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CATHOLIC VOLUNTARY ACADEMY

Year 10 Absolutes

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Caritas House

Term 2 2025-26

NAME:
FORM:

Topic: Ratio		Year 10	Tier H	TERM 2

What do I need to know?

- Understand the meaning of ratio notation and use ratios in different contexts e.g. geometrical and real life problems.
- Be able to simplify ratios and write them in the form 1 : n or n : 1.
- Make comparisons between two quantities and represent them as a ratio.
- Understand the meaning of ratio as a fraction.
- Apply your knowledge of ratio to best buy and proportion questions.

How do I recognise this topic?

- Look for the key words: **ratio, proportion, best value, unitary, scale factor, share, equivalent, convert**.
- Questions often involve sharing items, working out the best value or make comparisons.

General Tips

- When **simplifying** ratios, **divide** all parts of the ratio by a **common factor.**
- Find the **unit cost** by **dividing** the **price by the quantity.** The **lowest** number is the best value.

Write the **ratios as fractions**, then cross multiply to create equations.

Compare given quantities and find a lowest common multiple. Once compared, turn back into a ratio by turning the equations into fractions via division.

Numerator will be in the left position, whilst the denominator will be in the right position of the ratio.

The ratio d : e = 11 : 8 and $7e = 5f$ what is the ratio d : f ?

$d:e = 11:8$

$\frac{d}{e} = \frac{11}{8}$

$8d = 11e$

$8d = 11e$ (×7 ×7) → $56d = 77e$

$7e = 5f$ (×11 ×11) → $77e = 55f$

$56d = 55f$ (÷f ÷56)

$\frac{d}{f} = \frac{55}{56}$ → d : f = 55 : 56

Worked Example

Simplifying Ratios	5 : 10 = 1 : 2 (divide both by 5) 14 : 21 = 2 : 3 (divide both by 7)
Writing ratios in the form 1:n or n:1	5 : 7 = 1 : $\frac{7}{5}$ in the form 1 : n 5 : 7 = $\frac{5}{7}$: 1 in the form n : 1
Sharing a given quantity in a ratio.	Share £60 in the ratio 3 : 2 : 1. 3 + 2 + 1 = 6 60 ÷ 6 = 10 3 x 10 = 30, 2 x 10 = 20, 1 x 10 = 10 £30 : £20 : £10
Finding the best buy using the unitary method.	8 cakes for £1.28 → 16p each (÷by 8) 13 cakes for £2.05 → 15.8p each (÷by 13) Pack of 13 cakes is best value.

Question:

There are green, blue and white counters in a bag in the ratio 12:20:11

There are 4 more green counters than white counters. How many white counters are there?

Solution:

4 counters corresponds to 12−11=1 parts in the ratio.

Therefore 1 part in the ratio is 41=4 counters

Therefore the number of white counters is 4×11=44

Topic: Solving Linear Simultaneous Equations	Year 10	Tier H	TERM 2

What do I need to know?

- Solve simultaneous linear equations by elimination or substitution or any other valid method
- Set up a pair of simultaneous linear equations to solve problems

How do I recognise this topic?

- If the word simultaneous is used
- If you have two equations with two unknowns (i.e. $3x + 2y = 36$)

General tips

When do you subtract the equations?

When you have unknowns with equal coefficients.

e.g. $+2y$ / $+2y$

When do you add the equations?

When you have unknowns with equal coefficients but different signs.

e.g. $-4y$ / $+4y$

When do you scale (multiply) the equations?

When the coefficients of the unknowns are not the same. Find the lowest common multiple of both and multiply the rest of the equations by the appropriate scalar. i.e. LCM of 4 and 5 is 20. 4 **x 5** =20, 5 **x 4** = 20

Worked Examples

Example 1 (subtracting the equations)

$4x + 2y = 10$ (1)
$x + 2y = 7$ (2)

Equation (1) subtract equation (2)

$3x = 3$
$\div 3 \quad \div 3$
$x = 1$

Substitute $x = 1$ into Equation (2)

$1 + 2y = 7$
$-1 \quad -1$
$2y = 6$
$\div 2 \quad \div 2$
$y = 3$

Example 2 (adding the equations)

$9x - 4y = 19$ (1)
$4x + 4y = 20$ (2)

Equation (1) add equation (2)

$13x = 39$
$\div 13 \quad \div 13$
$x = 3$

Substitute $x = 3$ into Equation (2)

$4(3) + 4y = 20$
$12 + 4y = 20$
$-12 \quad -12$
$4y = 8$
$\div 4 \quad \div 4$
$y = 2$

Example 3 (scaling up the equations)

$4x + 6y = 5$ (1)
$3x + 4y = 4$ (2)

Equation (1) x by 3 and Equation (2) x by 4

$12x + 18y = 15$ (3)
$12x + 16y = 16$ (4)

Equation (3) subtract equation (4)

$2y = -1$
$\div 2 \quad \div 2$
$y = -0.5$

Substitute $y = -0.5$ into Equation (2)

$3x + 4(-0.5) = 4$
$3x - 2 = 4$
$+2 \quad +2$
$3x = 6$
$\div 3 \quad \div 3$
$x = 2$

Topic: Quadratic Simultaneous Equations		Year 10	Tier H	TERM 2

What do I need to know?

1. Rearrange Quadratics
2. Substitute into Quadratics
3. Solve Quadratics

How do I recognise this topic?

1. Look for the words simultaneous equations and also quadratics i.e. x squared terms
2. Questions related to the coordinates of the intersections between lines and curves.

Step by Step Guide / Worked Example

EXAMPLE: **Solve these two equations simultaneously:** $7x + y = 1$ **and** $2x^2 - y = 3$

1) Rearrange the quadratic equation so that you have the non-quadratic unknown on its own. Label the two equations ① and ②.

$7x + y = 1$ — ① $\qquad y = 2x^2 - 3$ — ②

You could also rearrange the linear equation and substitute it into the quadratic.

2) Substitute the quadratic expression into the other equation. You'll get another equation — label it ③.

$7x + y = 1$ — ①

$y = 2x^2 - 3$ — ② $\Rightarrow 7x + (2x^2 - 3) = 1$ — ③

Put the expression for y into equation ① in place of y.

3) Rearrange to get a quadratic equation. And guess what... You've got to solve it.

$2x^2 + 7x - 4 = 0$

$(2x - 1)(x + 4) = 0$

So $2x - 1 = 0$ OR $x + 4 = 0$

$x = 0.5$ OR $x = -4$

Remember — if it won't factorise, you can either use the formula or complete the square. Have a look at p.40-42 for more details.

4) Stick the first value back in one of the original equations (pick the easy one).

① $7x + y = 1$

Substitute in $x = 0.5$: $3.5 + y = 1$, so $y = 1 - 3.5 = -2.5$

5) Stick the second value back in the same original equation (the easy one again).

① $7x + y = 1$

Substitute in $x = -4$: $-28 + y = 1$, so $y = 1 + 28 = 29$

6) Substitute both pairs of answers back into the other original equation to check they work.

② $y = 2x^2 - 3$

Substitute in $x = 0.5$: $y = (2 \times 0.25) - 3 = -2.5$

Substitute in $x = -4$: $y = (2 \times 16) - 3 = 29$

7) Write the pairs of answers out again, clearly, at the bottom of your working.

The two pairs of solutions are: $x = 0.5, y = -2.5$ and $x = -4, y = 29$

Topic: Probability	Year 10	Tier H	TERM 2

What do I need to know?

- All of probability adds up to 1
- Probability is typically written as a fraction or decimal. In rare cases, it can be written as a percentage.
- How to construct a tree, venn and sample space diagram

How do I recognise this topic?

- If you see the following terms – Relative Frequency, Tree Diagrams, Venn Diagrams, Sample Space Diagrams

General Tips

Probability tends to follow the below formula:

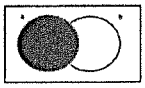
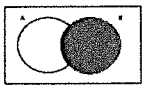
$$P(A) = \frac{\text{Number of favorable outcomes to A}}{\text{Total number of outcomes}}$$

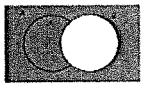
To put this into context→
A = A number more than or equal to 8

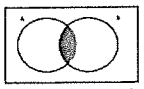
$$P(A) = \frac{6}{24} = \frac{1}{4}$$

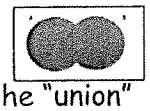
Score on 2nd Dice \ Score on 1st Dice	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10

Set Notation

A  B  A'  "not A"

B'  "not B"

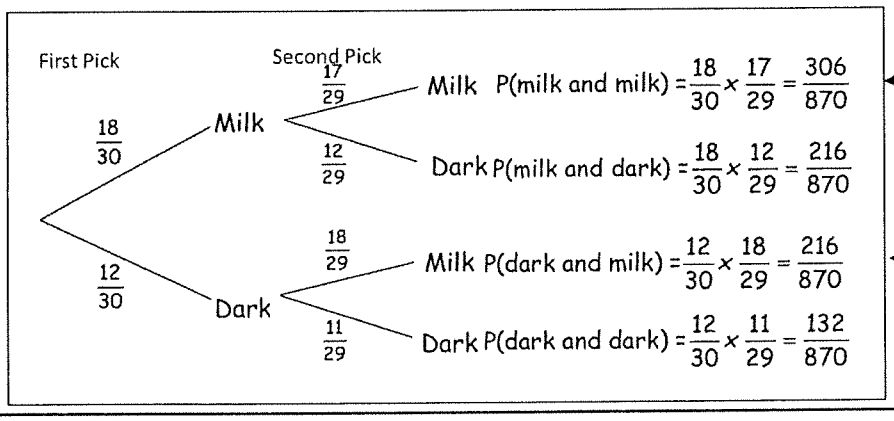
A∩B  the "intersection"

A∪B  the "union"

Worked Examples

Tree Diagrams

Lucy has a box of 30 chocolates. 18 are milk chocolate and the rest are dark chocolate. She takes a chocolate at random from the box and eats it. She then chooses a second. **(a)** Draw a tree diagram to show all the possible outcomes. **(b)** Calculate the probability that Lucy chooses: (i) 2 milk chocolates. (ii) A dark chocolate followed by a milk chocolate.

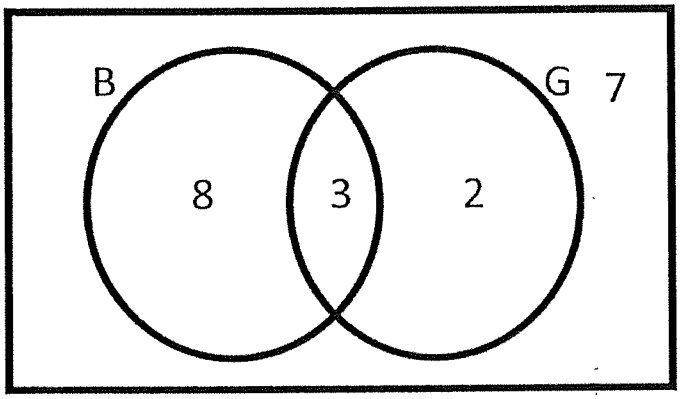


(i) 2 milk chocolates $\frac{306}{870}$

(ii) A dark chocolate followed by a milk chocolate. $\frac{216}{870}$

Venn Diagrams

In a class of 20, there are 11 boys, 5 Pupils with glasses and 3 boys that wear glasses.
Given that a boy is chosen, what is the probability that he wears glasses?



'Given that' means that you are only selecting from this source. In this case 'a boy'. Your total number of outcomes becomes the total amount of boys.
Then the Number of favourable outcomes is the part you want, in this case boys who wear glasses.

$$\frac{\textit{Boys who wear glasses}}{\textit{Total boys}} = \frac{3}{11}$$

Topic: Ratio		Year 10	Tier F	Term 2

What do I need to know?

- Write ratios in their simplest form.
- Write ratios as fractions, decimals and/or percentages.
- Be able to share in a given ratio.

How do I recognise this topic?

1. Look for questions written like, put 12 in the ratio 1 : 4
2. 2: 4
3. Sharing Money amongst friends.

Step by Step Guide / General Tips

1.Simplifying ratio.

Divide both sides of the ratio by the same number, just like simplifying a fraction.

2.Ratio as fractions totals.

Add up all the parts to find the total, then put the part you want over the total .

3. Proportional ratio (Division)

In a proportional ratio question a total amount is split into parts, the key word being 'parts'

Worked Example

Simplifying Ratio

Write the ratio 15:18 in its simplest form.

Step 1. Find a common factor.

3

Step 2. Divide both by the common factor

$\div 3$ (15 : 18) $\div 3$

$=$ 5 : 6

Ratio as fractions.

Apples and oranges are in the ratio of 5:13

Question. What Fraction of the fruit are oranges.

Step 1. Add both parts. 5+13 = 18.

18 is now your denominator.

Step 2. The Orange ratio was 5 parts, this becomes your numerator. As a fraction it is now

5/18

Proportional ratio

Steve, Michael and Christian share £9100 in the ratio 2:4:7 How much does Michael get ?

Step 1. Add up the parts

2+4+7 = 13 parts.

Step 2. Divide to find the value of 1 Part.

£9100 ÷ 13 = £700 (1 Part)

Step 3. Multiply to find the amount asked.

Michael has 4 parts so we multiply 1 part by 4.

£700 x 4 = £ 2800

Michael gets £2800

Topic: Forming and solving linear equations	Year 10	Tier F	Term 2

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.

$3x + 5 = 20$

-5 / -5

$3x = 15$

÷3 / ÷3

$x = 5$

Solving a linear equation with brackets.

$2(x - 1) = 10$

expand

$2x - 2 = 10$

+2 / +2

$2x = 12$

÷2 / ÷2

$x = 6$

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.**

$5a + 8 = 3a + 18$

− 3a / − 3a

$2a + 8 = 18$

− 8 / − 8

$2a = 10$

÷ 2 / ÷ 2

$a = 5$

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

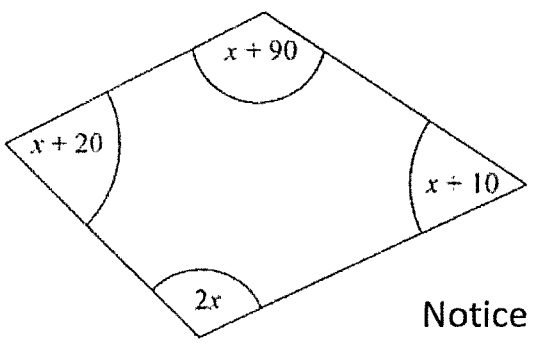


Diagram NOT accurately drawn

$x + 20 + x + 90 + 2x + x + 10 = 360$

$5x + 120 = 360$

$5x = 240$

$x = 48$

Notice the angles are labelled.

