gegessen**	Last weekend I ate chips
Ich bin mit meiiner Familie in die Stadt gefahren	I travelled into town with m y family
Ich werde Spezi trinken	I will drink Spezi
In der Zukunft werde ich heiraten	In the future I will get married

Quiz 1.2 – House and location

I live in a suburb of a city	Ich wohne in einem *Vorort* einer *Großstadt*
My home is on the outskirts	*Mein Wohnort* ist am *Stadtrand*
He lives in a semi-detached house in the town centre	Er wohnt in einem Doppelhaus in der *Stadtmitte*
My house has a lot of rooms	Mein Haus hat viele *Zimmer*
There are three bedrooms	Es gibt drei Schlafzimmer
I find my house extremely cosy and comfortable	Ich finde mein Haus ganz *gemütlich* und *bequem*

Quiz 1.3 – 'wo'

I have my own room where you can read	Ich habe mein eigenes *Zimmer*, wo man lesen kann
We have a living room where you can chill out	Wir haben ein Wohnzimmer, wo man chillaxen kann
There is a garden where you can play	Es gibt einen Garten, wo man spielen kann
One finds an office, where you can work	Man findet ein Büro, wo man arbeiten kann
We have a dining room, where you can eat	Wir haben ein Esszimmer, wo man essen kann
There is a bathroom where you can bathe	Es gibt ein Badezimmer, wo man baden kann

Quiz 1.4 – Furniture *(Möbel)*

At my house there is a fridge and a table	*Bei mir* gibt es einen Kühlschrank und einen Tisch
In the living room one finds an armchair	Im Wohnzimmer findet man einen Sessel
At home have we a big TV	*Zu Hause* haben wir einen grossen Fernseher
In my bedroom I have a bunkbed	In meinem Schlafzimmer habe ich ein Etagenbett

Don't forget these is a list of furniture items in your vocab book.

Can you answer the following questions?

1. Beschreib ein Zimmer in deinem Haus? (Describe a room in your house)
2. Hast du ein Lieblingszimmer? Warum? (Have you got a favourite room and why?)
3. Was machst du im Wohnzimmer am Abend? (What do you do in the living room in the evening?
4. Wo ist der beste Ort, Hausaufgaben zu machen? (Where is the best place to do homework)

Parallel texts

Ich wohne mit meiner Mutter in einem Doppelhaus am *Stadtrand* in Köln. Leider wohnen meine Mutter und mein Vater nicht mehr zusammen, weil sie getrennt sind. Das Haus ist gross und *bequem* und meiner Meinung nach ist mein Haus das Beste! Wir haben viele *Zimmer*, zum Beispiel drei Schlafzimmer, eine Küche, ein Wohnzimmer und auch ein Esszimmer, wo wir Abendessen haben. Mein *Zimmer* ist super, obwohl es klein ist. Ich habe ein Bett, eine Kommode und einen Kleiderschrank. Jedoch habe ich keinen Computer. Jeden Tag helfe ich *zu Hause* und gestern habe ich mein Schlafzimmer aufgefäumt. Dann habe ich gefaulenzt, weil ich müde war. Wie hilfst du zu Hause?	I live with my Mum in a semi-detached house on the outskirts of Cologne. Unfortunately, live my Mum and my Dad no longer together, because they separated are. The house is big and comfortable and in my opinion is my house the best! We have lots of rooms for example three bedrooms, a kitchen, a living room and also a dining room, where we evening meal have. My room is super, although it small is. I have a bed, a chest of drawers and a wardrobe. However, have I no computer. Every day help I at home and yesterday I tidied my bedroom. Then I lazed around, because I tidy was. How help you at home?

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Key skills

1. To use accurate present tense
2. To revise the past tense with haben and sein
3. To revise future tense with correct word order
4. To use subordinating conjunction 'wo' with accurate work order
5. To recognise all and use some prepositions

Prepositions

auf	on	zwischen between
an	on	
n	in	
über	over	
unter	under	
vor	in front of	
hinter	behind	

Half Term 2 – Town and local area

Quiz 2.1 – Places in town

In my town there is a school	In meiner Stadt gibt es eine Schule
One finds a tourist info office	Man findet ein Verkehrsamt
Furthermore there are many old buildings	**Ausserdem** gibt es viele alte Gebäude
Unfortunately we have no train station	Leider haben wir keinen Bahnhof
There are good entertainment opportunities	Es gibt gute Unterhaltungsmöglichkeiten
When the weather is good, I go to the park	**Wenn** das Wetter gut ist, gehe ich zum Park

Quiz 2.2 – Adjectives / opinions

It is unbelievably quiet	Es ist unglaublich ruhig
The town centre is beautiful and clean	Die Stadtmitte ist schön und sauber
Unfortunately there is an ugly cathedral	Leider gibt es einen hässlichen Dom
In my town there is not a lot to do	In meiner Stadt gibt es nicht viel zu tun
The public transport is expensive	Die öffentliche Verkehrsmittel ist teuer
I would like to have a beach. That would be great.	Ich möchte einen Strand haben. Das wäre toll!

Quiz 2.3 – 'wo' man kann

In my town there is a café where one can eat	In meiner Stadt gibt es ein Café, wo man essen kann
One finds shops where one can buy clothes	Man findet Geschäfte, wo man Klamotten kaufen kann
Furthermore there is a cinema where one can see films	Ausserdem gibt es ein Kino, wo man Filme sehen kann
Here one finds a park where one can play	Hier findet man einen Park, wo man spielen kann
In my town one can shop well	In meiner Stadt kann man gut einkaufen

Quiz 2.4 – Using high level language in your work – DIV WAZ DUM JO T

daher	therefore **(v2)**	um...zu	in order to...
ich denke, daß	I think that **(vs)**	meiner Meinung nach	in my opinion **(v2)**
vielleicht	perhaps **(v2)**	jedoch	however **(v2)**
weil/ wenn	because/if **(vs)**	obwohl	although **(vs)**
außerdem	in addition **(v2)**	trotzdem	nevertheless **(v2)**
zum Beispiel	for example **(v2)**		
da	because **(vs)**		

Key skills

1. Recognise gender and apply to form correct adjectives
2. To develop use of 'wo' with modal verbs (man kann)
3. To use accurate 'es gibt'
4. To expand use of GCSE opinion phrases
5. To attempt to write at the higher 150-word level

Parallel texts

Ich wohne in einer kleinen Stadt in Norddeutschland. Es gibt einen berühmten Zoo und ein altes Rathaus. Daher besuchen viele Touristen die Stadt, um die Tiere zu sehen.	I live in a small town in North Germany. There is a famous zoo and an old town hall. Therefore visit lots of tourists the town, in order the animals to see.
Es gibt auch ein grosses Sportzentrum und in der Nähe gibt es eine alte Kirche und ein kleines Café. Ausserdem für junge Leute gibt es eine große Diskothek, wo man durch die Nacht tanzen kann! Was für eine Stadt!	There is also a big sport centre and nearby there is an old church and a small café. Furthermore for young people there is a big disco where one through the night dance can. What a town!
Meines Erachtens ist meine Stadt ausgezeichnet. Zum Glück wohnen meine Freunde in der Nähe und es gibt ein Café, wo wir oft treffen.	In my view is my town excellent. Luckily live my friends nearby and there is a café where we often meet.
Es gibt viel los in meiner Stadt aber wenn ich die Wahl hätte, würde ich im Ausland wohnen, weil wir keinen Strand haben.	There is a lot to do in my town but if I the choice had, would I abroad live, because we no beach have.

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Es gibt viel los in meiner Stadt aber wenn ich die Wahl hätte, würde ich im Ausland wohnen, weil wir keinen Strand haben.	There is a lot to do in my town but if I the choice had, would I abroad live, because we no beach have.

Year 10 French Half-Term 1 – Home, Town, Neighbourhood and Region part 1

Quiz 1.1 – Where you live

j'habite I live	**dans un appartement** in an apartment / flat	**et c'est situé(e)** and it's situated	**en ville / en centre-ville** in town / town centre
il habite he lives	**dans une maison individuelle** in a detached house		**en banlieue** in the suburbs (outskirts of town)
			dans un village / un immeuble in a village / a block of flats
elle habite she lives	**dans une maison jumélée** in a semi-detached house	**qui se trouve** which is located	**dans un quartier résidentiel** In a residential area
nous habitons we live	**dans une maison mitoyenne** in a terraced house		**à la campagne / montagne** in the countryside / mountains
ils habitent they live	**dans un pavillon** in a bungalow		**au bord de la mer** by the sea

Quiz 1.2 – rooms in the house and basic structure

There are lots of **rooms** in my house	Il y a beaucoup de **pièces** dans ma maison
On the ground floor, there is a kitchen modern	**Au rez-de-chaussée,** il y a une cuisine moderne
The living room is situated **next to** the dining room	Le salon/La salle de séjour est située **à côté de** la salle à manger
On the first floor, we have three bedrooms	**Au premier étage**, nous avons trois chambres
My bedroom is **opposite*** the study/office	Ma chambre est **en face du*** bureau
There is also an attic **spacious** and a **small** garden	il y a aussi un grenier **spacieux (m)** et un **petit** jardin
There isn't a cellar	**il n'y pas de** cave

* When prepositions have 'de' in them, they change depending on the gender of the room:

(m) le grenier → en face **du** grenier **(f) la** chambre → en face **de la** chambre **(pl) les** pièces → en face **des** pièces

Quiz 1.3 – ideal house

My ideal house **would be situated** by the sea	Ma maison idéale **se situerait** au bord de la mer
My ideal house **would be** big	Ma maison idéale **serait** grand
My ideal house **would have** a swimming pool	Ma maison idéale **aurait** une piscine
There would be a cinema	**il y aurait** un cinéma
There wouldn't be an office	**il n'y aurait pas de** bureau
I would like to have a balcony	**J'aimerais avoir** un balcon
In the future **I would like to live** in the town-centre	À l'avenir **je voudrais habiter en centre**-ville

Example 90 word task: Vous écrivez un article au sujet de votre maison. Décrivez:

- votre maison et vos opinions
- votre pièce preférée
- ce que vous avez fait la semaine dernière à la maison
- votre maison idéale

I live in a big house detached with four bedrooms, a kitchen, a living room, a dining room and three bathrooms. According to **me**, my house is **pretty**.	J'habite une grande maison individuelle avec quatre chambres, une cuisine, un salon, une salle à manger et trois salles de bains. **Selon moi**, ma maison est **jolie**.
My favourite room is my room because she is calm and cosy. I have my **own** room and **I like it** because I have my bed, a computer and lots of books – I love to read on my bed.	**Ma pièce préférée** c'est ma chambre, car elle est tranquille et douillette. J'ai ma propbre chambre et **je l'aime** parce que j'ai mon lit, un ordinateur et beaucoup de livres – j'adore lire sur mon lit.
Last week I watched a film of action on the TV and in my opinion, it was **a bit** boring. **I would have preferred** to play football because I like to play football in the garden with my sister.	La semaine dernière j'ai regardé un film d'action à la télé et à mon avis, c'était **un peu** barbant. **J'aurais préféré** jouer au foot car j'aime jouer au foot dans le jardin avec ma sœur.
In the future I would like to live in an apartment modern in London with a balcony. That would be **incredible**.	A l'avenir, j'aimerais habiter dans un appartement moderne à Londres avec un balcon. Ça serait **incroyable**.

Example 150 word task: Vous écrivez un article sur une maison française que vous avez visitée pour un magazine français.
Décrivez :

- la maison en détail
- les différences entre cette maison française et une maison typiquement britannique ou votre maison.

Last month, I visited the house of my friend who lives in St Tropez. The house was very big and there was a garden enormous with a swimming pool. **I believe that** my friend is very rich because there were lots of rooms! **On the ground floor**, there were two living rooms, a big kitchen modern, a bathroom and a dining room with a table for eight or even ten people. It was incredible. **On the first floor**, there were **around** five bedrooms, but one of the bedrooms was an office. In addition, there were three bathrooms and each room had a balcony with a view whether of the garden, whether of the sea. **At mine**, it's very different. Unfortunately, we **only** have three bedrooms in my house and one bathroom for the whole family. Our garden is not big and we don't have a pool. However, **although** I love my house and that she is very comfortable, I would prefer to live in the house of my friend French!	**Le mois dernier**, j'ai visité la maison de mon copain qui habite à St Tropez. La maison était très grande et il y avait un jardin énorme avec une piscine. **Je crois que** mon ami est très riche car il y avait beaucoup de pièces! **Au rez-de-chaussée**, il y avait deux salons, une grande cuisine moderne, une salle de bains et une salle à manger avec une table pour huit ou même dix personnes. C'était incroyable. **Au premier étage**, il y avait **environ** cinq chambres, mais une des chambres était un bureau. De plus, il y avait trois salles de bains et chaque chambre avait un balcon avec vue soit sur le jardin, soit sur la mer. Chez **moi**, c'est très différent. Malheureusement, nous **n'**avons **que** trois chambres dans ma maison, et une salle de bains pour toute la famille. **Notre** jardin n'est pas grand, et nous n'avons pas de piscine. Cependant, **bien que** j'adore ma maison et qu'elle **soit*** très confortable, je préférerais habiter dans la maison de mon ami français !

* bien que uses the subjunctive, so instead of writing **est**, we need to write **soit**.

Year 10 French Half-Term 2 – Home, Town, Neighbourhood and Region part 2

Quiz 2.1 – Places in town

In my town, there are **lots of** shops	Dans ma ville, il y a **beaucoup de** magasins
There is a supermarket	il y a un supermarché
Unfortunately there isn't a museum	**Malheureusement**, il n'y a pas de musée*
You'll find a library **near to** the bakery	On trouve une bibliothèque **près de** la boulangerie
You won't find a police station	On ne trouve pas de commissariat*

* when saying what there **isn't** in town, you need to **get rid of** the **un / une** in front of the place

Quiz 2.2 – Activities you can do in town

Where you can **relax**	Où on peut **se relaxer/se reposer/se détendre**
Where you can **spend time with family**	Où on peut **passer du temps en famille**
You cannot **visit the museum**	On ne peut pas **visiter le musée**
It is possible to **meet friends** in the park	il est possible de **retrouver les copains/amis** dans le parc
In my opinion it's **really/so** practical/lively	À mon avis, c'est **vraiment/tellement** pratique/animé.

Quiz 2.3 – Photo card phrases for town

On the photo, there is a group of four people	Sur la photo, il y a un groupe de quatre personnes
I can see some houses (Higher)	je peux voir des maisons
They are inside a market **perhaps** in town	ils sont dans un marché **peut-être** en ville
They are **happys** because **they buy** food	ils sont **contents** car **ils achètent** de la nourriture
They are **in the process of** choosing food (Higher)	ils sont **en train de** choisir de la nourriture
It's a nice atmosphere because there is sunshine	C'est une belle ambiance car il y a du soleil
They wear a jean and a t-shirt	ils portent un jean et un t-shirt
I would say that the photo is interesting because I love shopping	**je dirais que** la photo est intéressante car j'adore le shopping

Quiz 2.4 – past tense activities you did in town

Last week I went to the stadium	La semaine dernière, je suis allée au stade
I saw a football match	**J'ai vu** un match de foot
I **met** my friends	**J'ai retrouvé** mes copains
We bought clothes	**Nous avons acheté** des vêtements
We watched a show at the theatre	**Nous avons regardé** un spectacle au théâtre
I did nothing	je n'ai rien fait
I wanted to eat in a restaurant	**j'ai voulu** manger* dans un restaurant
instead of going out I stayed at home	**au lieu de sortir***, je suis restée à la maison

* after using **j'ai voulu** and **au lieu de**, you need to use a full verb

j'ai voulu regarder / sortir / écouter / faire

au lieu de regarder / sortir / écouter etc...

Example 90 word task: Vous écrivez un blog au sujet de votre ville et votre région. Décrivez:

- les attractions pour les touristes dans votre ville
- les inconvénients de votre ville
- ce que vous avez fait récemment dans votre ville
- où vous aimeriez habiter à l'avenir

Remember to score top marks on a 90 worder you must include at least 2 opinions in the whole task

For tourists there are a lot of things to visit. There is a big park of course and monuments historical, **including** a museum **which** is very interesting. Unfortunately, **as** there isn't a centre shopping, **one must** visit the shops individuals in town. You won't find an ice rink, **therefore** you can't do ice skating. Recently, I went to town **where** I met my friends and **then** we have watched a film of adventure **together**. After having done that, we ate in a restaurant and **according to me**, it was **really** delicious. In the future I will live in a beautiful house in the suburbs where **there will be** lots of attractions. **That will be** magnificent.	Pour les touristes il y a beaucoup de choses à visiter. Il y a un grand parc bien sûr et des monuments historiques, **y compris** un musée **qui** est très intéressant. Malheureusement, **comme** il n'y a pas de centre commercial, **il faut** visiter les magasins individuels en ville. On ne trouve pas de patinoire, **donc** on ne peut pas faire du patin à glace. Récemment je suis allée en ville **où** j'ai retrouvé mes copains et **puis** nous avons regardé un film d'aventure **ensemble**. Après avoir fait cela, nous avons mangé au restaurant et **selon moi**, c'etait **vraiment** délicieux. À l'avenir je vais habiter dans une belle maison en banlieue où **il y aura** beaucoup d'attractions. **Ça sera** magnifique.

Example 150 word task: Vous écrivez un article au sujet de votre région: Décrivez:

- les avantages de votre région pour les touristes
- une visite spéciale dans votre région

Remember to score top marks on a 150 worder you must include at least 2 opinions and explain both of them for top marks

I live in Nottingham in the centre of England. Nottingham is a big town very commercial and quite touristy. **As for** things to do, you can **find** a big number of cinemas, restaurants and bars. If you like doing shopping, we have a big centre shopping with **a big variety of** shops. In the region **around** the town, there are **landscapes picturesques**. As far as I'm concerned, it's practical because you can do hikes. **If I were a tourist**, I would like visit the museums and I would do a tour of the town because it would be **so** interesting. Last weekend, I went to a restaurant in town with my friends for my birthday. We ate chicken which was delicious and **one served me** a big cake of chocolate. After the restaurant, we went to the cinema to watch the latest film of James Bond. **It pleased me a lot** because **I liked** the story and the special effects.	J'habite à Nottingham, dans le centre de l'Angleterre. Nottingham est une grande ville très commerciale et assez touristique. **Comme** distractions, on peut **trouver** un grand nombre de cinémas, de restaurants et de bars. Si vous aimez faire les courses, nous avons un grand centre commercial avec **une grande variété de** magasins. Dans la région **autour de** la ville, il y a **des paysages pittoresques**. En ce qui me concerne, c'est pratique vu qu'on peut faire des randonnées. **Si j'étais touriste**, j'aimerais visiter les musées et je voudrais faire une tour de la ville étant donné que ça serait **tellement** intéressant. Le week-end dernier, je suis allé au restaurant en ville avec mes amis pour mon anniversaire. Nous avons mangé du poulet qui était délicieux et **on m'a servi** un gros gâteau au chocolat. Après le restaurant, nous sommes allés au cinéma pour regarder le dernier film de James Bond. **Ça m'a beaucoup plu** parce que **j'ai aimé** l'histoire et les effets spéciaux.

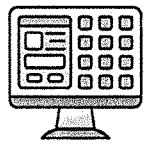
1.5.1 System Software – Operating Systems

The purpose and functionality of operating systems:

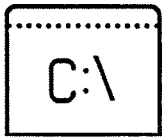
- ❑ User interface
- ❑ Memory management and multitasking
- ❑ Peripheral management and drivers
- ❑ User management
- ❑ File management

	COMMAND LINE INTERFACE	GUI
Ease of use	✗	✓
Flexibility	✓	✗
Heavy use of system resources	✗	✓

OPERATING SYSTEMS act as an interface between the user and the computer hardware.
Operating systems have three main types of interface;
COMMAND LINE INTERFACE (which uses text based commands) **GRAPHICAL USER INTERFACE** (which uses icons and pointers) and **VOICE INPUT** (allows voice to control the device)



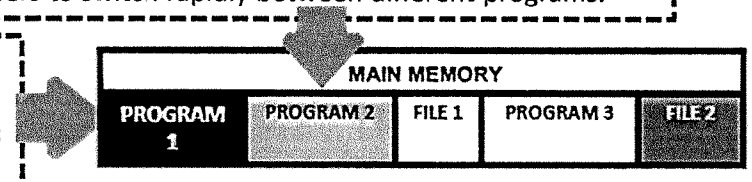
GUI



USER MANAGEMENT
Operating Systems enable different users to log onto a computer and settings for the individual can be retained.
A network administrator can allocate accounts to users and set access rights for different users in the network.
This enables security to be managed.

MEMORY MANAGEMENT
One of the most important roles of the OS is MEMORY MANAGEMENT and MULTITASKING.
Multitasking allows multiple files and programs to be resident in memory at one time. This allows users to switch rapidly between different programs.

A computer's memory is organised into "**blocks**". The OS moves programs and files in and out of main memory as and when they are needed.



PERIPHERAL MANAGEMENT
Operating Systems manage the way in which hardware interacts with software.
A **peripheral** is a piece of hardware that is not directly connected to the CPU – such as a keyboard, a mouse or even a hard disk drive.
An Operating System managed all of the peripheral devices that are connected to the computer – this allows them to be disabled, or **drivers** be updated.

DRIVERS
A piece of software used to control a piece of hardware.
Drivers allow a peripheral device to be connected to a computer and it be used by an Operating System.
You may get drivers for graphics cards, mouse, sound card, network interface cards.
Drivers are OS specific and are regularly updated by companies

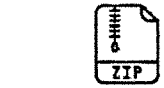
FILE MANAGEMENT
Like memory management, the Operating System must identify where files are stored for long term storage on for e.g. the hard disk drive or a solid state drive.

- The user does not need to know the specific track, sector and surface address – but the Operating System does in order to accurately locate a file on the hard disk drive.

Features e.g.

- Naming of files
- Allocating to folders
- Creating, moving, copying, modifying and deleting files
- Searching for files.

1.5.2 System Software – Utility Software



The purpose and functionality of utility software

Utility system software:

- ❑ Encryption software
- ❑ Defragmentation
- ❑ Data compression

UTILITY SOFTWARE

Utility system software helps to maintain or configure a computer. Many useful utilities are installed along with the operating system, but extra utility software can be installed to perform additional tasks.

- Utility programs are designed to do just one or two tasks.
- Utility software interacts with the computers hardware E.g. the Disk Drive.
- Utility programs are inbuilt in to the Operating System.

DATA COMPRESSION utilities can be used to reduce the size of a file. This is useful when sending files electronically.

Files compressed with this type of software need to have their contents extracted (using the same utility) before they can be used again.

Reducing the size of the file by performing an algorithm on the original data. There are two main types of compression:

- **Lossless**
  - The original file can be re-created as no data is lost.
- **Lossy**
  - Some of the original data is lost and the original file can not be re-created.

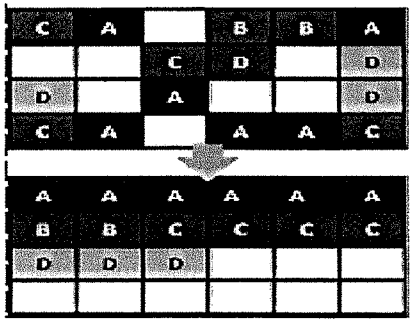
DEFRAGMENTATION SOFTWARE

When a hard disk drive is new – files get added onto the disk in order – very much like starting with a blank piece of paper and adding to it

- As files are deleted – this leaves gaps
- When new files are saved – the files fill the gaps and become fragmented
- This can slow the system down as the files need to be accessed from different areas
- Defragmentation software groups fragmented files back together

How it works –

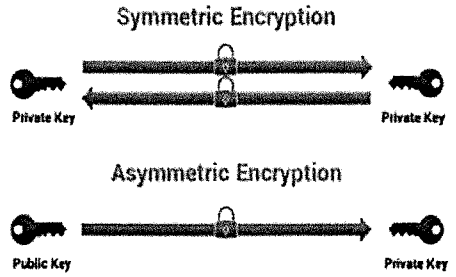
- The parts of the files are moved on the hard disk are moved so that they are stored consecutively
- All the free space is moved so that its al together making it easier for storing data later.
- Once defragmented the files can be accessed easier and the different parts of the file are all together.

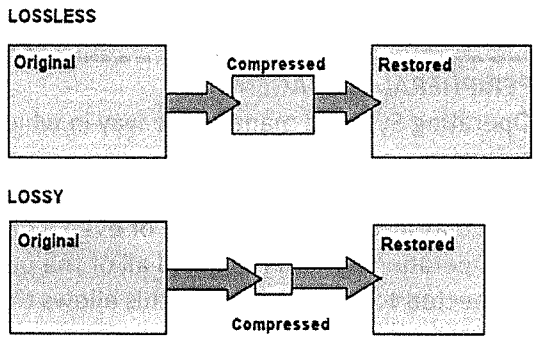


REVISION NOTE
SSDs do not need to be defragmented since electrical storage works differently to magnetic

ENCRYPTION SOFTWARE uses **ALGORITHMS** to turn **PLAINTEXT** files into **CIPHERTEXT**. This means that the contents of an encrypted file cannot be read without the use of the **KEY** that was used to encrypt it.

There are two **types of encryption** in widespread use today: symmetric and asymmetric **encryption**. The name derives from whether or not the same key is used for **encryption** and decryption.





1.6.1 Ethical, Legal, and Environmental Impact

Impacts of digital technology on wider society including:

- ❑ Ethical issues
- ❑ Legal issues
- ❑ Cultural issues
- ❑ Environmental issues
- ❑ Privacy issues

Legislation relevant to Computer Science:

- ❑ The Data Protection Act 2018
- ❑ Computer Misuse Act 1990
- ❑ Copyright Designs and Patents Act 1988
- ❑ Software licences (i.e. open source and proprietary)

REVISION NOTE
You need to be bale to talk about each of these in detail, considering both advantages and disadvantages of each

ETHICS= Our principles, the things that influence our choices and behaviours
CULTURE = Our way of life, including customs and beliefs

ETHICAL IMPACT

NEWS
✓ Lots of up-to-date news sources
✗ Which are real, which are "fake news"?

PRIVACY ISSUES
- Do you own your own data?
- Should governments and law enforcement have complete access?
- What are COOKIES? Should you allow websites to access them?

THE RATINGS CULTURE
Easy to find, give and share opinions
People can become obsessed with how they are perceived

HEALTHCARE

✓ Use of AI to diagnose illness
✗ Poorer nations cannot afford technology

DRIVERLESS CARS
✓ Can auto-navigate and do not get tired on long journeys
✗ Will computers cause accidents?

ETHICAL ISSUES SOCIAL MEDIA

✓ Great for keeping in touch
✗ Can be used for bullying/trolling

THE COPYRIGHT DESIGNS AND PATENTS ACT 1988
An act of law designed to provide protection for creators of books, software music and video, against illegal copying, piracy and distribution.