The angles sum for a quadrilateral is 360 degrees

Video: 110, 113, 115	dfm drfrostmaths.com	198, 199, 200, 254, 257, 259

Topic: Probability – Single Events		Year 10	Tier Foundation	TERM 2

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?

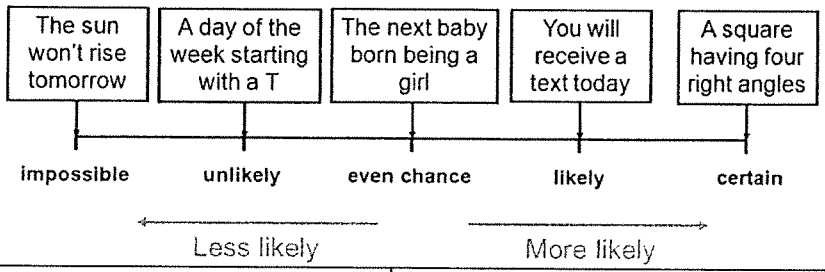
- Key words: Probability, chance, experiment, trials, outcome, relative frequency
- P(Outcome) is the probability of an outcome happening. E.g. P(5) is the probability of getting a 5.

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 = $\frac{\text{number of ways the outcome can happen}}{\text{total number of possible outcomes}}$
- 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.

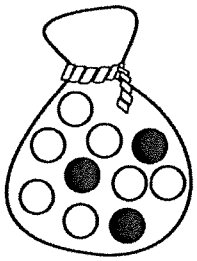
Worked Example

Probability Scale:



Worked example 1

Jem picks a counter randomly from the bag.



What is the probability of getting a:

a) Yellow counter?

$\frac{7}{10}$ 0.7 70%

b) Black counter?

$\frac{3}{10}$ 0.3 30%

c) Yellow or black counter?

1 or 100%

Worked example 2

Looking at the letters from the word:

MATHEMATICS

Calculate:

P(M) = $\frac{2}{11}$

P(T or S) = $\frac{3}{11}$

P(Not an M) = $\frac{9}{11}$

P(vowel) = $\frac{4}{11}$

P(number) = 0

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 = 0.34

b) Probability of B = 0.15
Probability of C = 0.26
Probability of B or C = 0.15 + 0.26 = 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 = $\frac{23}{100}$

Topic: Probability – Combined Events		Year 10	Tier Foundation	TERM 2

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.

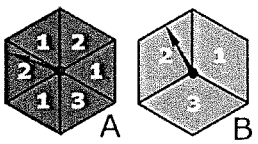
Step by Step Guide / General Tips

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

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:

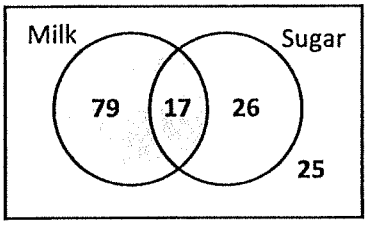
a) **A 4?** (Clue: how many sums of 4's are there?) $\frac{6}{18}$

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.

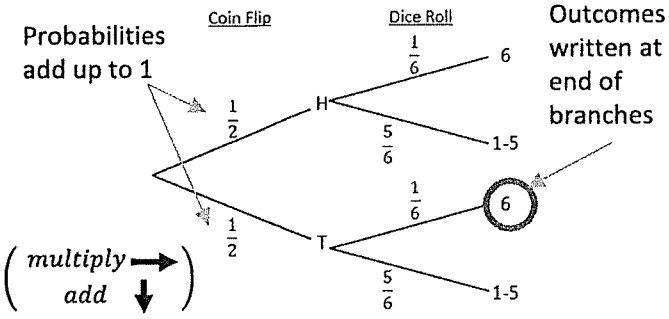


a) **How many people took part in the survey?** (Clue – add all the numbers together)
79 + 17 + 26 + 25 = 147

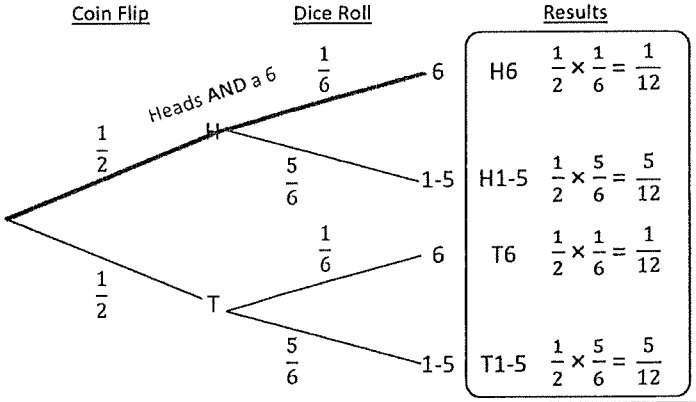
b) **What is the probability of choosing a customer who takes milk in their coffee?**
79 + 17 = 96 customers
Probability = $\frac{96}{147}$

Worked Example: Tree Diagram

John flips a coin and Jane rolls a dice.

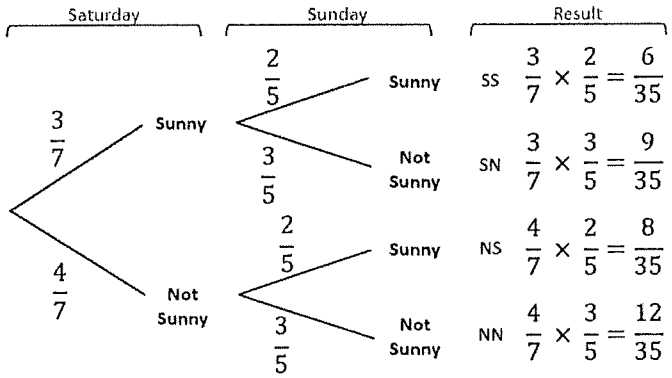


To find the combined probability we multiply across the branches.



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?** $\frac{6}{35}$

b) **It being sunny on Saturday and not sunny on Sunday?** $\frac{9}{35}$

c) **It being sunny on only one day?** $\frac{9}{35}$
Sunny on Saturday and not on Sunday = $\frac{9}{35}$
Not sunny on Saturday but sunny on Sunday: $\frac{8}{35}$

$$\frac{9}{35} + \frac{8}{35} = \frac{17}{35}$$

GCSE History Paper 3: Weimar and Nazi Germany KT2: Rise of the Nazi Party

Key Terms

Nazi Party (1920)	
The German Workers Party (DAP)	A nationalist party led by Anton Drexler, which only had 60 members by 1919. Hitler was sent to investigate the group.
The National Socialist Workers Party (NSDAP)	The DAP that was rebranded by Adolf Hitler to the Nazi Party. In 1921, Hitler became the leader of the group.
Nationalist Party	A party that focuses on the interests of its own country and people. Germany did this and adopted anti-Semitic views.
Hitler's Reforms (1920-23)	
25 Point Program	The Nazi's polices that promoted superiority of the German people, anti-Semitism and rejection of Treaty of Versailles.
Anti-Semitism	Racism and persecution aimed towards Jews.
Swastika	The logo used by Hitler for the Nazi Party.
SA "Brown shirts"	A private army of the Nazi Party of over 400,000 men.
The Munich Putsch	The Nazi Party's attempt to remove the Weimar Republic.
Hitler's reforms after the failure of Munich Putsch (1924-1929)	
Mein Kampf	Hitler's book describing his beliefs and ambitions in prison.
Lebensraum	Germany's right to more living space/territory in Europe.
Hitler Youth	A Nazi youth organisation for boys aged 10-18 to attend.
Bamberg Conference	A meeting to unify the Nazi Party and to set Hitler's agenda.
SS "Schutzstaffel"	Hitler's private bodyguards (SD, Gestapo, Stormtroopers).
Heinrich Himmler	Head of the SS and senior official in the Nazi Party.

Hitler's Rise to Chancellor (1929-1933)	
The Wall Street Crash	The Wall Street stock market in America crashed and sparked an international economic crisis with countries tied to US loans.
The Great Depression	A consequence of the Wall Street Crash, global economies collapsed and led to mass unemployment in Germany - 6 million in 1932.
Heinrich Bruning ('Hunger Chancellor')	Chancellor of Germany (1929-1932) who abused Article 48 to try and deal with the economic crisis of the Wall Street Crash.
Article 48	In emergencies the President could pass laws without the Reichstag.
The Communist Party (KPD)	A rival party who competed for the support of Germans hit by the economic crisis. Membership grew 130,000 to 300,000 (1928-32).
Hindenburg	War hero and President of the Weimar Government (1925-1934).
Franz von Papen	Chancellor of Germany (July 1932 - December 1932).
Kurt von Schleicher	Chancellor of Germany (December 1932 - January 1933).
Chancellor	Appointed by the President to serve as Head of the Government.
Hitler's Rise to Dictatorship (1933-1934)	
Reichstag	The German parliament containing elected politicians.
The Enabling Act	An act that allowed Hitler to govern/pass laws without parliament.
SA "Brown shirts"	A private army of the Nazi Party of over 400,000 men.
Ernst Rohm	Ex-military general from WWI, Nazi Party member and leader of SA.
Dictatorship	A form of government, dominated by one leader with total power.
Fuhrer	Hitler called himself this - the leader of the dictatorship.

25 Point Programme

- *The Programme stressed the superiority of the German people and promoted anti-Semitism.*
- *The party wanted to raise pensions, improve health and education – but only for Germans.*
- *They aimed to promote German greatness through nationalistic initiatives.*
- *Rejecting the Treaty of Versailles and demanding it be abolished/changed.*
- *All German-speakers should be united.*
- *Only Germans (people with German blood) can be classed as citizens.*
- *Jews cannot be citizens of Germany.*

The Munich Putsch (1923)

Hitler was inspired by Mussolini's successful March on Rome. He marched on a Munich beer hall with his SA storm troopers. Hitler declared 'a national revolution has broken out!' and did not allow anyone to leave the hall. He declared a new government with Ludendorff and continued the Putsch.

Hitler took Weimar Republic officials by gunpoint and demanded their support. Hitler then returned to the main beer hall and declared his intentions on the 'Berlin Jew Government' and 'November criminals of 1918'. The room responded in support of Hitler, he had won them over. Ludendorff then allowed some of the crowd to leave.

Hitler left the Beer Hall to meet with other Nazi officials. His aim was to seize the Munich City Council with hostages, but instead he marched with 2000 men through the streets of Munich. Little did they know, the people who left the beer hall had alerted the authorities and Hitler was about to be faced by the police and the German military.

Hitler's putsch was confronted by the alerted German military. 16 Nazis were killed and 4 police officers. Hitler was put on trial for treason and sentenced to 5 years in prison. The Nazi party was banned. However, his trial gave him publicity and highlighted the need for the Nazis to change their tactics. Whilst in prison, he wrote Mein Kampf ('My Struggle').

Question types

'Give two things you can infer from Source' [4]
Two separate inferences about the Source supported by two separate quotes
Useful phrases: "I can infer from the Source that..."
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Useful phrases: "I agree with Interpretation 2 about..."
"However, using Interpretation 1 I disagree .."
"Overall, I agree/disagree with Interpretation 2.."

Sample exam questions

'Explain why the failure of the Munich Putsch caused Hitler to change tactics of the Nazi Party' [12]

'Explain why the Weimar Government lost support during the years 1929-1933' [12]

'Explain why Hitler became Chancellor in 1933' [12]

'Explain why Hitler was able to become dictator in 1934' [12]

GCSE History Paper 3: Weimar and Nazi Germany KT2: Rise of the Nazi Party

How did Hitler become Chancellor in 1933?

Failure of the Munich Putsch (1924)
Hitler reforms the Nazis on his release from in 1924. He introduces the ideas he explored in Mein Kampf, reunites the Nazis under his leadership. He re-establishes the SA for propaganda purposes.

The Golden Age (1924-28)
The reforms of Stresemann cause the Weimar Republic to grow economically and socially between 1924-28. The Dawes Plan is vital to recovering the failing economy, however it makes Germany now reliant on US loans.

The Wall Street Crash (1929)
The Wall Street Stock market in America crashed. It sparked an international economic crisis and meant the US could no longer prop up countries such as Germany. The US now demanded repayment of the loans they had given out.

Growing Nazi support (1930-32)
During the Great Depression, Nazi Party membership grew to over 300,000 by 1930. Hitler promised to reduce unemployment and revive the economy. Many businessmen and workers started to support them and their ideas.

Growing Communist support (1930-32)
As the economic crisis continued, the Weimar Republic was becoming unpopular. Left-wing groups, such as the KPD, grew in popularity. Membership grew in the KPD from 130,000 in 1928 to 300,000 in 1932.

Bruning as Chancellor (1929-30)
Bruning's economic policies of increasing the cost of imports and food accompanied by lowering benefits and salaries earned him the name of 'Hunger Chancellor'. To do all this, he manipulated the use of Article 48 as Chancellor.

Hindenburg re-elected (1932)
Following a close contest, Hindenburg gained a 53% majority against Hitler's 36.8%. Hindenburg's first step was to replace the failing Bruning who had made the economy worse, with Franz von Papen.

Election Results (1932)
In July 1932, the Nazis became the most popular party in the Reichstag. Hitler demanded to be made Chancellor, but Hindenburg didn't trust him and refused his request. The Nazi Party was growing quickly in the Reichstag and Germany.

Von Papen is replaced (1932)
The Nazis lost 34 seats in the November elections. This allowed Hindenburg to change the Chancellor and overlook Hitler. Von Papen was replaced by Kurt von Schleicher, in an attempt to stabilise the role as Chancellor.

Hindenburg appoints Hitler (1933)
In January, 1933, Papen persuaded Hindenburg to appoint Hitler as his Chancellor. Papen argued that together, they could control Hitler and use him as a puppet for their own desires. He was wrong...

Von Papen makes a deal (1933)
Papen resented Schleicher and wanted to get back into government himself. So, he made a deal with Hitler that if he convinced Hindenburg to make Hitler Chancellor, Hitler would appoint Papen his Vice.

Schleicher as Chancellor (1932)
The newly appointed Schleicher attempted to cause a division amongst the Nazi Party, by asking another Nazi official, Gregor Strasser, to be vice-chancellor. Hitler made him refuse the offer or be removed from the Nazi Party.