© COPYRIGHT – material cannot be used/distributed without permission

CC CREATIVE COMMONS – material can be used without permission (though credit may need to be given)

COMPUTER MISUSE ACT 1990
There are three main principles of the Computer Misuse Act. It is an offence to:
1. access computer material without permission, e.g. looking at someone else's files
2. access computer material without permission and with intent to commit criminal offences, e.g. hacking into your bank's computer and increasing the money in your own account
3. alter computer data without permission, e.g. writing a virus to destroy someone else's data

THE 8 PRINCIPLES OF THE DATA PROTECTION ACT 2018
- ✓ Fair, lawful & transparent processing
- ✓ Purpose limitation
- ✓ Data minimisation
- ✓ Accuracy
- ✓ Data retention periods
- ✓ Data security
- ✓ Accountability

SOFTWARE LICENSES

	Open Source	Proprietary	Freeware
Is licensed	✓	✓	✓
Can be edited by users	✓	✗	✗
License is free	✓	✗	✓
Users can make and sell their own version	✓	✗	✗

2.3.2 Testing

The purpose of testing
Types of testing:
- Iterative
- Final/terminal

Identify syntax and logic errors
Selecting and using suitable test data:
- Normal
- Boundary
- Invalid/Erroneous

Refining algorithms

What is an error? An error in a program is sometimes called a Bug.
This is because Grace Hopper discovered a moth in a computer which was stopping it from functioning correctly.
Bugs cause the program to run incorrectly and are usually caused by an error in the coding.
Not all errors will stop a program from running.

The purpose of Testing is to find bugs and find them as early as possible and make sure they get fixed.
To ensure the program meets the requirements of the customer.
An important part of computer programming which involves checking a program for errors.

Runtime errors cause programs to crash even if there appears to be nothing wrong with the program code.
They are only detected once the program is executed.
Examples could be:
- running out of memory
- dividing by zero.

Final Testing – The program goes is tested once at the end of development.
Everything is tested in one go.
Iterative testing - a program is tested and then changes are made as it goes through the development cycle again. It may go through this process a few times to make sure it is exactly what the customer wants.

Syntax errors are mistakes in the way that the code is written.
Syntax break the rules of the programming language.
Translators can only execute a program if it is syntactically correct.
Common syntax errors include:
- spelling mistakes
- incorrect use of punctuation
- use of capital letters.

Logic errors: a logic error is a bug in a program that causes it to operate incorrectly.
Logic errors may not make a program terminate or crash.
Logic errors usually produce unexpected results.
Logic errors may not always be easy to spot.

```
stocklevel = input("Enter stock level")
    if stocklevel >= 5 or <= 25 then
        print(Not in demand)
else
        print(In demand)
endif
```

Logic Error
Will still run but wont give expected result

Syntax Error
will not run as rules of the language are broken

When testing the program it is important to use a range of test data:
- normal
- boundary
- invalid/erroneous

Invalid/Erroneous will cause the same error – it will be **rejected** by the program.
Normal and boundary data will be **accepted** by the program.

Normal – Data that is correct
Boundary – The minimum/maximum values of the data that could be entered for example for teenagers 13 and 19.
Invalid– Values higher or lower than the expected range, for teenagers greater than 19.
Erroneous - incorrect values that the program should not accept such as entering 'Dave' in an age field.

Refining algorithms: Now that you understand what invalid and erroneous data is, you should create programs that do not accept these values.
- Writing code which anticipates a range of possible inputs.
- Those inputs could be invalid data or erroneous data.
- Making sure "bad" data doesn't crash the program.
- Making sure prompts to the user are descriptive and helpful.
- Making sure only data of the correct "data type" are entered.
- Checking and handling missing or blank data

One common option is to use simple exception handing commands available in most languages.

2.4.1 Boolean Logic

- **Simple logic diagrams using the operators AND, OR and NOT**
- **Truth tables**
- **Combining Boolean operators using AND, OR and NOT**
- **Applying logical operators in truth tables to solve problems**

REVISION NOTE
You need to be able to draw a truth table for a given circuit. You also need to be able to represent a circuit as a Boolean expression

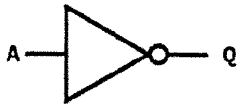
The possible values for each gate can be represented using a TRUTH TABLE.

Computers are made up of circuits containing millions of switches. There are only two possible values of these switches (**ON** or **OFF**), these values are represented using the binary values of **1** or **0**. Each circuit contains logic gates and **BOOLEAN LOGIC** is used to evaluate the results of the different combinations of 1s and 0s

There are a number of different logic gates used in logic diagrams, each of these give different results when they receive inputs (1s and 0s)
There three common ones are
AND
OR
NOT

A NOT gate has a single input – 'A'

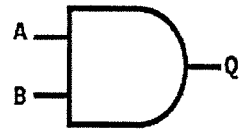
NOT gate



A	Q
0	1
1	0

An AND gate has two possible inputs – 'A' and 'B'

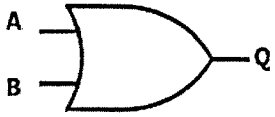
AND gate



A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

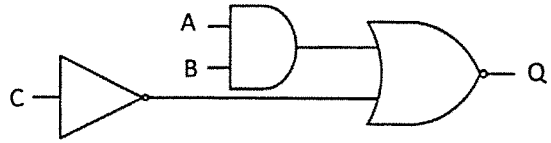
A OR gate has two possible inputs – 'A' and 'B'

OR gate



A	B	Q
0	0	0
0	1	1
1	0	1
1	1	1

Logic gates can be combined to create complete circuits.
These can also be represented using truth tables.
Circuits can be made up of many logic gates.
The logic diagram below is made up of the three most common logic gates:



The diagram above can be represented using the following table:

A	B	C	Q
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	1	1
1	1	0	1
1	1	1	1

This can also be represented as a Boolean expression:

(A AND B) OR (NOT C)

2.5.1 Languages

Characteristics and purpose of different levels of programming language:

- High-level languages
- Low-level languages

The purpose of translators

The characteristics of a compiler and an interpreter

	Languages	Syntax	Translation	Hardware dependent?	Example
Low level	Machine Code	Data and instructions made up of 1s and 0s	Does need to be translated	YES (unique to each processor type)	11000101 11011011
	Assembly Language	Mnemonics/ symbols	One statement translates to one machine code instruction	YES (unique to each processor type)	MOV1 #5B #6A LDA1 #6A
High level	Python, JAVA, C++, Visual Basic	Resembles human language	One statement translates into many machine code instructions	NO – transferrable and usable on any computer	print("Hello World")

HIGH LEVEL LANGUAGES are languages that are easier for the programmer to understand as they are closer to human language this helps the programmer because:

- Easier to find error
- Uses English like keywords
- One instruction translates into many machine codes instructions

LOW LEVEL LANGUAGES are used for writing device drivers and programs that interact with hardware.

All programs are executed in machine code – this means that any program now written in machine code needs to be translated into this form.

Software called **TRANSLATORS** is used to convert High Level Languages or Assembly Language into machine code.

There are two types of translator – **COMPILERS** and **INTERPRETERS**.

SOURCE CODE is the language the program was written in. When this is compiled into **OBJECT CODE** it creates an **EXECUTABLE** file that can run on any computer without the use of a compiler.

2.5.2 The Integrated Development Environment

Common tools and facilities available in an Integrated Development Environment (IDE):

- Editors
- Error diagnostics
- Run-time environment
- Translators

Integrated Development Environment (IDE):

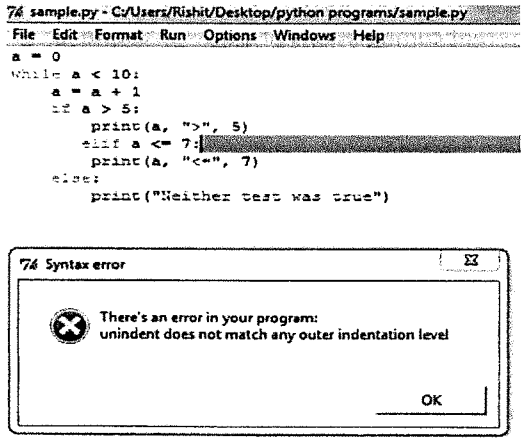
- Editor (for writing the code)
- Error Diagnostics (such as de-bug facilities)
- Run-Time Environment
- Translators

IDE's allow the programmers to **WRITE, EDIT, EXECUTE** and **TRANSLATE** their code.

The **EDITOR** allows the programmer to enter/edit code and may provide tools like auto-indenting, colour coding variables and commands, and adding line numbers.

The **RUN –TIME ENVIRONMENT** shows what happens when the code is executed

ERROR DIAGNOSTICS identify any errors picked up during the compilation process – the IDE will also **TRANSLATE** the code.



R093: Creative iMedia in the media industry

Physical Media

CD/DVD **Characteristics:**
A small plastic, easily transportable disc that can be played in a computer, DVD player, games console or CD player. Content is downloaded (Burnt) directly on to the surface of the disc so it can be read by the player

Advantages:	Disadvantages:
• Audiences can keep a physical copy and access it over and over again • Does not rely on the internet • Can be sent directly to the target audience	• Costly to produce • Takes time to make • Fixed size and space for content • Requires a disc player • Flimsy and fragile

Memory stick **Characteristics:**
Removable USB device that can connect to computers and TVs. They store different amounts of data depending on the size of the memory stick

Advantages:	Disadvantages:
• Small so easy to transport • Physical copy, so no worries about content being taken away • Does not rely on the internet • Allows the user to share and transfer data	• Requires a computer or TV to work • File compatibility can be a problem • Content can be erased or over written • Easily lost or broken

Paper based **Characteristics:**
The oldest and most traditional physical media form. Paper based media products can be printed and distributed by hand or by vehicle to there location. Includes posters, newspapers and other printed content.

Advantages:	Disadvantages:
• Physical copies have a visual impact • Print quality • Professional looking • Can be placed in a range of location	• Expensive to produce • Often some wastage • Can be easily damaged • Costly to transport and get to the audience • Can be difficult to tack the impact of the print advert

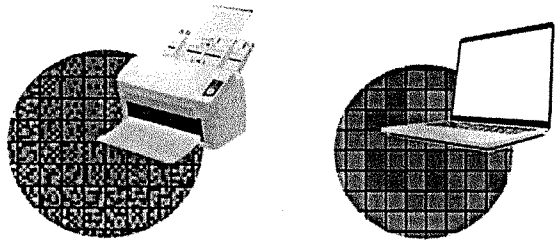
4.2 Properties of media files

Static images

Properties of static images
The mail two properties of static image files that affect the quality are DPI/PPI and pixel dimension

DPI
Dots per inch describes the number of dots of ink or toner that are printed onto one inch of the image.
This relates to printed images
PPI
Pixels per inch describes the number of pixel in one inch of the screen, this relates to digital images rather than printed images

DPI **PPI**



Pixel Dimensions
The pixel dimensions of an image are what we would usually call its size. Instead of using inches/centimetres, pixels are usually used for images

To convert the pixel dimensions of an image to inches you need to know the PPI

Pixel height ÷ images PPI = height in inches

To convert from inches to pixel dimensions you do the calculation the other way round

Height in inches ÷ image PPI = pixel height

Native image file types

File format	Properties	Limitations
.psd Photoshop file	• Accessible only on graphic design software • Large file containing layers	• Not easily opened without specialist software • Large file size • When sending to someone the fonts and images need to be sent to
.xcf GIMP file	• Uncompressed • Edit and store layers	• Only openable by using GIMP • Only deals with RGB colour mode
RAW	• Processed directly from a camera • Lossless or no compression used • Often automatically converted to JPEG	• Not easily used by most software • Very large file

Native image file types

File format	Properties	Limitations
JPEG	• Lossy raster image file • Compression rate can be adjusted • Can be used for print and digital work	• Quality is lost over time and through use
TIFF	• Flexible raster image format • Lossless uncompressed raster file • Retains layers in a similar way to native file types • High quality and good colour depth	• Large file size • Can take a long time to open and download • Not all programs can open TIFF files
BMP	• Uncompressed • Very high quality • Supports various colour pallets • Colour date is stored for every pixel	• Very large file size • Does not scale up very well
PNG	• Lossless compression • Designed for images on the internet • Good for images with blocks of colour • Can handle millions of colours	• Some internet browsers do not support it • File size still large after compression • Only supports RGB colour mode

R093: Creative iMedia in the media industry

4.1 Distribution Platforms

Description: Once a product has been finalised the product will need to be distributed. Distribution methods and platforms are the way the product is going to be access/sent to the audience.

Online Platforms

Apps **Characteristics:**
Downloadable from an app store and accessed instantly from mobile devices. They are updated frequently vis the internet. Files can be embedded in the app.

Advantages:	Disadvantages:
• Quick and easy to update • Potentially free to access • Users can watch/interact anywhere • Only requires phone or tablet • Easy to interact with	• Consumers must have the app to access content • Limited file sizes • Limited to app shape and structure • Likely to need internet to access

Multimedia **Characteristics:**
Multimedia spaces are used to make, share and view content. They are delivered digitally, directly to the audience. They are digital packages of audio, video, text and images

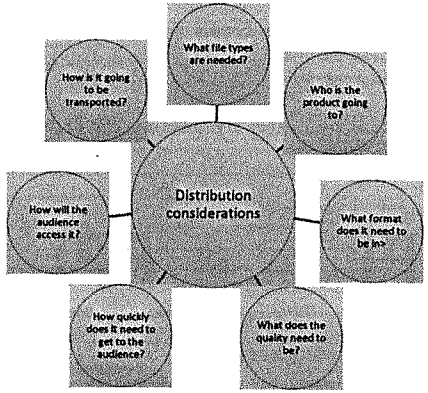
Advantages:	Disadvantages:
• Allows a range of content • Great interactivity	• Content tents to need sending to the consumer before they can access it. • May also need the internet for external links.

Web **Characteristics:**
Websites can have content embedded for its audiences to access. They can show a combination of audio, video, text and images and allow content to be streamed

Advantages:	Disadvantages:
• Easy to access using the internet • Can be searched for using a search engine • Moving content is easy to embed • Quick to upload and update	• Specific sizes and dimensions often needed • Requires the internet • Can get lost among all other web content • May require coding • Will not take large file sizes and file types may be restricted

Distribution consideration

Before you can make any decisions about how a product is distributed there are some things that need to be considered



Mobile devices **Characteristics:**
Applies to tablets, mobiles and watches. Allows a range of digital content to be downloaded or accessed thought the internet.

Advantages:	Disadvantages:
• Mass audiences • Fast-moving technology • Highly interactive • Portable • Can come with accessories such as headsets • Quick distribution • Good range of compatible file types	• Huge competition • Relies on internet/Bluetooth • Can have limited memory • Android/MAC operating systems require different setup/content

Physical Platforms

Computer **Characteristics:**
Can be used to run video, audio, multimedia products, eBooks and games independently or in a network

Advantages:	Disadvantages:
• Can show products with complex levels of interactivity • Will show most media products • Internet not always needed • Powerful with few limits • Can be monitored	• Expensive products to buy so not all members of the target can afford • Not always portable • Relies on being set up correctly

Interactive TV **Characteristics:**
Streams and can save downloadable audio and video content, can play video games

Advantages:	Disadvantages:
• Access many different apps and channels • Highly interactive • Speed of delivery • Content can be sent directly to the TV • Content can be matched to the target audience	• Not portable]too much choice content could be missed • Expensicve to buy so not everyone has one

Kiosk **Characteristics:**
Static product that can show a interactive media presentation, video or game. Usually used independently or part of a small network. Sometimes uses the internet

Advantages:	Disadvantages:
• Can be set up anywhere • Easy for consumers to use • Highly interactive • Can process many file types • Can have multiple users	• Target audience is limited to who can get to the kiosk • Generally not portable • Often limited in what it can present needs maintenance • May not have speackers

Musical Ensembles PART 1

MUSICAL ENSEMBLE: A group of people who perform instrumental or vocal music together

DUET: 2 performers **TRIO**: 3 performers **QUARTET**: 4 performers **QUINTET**: 5 performers **SEXTET**: 6 performers **SEPTET**: 7 performers **OCTET**: 8 performers

An ensemble may group together:

- **Different** instruments (e.g. a quartet for violin, clarinet, piano and guitar) or voices (soprano, alto, tenor and bass)
- The **same** types of instruments, from the same families (e.g. all string instruments or a group of saxophones) or voices (all male voices)
- A group of instruments/voices suitably based on the **style** of music they perform (e.g. in jazz style - drums, bass, trumpet and sax)

(One instrument or a single voice performing is **not** an ensemble)

TEXTURES:

- HOMOPHONIC: one main melody is heard with a harmonic accompaniment of chords
- POLYPHONIC: number of melodic lines heard independently of each other. Imitation and Counterpoint are examples of devices used in this type of texture.
- UNISON: 2 or more musical parts sound the same pitches at the same time or an octave apart.
- CHORDAL: parts move together producing a progression of chords.
- LAYERED: parts are added or layered on top of each other, to add more fullness to the sound and produce a richer texture.
- MELODY & ACCOMPANIMENT: when the tune is the main focus and it is 'accompanied' by another part which supports the tune.
- CANON: the melody is repeated exactly in another part while the initial melody is still being played (think of a round!).
- COUNTERMELODY: a new melody is heard at the same time as a previous melody.

The Baroque Era

Music was classified in terms of function, it was either played in Church, the theatre or "the chamber" (nobility employed musicians as part of their household staff)

BASSO CONTINUO (continuous bass)

- Strong bass line with a melody
- Main instruments were: harpsichord, organ, or lute and sometimes supported by a cello, bassoon or 'viola da gamba'

BAROQUE SONATA

- Sonata = a piece in several movements for one or two soloists + basso continuo

COMPOSERS:

- Arcangelo Corelli (Italian composer)
- J.S. Bach and Handel

The Classical Era

The "Golden age" of chamber music

- Many ensembles written: duos, trios, quartets etc.
- The use of basso continuo declined giving way to the new "Pianoforte" (early piano)

STRING QUARTET

Consists of four string performers: two violins, a viola and cello "a musical conversation amongst equals"

Follows the four-movement structure:

- Mov1: Fast (allegro) usually in **sonata form**
- Mov2: Slow in **Ternary** or **theme and variations**
- Mov3: Moderate dance style (**minuet and trio**)
- Mov4: a final fast movement in **sonata** or **rondo**

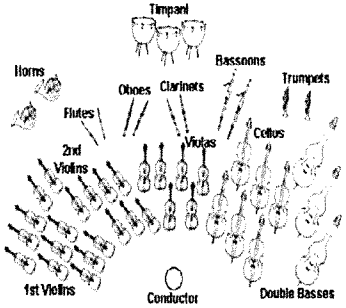
The Romantic Era

Composers experimented with different combinations of instruments, as advances in construction (especially woodwind instruments) had improved.

The Classical Period (1750-1830)

- Less complicated texture than Baroque (more homophonic).
- Emphasis on beauty, elegance and balance.
- More variety and contrast within a piece than Baroque (dynamics, instruments, pitch, tempo, key, mood and timbre).
- Melodies tend to be shorter than those in baroque, with clear-cut phrases, and clearly marked cadences.
- The orchestra increases in size and range. The harpsichord fails out of use. The woodwind becomes a self-contained section.
- The piano takes over, often with Alberti bass accompaniment.
- Composers of this period placed much importance on form and structure. Important features include: Symphony, Concerto, Opera, Minuet and Trio, Rondo, Theme and Variations, Cadenza and Scherzo.
- Sonata form was the most important structure design.

Key Composers	
Wolfgang Amadeus Mozart (1756 - 1791) 	Born in Austria . A child prodigy. He composed his first piece at five. By 20 he was considered the most famous composer in Europe. Mozart was only 35 when he died. He composed in different musical forms, operas, symphonies,concertos, masses, and chamber music.
Franz Joseph Haydn (1732 - 1809) 	Born in Austria . "Father of Symphony" or the "Father of the String Quartet," Joseph Haydn's pivotal role in birthing the Classical Era is unquestioned. He composed over 340 hours of music.
Ludwig van Beethoven (1770 - 1827) 	Beethoven was born in Bonn, Germany. A crucial figure in the transition between the classical and romantic eras in classical music, he remains one of the most recognized and influential musicians. He wrote 772 works including symphonies, sonatas and concertos.

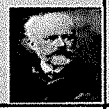


Seating plan for a standard Classical period symphony orchestra

EXPANSION OF THE ORCHESTRA - In the Classical Period the orchestra expanded. The **STRINGS** were still the 'backbone of the orchestra' and played the **MELODY LINE** parts most of the time (1st and 2nd Violins often an octave apart – **OCTAVE DOUBLING**) with the number of strings increasing. The **WOODWIND** became more important and formed its own section. There would usually be **TWO FLUTES, TWO OBOES, TWO BASSOONS** and later, **TWO CLARINETS** – newly invented in the Classical Period – **DOUBLE WOODWIND**. The **BRASS** section would now contain **TRUMPETS** and **FRENCH HORNS** with **TROMBONES** (again invented during the Classical Period) being added later. Classical composers often used the **FRENCH HORNS** and **WOODWIND** section to 'bind the texture of their music together'. The **PERCUSSION** section, as in the Baroque Period, contained just the **TIMPANI**. The **CONTINUO** (Harpsichord) player was now no longer necessary, and the orchestra was, for the first time, directed by a non-instrumental player – the **CONDUCTOR**.
Classical Orchestra: 30-40 players
Romantic Orchestra: 70-120 players

The Romantic Period (1600-1750)

- Emphasis on lyrical melodies
- Starting to explore other cultures and create some fusion with Chinese, Indian and African music
- Folk music fusion – wanted to go back to traditional values and music of the olden days (Nationalism)
- More technical virtuosity – the performer as genius and talented
- Use of recurring themes to give more shape to the pieces
- Highly emotional and intense (hence the name Romantic)
- New Structures: Symphony and Opera – both extended to new, epic lengths
- Programme Music, Piano Concerto and Preludes
- MELODIES become LONGER, less structured and more developed
- MODULATIONS become more frequent and to more UNUSUAL KEYS
- More extravagant, EXTENDED and DISSONANT CHORDS are used

Key Composers	
Pyotr Ilyich Tchaikovsky (1840 –1893) 	He was the first Russian composer whose music made a lasting impression internationally. He wrote melodies which were dramatic and emotional. His compositions include 11 operas, 3 ballets, orchestral music, chamber music and over 100 songs.
Fryderyk Chopin (1810 –1849) 	Chopin was a polish composer and virtuoso pianist of the Romantic era who wrote primarily for solo piano.
Franz Liszt (1811 - 1886) 	Liszt was a hungarian composer Many of his piano pieces were harder to play than anything that had been written before. He developed piano playing, setting new standards for the future.
Clara Schumann (1819 – 1896) 	German pianist, composer and piano teacher. Regarded as one of the most distinguished pianists of the Romantic era

Importance of Pilgrimage

A pilgrimage is a journey to a holy place. **Reasons for Pilgrimage**: Catholics may go on pilgrimage for many reasons, including: To help strengthen faith, To share the experience and their faith with other believers, To pray for the sick, To thank God, To seek physical, spiritual or emotional healing, To ask for forgiveness, Pilgrimage allows pilgrims to reflect on their life journey and is an opportunity to take time out and focus on their journey with God. It is often a journey of self-discovery, most noticeably for those who are sick. Very few people who are sick come back cured however they may feel at peace and be able to accept and cope with the problems they face.

The Importance of Lourdes as a place of Pilgrimage for Catholics

Lourdes is a place of pilgrimage dedicated to Mary in the south west of France. In 1858 a young girl called Bernadette Soubirous had visions of Mary. Mary told her to dig for a spring, this spring is believed to have healing properties and many pilgrims bathe there. Thousands of pilgrims also pray in the grotto. Large numbers of people volunteer as helpers for the sick and disabled pilgrims, which can be a life changing experience.

Jewish Pilgrimage: Pilgrimage is not considered an obligation in Judaism. However, in practice, something like Pilgrimage is an important feature of life of many Jews.
The Torah refers to the traditional importance of all Jews going to Jerusalem for the festivals of Pesach, Shauvot and Sukkot. For some Jews it is important to visit Israel, particularly to visit or hold celebrations at the Western Wall.

Key Quotes:

"The Rosary is the most rich and beautiful of all prayers... (Pope Pius X)

"For God so loved the world that he gave his one and only Son" (John 3:16)

Popular Piety: The Rosary

The Rosary is a devotion in honour of our Mother, the Blessed Virgin Mary and contemplates the life of Christ through the eyes of Mary. The rosary is a popular form of prayer for Catholics. By praying it Catholics remember important events both happy and sad from the life of Jesus and Mary, his mother. The Sorrowful Mysteries in particular help Catholics to reflect upon the suffering if Jesus and the incarnation. Each bead represents a prayer and the beads are arranged in a sequence of one ***"Our Father",*** ten ***"Hail Mary's"*** and one ***"Glory Be".*** Most Catholics can recite the prayers from memory which means they can think more deeply about the meaning of the prayer. Each sequence of beads is called a decade and a set of rosary beads usually has five decades.

How and when do Catholics pray the Rosary?

Each of the Rosaries parts has a prayer to accompany it and the Rosary is divided into different sets of mysteries which are prayed on different days. There are three traditional sets of mysteries **The Joyful, The Sorrowful, The Glorious** Pope John Paul II added an additional set of mysteries: **The Luminous Mysteries.**

The Sorrowful Mysteries: These are the 5 that encourage Catholics to think about the meaning and importance of Jesus' suffering and death.
1.The Agony in the Garden, 2. The Scourging at the Pillar, 3. The Crowning of Thorns, 4. Jesus is made to carry his Cross and 5. Jesus dies on the Cross.

Key concept	Meaning
Conscience	An inner feeling of right and wrong that comes from God.
Evil	The absence of good which often results in suffering.
Free Will	The ability to choose right from wrong freely and without being controlled.
Goodness	The quality of being like God; putting the needs of others first.

Factual Knowledge:

Moral Evil: This is suffering which is a result of human actions e.g. terrorism, rape, theft. This is easier to explain as it can be blamed by humans.

Natural Evil: This is suffering which has nothing to do with human actions but with the way the world works e.g. floods, volcanos and disease.

Original Sin: Genesis and the fall of humanity Genesis 3 – Adam and Eve. Suffering was introduced into a perfect world. Original sin is a reminder that we all share some responsibility for the evil and suffering in the world as we all have a tendency to go against God.

St. Augustine & privation of Good (Enchiridion 3:11): The Bible shows that God is wholly good and that according to Genesis 1, created a world perfectly good and free from defect, evil& suffering: Augustine believed evil is the PRIVATION of good, just as darkness is the absence of light. Augustine believed that evil is not from God but from those entities which had free will – angels and humans who turned their backs on God, the Supreme Good and settled for lesser goods.

Attitudes towards Suffering

Catholics: believe that suffering brings the closer to God and a way to bring about a greater good, just like Jesus suffered and died on the cross so that we can achieve salvation. Suffering is a mystery however evil can never become a good.

Jews: Suffering often arises through humans misusing free will, it is a consequence of the wrong choices humans make. God is the source of all life and the sole creator. He is the judge and is merciful. Jews have several solutions to the problem of suffering and evil. The book of Job suggests that humans should not try to figure out why God lets people suffer, it's a mystery but we should remain faithful.