Hitler becoming Chancellor Basics

1932: There are 6 million unemployed in Germany
Nazi Party policies gain votes
Hitler stands against Hindenburg in 1932 and loses
The Nazis lose seats, but are still the largest party
Nazis are the largest party in the Reichstag
Hitler is finally offered the Chancellorship
1933

How did Hitler become Fuhrer in 1934?

Dictatorship

Removed presidential competition

Death of Hindenburg
In August 1934, Hindenburg died and Hitler saw this as an opportunity to combine the posts of Chancellor and President, and also made himself Commander-in-Chief of the army. He called himself 'Fuhrer' (leader) – this was the beginning of his dictatorship. He demanded the German Army, SA, SS and Law Courts swear an Oath of Allegiance to him and the Nazi Party's mission for Germany's future.

Removed internal party competition

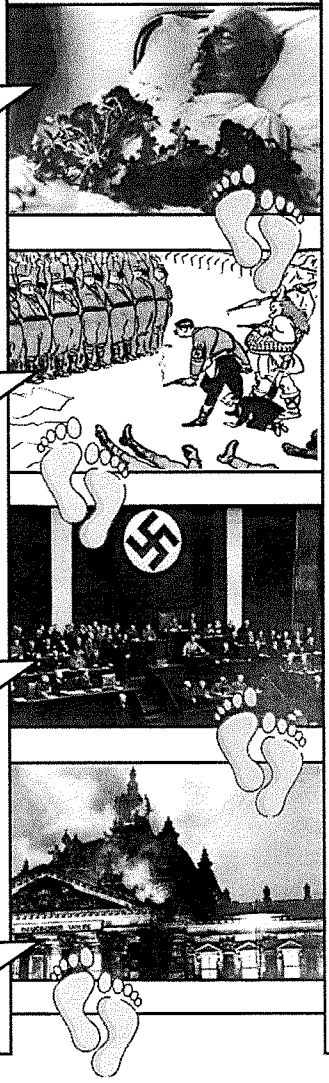
The Night of the Long Knives
The growing size and unpopularity of the SA under Ernst Rohm was becoming a threat to Hitler and the Nazis. In June 1934, Hitler arrested Rohm and hundreds more SA officials. They were killed and imprisoned. He claimed they had been plotting to overthrow the government with foreign allies.
Consequences: Killing Rohm stamped out opposition within the Nazi party and showed that Hitler was above the law.

Control of the legal system

The Enabling Act
In March 1933, The Nazi Party won 288 seats but not a majority. So, Hitler made the Communist Party (81 seats) illegal, allowing him to pass the Enabling Act in the Reichstag - an act that let him govern for four years without parliament.
Consequences: The act allowed Hitler to pass controversial legislation to strengthen the Nazis' position, such as banning Trade Unions and other political parties.

Removed political competition

The Reichstag Fire
In February 1933, just 6 days before the elections, a fire broke out in the Reichstag. Hitler blamed the Communist Party and used the event to whip up anti-communist feelings in Germany. A Dutch communist, Marinus van der Lubbe, was found at the scene of the fire and pleaded guilty in court.
Consequences: Hitler was given emergency powers by Hindenburg to round up and imprison over 400 communist members.



GCSE History Paper 3: Weimar and Nazi Germany KT3: Nazi Control

Key Terms

The Justice System	
The Enabling Act	An act that allowed Hitler to pass laws without parliament.
Law for Reconstruction of the Reich	A law that gave the Nazis total power over local government
People's Court	A Nazi controlled court which held trials of political crimes.
SD (Sicherheitsdienst)	A Nazi intelligence service run by Reynhard Heydrich.
The Police State	
SS "Schutzstaffel"	Hitler's private bodyguards that were totally loyal Nazis.
Gestapo 'Secret Police'	Police that interrogated/imprisoned people without trial.
Heinrich Himmler	The head of the SS and in charge of the Gestapo.
Informers	People who reported disloyalty towards the Nazis.
Concentration Camps	A camp that contained political enemies of the Nazis.
Death Camps	The use of concentration camps to kill minority groups.
Propaganda	
Dr Joseph Goebbels	The Minister for Public Enlightenment and Propaganda for the Nazi Party from 1933 - created Nazi propaganda campaigns
'Hitler Myth'	Goebbels' strategy to make Hitler seem like a god and the saviour of Germany. This was the 'cult of the Fuhrer'.
Censorship	A method to stop people from seeing or hearing anything different or challenging to the Nazis.

Propaganda	Information which is used to promote a political cause or idea.
Anti-Semitism	Racism and persecution aimed towards Jews.
Nuremburg Rallies	Marches & speeches from Nazi officials, like Hitler and Goebbels.
'Triumph of the Will'	A propaganda video created to glorify Nazi Germany and Hitler.
Aryans	Pure blooded Germans, often with blonde hair and blue eyes.
Nazi Doctrines	The values and ideals of the Nazi Party which is indoctrinated.
Degenerate	Modern art was labelled as 'evil' and 'bad' as it was not traditional.
Asocials	Criminals and people that did not fit into Aryan German society.
Control of the Church	
Catholic Church	The international Roman Catholic Church controlled by the Pope.
Concordat	An agreement made between the Pope and Hitler to not interfere.
Protestant Church	An alternative Christian Church which was supported by Hitler.
The Reich Church	A Nazified version of Christianity, which only allowed Aryans in.
Martin Niemoller	A Protestant Pastor and one-time Nazi supporter. He objected the Nazis interference in the church and was a founding member of the Confessing Church.
Confessing Church	A church which protested against Hitler's attempts to unite the different Protestant churches into one Reich Church.
Catholic Bishop Galen	A Catholic Bishop of Munster, who used his sermons to protest against Nazi racial polices and the 'euthanasia' of the disabled.

Question types

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Sample exam questions

'Explain why Hitler created a police state in Germany' [12]

'Explain why the police state was so successful'. [12]

'Explain why propaganda indoctrinated Germans' [12]

'Explain why Hitler successfully controlled the church' [12]

'Explain why Hitler faced challenges from the Church' [12]

SS (Protection Squad)
- Set up by Heinrich Himmler in 1925
- They were led by Himmler
- They wore black uniforms (nicknamed 'The Black Shirts')
- They controlled all Germany's police and security forces
- They acted outside the law
- Members had to marry 'racially pure' wives (Aryans)
- They ran the concentration camps

SD (Security Service)
- Set up by Heinrich Himmler in 1931
- They were led by Reynhard Heydrich
- They wore uniforms
- Spied on all opponents of the Nazi Party, both at home and aboard.

Gestapo (Secret State Police)
- Set up by Hermann Goering in 1933
- They were led by Reynhard Heydrich
- They wore plain clothes (disguised in public)
- The spied on people and used children as informers
- Prosecuted people for speaking out against the Nazis
- Sent people to concentration camps and used torture

The Nazi Police State

The Justice System

Hitler controlled the legal system so that meant it was very difficulty for anyone to oppose him.

The Judges	Law Courts
All judges had to belong to the National Socialist League for the Maintenance of the Law.	He abolished the trial by jury – only judges were able to decided guilty or innocence now.
All judges had to favour the Nazi Part in decisions.	People's Court, trials were secret & with handpicked judges

Concentration Camps

Enemies of the Reich were placed in work camps.

GCSE History Paper 3: Weimar and Nazi Germany KT3: Nazi Control

The Propaganda machine in Germany

Joseph Goebbels

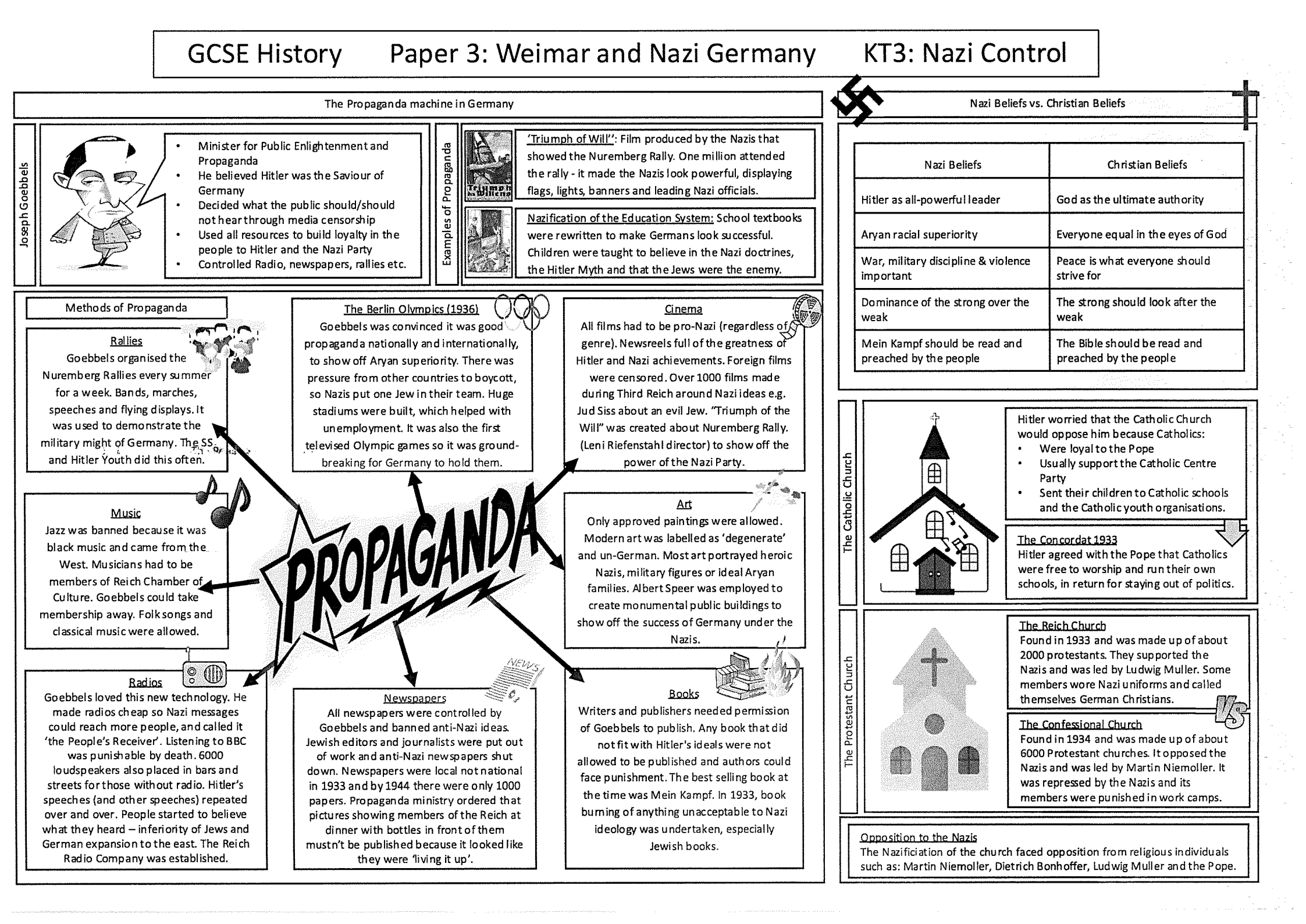
- Minister for Public Enlightenment and Propaganda
- He believed Hitler was the Saviour of Germany
- Decided what the public should/should not hear through media censorship
- Used all resources to build loyalty in the people to Hitler and the Nazi Party
- Controlled Radio, newspapers, rallies etc.

Examples of Propaganda

'Triumph of Will'': Film produced by the Nazis that showed the Nuremberg Rally. One million attended the rally - it made the Nazis look powerful, displaying flags, lights, banners and leading Nazi officials.

Nazification of the Education System: School textbooks were rewritten to make Germans look successful. Children were taught to believe in the Nazi doctrines, the Hitler Myth and that the Jews were the enemy.

Methods of Propaganda



Rallies
Goebbels organised the Nuremberg Rallies every summer for a week. Bands, marches, speeches and flying displays. It was used to demonstrate the military might of Germany. The SS and Hitler Youth did this often.

The Berlin Olympics (1936)
Goebbels was convinced it was good propaganda nationally and internationally, to show off Aryan superiority. There was pressure from other countries to boycott, so Nazis put one Jew in their team. Huge stadiums were built, which helped with unemployment. It was also the first televised Olympic games so it was ground-breaking for Germany to hold them.

Cinema
All films had to be pro-Nazi (regardless of genre). Newsreels full of the greatness of Hitler and Nazi achievements. Foreign films were censored. Over 1000 films made during Third Reich around Nazi ideas e.g. Jud Siss about an evil Jew. "Triumph of the Will" was created about Nuremberg Rally. (Leni Riefenstahl director) to show off the power of the Nazi Party.

Music
Jazz was banned because it was black music and came from the West. Musicians had to be members of Reich Chamber of Culture. Goebbels could take membership away. Folk songs and classical music were allowed.

Art
Only approved paintings were allowed. Modern art was labelled as 'degenerate' and un-German. Most art portrayed heroic Nazis, military figures or ideal Aryan families. Albert Speer was employed to create monumental public buildings to show off the success of Germany under the Nazis.

Radios
Goebbels loved this new technology. He made radios cheap so Nazi messages could reach more people, and called it 'the People's Receiver'. Listening to BBC was punishable by death. 6000 loudspeakers also placed in bars and streets for those without radio. Hitler's speeches (and other speeches) repeated over and over. People started to believe what they heard – inferiority of Jews and German expansion to the east. The Reich Radio Company was established.

Newspapers
All newspapers were controlled by Goebbels and banned anti-Nazi ideas. Jewish editors and journalists were put out of work and anti-Nazi newspapers shut down. Newspapers were local not national in 1933 and by 1944 there were only 1000 papers. Propaganda ministry ordered that pictures showing members of the Reich at dinner with bottles in front of them mustn't be published because it looked like they were 'living it up'.

Books
Writers and publishers needed permission of Goebbels to publish. Any book that did not fit with Hitler's ideals were not allowed to be published and authors could face punishment. The best selling book at the time was Mein Kampf. In 1933, book burning of anything unacceptable to Nazi ideology was undertaken, especially Jewish books.

Nazi Beliefs vs. Christian Beliefs

Nazi Beliefs	Christian Beliefs
Hitler as all-powerful leader	God as the ultimate authority
Aryan racial superiority	Everyone equal in the eyes of God
War, military discipline & violence important	Peace is what everyone should strive for
Dominance of the strong over the weak	The strong should look after the weak
Mein Kampf should be read and preached by the people	The Bible should be read and preached by the people

The Catholic Church

Hitler worried that the Catholic Church would oppose him because Catholics:
- Were loyal to the Pope
- Usually support the Catholic Centre Party
- Sent their children to Catholic schools and the Catholic youth organisations.

The Concordat 1933
Hitler agreed with the Pope that Catholics were free to worship and run their own schools, in return for staying out of politics.

The Protestant Church

The Reich Church
Found in 1933 and was made up of about 2000 protestants. They supported the Nazis and was led by Ludwig Muller. Some members wore Nazi uniforms and called themselves German Christians.

VS

The Confessional Church
Found in 1934 and was made up of about 6000 Protestant churches. It opposed the Nazis and was led by Martin Niemoller. It was repressed by the Nazis and its members were punished in work camps.

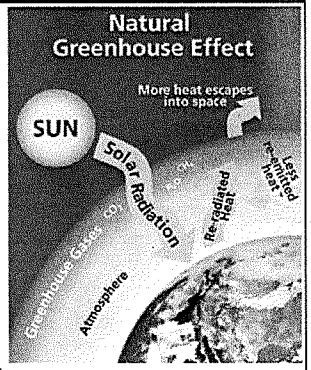
Opposition to the Nazis
The Nazification of the church faced opposition from religious individuals such as: Martin Niemoller, Dietrich Bonhoffer, Ludwig Muller and the Pope.

Geography – Climate Change Causes

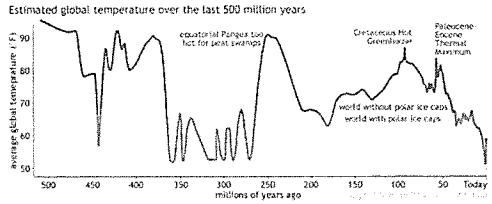
Keywords

1. **Quaternary Period**	The Quaternary or Pleistocene is the Earth's most recent period of geological time. It started 2.6 million years ago.	14. **Methane (CH_4)**	A greenhouse gas which is released by livestock, such as cows and sheep, landfills, producing natural gas and mining coal.
2. **Glacials**	A cold period of time during the quaternary period when polar ice advances.	15. **Nitrous oxide (N_2O)**	A greenhouse gas which is released by certain types of farming and by burning fossil fuels.
3. **Inter-glacials**	A warm period of time during the quaternary period when polar ice retreats.	16. **Fossil Fuels**	Carbon based natural deposits such as coal, gas, oil, that were made missions of years ago and are burnt today as a fuel.
4. **Climate change**	The long term shift in the earth's average temperature (this could be warming or cooling).	17. **Carbon emissions**	The release of CO_2 and other GHGs into the atmosphere by human activities like burning fossil fuels.
5. **Global warming**	The type of climate change being seen on the Earth at present.	18. **Carbon sink**	Something that absorbs and stores carbon, like a tropical rainforest.
6. **Natural greenhouse effect**	The natural process by which the earth's atmosphere traps solar radiation, warming the earth enough to support life.	19. **Renewable energy**	Ways of generating electricity and heat without causing lasting damage like wind, solar, wave, tidal, biomass and nuclear power.
7. **Enhanced greenhouse effects**	Increase in the amount of GHGs in the earth's atmosphere is causing the earth's temperature to increase.	20. **Drought**	A prolonged period of abnormally low rainfall, leading to a shortage of water.
8. **Atmosphere**	The layer of gases surrounding the earth.	21. **Rainfall intensity**	Warmer atmosphere holds more moisture which can increase rainfall intensity.
9. **Milankovitch cycle**	A reason for naturally occurring temperature changes – an eccentric orbit around the sun.	22. **22.Water vapour**	Water in its gaseous state. It forms a part of the atmosphere.
10. **Sunspots**	Cycle of solar activity that change Earth's temperature by 1°C.	23. **Adaptation**	People learn to live with the impacts of climate change, adapting their lifestyles.
11. **Volcanic eruptions**	Ash added to the atmosphere cools the Earth by shading it from solar radiation.	24. **Mitigation**	Governments, TNCs, NGOs, climate action groups and individuals make changes to reduce the impacts of climate change.
12. **12. Solar radiation**	The energy from the sun.	25. **Carbon neutral**	A balance between the emitting and absorbing of CO_2.
13. **Carbon dioxide (CO_2)**	A GHG which is released by burning fossil fuels (coal), cutting down and burning trees.	26. **Biofuels**	Natural matter that can be directly used as fuel. Biomass has to be converted into biofuel.

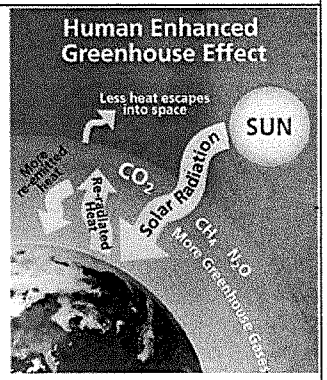
The Greenhouse Effect



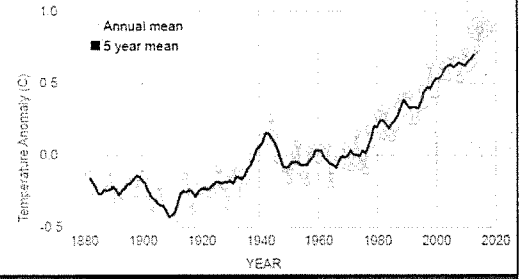
- The greenhouse effect is a **naturally occurring** effect.
- Energy from the sun bounces off the earth's surface as some of this energy is **absorbed** by the gases forming the atmosphere. Roughly 30% of this absorbed energy is then **radiated back towards the earth**. This causes the earth's average temperature to be around 15°C.
- Without the natural greenhouse effect, the earth's average temperature would be around -18°C. This would be far too cold to sustain many forms of life



The Enhanced Greenhouse Effect



- Data demonstrates that the earth's average temperature has been increasing rapidly over the last 100 years (see graph).
- The average global temperature has risen by 0.9°C and the UK's temperature has risen by 1°C.
- Scientists have theorised that this is because of the **drastic increase in the amount of greenhouse gases humans are releasing into the atmosphere**. They have called this the **enhanced greenhouse effect**.
- These greenhouse gases are mainly **carbon dioxide, methane, nitrous oxide and other gases.** The release of these gases has been accelerated by the burning of fossil fuels like coal and natural gas, deforestation and farming.
- There are **some** who disagree with the concept of the enhanced greenhouse effect.
- These opponents argue that this increase in temperature is because human settlements are now much closer to where the measurements about temperature is taken.
- As a result, they argue that temperatures only appear to be rising because settlements are warmer as surfaces concrete absorb more heat energy.
- However, the majority of the scientific community disagree with this view.



Practice Exam Questions

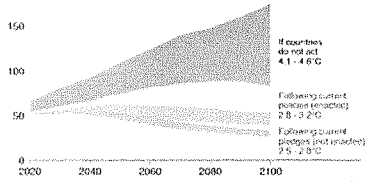
1. **Explain how and why the climate has changed naturally over the quaternary period.**
2. **Explain how the climate has been changed by human activity since 1900.**
3. **Explain how climate change has caused economic impacts.**
4. **Explain how climate change has caused environmental impacts.**
5. **Explain how climate change has caused social impacts.**
6. **Compare the impacts of climate change on HICs and LICS.**
7. **How does relief influence the impact of climate change along coastlines?**
8. **Which groups of people are most vulnerable to climate change?**
9. **Using an example you have studied, explain how ecosystems may be impacted by climate change.**
10. **Compare the impacts of climate change on two opposing locations.**
11. **Describe how climate change is being addressed at a global, national and local scale.**
12. **Who is most accountable for climate change and who should be addressing the impacts?**

Geography – Climate Change Impacts

Keywords	
1. (SIDS)	Small Island Developing States
2. Inundation	Covered in water
3. Salt water intrusion	Diminished aquifer stored created space which sea/salt water may fill through percolation
4. Poleward migration	Species migrate towards the north or south pole for cooler temperatures, like the Atlantic Cod.
5. Coral bleaching	Warmer ocean temperatures kill polyps and algae, causing coral to die and lose its colour.
6. Global	Impacts and actions at a worldwide scale.
7. National	Impacts and actions within a country.
8. Local	Impacts and actions in a local area.
9. Individual	Impacts and actions by a single person.
10. Social effect	Something which affects communities or the way people live their lives.
11. Economic effect	Something which affects money or a country's ability to make money.
12. Environmental effect	Something which affects the plants, animals and ecosystems in an area.
13. Desertification	The process where fertile land becomes infertile desert or where soil becomes sand.
14. Migration	The movement of people or animals from one area to another.
15. Glacier	A slowly moving river of ice formed by compacted snow.
16. Permafrost	A thick layer of soil that remains constantly frozen throughout the year.

Effects of Climate Change

- The world's average temperature has increased by 0.9°C over the last 100 years. While this does not sound like much, this is already having a significant effect on the world.
- The graph on the right show the future predictions of CO_2 emissions in gigatons.
- Ice is melting worldwide, including the **poles, glaciers and arctic sea ice**. This has caused sea levels across the globe to rise.
- Although we should stop global warming, not all effects of global warming are negative.



Economic

- Alpine ski resorts forced to close.
- While some crops will become more productive in cooler countries, other areas will experience food shortages.
- Ocean passages could become open for commercial shipping.
- Governments purchase and maintain flood defences on coasts.

Environmental

- Hurricanes become more frequent.
- Low lying countries (Maldives), could disappear because of rising sea levels.
- Between 20 and 50% of species in Africa could become extinct.
- Delicate ecosystems would fall out of sync and collapse as animals migrate or lose their habitats.

Social

- Diseases such as malaria would spread.
- People who lose their homes to floods would be forced to migrate elsewhere.
- Droughts would increase, causing severe water shortages.
- Thousands of people would be left without clean water, causing diseases such as cholera.
- A lack of clean water may lead to conflicts.

Global Responses to Climate Change

- **The Kyoto Protocol 2005:** Over 170 countries agreed to reduce their carbon emission below their 1990 level by 2012. The USA and Australia refused to sign.
- **The Paris Agreement 2015:** 195 countries signed a legally binding agreement to lower carbon emissions by 5.2% to a level that oceans and forests can absorb, keep climate change below a 2 degree increase in temperature and give $100 billion a year to help developing countries reduce their greenhouse gas emissions.
- **COP26:** United Nations Climate Change conference in November 2021 produced 35 programmes and pledges for governments including health programmes, zero emission targets and green transport targets.

National Responses to Climate Change

The UK has:

- increased tax on vehicles which produce high emissions
- increased its nuclear energy production and
- aims to ban single-use plastics by 2030.

Local Responses to Climate Change

- Nottingham parking levy charges firms for parking spaces to pay for tram improvements, encouraging public transport.
- Mansfield based Veolia recycles 85,000 tonnes of recyclable waste from Mansfield every year.

The Arctic

1.How have Arctic habitats changed?	▪ Sea ice coverage is much smaller than 30 years ago. ▪ Polar bear numbers are falling – probably due to less sea ice.
2. How do polar bears catch food?	Polar bears hunt for seals on the sea ice. They lie in wait at breaking holes in the ice or they stalk seals and then sprint the last few metres to catch them.
3.How has polar bear hunting been affected?	Sea ice in the Arctic is now thawing 3 weeks earlier so polar bears have fewer weeks to hunt seals on the ice, they swim from ice floe to ice floe and this uses more energy. The sea ice now refreezes 2 weeks later than previously. Polar bears are now lighter weight, cannot always feed their cubs conflict with people as they forage for food.
4.What is thermal expansion?	Higher sea temperatures due to global warming means water expands and sea levels rise. Warmer water also causes more sea ice to melt.
5.How is Albedo causing ice melt?	White ice reflects a lot of the sun's rays, keeping areas cold. When the ice melts, it is replaced by dark blue water which absorbs a lot of the sun's rays.
6.What is the future?	Fewer polar bears/top predators > more ringed seals so fewer Arctic char (prey) > eventually causing a reduction in population of Arctic char
7.What are the features of the Arctic Ecosystem?	Producer Phytoplankton – algae > Primary consumer Herbivorous zooplankton > Secondary consumer Carnivorous zooplankton e.g. prawns and Arctic char fish > Tertiary consumer Ringed seal > Apex predator Polar Bear

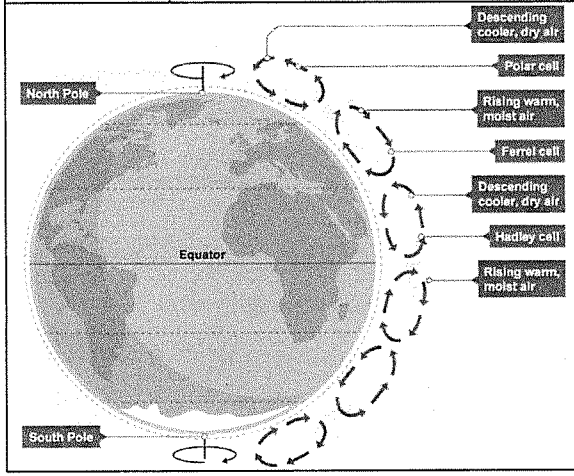
The Bahamas

1.Where are the Bahamas?	▪ The Bahamas are a string of islands 900km long of the south east coast of Florida on the outer eastern edge of the Caribbean Sea, the eastern coastline facing the Atlantic Ocean.
2.What are tourism impacts?	▪ 40% GDP, 49% jobs in tourism, Earned $1.3 billion in 2015. ▪ Half of government's spending on services (health, roads, education) is from tourism.
3.What are the threats to tourism in the Bahamas?	▪ Loss of beaches due to coastal erosion and flooding – unattractive so people do not visit. ▪ Salt water incursion - not enough fresh water for local people or tourists. ▪ Coral 'bleaching' causes reefs to die -more stormy waves so less snorkelling for visitors. ▪ More intense rainstorms and hurricanes - more damage and flooding
4.Why are they vulnerable?	Large number of small islands with very long coastlines due to islands Reliance on coastal tourism and beach holidays with no alternatives so weak economy
5.What are the impacts?	Thermal Expansion. More Intense Rain Storms - warmer sea temperatures aid more rapid evaporation causing larger clouds, storms and heavier rainfall.
6.What are the social impacts?	Erosion and coral reef bleaching make areas unattractive so; fewer jobs in tourism, negative multiplier, less tourism tax and income, fewer services, funding used for coastal defences.
7.What are the solutions for The Bahamas?	Managed retreat: not enough current defences to consider this or Do Nothing: may have to abandon defences on some islands and decide not to protect areas which do have some value. Hold the line: large scale hard engineering - concrete structures to raise level of coastline – ugly, unattractive to tourists. Too expensive for government. Loss of jobs for locals if hotels close. Will only happen in highest income generating tourist areas like Nassau. Advance the line: build more hurricane shelters and build desalination plant but too expensive.