Non-Religious attitudes towards Evil:

David Hume created the Inconsistent Triad. The triad is inconsistent because it appears that not all three of them can be true at the same time. Hume concluded that either God does not exist or he is not worthy of worship.

John Mackie took Hume's idea further and rejected some of the usual answers to the problem of evil given by Christians:

1. Evil is necessary as an opposite of good – Mackie argues that there is far more and far worse suffering than is needed to contrast with the good in the world.
2. Evil helps us to become better people – Mackie asks why would God need to make us better through suffering? Why not just make us perfect to start with? Also suffering often makes people worse.
3. Evil is a consequence of free will – Mackie asks why would an omnipotent God simply make free human beings who always choose good. He also believes that suffering is too high a price to pay for having free will.

Humanists and Evil: Humanists avoid using the word "evil" because they link it with religious texts and rules. Humanists don't believe that suffering is punishment or test, because they don't think there is a god to punish or test us.

Jewish Views on Evil: Jews do not believe that people are born evil and do not share the Christian concept of original sin. For Jews evil and suffering can be seen as a consequence of human beings making wrong choices. Jews believe they are born free with the inclination to do good or do evil, but that God has given human beings choices and they must struggle against the inclination to do evil actions and follow God.

Key Quotes:

"God saw all that he had made and it was good." (Genesis 1)

"For what is that which we call evil, but the absence of good?" (Enchiridion 3:11)

"For God so loved the world that he gave his one and only Son" (John 3:16)

Factual Knowledge

Importance of the Trinity: The Holy Trinity is made up of the Father, Son and Holy Spirit.

Biblical Teaching on Trinity: The word "trinity" does not appear in the Bible. The doctrine of the Trinity developed over several hundred years. The theological concept of One God consisting of three divine Persons is found many times in the New Testament. In the Baptism of Jesus all three are present. There is the voice of the Father, the presence of the Son (Jesus) and the descent of the Holy Spirit. Jesus Christ as the divine word, the light and life of the world, the ***"only begotten Son"*** of the Father John 1:1-18

Catholics and the Trinity: The importance of the Trinity is demonstrated by its central role within religious practice. The sign of the cross reflects the trinity. Many prayers are said to or in the name of the Trinity. The Nicene Creed is recited by Catholics during prayer and worship and at baptisms. The worshippers declare publicly that they believe in the Trinity it is said by everyone as a sign of unity it binds them together as a community who share common beliefs.

The Jewish view on the Trinity Jewish belief states there is one God. This belief is stated in the Shema ***"You shall love the L-rd your G-d with all your heart, with all your soul, and with all your might."*** Jews would reject totality the idea of the Trinity

Jews do not believe that Jesus was the Messiah.

Key Quotes

"Go forth,, make disciples of all nations, baptise them in the name of the Father, the Son and of the Holy Spirit" (Matthew 28:19)

"There are 3 things in love, as it were a trace of the Trinity...love is of someone who loves, and with love something is loved. Behold, then, there are 3 things: he that loves, and that which is loved, and love" **Augustine De Trinitate**

"The word became flesh and made its dwelling among us" (John 1:1)

Importance of Jesus as Incarnation for Catholics

The Incarnation means becoming flesh, taking human form. God becoming flesh as Jesus Christ. The Incarnation took place when Jesus was conceived. Jesus was born as a human, took on a human body, a full human nature and lived among mankind as one of them. The incarnation shows Gods love for us as he took on human form, suffered and sacrificed himself for us.

Jewish Teaching on the Incarnation: Jewish people do not accept that Jesus was God, as this challenges their basic belief that God is one. This belief is stated in the Shema, which is a very important prayer for Jewish people. It is also stated in the Ten Commandments.

Catholics and Salvifici Doloris: Salvifici Doloris is a document written by Pope John Paul II.

The title is Latin meaning ***"The saving power of*** *suffering".* He says that the problem of evil is not easy to understand. The only way for humans to get an idea about it is to try and understand the depth of God's love for humans which Jesus showed through his willingness to die on the cross for us. He writes that Christians willingly ***"offer up"*** their own suffering in prayer for the sake of others, that they can share in the saving suffering of Jesus.

Key concept	Meaning
Conscience	An inner feeling of right and wrong that comes from God.
Evil	The absence of good which often results in suffering.
Free Will	The ability to choose right from wrong freely and without being controlled.
Goodness	The quality of being like God; putting the needs of others first.
Incarnation	Meaning 'made flesh'. The Christian belief that God became man in the person of Jesus.
Natural Law	The belief that there are universal laws of what is right and what is wrong.
Privation	The absence of a quality that is normally present. St Augustine said that evil is a privation of good.
Suffering	Pain or loss which harms human beings.

Factual Knowledge: **Jesus and Moral Authority**

Moral Authority of Jesus: Jesus gives clear teachings on how people should live their lives. The clearest collection of these teachings is in chapters 5 -7 of Matthews Gospel that is often called the Sermon on the Mount. It begins with a list of blessings, which are often called the Beatitudes (Latin for "blessings"). The key message is that those who are closest to God are often those that that the world does not recognise or value.

Other Sources of Authority for Catholics: Natural Law

This is the idea that there is a discoverable moral law which applies to all humans, was put forward by Thomas Aquinas. It says that all humans have some purposes in common: Preserving life, Reproduction, Educating the Young, Ordered Society and worshipping God. These are known as the 5 Primary Precepts. This means that there are some laws which we must all obey. Laws against murder, child abuse, theft and lying. All humans must do good and avoid evil.

Other Sources of Authority for Catholics: The Conscience

Catholics believe that the conscience is a gift given only to humans, created in the image and likeness of God. Some people believe that our conscience comes from God. Augustine taught that it was the voice of God telling us what to do (like Jiminy Cricket). **Aquinas** taught that God gives us a conscience but we must also use our reason to decide how to behave. **Freud** believed that the conscience had nothing to do with God. He said that it was a moral code given to us by outside influences (e.g. the law, rules from parents) which people develop through life. **Catholics** believe that Natural Law teaches us the principles of the moral life and that Conscience applies the natural law to particular circumstances, enabling us to choose what is good and avoid what is evil **(CCC).**

Sculpture and Statues

Catholic Attitude to Sculptures and statues

Statues are common features in Catholic churches. There will be a crucifix, a statue of Mary and a statue of the saint that the church is named after. The crucifix is the most common focus for Catholic prayer and it reminds Catholics of the Incarnation, but also the suffering of Jesus. These statues will have places to kneel in front of them and to light candles, the candles are called votive candles. They are symbols of the prayers the worshippers are offering. Catholics will ask the saints to intercede on their behalf and pray to God for them For Catholics statues are just another sign of the reality of the incarnation.

The Protestant Attitude to Statues

For some Christians, especially those who belong to the Protestant Church, the making of religious statues goes against the second commandment that forbids the making of any image as an object of worship. They might use just a simple cross with no image of Jesus on it.

Jewish Attitude to Statues

Jews do not use statues as a focus of prayer. It goes against the Ten Commandments ***"You shall have no other gods before me"*** Synagogues do not have any representation of God as he is above human understanding

Michelangelo's La Pieta

Statues help Catholics to reflect the meaning of suffering. One of the most famous statues that does this is **Michelangelo's La Pieta**. It is a statue of Mary holding the body of her son after his crucifixion. The word pieta comes from the Latin word for ***'holiness'.***

Key Quotes:

Blessed are the poor and spirit for theirs is the Kingdom of Heaven. (Matthew 5)

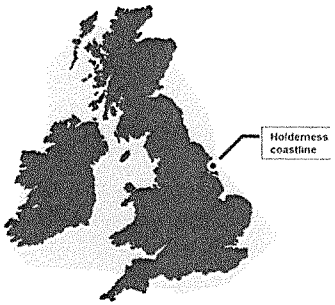
You have heard it said 'An eye for an eye' but I say to you...if anyone slaps you on the right cheek, turn to them the other cheek also. (Matthew 5:38-39)

Conscience is the voice of God within every human being (Augustine)

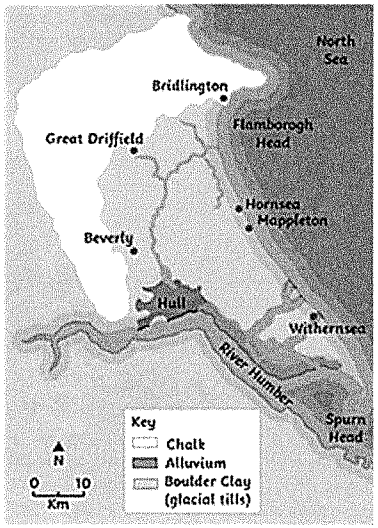
I am the Lord your God, you shall have no other Gods before me. (Exodus 20:2)

Geography – Holderness case study

Location and Erosion

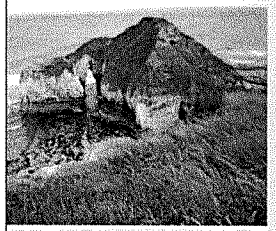


1. **Location** - The Holderness coastline is on the east coast of England, north of the Humber estuary and south of Flamborough Head.
2. **Rate of erosion** - There is a large fetch (distance wind travels unopposed to create friction on water and build up waves) of 800 miles from Scandinavia.
3. The headland is made up of chalk, which is a relatively strong sedimentary rock so Flamborough head protrudes from the rest of the coastline.
4. The cliffs are made up of extremely soft boulder clay which is an unconsolidated material, rather than solid rock. Boulder clay is 'glacial till' which means during the last glacial advance, ice travelling south from the Arctic pushed sediments up to the UK coastline, filling in the gaps in geology. The sediments have only been there for 12,000 years so they have not formed sedimentary rock yet, meaning it has a rapid erosion rate.
5. Most beaches are narrow and created by destructive waves so they have a lower gradient and are less effective at stopping waves hitting the cliffs behind. Longshore drift also carries sediments south along the coastline from Flamborough to Spurn Point where deposition occurs.



Landforms

6. **Cave, arch, stack, wave cut platform, headland at Flamborough Head**

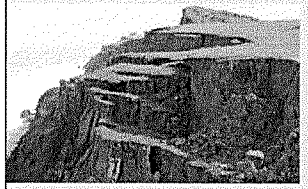


Firstly, a joint in the cliff is widened by weathering such as freeze thaw. As waves attack the joints and erode them through abrasion and hydraulic action they turn firstly into a cave then erode through the headland to form an arch. Eventually, the top of the arch collapses to form a stack and that is eroded down to leave a stump. Over time the whole process repeats and a wave-cut platform is left behind.

7. **Bay at Bridlington**

Soft boulder clay is eroded quicker than hard rocks like limestone. As the soft rock retreats, it creates a sheltered area between two headlands. When material is eroded from the headlands by abrasion and hydraulic action it is carried into the areas which are sheltered from winds and more powerful waves and the material is deposited on a beach as there is no energy to transport them.

8. **Cliff slumping (mass movement) at Great Cowden**



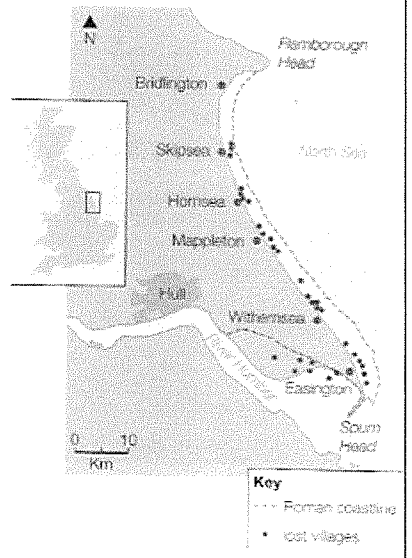
Waves erode a notch at the base of a cliff. The material above is undercut and the boulder clay starts to slip down under the weight of gravity. One-layer sliding will create friction on another and drag that down. This will lead to rotational slumping. Over time the cliff retreats back as it is eroded by abrasion and hydraulic action. This will leave a hard, rocky platform called a wave-cut platform.

9. **Spit at Spurn Head**

Eroded material is transported down the coast by longshore drift. When the coastline changes shape across the Humber estuary the material continues to be transported across the river. Energy is lost as river and sea water currents collide and material is deposited across the estuary. The spit builds up and is curved by sea currents. A salt marsh develops with mud flats in the sheltered area behind the spit.

Management

10. **Bridlington** – sea wall and groynes. The sea wall deflects away wave energy and stops a notch being created at the base of the cliff. These are needed at Bridlington as there is a large tourist industry with many hotels and restaurants to protect along with a population of 40,000 people.
11. **Mappleton** – rock groynes, rip-rap, beach nourishment. Coastal defences are needed to protect the holiday parks for tourism (caravan sites), the B1242 coast road to Bridlington and businesses such as the local garage which employs 20 people. Beach nourishment increases friction on the waves so they cannot hit the cliffs and rock groynes build up a beach by stopping longshore drift and this again will increase friction on the waves which slow them down and stop them hitting the cliffs. This can reduce longshore drift so areas like Easington and Kilnsea get less beach material and are more at risk of erosion.
12. **Great Cowden and Kilnsea** – do nothing. Chosen as the area is only small villages and farmland and it the cost-benefit analysis shows that it is not financially sensible to spend millions of pounds to protect property of a lower value.
13. **Easington** – rip-rap – chosen to protect the BP gas terminal. The terminal is the main reason the cost-benefit analysis is passed as Easington terminal receives gas which is then distributed across the Midlands. Gneiss rock stops the waves eroding a notch.



Coasts Practice Questions

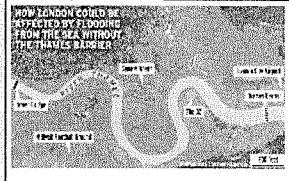
14. Describe the location of the Holderness coastline.
15. Describe the geology of the Holderness coastline.
16. What is glacial till and why is it eroded so quickly?
17. Describe the relief of Holderness.
18. Using an example you have studied, explain how different landforms can form along one stretch of coastline.
19. Explain how erosion, longshore drift and deposition can create different landforms along one stretch of coastline.
20. Using an example you have studied, explain how management may vary along one stretch of coastline.
21. Explain why a sea wall may be used to protect a coastline.
22. Explain why 'do nothing' SMP is used along some fast eroding coastlines.
23. Explain why multiple types of coastal management may be used in one area.
24. Give 3 examples of places or infrastructure that need protecting against rapid coastal erosion.
25. Explain why some stakeholders may not agree with chosen coastal management strategies.
26. Explain why there may be conflict between stakeholders when making decisions on coastal management.
27. Why might coastal management be unsustainable in the future?

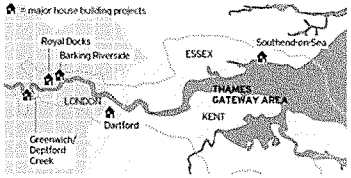
Geography – Coasts and Climate Change

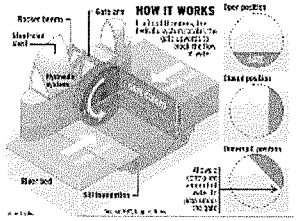
UK (Thames Barrier)– HIC

Location

1. The Thames Gateway is on the south east of England to the east of London. The River Thames flows into the very southern part of the North Sea, with places like Southend-on-Sea on the northern shoreline.

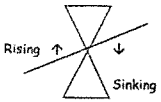






Causes

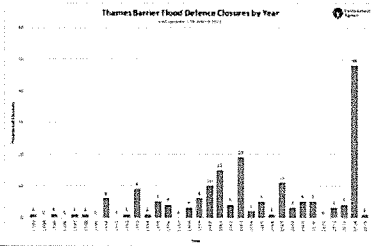
2. **More intense rainfall -** Warmer sea temperatures aid more rapid evaporation forming larger clouds which give more intense rainfall and river floods.
3. **Thermal expansion -** This is where water in the sea expands due to rising temperatures. This means the water takes up more room and sea levels rise, especially at high tides.
4. **Post glacial rebound -** The north west of Scotland is still rebounding after the release of weight from ice sheets in the last Ice Age 10,000 years ago. The UK is pivoting due to this which means that south east England is sinking, so high tides flood larger areas.



5. **Coastline shape -** The funnel shape of the Thames estuary means that water is pushed up into London during high tides and storms and this water becomes deeper and floods as the channel becomes narrower.

Impacts

6. The graph shows that since 1994, there have been far more closures of the Thames Barrier due to both river floods and high tides. Global warming affects both of these.

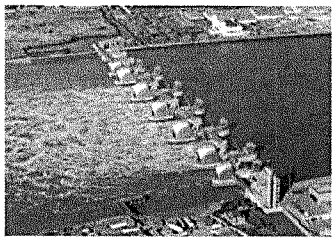


Places protected by the Thames Barrier - London docklands, Olympic Park, South Park – Globe Theatre, Tate Modern, Houses of Parliament, St. Paul's Cathedral, 500,000 homes, 400 schools, 300km roads, 16 hospitals, 35 tube stations

Some of these buildings are priceless and cost/benefit is easy to meet.

Future

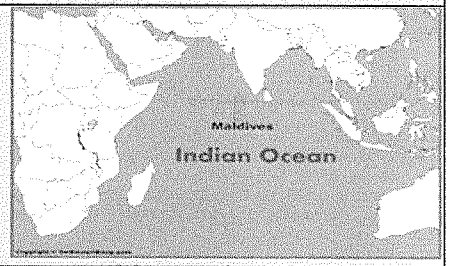
7. **Thames Estuary 2100 Plan details**
   - Review and replace existing embankments, sea walls and sluices.
   - Use managed realignment such as at Tollesbury, Essex, to create salt marshes which can store flood water or storm surge water and relieve pressure on more valuable areas. Increase inter-tidal habitats (salt marshes) by 876 ha.
   - Consider building a new Thames Barrier further east. Cost £6 billion - £7 billion.
   - £1.5bn in the first 25 years until 2034 on maintenance of existing protection, habitat creation and planning
   - £1.8bn in the next 15 until 2049 on raising existing barriers
   - £2.7-3.74bn until 2100 depending on the success of the previous stages



Maldives - LIC

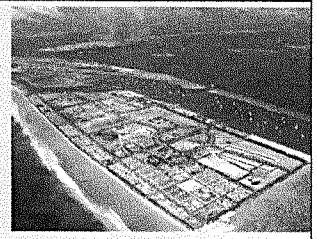
Location

8. The Maldives are a string of 1,190 islands running in a north-south line of 800km. They are south west of India in the Arabian Sea and the Equator runs through the southern islands of the Maldives.
   Population of 350,000, ½ of population lives in Malé, capital city. LIC ranked at 165th out of 192 countries.



Causes

9. **Thermal expansion -** This is where water in the sea expands due to rising temperatures. This means the water takes up more room and sea levels rise, especially at high tides.
10. **Low lying land -** 80% of land under 1m above sea level, no land is over 3m above sea level. 0.5m sea level rise would mean 77% of the land in the Maldives would be underwater. 1m sea level rise would mean the Maldives would be uninhabitable.
11. **Storms -** Most flooding in Maldives occurs when high spring tides coincide with storms.



Impacts

12. Malé, the capital city, is surrounded by 3m concrete sea walls. These were partly funded by $60 million aid from Japan. This sea wall will hold back the sea for the next few decades. It needs constant repairs paid for from tourist taxes. Other islands do not have sea walls.
13. Drinking water is in short supply in the Maldives. 87% of the population gets fresh water by collecting rainwater. Groundwater sources in the islands have become contaminated by saltwater incursion due to higher sea levels and are now undrinkable. It is unsustainable to bring in water from abroad.
14. The tourist industry accounts for 90% of the government's tax revenue. The Boxing Day tsunami of 2004 destroyed many beaches and resorts and it has taken many years to restore this damage. Future rises in sea level would have a similar effect.

Future

15. **Options for management include:**
   - Keep publicising their plight to get people in other countries to take measures to reduce climate change as Maldives have not caused climate change, developed nations have.
   - New resorts to be adapted by being built on stilts.
   - Raise tourist taxes to pay for more sea walls.
   - Develop other high value industries, e.g. software design.
   - Look at the lifestyle of the Bajau people who live on the sea in Borneo.

16. Large-scale plans:
   - Floating islands moored to the sea bed with cables. One floating island to be a golf course accessed by a tunnel on the sea bed. Islands will be made in India and towed to the Maldives.
   - The Maldivian President has said that if the Maldives are completely flooded, then the population will need to leave and he said they could all move to Australia, making them climate refugees.

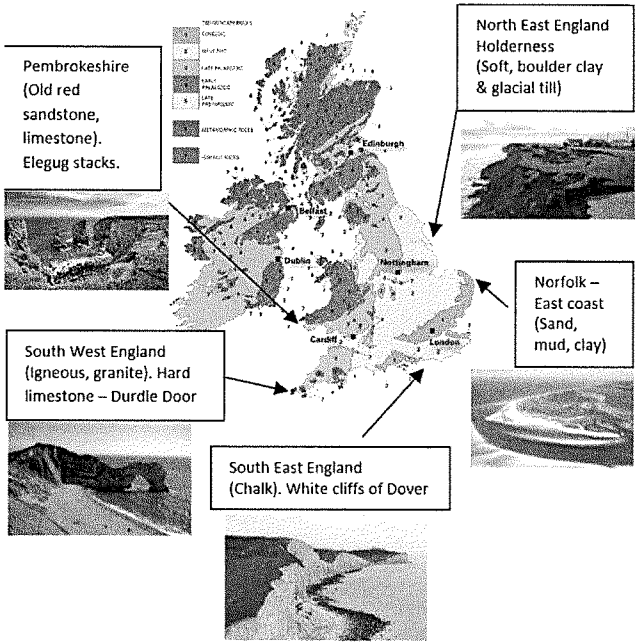
Coasts Revision Questions

17. **How is coastal flooding impacting London?**
18. **Explain how climate change may impact coasts around the world.**
19. **Compare how climate change may impact a HIC and an LIC.**
20. **Explain how a HIC may manage future flood risk.**
21. **Explain how an LIC may manage future flood risk.**
22. **Explain how future flooding risk may be managed.**
23. **How sustainable will coastal flood management be in the future?**
24. **Explain why soft engineering methods are not sustainable for the Maldives or London.**
25. **Explain why hard engineering methods may not be enough for the Maldives.**
26. **Why will there be more climate refugees in the future?**

Geography – Coastal Features

Geology

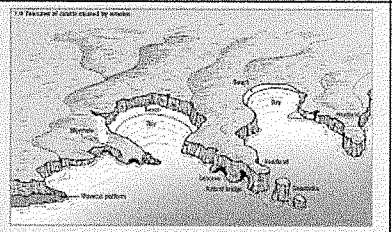
1. UK geology and distinctive landscapes



2. **Igneous rocks –** created through volcanic activity, they have a crystalline structure with no bedding planes or strata so it is very strong and has a slow rate of erosion (only hydraulic action and abrasion) which means there is a gradual wearing away of rock (hundreds of years).
3. **Sedimentary rocks –** created through erosion of igneous rock, the sediments are transported by wind or water and then deposited in the ocean. Layers build up over thousands of years, fossils are often found as skeletons sink to the bottom of ocean in between layers. There are pores and layers (strata) in sedimentary rock so they have a rapid rate of erosion and extreme erosion from destructive waves can occur overnight. Hydraulic action easily weakens the rock along the joints in the bedding plane. Solution easily dissolves sedimentary rocks like chalk.
4. **Metamorphic rocks –** are sedimentary rocks that have been changed over time through heat and pressure. You can often see the layers (strata) from the sedimentary rock, but they are now distorted and warped. The rock is condensed and air/water is squeezed out of the rock so even though there are weak joints in the bedding plane, there is still a slow rate of erosion. Hydraulic action erodes at the exposed bedding planes and any trapped sediments can erode through abrasion.

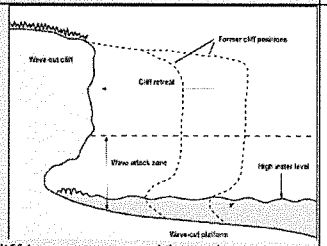
Erosional Landforms

5. Headlands and Bays



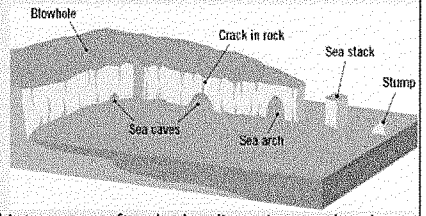
An erosional feature which occurs on discordant coastlines (patterns of different rock types, perpendicular to the coast). The different rock types have different rates of erosion (differential erosion) so more resistant rocks protrude from the coast and less resistant rocks erode at a faster rate and bays are created.

6. Wave-cut platform



- The sea attacks the base of the cliff between the high and low water mark.
- A wave-cut notch is formed by erosional processes such as abrasion and hydraulic action - this is a dent or undercutting at the base of the cliff.
- As the notch increases in size, the cliff becomes unstable and collapses, leading to the retreat of the cliff face.
- The backwash carries away the eroded material, leaving a wave-cut platform. The process repeats. The cliff continues to retreat.

7. Crack – cave – blowhole - arch – stack - stump



Crack – hydraulic action exploits a weak joint in the bedding plane

Cave - A wave-cut inlet of a cliff, caused by a crack becoming larger through hydraulic action and abrasion.

Blowhole – as water is forced into caves, often hydraulic action erodes the top of the cave and can break through to the top of the headland. Water at high tide and in storm conditions may then spray through the hole like a whale, which is where it gets the name 'blowhole' from.

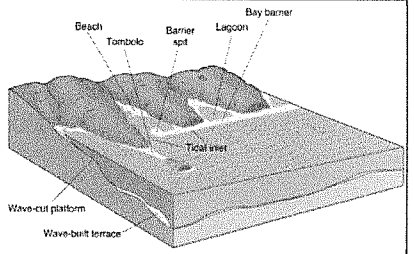
Arch - An offshore pillar of rock linked to the mainland at the top, created as the back of the cave is eroded through hydraulic action, abrasion and solution on some coastlines.

Stack - An isolated offshore pillar of rock, created because the base of an arch continually becomes wider through further erosion, and the top is weathered, until its roof becomes too heavy and collapses into the sea.

Stump – the stack is undercut at the base by destructive waves, which have a weak swash and strong backwash, until it collapses to form a stump.

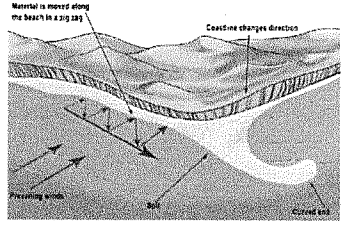
Depositional Landforms

8. Beach



Beaches are made up from eroded material that has been transported from elsewhere and then deposited by the sea. For this to occur, waves must have limited energy, so beaches often form in sheltered areas like bays. Constructive waves build up beaches as they have a strong swash and a weak backwash.

9. Spit



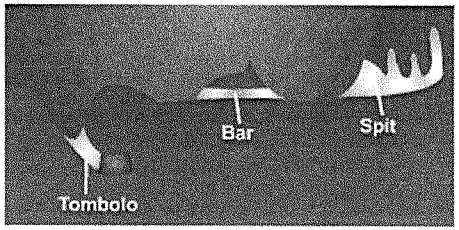
An extended stretch of beach material that projects out to sea.