Geography – Weather and Climate

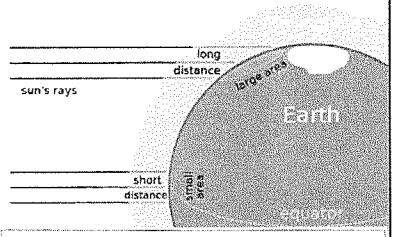
Keywords

Cyclone	A low pressure system in the atmosphere associated with very unsettled weather, wind and rain
Drought	A long period of time with little precipitation
ITCZ (Intertropical convergence zone)	A band of low pressure in the atmosphere which circles the equatorial region of the Earth
Monsoon	A seasonal prevailing wind in the region of South and SE Asia, blowing from the south-west between May and September and bringing rain
Aspect	The direction a slope faces which can affect temperatures
Depression	A weather system associated with low air pressure they bring changeable weather
Anticyclones	A high pressure system that brings settled weather hot and dry in summer and sometimes foggy in winter
Relief rainfall	Precipitation that is caused when warm moist air is forced over a mountain area as the air rises and cools the water vapour condenses forming rain
Storm surge	The rise in sea level that can cause coastal flooding during a storm or hurricane the low pressure causes the sea level to rise and the strong wind can force a bulge on the shore line
Isobar	A line joining places of equal air pressure
Interglacial	Periods of time between the glacial periods
Greenhouse gases	Gases such as carbon dioxide (CO_2), Methane (CH_4), and water vapour (H_2O) they trap the sun's solar energy
Climate change	A long term change in in the annual weather conditions
Emissions	Chemicals released into the atmosphere by industry such as nitrogen oxide

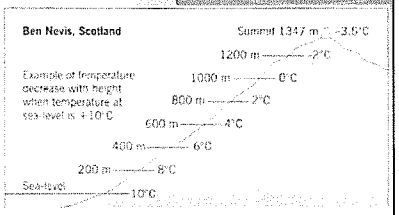


Factors Affecting Climate

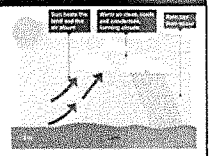
Latitude: Means how far a place is from the equator (which is the hottest places). This is due to a combination of the curvature of the earth, the angle of the rays in the sky and the layer of atmosphere that surrounds the earth.



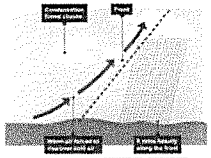
Altitude: The height of something in relation to sea / ground level. There are fewer solid particles in the upper air to retain heat and so the atmosphere never heats up.



Types of rainfall

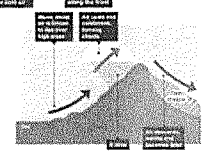


23. Convectional rain: the **sun heats the land** and the air above. The warm air rises, **cools and condenses, forming clouds. Rain** can then occur.



24. Frontal rain: warm air meets cold air, the warm air is forced to rise over the cold which forces **condensation and therefore rains heavily** along the front (where the warm and cold air meet).

25. Relief rain: warm, moist air is forced to **rise over high areas like mountains** or hills. **Air cools and condenses, forming clouds** which **rain** on the **windward side**, leaving the **leeward side** in the **rain shadow** as the warm air descends and becomes drier.

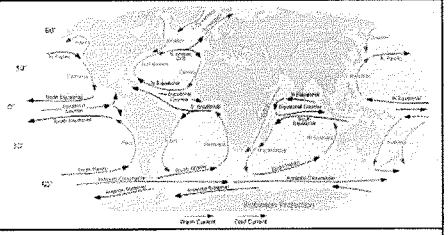


Aspect: The direction a slope faces, in the northern hemisphere, south facing slopes are warmer. In the southern hemisphere, north facing slopes are warmer.

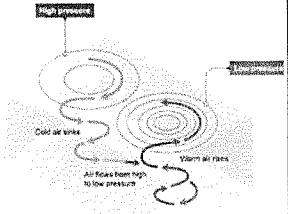
Distance from the sea:

Continentality: Oceans heat up and cool down much more slowly than land. This means coastal locations tend to be cooler in summer and warmer in winter, (in summer, sea warms up slowly / in winter takes longer to cool).

Ocean currents: The North Atlantic drift is a warm current of water that originates in the Gulf of Mexico. It keeps the West Coast of Britain much warmer in winter than other places in similar altitudes.



High pressure and low pressure



Air pressure is measured in millibars.

Standard pressure at sea level is 1013 millibars, but large areas of either high or low pressure can form.

Areas of high and low pressure are caused by rising and sinking air.

As air warms, it rises, leading to low pressure at the surface.

As air cools, it sinks leading to high pressure at the surface.

Global Atmospheric Circulation Model. Air circulates between high and low pressure belts as surface winds:

Winds are large scale movements of air caused by differences in air pressure.

Differences in air pressure are caused by differences in temperature between the equator and the poles. Winds move FROM the areas of high pressure TO the areas of low pressure.

Winds are part of global atmospheric circulation loops (or cells). These loops have warm rising air which creates low pressure belt. There are loops in each hemisphere and it works as below:

At the equator the sun warms the Earth which transfers heat to the air above causing it to rise. This creates a low pressure belt with rising air, clouds and rain.

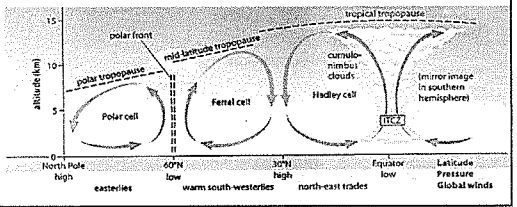
As the air rises it cools and moves out to 30 degrees north and south of the equator.

30 degrees north and south of the equator the cool air sinks, creating a high pressure belt with cloudless skies and very low rainfall.

The cool air reaches the ground surface and moves as surface winds either back to the equator or towards the poles: 60 degrees north and south of the equator, the warmer surface winds meet colder air from the poles. The warmer air is less dense than the cold air so it rises and creates low pressure.

Some of the air moves back towards the equator and the rest moves towards the poles.

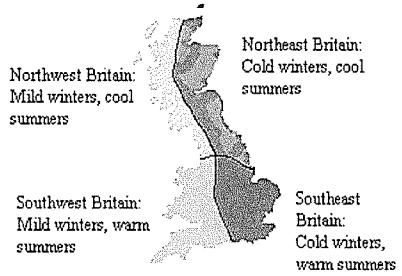
At the poles the cool air sinks and creates high pressure. The high pressure air is drawn back towards the equator as surface winds.



Factors Affecting UK Climate

Polar Maritime: Heavy rain all year, especially in winter. High altitude. There are fewer solar particles in the upper air to retain heat so the atmosphere never heats up. Prevailing winds = bring frost and dry conditions. Frontal & relief rain. **Fort William figures:** Temperature range: 9°C, Total rainfall: 2020mm, Hours of sunshine: 1100.

Polar Continental: Relatively dry all year. Cold winters. High latitude. Sun's rays have to spread out over a larger area therefore cannot heat it as much. **Aberdeen figures:** Temperature range: 11°C, Total rainfall: 640mm, Hours of sunshine: 1300.



Tropical Maritime: Rain all year, especially in winter. It is fairly warm because it has a low latitude which means the curvature of the Earth affects how much land needs to warm up. Less land needs warming – more heat to share. Frontal & relief rain.

Penzance figures: Temperature range: 10°C, Total rainfall: 1000mm, Hours of sunshine: 1600

Tropical Continental: Some rain all year – slightly more in summer. Air bring hot and dry conditions.

Margate figures: Temperature range: 14°C, Total rainfall: 540mm, Hours of sunshine: 1800.

Jet streams

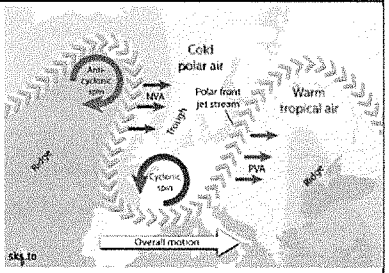
A jet stream is a narrow zone of high-speed winds. They can be thousand miles long.

They are typically found about 30,000 feet up in the atmosphere.

They are formed through large temperature differences between conflicting air masses.

The ribbons of strong winds influence global weather patterns. They help meteorologists to forecast weather.

For the UK, jet streams steer depressions off the Atlantic towards us.

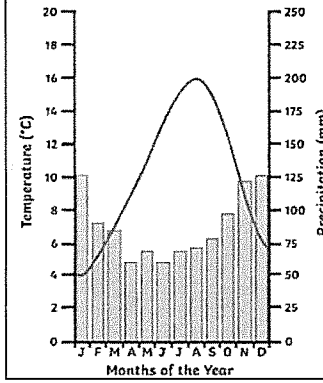


If the jet stream is North of the UK we have warm weather.

If the jet stream is South of the UK we have cold weather.

With speeds of up to 200 mph, jet streams are important to pilots because flight time and fuel use can be affected by flying with or against them. If you have ever felt that your return flight seemed quicker than on the way out - your pilot could well have flown in a jet stream.

Climate graphs



Months (time) along x-axis.

Temperature shown on line graph using y-axis, measured in °C.

Precipitation shown on bar chart using y-axis measured in mm.

Patterns identified can shown seasons, risks of drought and flooding.

UK climate graph shows fluctuating precipitation levels, ranging from 60mm in April to 125mm in December and January. Also, there is a large range in temperature from 4°C in January to 16°C in August. This data shows a warm, dry season in July and a cool, wet season in December-January.

Anticyclones – high air pressure:

Where there is high pressure caused by cooler air sinking through the atmosphere, we get large weather systems called anticyclones.

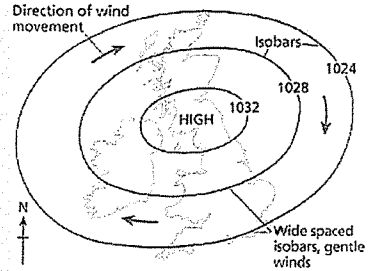
As the air is sin king, not rising, no clouds or rain are formed. This is because as the air sinks it warms, meaning it can hold

The absence of fronts means winds may be very light. So, high pressure areas are often associated with settled, dry and bright conditions.

Isobars = lines on a map with the same atmospheric pressure.

In cold conditions, anticyclones may also bring fog

In summer, anticyclones bring dry, hot weather. In winter, clear skies may bring cold nights and frost.

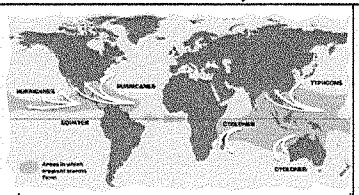


Sahel case study

- Across the Sahel's northern border (Senegal to Eritrea).
- Drought in Sahel from 1970s-2011 but some continue.
- Many causes, including blocking anticyclone. (More details on this on the desertification absolute).

Depressions - low air pressure:

They travel east – a region of lower atmospheric pressure, especially a cyclonic weather system. **Occluded front.** Cold front catches the warm front up and lifts the warm air off the ground.



Cyclone Pam case study

Background

- Vanuatu (population 272,000), 83 volcanic islands
- Gross national income = US $3,090 (LIC).
- Many forms of employment: farming, fishing and tourism. Rely on rainwater harvesting.
- Australia provided most aid. (£31.45million in 2013/2014)

Cyclone

- March 2015, Category 5 cyclone.
- Wind speed: 250km/h, some highest of 320km/h.
- Air pressure <920 millibars

Impacts

- 68% of rainwater harvesting structures damaged
- 90% of homes were damaged
- 35,000 pupils affected from school closures
- 80% of subsistence crops and cash crops were destroyed, estimated at US$2.5million
- 11 people killed

Response

- Australia, Fiji, France, New Zealand, Solomon Islands, Tonga, UK – all sent emergency aid using military aircraft and personnel.
- 21,000 people received safe drinking water supplies
- 153 temporary schools
- 20 foreign medical teams
- 95,000 people received medical care
- 19,000 children vaccinated against measles

Practice Questions

1. Explain 3 factors affecting temperature.
2. Explain the 3 types of precipitation.
3. Explain how the Global Atmospheric Circulation Model impacts air pressure across the globe.
4. Give 3 similarities or differences in high and low air pressure.
5. Explain the different weather that is created through 3 different air masses.
6. Explain how changes in the jet stream impact the UK's climate.
7. Describe the climate of the UK.
8. Define the weather system - anticyclone.
9. Define the weather system - depression.
10. Using an example you have studied, explain how an extreme weather event may be caused.
11. Using an example you have studied, explain the impacts an extreme weather event may have on different groups of people.
12. Using an example you have studied, explain how people may respond after an extreme weather event.

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Foundational Theology

Good and Evil

Exploring the origin of evil, suffering, and the goodness of God

Key Concepts

- **Evil**: The absence of good. It can be moral (caused by humans) or natural (caused by nature).
- **Suffering**: Pain or loss that harms people. It can help develop virtues like compassion.
- **Free Will**: Humans can choose right or wrong. This freedom can lead to sin.
- **Conscience**: The inner sense of right and wrong. Catholics believe it is the voice of God.

1.Origins of Evil

Where does evil come from? Why do people suffer?

Genesis 3 – The Fall

The Story

- Adam and Eve lived in the **Garden of Eden**, created by God.
- God gave them **free will** and one rule: not to eat from the **Tree of Knowledge of Good and Evil**.
- Tempted by the **serpent**, they disobeyed God and ate the fruit.
- This act is called **The Fall** – the first sin, also known as **Original Sin**.
- As a result, humans became **separated from God**, and **suffering, death, and sin** entered the world.

Catholic Interpretation

- Catholics see Genesis 3 as a **symbolic story** (a myth) that teaches **spiritual truths**.
- It explains the **human condition** – why people sin and suffer.
- Catholics believe that **Original Sin** is passed on to all humans, but it can be washed away through **Baptism**.
- The story shows the importance of **free will, temptation**, and the need for **God's grace**.
- Jesus is seen as the **"New Adam"** who came to fix what Adam broke.

Literalist (Fundamentalist) Interpretation

- Literalist Christians believe Genesis 3 is **historically and scientifically true**.
- They believe Adam and Eve were **real people**, and their actions caused a real change in the world.
- The Fall is seen as the exact moment when **sin and death** entered creation.
- This view often rejects scientific explanations like **evolution** or symbolic readings of the Bible.