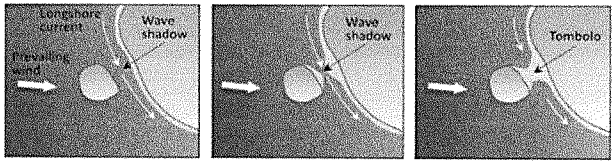
- Sediment is carried by longshore drift in the same direction as the prevailing wind.
- When there is a change in the shape of the coastline, deposition occurs. A long, thin ridge of material is deposited.
- A hooked end can form if there is a change in wind direction.
- Waves cannot get past a spit, therefore the water behind a spit is very sheltered. Silts are deposited here to form salt marshes or mud flats.

10. Bars and Tombolo

Bar - Both form like spits but a bar is a spit that connects two headlands together, which traps a shallow saltwater lake behind it called a lagoon. The lagoon may be filled up with sediment and is not a permanent feature.

Tombolo - A tombolo is a spit joining an island to mainland. The spit can form as above, but the island also helps the tombolo to form as it dissipates wave energy, waves are refracted around the island and causes deposition behind the island.





Coasts Practice Questions

11. **Explain how rock type can influence coastal erosion rates.**
12. **Explain how geology changes around the UK.**
13. **Explain how rates of erosion change around the UK.**
14. **Explain how discordant coastlines create headlands and bays.**
15. **What is the difference between constructive and destructive waves?**
16. **Explain what a wave-cut notch is.**
17. **Explain how a wave-cut platform is created.**
18. **Explain how a crack in a headland can become a stump.**
19. **Explain how deposition creates beaches.**
20. **Explain how longshore drift creates s spit, bar and tombolo.**

Geography – Coastal Processes

Keywords	
1.Swash	The flow of water up a beach as a wave breaks on the shore
2.Backwash	The flow of water back into the sea after a wave has broken on the beach
3.Waves	Movement of water caused by wind, often seen travelling up the beach
4.Tides	Twice daily rise and fall of the sea caused by gravitational pull of the moon and sun
5. Longshore drift	Angled prevailing winds cause swash to by angled and backwash to be perpendicular to the coastline, transporting sediments along the beach making long, thin beaches.
6. Prevailing wind	The most common or prominent wind direction in an area
7. Fetch	The distance travelled by wind or waves across open water
8.Hydraulic Action	Waves or water in the river which crashes against the cliff or river banks compressing the water and air into cracks and forcing the rocks apart
9.Abrasion/corrasion	When waves pickup rocks from the sea or river bead or beach and smash them against the cliff or river banks
10.Attrition	Sand and pebbles are picked up and smash against one another wearing them down into smaller and more rounded particles
11.Soultion/Corrosion	Minerals such as calcium carbonate are slowly dissolved in water
12.Traction	Material being dragged along the surface by the water
13.Saltation	Material being bounced along the surface by the moving water
14.Suspension	Material floating in the water as it moves
15.Solution	Rock material dissolved in the water it will return to its solid state as the water evaporates
16.Geology	The study of rock type and structure e.g. granite is igneous
17.Weathering	Subaerial processes which wear away rocks e.g. freeze-thaw or plant roots
18.Mass movement	Movement of large quantities of rock or soil down a cliff or slope
19.Wave cut notch	A slot cut by wave action at the bottom of a cliff
20.Cave	A wave cut inlet at the bottom of a cliff
21.Arch	An offshore pillar of rock linked to the mainland at the top
22.Stack	An isolated offshore pillar of rock
23.Wave-cut platform	A flat area of land at sea level left as a cliff retreats
24.Cliff	A steep rockface along the coastline
25.Headland	Narrow land that projects from the coastline because it is resistant to erosion
26.Bay	Less resistant rock is eroded between headlands, beaches often build up from deposition
27.Tombolo	A depositional feature which connects an island or sand bar to the mainland
28.Gullying	Vertical cutting in cliffs composed of weak rock and caused by rainwater erosion
29.Load	The material carried by water as it erodes
30.Spit	A feature formed by longshore drift at a change in coastline direction when deposition continues into the sea
31.Estuary	Tidal area at the river mouth with fresh and salt water

32. Erosion

Hydraulic action – the force of the water hitting the coast forces air in cracks and breaks rock off.

Abrasion – when the sediment carried by the ocean scrapes the coastline/cliff, dislodging particles into the flow of water. Can also be called corrasion

Attrition – when stones carried by the sea knock against each other, gradually making stones smaller and less rounded.

Solution – happens along limestone or chalk coastlines, the rock is slowly dissolved. This is because it is soluble in mildly acidic river water. Also known as corrosion.

34. Weathering

Biological – break down of rock by plants, animals or microbes. Plant roots can grow or animals can burrow in cracks. As they grow bigger, the roots can push open the cracks and make them wider and deeper. Eventually pieces of rock may fall away. This includes people walking.

Chemical – break down of rock due to chemical reactions. All rain is slightly acidic so causes solution of rock, particularly sedimentary rocks like chalk. Igneous rocks like quartz are much more resistant so they are weathered very slowly. Air pollution and an increase in CO_2 in the atmosphere can make rain more acidic.

Physical/mechanical – A physical force acts on the rock to break it down. Freeze thaw is where water goes into cracks of rocks and the air temperature drops below freezing and expands by 9 - 10% putting pressure on the rock. If this repeatedly happening, the rock shatters into angular fragments. This cannot happen with salt water as it does not freeze. Onion-skin weathering is rocks are repeatedly warmed and cooled, causing it to expand and contract so the outside layer peels away. This is common in deserts which have extreme day and night temperatures.

36. Deposition

Energy - The energy of the waves and currents carries sediment and when the energy is dissipated, the sediment is dropped. Large sediments are only moved in heavy storms.

Velocity - If the speed of water flow is too slow to move the rock fragments, they are deposited.

Volume - Smaller eroded material is deposited at a distance from the shore as it is lighter however heavier sediment moves shorter distances (gravity settling).

33. Transportation

The four main processes of transportation are:

Traction – large particles rolled on the sea bed.

Saltation – 'bouncing' of particles too heavy to suspend.

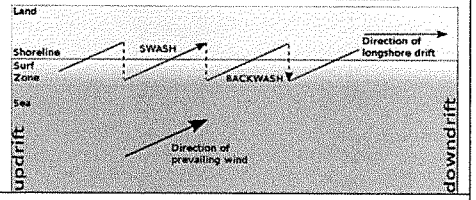
Suspension – small sediment held in the ocean (floating).

Solution – dissolved load.

The size and total amount of sediment that can be carried will depend on the conditions – low pressure depressions increase wave action and therefore more transportation takes place.

Longshore Drift

- Beach material is carried up the shore at the angle of the prevailing wind. This is the swash. When the wave breaks, the water backwash returns to the sea at right angles to the coast, pulled by gravity.
- This backwash carries the beach material with it only to be picked up by another breaking wave and so the process continues.
- It is broken when it meets a built feature like a port or a natural feature like a river estuary.



35. Mass movement

Slumping - This is where a mass of loosely consolidated materials or rock layers moves a short distance down a slope. Can be rotational.

Landslide - Massive/rapid movements of a mass sliding. They can occur after periods of heavy rain when the water saturates overlying rock, making it heavy and liable to slide.

Mudflows - They occur on steep slopes over 10°. Rapid, sudden movement after heavy rain when there is not enough vegetation to hold the soil in place. Saturated soil flows over impermeable sub soil, causing great devastation and endangering lives.

Coasts Revision Questions

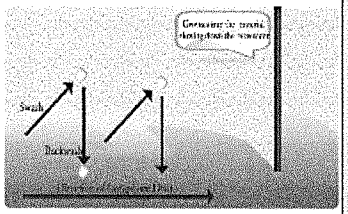
36. **Describe the processes that erode coastlines.**
37. **Describe how a cliff may be weathered.**
38. **Describe how sediment is transported along a coastline.**
39. **Describe how sediments are deposited at the coast.**
40. **Explain how 'onion-skin weathering' weathers rocks.**
41. **Why might freeze-thaw weathering be rare along UK coastlines?**
42. **What is the difference between traction and saltation transportation?**
43. **What is longshore drift caused by?**
44. **How does longshore drift move sediment?**
45. **Explain how biological, chemical and physical weathering differ.**
46. **Explain how large amounts of land move when erosion or weathering takes place.**
47. **Explain what gravity settling is.**
48. **Explain how a change in velocity leads to deposition.**
49. **What is the difference between a landslide and a mudflow?**

Geography – Coastal Management

Hard engineering

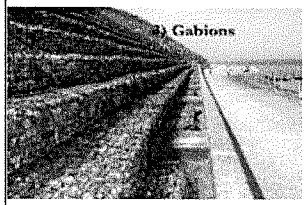
Building structures either parallel to the coast or at right-angles to it

1. Groynes



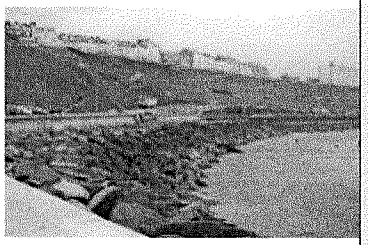
They build up sand to keep it on the beach so that it helps to protect the base of the cliff more from destructive waves by breaking them. They are cost effective, especially as they require little maintenance. They block longshore drift. Rock groyne - £125,000 each average. Timber groyne - £100,000 average.

2. Gabions e.g.



The Gabion is a metal cage filled with rocks by about 1 metre x 1 metre square. They are used by stacking them to form a simple wall. They are there to absorb wave energy and protect the base of the cliff. They are relatively cheap (£350 per square metre) but have a short life span.

3. Rock armour/Riprap



3 tonne boulders of resistant rock (gneiss rock, impermeable) pile up at the base of the cliff. The air pockets between these boulders help to dissipate the force of the wave to help break it. Highly effective, average cost of between £1,000 and £3,000 per m but can cost up to £10,000 per metre.

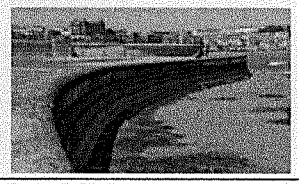
4. Sea walls

The turbulent waves (the circular motion) get thrown back after hitting the stone wall. They work by keeping strong waves away from the bottom of the cliff to prevent notches forming. They can cost £10,000 per metre to be built but on average are £5,000 per m.

Shoreline Management Plan (SMP)

A detailed set of strategies for the future management of a shoreline

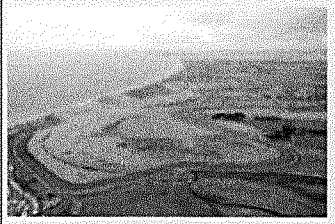
5. A shoreline management plan (SMP) sets out policies to assist decision-making on flooding from the sea and coastal erosion risk management over the next 20, 50 and 100 years. A cost-benefit analysis is a consideration of the balance between the advantages and disadvantages of implementing a particular strategy



6. Hold the line e.g. Scarborough

Using coastal protection methods to prevent erosion e.g. sea walls and groynes. Used to protect towns which are high value.

7. Retreat the line e.g. Medmerry, Sussex realignment



Accepting that erosion will take place and putting strategies in place that will protect the people as it happens. Happens with low value land.

Factors considered in the cost – benefit analysis: 1. the value of property threatened and 2. population living along the stretch of coast.

8. Do nothing e.g. Holderness farmland

This involves no action at all. This is because the value of land behind the cliff is not worth being protected as it does not threaten lives.

Cost of replacing infrastructure destroyed by the eroding coast and the effect of destruction on overall economy is not great enough to protect the coast.

9. Advance the line e.g. Dubai coastline

It is building new defences that are further out in the sea in an attempt to reduce the stress on current defences and possibly extend the coastline slightly. Dubai's coastline consists of 3 artificial small island groups to minimise erosion on the original beach.

Soft engineering

In the UK the placing of material in front of the coast or regrading the cliff

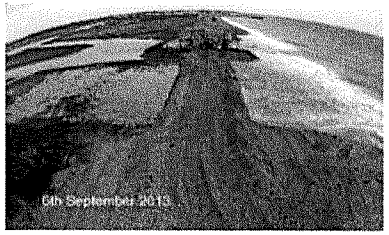
10. Beach nourishment e.g. Skegness

This is the process by which sand is replaced along the beach. It is done by taking material from the sea bed and dumping it onto shore. Replenishing the beach makes it more effective at dispersing the energy of the waves by replacing the material lost by longshore drift. £10 per m^3 sand (needs thousands m^3 sand)

11. Beach stabilisation e.g. Skegness

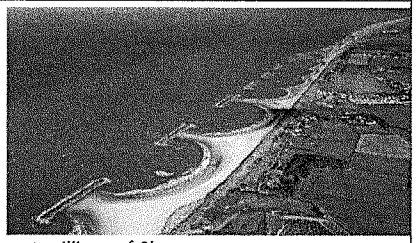
It involves shaping the beach in a particular way so that it absorbs more energy during storms by using bulldozers. During storms, destructive waves tend to move the sediment down the beach towards the sea exposing the cliff to wave attack and erosion. This process moves material back up the beach to reflect wave energy. Up to £2000 per 100m.

12. Wetlands, Medmerry, Sussex



It encourages salt marshes and mudflats allowing some parts of the coast to flood in order to grow vegetation. By allowing small areas of the coast to flood and develop vegetation, other land is protected from flooding. This is also good for wildlife. Sacrificing areas means the only cost is the land.

13. Offshore reefs or breakwaters e.g. Norfolk



Structures parallel to the shore that reduce the amount of wave energy reaching a protected stretch of shoreline, reducing the amount of coastal erosion. They are large-scale projects so cost millions of £'s.

Coasts Practice Questions

14. What is the difference between hard and soft engineering?
15. Explain 2 examples of hard engineering.
16. Explain 2 examples of soft engineering.
17. What does SMP stand for? Why would a stretch of coastline need an SMP?
18. Why might a stretch of coastline need both hard and soft engineering?
19. The Holderness coastline needs protecting from rapid erosion. Explain which 3 types of coastal engineering you would recommend and why. Then explain which 3 types of coastal engineering you would not recommend and why.
20. The Holderness coastline needs an SMP. Which of the 4 SMP types would you recommend and why?
21. The Holderness coastline needs an SMP. Which of the 4 SMP types would you not recommend and why?

History

Year 10/ 11

Topic 1: The Weimar Republic, 1918-29

The Weimar Republic	
1	This was the name given to Germany after the Kaiser had abdicated in November 1918. This was a time of despair and hope for Germany. At first, the country faced lots of chaos but under Gustav Stresemann, there was some stability.
Key events	
2	**1918** World War One ended. The Kaiser abdicated and Germany became a country without a monarch (a Republic).
3	**1919 January** Spartacist Uprising –opposition from the left
4	**1919 June** Signing of the Treaty of Versailles
5	**1919 August** Weimar Constitution finalised
6	**1920**KappPutsch –opposition from the right
7	**1923**French occupation of the Ruhr and hyperinflation
8	**1924**Dawes Plan
9	**1925**Locarno Pact
10	**1926**Germany joins League of Nations
11	**1928**Kellogg Briand Pact
12	**1929**Young Plan
Key Concepts	
13	**The Weimar Republic** faced much opposition, It was disliked by the left wing who wanted Germany to be like Communist Russia and it was disliked by the right wing who wanted the monarchy back.
14	**The Treaty of Versailles** caused many problems for Germany. The German people disliked the politicians for signing it and it caused political problems and economic problems.
15	**Gustav Stresemann** helped to bring about recovery in Germany after 1924. He solved economic problems by making friends with other countries. However, historians have very different views about the extent of this recovery.
16	**The Golden Age** was the period from 1924-29 and it saw significant changes in culture, the standard of living and the position of women.
17	**Stab in the back theory**–the German Army had been stabbed in the back by the politicians who signed the armistice

18. Treaty of Versailles	
Blame	Germany had to accept blame for starting the war –article 231
Money	Germany had to pay £6,600b In reparations for the damage caused during the war
Army	Germany's army and navy were massively reduced in size Army only 100,000 no tanks or aircraft, or submarines
Land	Germany lost territory on all sides, and its colonies in Africa, Alsace-Lorraine to France, no Anschluss (union) with Austria)

Key People		
1	Kaiser Wilhelm II	Leader of Germany—abdicated 9th November 1918.
2	Philipp Scheidmann	Leading member of the Social Democratic Party (SPD). Proclaimed that the Kaiser had gone and there was a new German Republic.
3	Max von Baden	Chancellor—stood down on the 9th November 1918.
4	Paul von Hindenburg	President of Germany between 1925 and his death in 1934.
5	Friedrich Ebert	Leader of the SPD. Became Chancellor 9th November 1918.
6	General Groener	10th November 1918—made an agreement with Ebert that the army would work with the government to keep communists out of power.
7	Rosa Luxemburg	Leader of the Spartacist Revolt. Killed on 16th January 1919.
8	Karl Liebknecht	Leader of the Spartacist Revolt. Killed on 16th January 1919.
9	Wolfgang Kapp	Led the right-wing Kapp Putsch uprising.
10	Charles G. Dawes	An American banker who created the Dawes Plan to resolve Germany's non-payment of reparations.
11	Owen Young	An American banker who led the committee which created the Young Plan, to further help Germany manage reparation payments.
12	Otto Dix	Expressionist painter whose scenes of German life were critical of German society.
13	Erich Mendelsohn	Famous architect—designed Einstein Tower in Potsdam which was very unusual and futuristic.
14	Fritz Lang	Film director famous for *Metropolis* in 1926. A government-funded film about life and technology in the 20th century.
15	Gustav Stresemann	Chancellor between August and November 1923, and foreign secretary from August 1923—1929.

Key Terms		
1	Communism	An extreme form of government, representatives of the workers set up government and take ownership of all land, property and resources in a country.
2	Abdication	A leader, like a King, giving up their throne or position.
3	Constitution	The rules which set out how a country is run.
4	Trade Union	Groups of workers formed to protect workers rights in a variety of jobs.
5	Spartacist	Left-wing uprising against Weimar Republic—supported Communists.
6	Kaiser	The German Emperor.
7	Chancellor	The head of the government in Germany
8	Diktat	The Treaty of Versialles was a Diktat as the terms were imposed on Germany, not negotiated with them.
9	Dolchstoss	'Stabbed in the back' - how Germans viewed the Treaty of Versailles.
10	November Criminals	Leaders of the new German republic who signed the Treaty of Versailles.
11	Freikorps	'Free corps' formed of thousands of demobilised soldiers after WW1.
12	Hyperinflation	Prices went up due to shortages of goods = inflation. The government printed more money, which made prices rise further = hyperinflation.

3.1 Sources of support that meet individual needs

Formal support: Support given by someone who is a trained professional, egg, doctor, therapist, other health professionals

Informal support: Support given by an untrained family member, friend or advocate

Statutory care: These are services that are paid for and provided by the government e.g. National Health Service (NHS), school nursing, social services.

Charity: non-profit organisations that seek to raise awareness and funds for various different sections of society

Informal care giver: Someone who cares for a family member or a friend without payment and little (if any) care training

Primary care: initial point of contact between the patient and the healthcare system, provides individuals with support for issues

Secondary care: Services provided by healthcare professionals who do not generally have the first contact with a service user, examples include specialist treatment for specialist diseases

Holistic care: Provides support that looks at the whole person, consider their physical, emotional, social and spiritual wellbeing

Care home: An institution to provide accommodation and care for those who cannot look after themselves

Day centre: Location that provides care and recreation facilities for those who cannot be independent

Hospice: A home providing care for the very sick and terminally ill

Respite care: Temporary institutional care of a sick, elderly, or disabled person, providing relief for their usual carer.

Rehabilitation centre: A clinic or institution designed to help people recovering from an illness or an addiction

Domiciliary care agency: health care or supportive care provided by a professional caregiver in the individual home where the patient or client is living, as opposed to care provided in group accommodations like clinics or nursing home.

Co-ordinated care: Care coordination involves deliberately organising patient care activities and sharing information among all of the participants concerned with a patient's care to achieve safer and more effective care.

Person-centred approach: A person-centred approach means focusing on the elements of care, support and treatment that matter most to the patient, their family and carers. So before even thinking about measuring, the priority is to identify what is most important to them, without making assumptions.

Empowerment: process through which people gain greater control over the decisions and actions that affect their lives

Autonomy: right of competent adults to make informed decisions about their own medical care

Respect: due regard for the feelings, wishes, or rights of others.

Dignity: the state or quality of being worthy of honour or respect.

Compassion: sympathetic pity and concern for the sufferings or misfortunes of others.

Additional Note Space:

Y10 HSC Absolutes Term 2

RO33: Supporting Individuals through Life Events

R033 Topic 2: Impacts of Life Events

2.1 Life events and their impact on individuals
Life event: Experience(s) that could affect and individual's usual activities

Expected life events: are planned and ones that individuals know will happen.

Unexpected life events: Are events that take individuals by surprise e.g. redundancy

Physical event: changes to someones body e.g. accident, ill health, injury

Relationship change: a change in status between a certain friend, family member or colleague

Life circumstances: impacts on day-to-day life and the choices you make

Menopause: The stage when the ovaries completely stop producing reproductive hormones, and there are no monthly periods for consecutive twelve months

Puberty: the period during which adolescents reach sexual maturity and become capable of reproduction

Imprisonment: the act of confining someone in a locked environment over a set period of time.

Divorce: the legal separation of two people who were married.

Bereavement: is the process of coming to terms with the death of someone close.

Redundancy: A form of dismissal from your job. Happens when a company no longer has requirement for your position.

Genetic disorder: a disease caused in whole or in part by a change in the DNA sequence away from the normal sequence

Retirement: stopping work today it is 65 for men and women but will rise to 67 in the next few years.

R033 Topic 3: Sources of Support

Practitioner: Professionals who deliver healthcare support from initial care to rehabilitation

General Practitioner (GP): a doctor based in the community who treats patients with minor or chronic illnesses and refers those with serious conditions to a hospital.

Nurse: a person trained to care for the sick or infirm, especially in a hospital.

Midwife: a person, typically a woman, who is trained to assist women in childbirth.

Health visitor: a trained nurse who visits people in their homes to assist or advise the chronically ill or parents with very young children.

Specialist doctor: training in a specific area of medicine. This allows them to treat complex health problems that primary care doctors may not be able to.

Physiotherapist: a person qualified to treat disease, injury, or deformity by physical methods such as massage, heat treatment, and exercise.

Dietitian: expert in identifying and treating disease-related malnutrition and in conducting medical nutrition therapy

Social worker: A professional concerned with meeting the basic needs of individuals, families, groups, communities, and society as a whole to enhance their individual and collective well-being.

Counsellor: a person trained to give guidance on personal or psychological problems.

Occupational therapist: A professional help people overcome physical and mental problems that are the result of disability, injury, ageing or illness.

Topic 1.1 Life Stages and Development

Physical factors: Factors that can impact on physical, social and psychological health and well-being include a range of conditions, illnesses or diseases. These may be genetically inherited or associated with ageing.

Diet: food and drink considered in terms of its qualities, composition, and its effects on health

Nutrition: the process of providing or obtaining the food necessary for health and growth

Lifestyle: Involves the choices made that affect health and development.

Genetic inheritance: the genes a person inherits from their parents.

Mental Health: a person's condition with regard to their psychological and emotional well-being

Disability: a physical or mental condition that limits a person's movements, senses, or activities

Sensory impairment: Sensory impairment is the common term used to describe Deafness, blindness, visual impairment, hearing impairment and Deafblindness, not smell or touch though.

Emotional factors: how someone's thoughts and feelings could influence their behaviour and development.

Anxiety: apprehensive uneasiness or nervousness

Fear: an unpleasant emotion caused by the threat of danger, pain, or harm

Grief: intense sorrow, especially caused by someone's death

Attachment: Emotional bond between child and parent.

Economic factors: A person's wealth which can include their wages (income) and possessions and how this can impact their behaviour and development.

Income: How much money someone earns

Employment: the state of having paid work

Debt: a sum of money that is owed or due

Educational experiences: amount of knowledge, skills and understanding developed/gained through time spent in school

Cultural factors: The set of beliefs, moral values, traditions, language and laws held in common by a nation, a community or other defined group.

Culture: Relating to the ideas, customs and social behaviour of a society.

Community: a group of people living in the same place or having a particular characteristic in common

Religion: a particular system of faith and worship

Gender Identity: an individual's personal sense of having a particular gender

Sexual Orientation: a person's identity in relation to the gender or genders to which they are sexually attracted

Environmental factors: factors relating to or arising from a person's surroundings. This is linked to our living conditions such as housing needs, pollution etc.

Pollution: the presence in or introduction into the environment of a substance which has harmful or poisonous effects

Neighbourhood: the area surrounding a particular place, person, or object

Environment: the surroundings or conditions in which a person, animal, or plant lives or operates

Access to services: the availability of health services within an area

Topic 1.1 Life Stages & Development

Life Stage	Age
Childhood	4-10
Adolescence/young person	10-18
Young Adulthood	19-45
Middle Adulthood	46-65
Older adulthood	65+

PIES: physical, intellectual, emotional and social development

Physical Development	Growth patterns and changes in mobility of the large and small muscles in the body that happen throughout life.
Intellectual development	How people develop their thinking skills, memory and language.
Emotional development	How people develop their identity and cope with feelings.
Social development	How people develop friendships and relationships.

1a: Development

Gross motor skills: The larger movements of arms, legs, feet or the entire body using the large muscles for walking, running, skipping and jumping.

Fine motor skills: Smaller actions using the smaller muscles, such as grasping an object between the thumb and finger when holding a paintbrush or pencil.

Primary sexual characteristics: Characteristics that are present at birth.

Secondary sexual characteristics: Physical characteristics and signs that indicate the change from childhood towards adulthood.

Puberty: The process of bodily changes that occur during adolescence, as a child grows into an adult capable of sexual reproduction.

Menopause: ceasing of menstruation

Cognitive development: The construction of thought processes, including remembering, problem solving and decision making, from childhood through to adulthood.

1b: Development

Language development: The process by which children come to understand and communicate.

Attachment: strong emotional bond between a child and their primary care giver

Self-confidence: how much we feel valued, loved and accepted

Self-image: the way and individual sees themselves, both physically and mentally

Peer group: A group of people, usually of the same age, who have similar interests, background, and social status. A peer group can influence the behaviour of group members.

Lifestyle: Involves the choices made that affect health and development.

1c: Factors

Factors: influences on the way a person develops. Factors may relate to a person's physical make up, social and cultural experiences and economic situation.

Social factors: The facts and experiences that influence a person's personality, attitudes and lifestyle.

Relationships: the way in which two or more people or things are connected, or the state of being connected

Inclusion: the action or state of including or of being included within a group or structure

Exclusion from education: when an individual has been excluded from an educational setting permanently, due to not changing poor behaviour over time.

Discrimination: the unjust or prejudicial treatment of different categories of people, especially on the grounds of ethnicity, age, sex, or disability

Bullying: seek to harm, intimidate, or coerce