St Augustine – Evil as Privation

- St Augustine taught that **evil is not a thing**, but a **privation (absence) of good**.
- God is perfectly good and only creates good things.
- Evil happens when humans **misuse their free will** and choose to turn away from God.
- This view helps explain why God allows evil – He gives humans freedom, even if they choose wrongly.

St Irenaeus & John Hick – Soul-Making

- St Irenaeus believed that God allows suffering so that humans can **grow and develop**.
- John Hick built on this idea, saying that suffering is part of a **"soul-making" process**.
- Just like an athlete trains through pain, humans become better people through challenges.
- This view sees suffering as a way to develop **virtues** like courage, patience, and compassion.

Types of Evil

Type	Description
Moral Evil	Caused by human actions (e.g. theft, violence).
Natural Evil	Caused by nature (e.g. earthquakes, illness).

2. Catholic Views on Suffering - Ambivalence

Suffering is a Mystery

- Catholics believe that suffering is part of the human experience, but its full meaning is often **beyond human understanding**.
- The story of **Job** in the Bible shows that even good people suffer, and that we may not always know why.
- Catholics trust that **God can bring good out of suffering**, even if we don't see it at the time.

Jesus' Suffering Had Purpose

- Jesus suffered and died on the cross to **save humanity from sin**.

- His suffering is known as the **Passion**, and it shows that God understands human pain.
- Catholics believe that Jesus' suffering was an act of **love and sacrifice**, and it gives meaning to their own suffering.

Suffering as a Blessing

- Suffering can help people grow in **virtue**, such as patience, compassion, and courage.
- It can be a **sign of love** – when people suffer for others, they show deep care and commitment.
- Catholics believe that suffering can be a **proof of faith** – staying faithful to God even in hard times shows true belief.

3. Catholic Responses to Suffering

How Catholics respond to pain, illness, and hardship

Following Jesus' Example

- Jesus spent much of His life **helping the sick, the poor, and the suffering**.
- Catholics are called to do the same by showing **compassion, kindness, and support**.
- This includes **visiting the sick**, **comforting the grieving**, and **standing up for the vulnerable**.

Spiritual Support

- Catholics offer **prayers** for those who are suffering, both privately and during Mass.
- They may pray for healing, strength, or peace.
- **Praying the Rosary**, especially the **Sorrowful Mysteries**, helps Catholics reflect on Jesus' own suffering.

Sacraments and Care

- The **Anointing of the Sick** is a special sacrament for those who are seriously ill or near death.
    - It brings **spiritual healing**, **forgiveness of sins**, and **peace**.
- **Palliative care** is supported by the Church as a way to relieve pain while respecting the dignity of life.

Charity and Action

- Catholics support charities like **CAFOD** and **SVP**, which help those in need.
- Acts of charity are seen as a way to **serve Christ in others** (Matthew 25:40).
- Helping others is not just kind – it's a **moral duty** for Catholics.

Finding Meaning in Suffering

- Many Catholics believe that suffering can have **spiritual value**.
- It can bring people **closer to God**, help them grow in **virtue**, and unite them with **Jesus' suffering**.
- Suffering is not seen as pointless – it can be **offered up** as a prayer or sacrifice.

4. The Inconsistent Triad – J.L. Mackie

A philosophical challenge to belief in an all-powerful, all-loving God

The Three Claims

Claim	Challenge
God is all-powerful	So He has the ability to stop evil and suffering.
God is all-loving	So He would want to stop evil and suffering to protect His creation.
Evil exists	So either God is not all-powerful, not all-loving, or does not exist at all.

Why Is It a Problem?

- If God is omnipotent, He can stop evil.
- If God is omnibenevolent, He wants to stop evil.
- But evil and suffering exist in the world.
- Therefore, one of the three claims must be false – they cannot all be true at the same time.

Mackie's Conclusion

- Mackie argued that the existence of evil makes belief in the traditional Christian God logically inconsistent.
- He believed that if God were real, evil should not exist.
- This is known as the problem of evil and is a major challenge to religious belief.

5. Catholic Social Teaching (CST)

How Catholics are called to live out their faith in the world

Imago Dei – The Foundation of CST

- CST is based on the belief that all humans are made **Imago Dei** – in the image and likeness of God.
- This means every person has **infinite dignity, worth,** and **rights.**
- Because of this, the Church teaches that we must treat all people with **respect, compassion, and fairness.**

Working for Peace, Justice, and Reconciliation

- **Peace:** The Church teaches that peace is more than the absence of war – it is about right relationships and justice.
- **Justice:** Catholics are called to challenge injustice and stand up for the oppressed.
- **Reconciliation:** True peace comes through forgiveness and healing after conflict.

Key Principles of Catholic Social Teaching

Principle	Meaning
Human Dignity	Every person is sacred and must be respected.
The Common Good	Society should be organised so that all people can flourish.
Solidarity	We are one human family and must stand together, especially with the poor.
Subsidiarity	Decisions should be made at the most local level possible.
Option for the Poor	The needs of the poor and vulnerable must come first.
Stewardship	We must care for creation and protect the planet for future generations.

Charities That Live Out CST

Charity	What They Do
CAFOD *(Catholic Agency for Overseas Development)*	Works globally to fight poverty, respond to emergencies, and promote justice.
SVP *(St Vincent de Paul Society)*	Supports people in the UK through home visits, food banks, and practical help.

Sources of CST

- **Gaudium et Spes** (Vatican II): Teaches that the Church must engage with the modern world and promote justice.
- **Papal Encyclicals**: Letters from Popes, like *Laudato Si'* (Pope Francis), which call for care of creation and action on climate change

6. Working for Peace and Justice

Living out Catholic values in the world

Peace

- Peace is more than the absence of war – it means **living in harmony** with others.
- Catholics are called to be **peacemakers**, following Jesus' teaching: *"Blessed are the peacemakers"* (Matthew 5:9).
- Peace is promoted through:
    - **Prayer** – especially during Mass, where Catholics offer the **Sign of Peace**.
    - **Action** – supporting refugees, opposing war, and promoting non-violence.
    - **Community support** – helping those affected by conflict or injustice.

Justice

Justice means **giving everyone what they are due** – fairness, dignity, and rights.

- Inspired by **Imago Dei**, Catholics believe all people deserve equal treatment.
- The Church teaches that **true peace cannot exist without justice** (*Gaudium et Spes*).
- Catholics fight against:
    - **Discrimination**
    - **Poverty**
    - **Unfair treatment of the vulnerable**

Reconciliation

- Reconciliation means **healing broken relationships** – between individuals, communities, or nations.
- Jesus taught the importance of forgiveness, as seen in the **Parable of the Forgiving Father**.
- The Church promotes reconciliation through:
    - **Dialogue** and **interfaith cooperation**
    - **Forgiveness** and **restorative justice**
    - **Charities** and **peace-building organisations** like **Pax Christi**

7. Moral Authority

How Catholics decide what is right and wrong

Natural Moral Law (NML)

A Catholic guide to right and wrong based on reason and purpose

What is Natural Moral Law?

- Developed by **St Thomas Aquinas**, a Catholic philosopher and theologian.
- Teaches that there are **universal moral laws** that apply to **all people**, in **all places**, at **all times**.
- These laws are part of **God's eternal law**, but they can be **discovered through human reason**, not just religion.
- Aquinas believed that by using our **intellect and conscience**, we can know what is right and wrong.

The Five Primary Precepts

Aquinas taught that all humans naturally aim to do good and avoid evil. The five basic rules (precepts) that guide moral behaviour are:

1. **Preserve life** – protect and value human life.
2. **Reproduce** – continue the human race.
3. **Educate children** – help the next generation grow in knowledge and virtue.
4. **Live in an ordered society** – follow laws and promote peace.
5. **Worship God** – show gratitude and respect to the Creator.

How It Works

- If an action **supports** one or more of the precepts, it is considered **morally good**.
- If an action **goes against** a precept, it is considered **morally wrong**.
- Example: **Helping the poor** supports human dignity and ordered society → good.
- Example: **Murder** goes against preserving life → wrong.

Virtues and Suffering

How suffering helps Catholics grow in goodness

What Are Virtues?

- **Virtues** are **positive qualities** or habits that help people do good and live morally.
- Examples include:
    - **Kindness**
    - **Patience**
    - **Courage**
    - **Compassion**
    - **Generosity**

How Are Virtues Developed?

- Catholics believe that virtues are **not automatic** – they are developed through **life experiences**, especially **suffering**.
- Suffering can:
    - Teach **empathy** and **compassion** for others.
    - Help people become more **generous** and **selfless**.
    - Encourage **reflection** and **spiritual growth**.

Virtues vs. Vices

- **Vices** are the opposite of virtues – they are **selfish or harmful traits** (e.g. greed, pride, laziness).
- Developing virtues helps people **overcome vices** and become more like **Jesus**.
- Catholics believe that **suffering can be meaningful** if it leads to personal growth and deeper faith.

Example

- Someone who suffers from illness may become more **understanding** of others who are sick.
- Someone who has experienced poverty may become more **generous** and **supportive** of the poor.

Conscience

The inner guide to right and wrong

What Is Conscience?

- The **conscience** is the **inner sense** of what is right and wrong.
- It helps people make **moral decisions** and guides their actions.
- Catholics believe the conscience is the **voice of God** speaking within us.

Catholic Teaching

- **St Paul** said the moral law is **"written on our hearts"** (Romans 2:15), meaning we naturally know what is right.
- The **Catechism of the Catholic Church** teaches that we must always follow our conscience, but we also have a duty to **form it properly** through prayer, Scripture, and Church teaching.

Two Parts of Conscience

1. **Knowledge** – Understanding what is right and wrong.
2. **Action** – Choosing to do what is right.

- When these are **out of balance**, we experience **guilt**.
- Guilt is a sign that we have gone against our conscience and need to reflect and possibly seek forgiveness.

Why It Matters

- A well-formed conscience helps Catholics:
  - Make good moral choices.
  - Avoid sin.
  - Grow in virtue.
  - Live in harmony with God and others.

Jesus as Moral Authority

The perfect example of how to live a good and holy life

Why Jesus?

- Catholics believe Jesus is both **fully human and fully divine**.
- His life and teachings show the **perfect model** of love, mercy, and justice.
- Jesus' moral authority comes from His **divine nature** and His **example of selfless love**, especially shown in His death and resurrection.

The Sermon on the Mount (Matthew 5–7)

Jesus' most famous teaching, which includes:

The Beatitudes

Blessings for those who are often overlooked or suffering:

- "Blessed are the poor in spirit..."
- "Blessed are those who mourn..."
- "Blessed are the meek..."
- "Blessed are those who hunger and thirst for righteousness..."

These show that **God values humility, mercy, and justice**.

The Golden Rule

- **"Love your neighbour as yourself"** (Matthew 7:12)
- Encourages **empathy**, **kindness**, and **respect** for all people.

The New Law

- Jesus **deepens the Old Testament laws**:
    - "You have heard it said, 'Do not kill' – but I say, do not even be angry."
    - "You have heard it said, 'Do not commit adultery' – but I say, do not even look with lust."

This shows that **intentions matter**, not just actions.

Key Message

- Jesus teaches that **true morality comes from the heart**.
- Catholics are called to **follow His example**, not just follow rules.

B3 – Infection and Response

1. Definitions

Communicable	A disease that can be transmitted (spread). E.g. chicken pox, common cold and HIV.
Non-communicable	A disease that cannot be transmitted. E.g. cancer, diabetes and heart disease.
Pathogen	A micro-organism which can cause disease. They are bacteria, viruses, fungi and protists.
Antigen	A molecule found on the surface of cells, including pathogens, that triggers an immune response in the body
Antibody	Produced by white blood cells in response to an antigen
Antitoxin	Produced by white blood cells to neutralise toxins
Phagocyte	A type of white blood cell that engulfs and ingest pathogens (phagocytosis)
Lymphocyte	A type of white blood cell that produces antibodies
Immune	When a body is not affected by a pathogen
Vaccination	Using a vaccine (an inactive form of a pathogen) to create immunity
Antibiotic	Drug that kills bacteria
Painkiller	Drug that stops pain
Placebo	Drug which does not contain the active ingredient
Risk factor	Something that increases the likelihood of developing a disease or condition
Causal mechanism	A factor that has been found to cause a change in another factor

2. Health

Health is the state of physical and mental wellbeing.

Causes of ill health:

- Communicable diseases
- Non-communicable diseases
- Poor diet
- Stress and life situations

Different types of disease may interact:

- Defects in the immune system mean that an individual is more likely to suffer from infectious diseases.
- Viruses living in cells can be the trigger for cancers, e.g. HPV can trigger cervical cancer
- Immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma.
- Severe physical ill health can lead to depression and other mental illness.

3. Communicable Diseases

Disease	Pathogen	Symptoms	Spread by	Prevention	Treatment
Measles	Virus	Red rash and fever	Breathing in droplets from coughs/sneezes	Vaccination	No cure – only management of symptoms
HIV	Virus	Flu-like symptoms, develops into AIDS	Bodily fluids e.g. blood or sexual contact	Using barrier protection, e.g. condoms	Antiretroviral drugs
Tobacco Mosaic Virus (plants)	Virus	'Mosaic' pattern of discolouration on the leaves reduces photosynthesis and growth	Direct contact between infected and healthy plants, or via contaminated tools, clothing, or hands	Destroy infected plants	No treatment
Salmonella	Bacteria	Fever, cramps, vomiting, diarrhoea	Contaminated food	Vaccinating poultry, cooking food thoroughly	Antibiotics or management of symptoms
Gonorrhoea	Bacteria	Yellow/green discharge, pain when urinating	Sexual Contact	Using barrier protection, e.g. condoms	Antibiotics
Rose Black Spot (plants)	Fungus	Black spots on leaves. Reduces photosynthesis	Wind or water	Remove and destroy infected leaves	Fungicides
Malaria	Protist	Recurrent episodes of fever	Insect bites (mosquitoes)	Mosquito nets, insect repellent, preventing mosquitos breeding	Antimalarial drugs

Bacteria may produce poisons (toxins) that damage tissues and make us feel ill.
Viruses live and reproduce inside cells, causing cell damage.

4. Antibiotics and Painkillers

Antibiotics - kill bacteria (a specific antibiotic is used for a specific bacteria) THEY DO NOT KILL VIRUSES e.g. penicillin

Antibiotics cannot kill viruses because viruses live inside cells

Painkillers - stop pain (don't kill microbes, just help with symptoms) e.g. paracetamol

5. Discovery of Drugs

Traditionally drugs were extracted from plants and micro-organisms.

Most new drugs are synthesised by chemists in the pharmaceutical industry.

- Digitalis- heart drug- originated from foxgloves
- Aspirin- painkiller- originated from willow
- Penicillin- antibiotic- originated from *Penicillium* mould (discovered by Alexander Fleming)

6. Development of Drugs

Testing for:

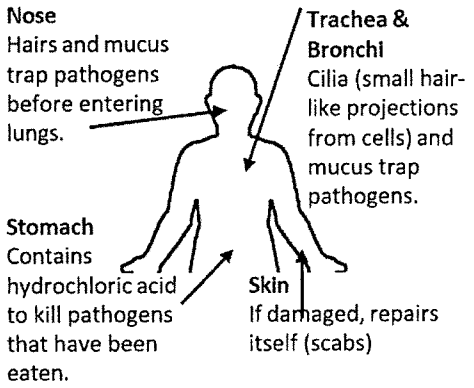
- Side-effects (is it safe?)
- Efficacy (does it work?)
- Dosage (how much is needed?)

Stage		Description
1	preclinical	Tested on cells and tissues. Side effects? Efficacy?
2		Tested on animals. Side effects?
3	clinical	Tested on humans. Dosage gradually increased up to optimum. • 1st on healthy volunteers, Side effects? • 2nd on patients with the illness. Efficacy? Dosage?

In double blind-trials some patients are given a placebo (a drug which does not contain the active ingredient). Neither the patient or observer knows whether they have been given the drug or the placebo.

7. Human Defence Systems

Non- specific defence system:



Specific defence system:

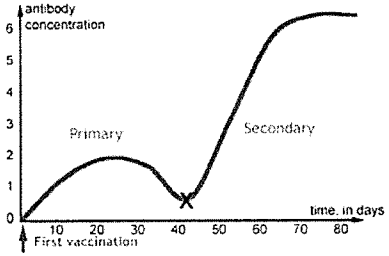
If a pathogen enters the body the immune system tries to destroy the pathogen.

White blood cells help to defend against pathogens by:

- Phagocytosis – engulfing the pathogen
- Producing antibodies – specific to the antigen
- Producing antitoxins – to neutralise toxins

8. Vaccination

1. Inject a small quantity of an inactive form of the pathogen into the body. This pathogen will have antigens on its surface.
2. White blood cells are stimulated to produce antibodies which are complementary to the antigens.
3. The antibodies bind to the antigens and cause the pathogens to clump together.
4. Phagocytes engulf the pathogens.
5. Memory cells are produced.
6. If the same pathogen now enters the body, the white blood cells can respond quickly and prevent infection - the person is now **immune**. They make MORE of the SPECIFIC antibodies, MORE QUICKLY, and they stay in body for LONGER.



9. Disease Risk Factors

Risk factors increase the chance of a disease. A causal mechanism has been proven for some risk factors, but not in others. Many diseases are caused by the interaction of a number of factors:

- Diet, smoking and exercise affect cardiovascular disease.
- Obesity is a risk factor for Type 2 diabetes.
- Alcohol can affect liver and brain function.
- Smoking can cause lung disease and lung cancer.
- Smoking and alcohol can affect the development of unborn babies.
- Carcinogens, including ionising radiation, are risk factors in cancer.

10. Cancer

Cancer is caused by a random mutation which changes cells, leading to uncontrolled growth and division.

Benign tumours are growths of abnormal cells which are contained in one area, usually within a membrane. They do not invade other parts of the body.

Malignant tumours are cancers. They invade neighbouring tissues and spread to different parts of the body in the blood where they form secondary tumours.

Scientists have identified lifestyle risk factors for various types of cancer. There are also genetic risk factors for some cancers.

B5 – Homeostasis and Response

1. Definitions

Keyword	Definition
Stimulus	Change in environment
Receptor	Cells which detect the stimulus
Sensory neurone	Carries the electrical impulse from the receptor to the CNS (brain/spinal cord)
Relay neurone	Allows electrical impulse to travel between the sensory neurone and the motor neurone
Motor neurone	Carries the electrical impulse from the coordinator to the effector
Effector	Muscle or gland which carries out the response
Coordinator	Receives and processes information e.g. brain, spinal cord or a gland
Gland	Organ which secretes a hormone
Hormone	A chemical messenger that travels in the blood
Endocrine system	Consists of the different glands that secrete hormones
Nervous system	Consists of neurones and the CNS (central nervous system – the brain and spinal cord)

2. Homeostasis

Homeostasis is the regulation of the internal conditions of a cell or organism to maintain optimum conditions for cell/enzyme function in response to internal and external changes.

Processes controlled by homeostasis include:

- Blood glucose concentration
- Body temperature
- Water levels

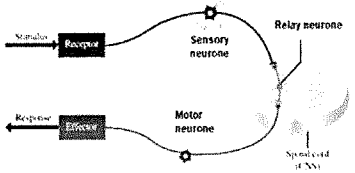
3. Nervous system

- The nervous system enables humans to react to their surroundings and to coordinate their behaviour.
- Messages are passed through neurones as electrical impulses.

Conscious action – involves the brain.
Stimulus -> receptor cells -> sensory neurone -> coordinator -> motor neurone -> effector -> response.

Reflex actions - automatic and rapid, to protect you from harm. Does not include the brain.

Stimulus -> receptor cells -> sensory neurone -> relay neurone -> motor neurone -> effector -> response



4. Synapse

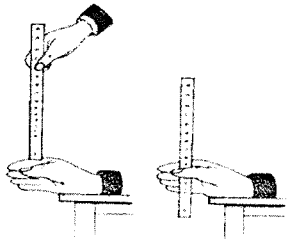
1. An electrical impulse travels along
2. This triggers the nerve-ending of a neuron to release chemicals called **neurotransmitters.**
3. These chemicals **diffuse** across the synapse and bind with **receptor molecules** on the membrane of the next neuron.
4. The chemicals bind to the specific receptors on the next neuron. This **stimulates** the second neuron to transmit the electrical impulse.

5. Reaction Time Required Practical

An increased reaction time means that it will take you longer to react to a situation.
Reaction times can be measured using the ruler drop test.

1. Person A holds out hand with a gap between thumb and finger
2. Person B holds ruler with the zero at the top of person A's thumb
3. Person B drops ruler without telling Person A and Person A must catch it
4. The distance on the ruler level with the top of person A's thumb is recorded
5. Repeat this ten times.
6. Repeat steps 1-5 after a factor has been changed
7. Use conversion table to convert ruler measurements into reaction time.

Independent variable: (one of these)
Caffeine consumption
Hours of sleep
Alcohol consumption
Amount of practice



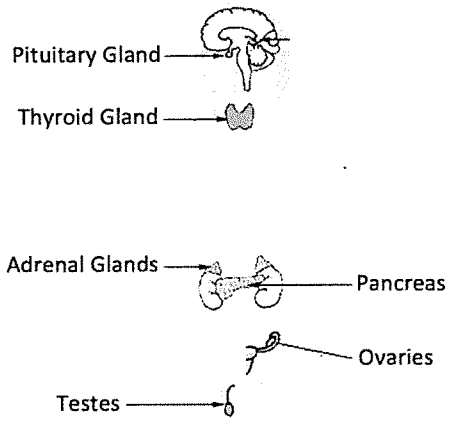
Dependent variable:
Distance on the ruler

Control variables:
distance above the hand, distance between finger and thumb, hand used (dominant or non-dominant, any of the independent variables except the one being changed.

A computer reaction test could be used as an improvement.

6. Hormones

Endocrine system consists of **glands** which secrete chemicals messengers called **hormones** directly into the bloodstream.



Name of gland	Hormone released	Function of hormone
Pituitary	'master gland'- several hormones	Stimulate other hormones to be released
Pancreas	Insulin	Controls blood glucose concentration
Thyroid	Thyroxine	Controls metabolism
Adrenal	Adrenaline	Fight or flight/ coping with stress
Ovaries	Oestrogen	Controls female sexual characteristics
Testes	Testosterone	Controls male sexual characteristics

7. Comparing Nervous and endocrine systems

	Nervous system	Endocrine system
How are the messages carried?	Nerve impulses which are electrical signals	Hormones which are chemical signals
Target	Carried by nerves to specific locations, e.g. muscle.	Carried in blood to all organs but affects the target organ only.
Response	Rapid and precise	Slower but acts for longer

10. Blood glucose

Blood glucose concentration goes too high:	Blood glucose concentration goes too low **(HIGHER ONLY)**:
• Pancreas detects high glucose concentration • Pancreas releases insulin • Increased uptake of glucose from blood into cells • Insulin converts glucose into glycogen, in the liver & muscles • Blood glucose concentration decreases back to normal	• Pancreas detects low glucose concentration • Pancreas releases glucagon • Glucagon converts glycogen back into glucose, in the liver & muscles • Glucose released into blood • Blood glucose concentration increases back to normal

8. Negative feedback (HIGHER ONLY)

Negative feedback is when the release of something brings the levels back towards acceptable levels, it maintains a steady state.

E.g. if blood glucose increases, insulin is released to bring blood glucose back towards the normal range.

9. Adrenaline and Thyroxine (HIGHER ONLY)

Adrenaline is produced by the adrenal glands.

- It is produced in times of fear or stress.
- It increases heart rate to ensure more oxygen and glucose to the brain and muscle cells to prepare for the 'fight or flight' response. It is not controlled by negative feedback.

Thyroxine is produced by the thyroid gland.

- It is involved in regulating metabolic rate and growth and development. It is controlled by negative feedback.

11. Diabetes

Diabetes is when the body cannot control blood glucose concentrations.

	Type 1 diabetes	Type 2 diabetes
Cause	No insulin made by the pancreas	Insulin is made but the liver and muscle cells no longer respond
Treatment	Insulin injections Pancreas transplant	A carbohydrate-controlled diet, exercise, losing weight
Risk factors	Family history (genetics)	Obesity, lack of exercise, sugary diet
When it develops	Childhood	Adults over 45

12. Puberty

Females – Oestrogen is produced in the ovary. At puberty, eggs begin to mature, and one is released approximately every 28 days. This is called ovulation.

Males – Testosterone is produced by the testes. It stimulates sperm production.

13. Reproductive Hormones & the Menstrual Cycle

Menstrual cycle	***Follicle stimulating hormone (FSH)***	Released from the pituitary	Causes an egg to mature in the ovary.	**(HIGHER ONLY)** FSH stimulates ovaries to produce oestrogen.
	Luteinising hormone (LH)	Released from the pituitary	Stimulates release of an egg (ovulation)	**(HIGHER ONLY)** Oestrogen stops FSH production and stimulates LH production in pituitary gland.
	Oestrogen and progesterone	Released from the ovary	Maintain uterus lining, for implantation	

15. Treating infertility

FSH and LH can be given as a fertility drug to woman, so she is able to naturally conceive (become pregnant). This increases the number of eggs released and so there is more chance of fertiisation.

If this method is unsuccessful, a couple may choose to have IVF (in vitro fertilisation).

IVF Process

1. FSH and LH are given to the woman, to stimulate egg maturation
2. The eggs are collected from the mother and fertilised by the father's sperm, in the laboratory
3. The fertilised eggs develop into embryos
4. One or two embryos are inserted into the mother's uterus

Disadvantages of IVF: it is emotionally and physically stressful, the success rates are not high and decrease with age, it can lead to multiple births which are a risk to both the babies and mother, many embryos that are not used are destroyed

14. Contraception

Contraception	Hormonal?	How it works	Advantages	Disadvantages
Oral contraceptives (the pill)	Hormonal	Contain hormones to inhibit FSH production so that no eggs mature.	Very effective	Must remember to take every day. Can have side effects. No STI protection
Injection, implant	Hormonal	For slow release of progesterone to inhibit the maturation and release of eggs for months or years.	Long lasting. Don't have to remember to take every day.	No protection from STIs. Can have side effects. Implant needs minor surgery.
Barrier methods (condom, diaphragm)	Non-hormonal	Prevent the sperm coming into contact with the egg	Very effective. Protects against STIs	Unreliable if not used properly
Intrauterine devices	Hormonal	Prevent implantation of an embryo or release a hormone.	Long lasting (up to 5 years)	Side effects such as heavy periods Needs to be fitted by doctor or nurse. No STI protection
Spermicidal agents	Non-hormonal	Kill/disable sperm	Effective if used with barrier methods	No protection from STIs
Abstaining	Non-hormonal	Avoiding intercourse during the ovulation period	Natural form of contraception	Not very reliable.
Sterilisation	Non-hormonal	Sperm ducts or oviducts cut so that sperm or eggs cannot be released	Almost 100% effective. Permanent.	Difficult or impossible to reverse. Needs an operation. No STI protection.

C3 knowledge organiser (F tier need to do boxes 1-6 and 12 only)

1. Conservation of mass

Conservation of mass states atoms cannot be created or destroyed

Mass of reactants = mass of products

In other words, if we have 150g of reactants, we will form 150g of products

Example:

$2KBr + Cl_2 \rightarrow 2KCl + Br_2$

20g 15g 22g x

Calculate mass of x

Mass of reactants = 20 + 15 = 35g

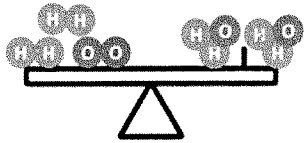
Mass of products = 22 + x

Mass of products must equal 35g due to conservation of mass so x = 35 -22 = 13g

2. Balancing symbol equations

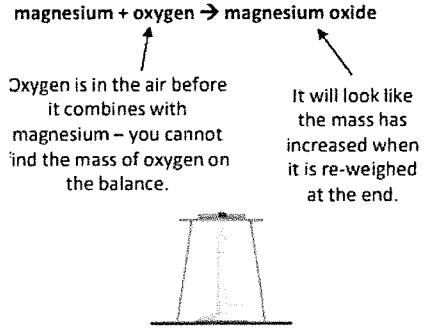
- The formula $MgCl_2$ tells us that there is 1 Mg atom and 2 Cl atoms in the compound
- If we have $2MgCl_2$ there are now 2 Mg atoms and 4 Cl atoms
- The formula Al_2O_3 tells us that there are 2 Al atoms and 3 O atoms in the compound
- If we have $3Al_2O_3$ there are (3x2) 6 atoms of Al and (3 x 3) 9 O atoms
- When balancing symbol equations numbers can **only be put in front** of formula

$2H_2 + O_2 \rightarrow 2H_2O$



3. Mass changes

- Mass is always conserved in a reaction
- Sometimes it may seem like the mass has increased or decreased after the reaction
- If a reactant is a gas – reactants mass appears to increase
- If product is a gas – products mass appears to decrease if gas escapes into the atmosphere

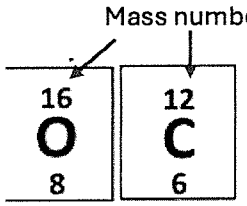


4. Relative formula mass

How to calculate relative formula mass:

- **Add** up all the **mass numbers** of the elements in the compound
- If there are 2 or more atoms of the same element the mass number needs to be multiplied by the number of atoms before added
- For example:

Calculate the relative formula mass of CO_2



12 + (16 x 2) = 44

↑ Mass of 1 C atom

↑ 2 Oxygen atoms so mass number of O x 2

5. Calculating percentage of an element in a compound

Learn equation:

$$\frac{\text{Mass of element in compound}}{\text{Total mass of compound}} \times 100$$

Use mass numbers from periodic table and multiply by how many atoms there are in the formula

Example: find the percentage mass of chlorine in $MgCl_2$ (A_r of Mg = 24, A_r of Cl = 35.5)

$$\frac{35.5 \times 2}{24 + (35.5 \times 2)} \times 100 =$$

Notice as there are 2 Cl's in the compound the mass of Cl is multiplied by 2 on the top line

6. Chemical Measurements

Accurate: a measurement close to the true value

Precise: a measurement where there is very little spread about the mean value.

Resolution: the smallest change in the quantity being measured of a measuring instrument

Range: difference between the highest and lowest measurement taken

Uncertainty: calculated by range / 2

Random error: are present when any measurement is made and cannot be corrected. The effect of random errors can be reduced by repeating the experiment and calculating a mean.

Systematic error: These cause readings to differ from the true value by a consistent amount each time a measurement is made.

Zero error: measuring equipment gives a false reading when the true value of a measured quantity is zero

7. Moles (Higher only)

- Chemical amounts are measured in moles.
- The symbol for the unit mole is mol.
- The mass of one mole of a substance in grams is numerically equal to its relative formula mass.
- One mole of a substance contains the same number of the stated particles, atoms, molecules or ions as one mole of any other substance.
- The number of atoms, molecules or ions in a mole of a given substance is the Avogadro constant.
- The value of the Avogadro constant is 6.02×10^{23} per mole.
- Iron has a mass number of 56, so 1 mole of iron is 56 g and contains 6.02×10^{23} atoms of iron

Can calculate moles using the equation:

Moles = mass in grams of substance / relative formula mass

8. Mole ratios (higher only)

- If we take a balanced symbol equation it shows how many moles of each reactant are needed to make a certain number of moles of product
- Mole ratios are obtained using the big numbers in front of the chemical formula to balance the equation

For example – for the reaction:

$Mg + 2HCl \rightarrow MgCl_2 + H_2$

The equation shows that one mole of magnesium (Mg) reacts with two moles of hydrochloric acid (HCl) to produce one mole of magnesium chloride ($MgCl_2$) and one mole of hydrogen gas (H_2)

9. Calculating mass of product made from mass of reactant (higher only)

Steps to follow:

1. Calculate relative formula mass of compound you are given the mass in grams of in the exam question
2. Calculate the number of moles of this compound
3. Identify the mole ratio of this reactant and the product specified in the exam question
4. Deduce number of moles of product using mole ratio in balanced symbol equation
5. Calculate relative formula mass of product (one specified in exam question)
6. Calculate mass in grams of product by multiplying it's moles and it's relative formula mass

10. Calculating moles to balance equations (Higher only)

The balancing numbers in a symbol equation can be calculated from the masses of reactants and products by converting the masses in grams to amounts in moles and converting the numbers of moles to simple whole number ratios

Example:

170g of $NaNO_3$ was thermally decomposed to form 138g of $NaNO_2$ and 32g of O_2. Deduce the balanced equation for the reaction

Action			
Write the formulae of the substances	$NaNO_3$	$NaNO_2$	O_2
Calculate the amount of moles of each	170/85 = 2	138/69 = 2	32/32 = 1
Divide both by the smaller amount	2/1 = 2	2/1 = 2	1/1 = 1

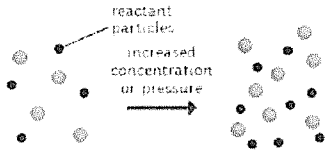
Final answer: $2\ NaNO_3 \rightarrow 2\ NaNO_2 + O_2$

11. Limiting Reactants (higher only)

- A chemical reaction ends once one of the reactants is used up
- The **limiting reactant** is the one that is **completely used up** in a reaction. This determines how much product is made
- The other reactant is then in excess
- To determine the limiting reactant you need to look at mole ratios between the reactants and work out which reactant you have not got enough moles of to react

12. Concentration of solutions

- Concentration is a measure of the mass of solute in a volume of liquid (solvent)
- The higher the concentration, the more particles of a substance are present in the liquid



Concentration is calculated using the equation:

Concentration = mass of solute in grams / volume in dm^3

To convert cm^3 to dm^3 you need to divide by 1000

Eg $25cm^3 = 0.025dm^3$

- Unit of concentration is g/dm^3

4.9 Chemistry of the Atmosphere

1. Earth's early atmosphere

Main gas in Earth's early atmosphere was carbon dioxide due to the surface of the Earth being covered in volcanoes. There was no oxygen.

Name of gas	How changed over time	Reasons for changes
Carbon dioxide	decreased	• Plants evolved and use carbon dioxide for photosynthesis • Carbon dioxide dissolved in the oceans when they formed (due to water vapour cooling and condensing) • Carbon dioxide gets locked up in sedimentary rocks
oxygen	increased	• Plants evolved and carry out photosynthesis which produced oxygen
Nitrogen	Increased	• Ammonia reacts with oxygen to produce nitrogen

2. Composition of Earth's atmosphere today

Gas	*Percentage*
Nitrogen	***78%***
Oxygen	***21%***
Argon	***0.93%***
Carbon dioxide	***0.04%***

3. Greenhouse effect

Names of greenhouse gases	Causes of these gases
Carbon dioxide	Burning of fossil fuels, deforestation
Methane	Raising livestock, using landfills

Based on **peer-reviewed evidence**, many scientists believe that human activities will cause the temperature of the Earth's atmosphere to increase at the surface and that this will result in global climate change.

What is the greenhouse effect?

Short wave radiation from the Sun enters the atmosphere, it is absorbed by the Earth and re-emitted as long wave radiation however the greenhouse gases prevent all this radiation escaping back to space causing the temperature of Earth to increase

4. Effects of climate change - An increase in average global temperature is a major cause of climate change

- Ice caps melt which causes sea levels to rise
- Extreme weather events such as severe storms
- More flooding and more droughts

5. Atmospheric pollutants

Released when fuels undergo complete or incomplete combustion

Name of pollutant	Effects of pollutant
Carbon dioxide	Greenhouse gas Leads to climate change
Carbon monoxide (produced as a result of incomplete combustion)	Toxic gas
Sulphur dioxide	Acid rain Respiratory problems in humans
Nitrous oxides (produced when nitrogen reacts with oxygen in the air at high temperatures)	Acid rain Respiratory problems
Particulates / soot (produced as a result of incomplete combustion)	Global dimming Health problems for humans

6. Carbon footprint

The carbon footprint is the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event. The carbon footprint can be reduced by reducing emissions of carbon dioxide and methane.

7. Relevant equations for topic

Photosynthesis: carbon dioxide + water ⟶ glucose + oxygen

Complete combustion: fuel + oxygen ⟶ carbon dioxide + water

Incomplete combustion: fuel + oxygen ⟶ carbon monoxide + water

Forming sulphur dioxide: sulphur (impurity in coal) + oxygen ⟶ sulphur dioxide

Forming nitrous oxides: nitrogen + oxygen ⟶ nitrous oxides

(reaction **only** occurs at high temperatures)

P6 Waves

Box 1: Definitions to learn

Definitions

Transverse – Oscillations (vibrations) are perpendicular to the direction of wave travel

Longitudinal – Oscillations are parallel to the direction of wave travel

Time Period – Time taken for 1 complete wave

Frequency – Number of waves per second.

Wavelength – Distance from a point on a wave to the same point on the next wave

Amplitude – Maximum displacement of a point on a wave from its undisturbed position.

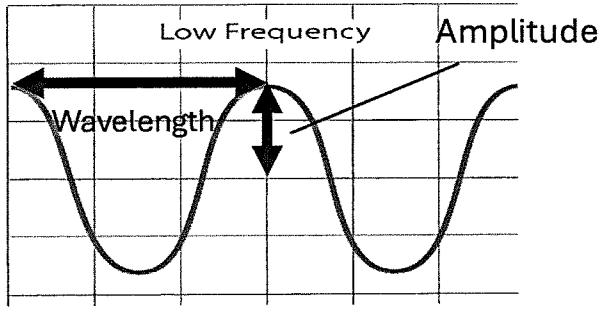
Absorb – Transfer all energy

Transmit – Pass through

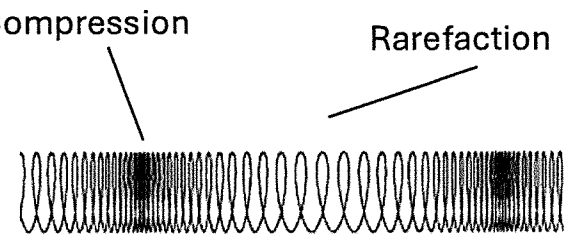
Reflect – Bounce off

Refract – Change direction when changing medium.

Box 2: Transverse Wave



Box 3: Longitudinal wave



Box 4: Ripple tank **(Required Practical)**

Frequency

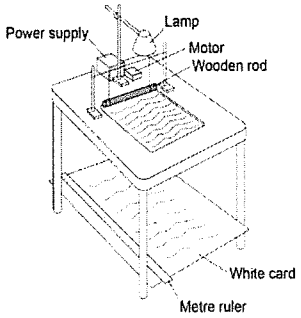
Count the number of waves passing a certain point in 10 seconds and divide by 10.

Wavelength

Measure the distance between 5 wave peaks. Divide by 5 to find a mean.

Wave Speed

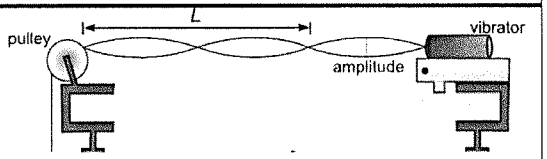
Use the wave equation to calculate the speed from frequency and wavelength.



Box 5: Waves on a string **(Required Practical)**

Measure L for Wavelength using a ruler

Frequency given by vibration generator

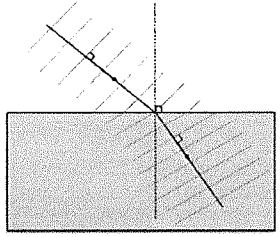


Box 6: Refraction

Refraction Explanation

One side of the wavefront changes speed when it enters the new substance.

This causes the wave to change direction.



Box 7: Key wave information

Waves transfer energy without transferring matter.

Light is a transverse wave

Sound is a longitudinal wave

Units:

Wavelength: m

Frequency: Hz

Wave Speed: m/s

Time Period: s

P6 Waves

Box 8: Electromagnetic spectrum

Gamma Rays	**X Rays**	**Ultraviolet**	**Visible Light**	**Infrared**	**Microwaves**	**Radio Waves**
Short Wavelength →						Long Wavelength
High frequency →						Low Frequency
Radiotherapy	X-Rays	Sunbeds	Fibre Optics	Thermal Cameras	Satellite Communication	TV and Radio

Box 9: Electromagnetic spectrum key information

All EM Waves:

Transfer energy – (Infra-red is radiated heat)

Travel at the same speed – The speed of light

Are transverse

Dangers

Gamma and X rays: Ionising radiation that can lead to **mutation of genes** and **cancer**.

Ultraviolet: **Premature skin ageing** and **skin cancer**

Different Substances (Higher Tier)

Depending on wavelength, different substances will absorb, transmit or reflect different EM waves.

Box 10: How do radio waves produce an electrical current?

(Higher Tier)

A conductor with an Alternating Current will emit radio waves. When a conductor absorbs radio waves, it creates an AC with the same frequency as the wave,

Box 11: Leslie Cube **(Required Practical)**

Independent variable - colour of the surface.

Dependent variable - change in temperature of the water inside the can.

Control variable:

Volume of the water - it would take a greater change in energy to change the temperature of the water if there was more water.

1. Fill a Leslie cube with boiling water.
2. Using an infrared detector, measure the infrared radiation being emitted from each of the four sides of the Leslie Cube

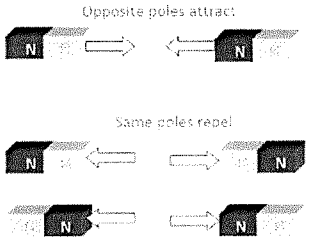
P7 - Magnetism

Box 1 – Introduction to magnets

The poles of a magnet are the places where the magnetic forces are strongest.

When two magnets are bought together they exert a force on each other:

- Like poles (N,N / S,S) repel
- Opposite poles attract



The Magnetic materials are:

- Iron
- Cobalt
- Nickel
- Steel

Box 2 – Definitions

Permanent magnet - a magnet which produces its own magnetic field.

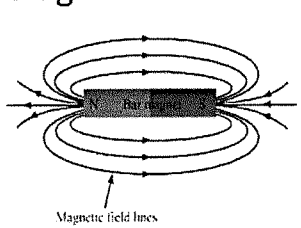
Induced magnet - becomes magnetic when it is placed in a magnetic field. When removed from a magnetic field it loses most / all of its magnetism quickly.

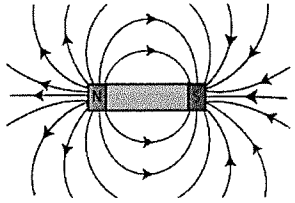
Compass - a small bar magnet. The needle points in the direction of the Earth's magnetic field.

Box 3 – Magnetic fields

Magnetic Field - the region around a magnet where a force acts on another magnet or on a magnetic material (iron, steel, cobalt and nickel).

The direction of a magnetic field line is from the north pole of a magnet to the south pole of the magnet – as shown in the diagram above.



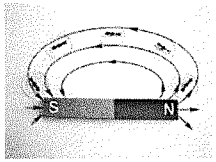


How can we find out the shape of a magnetic field?

Magnetic field shape shown using tiny "plotting compasses"

Follow the field lines until they go off the page or come back to the magnet

Plot as many field lines as possible

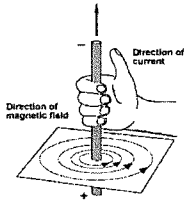


Box 4 – Electromagnetism

When a current flows through a conducting wire a magnetic field is produced around the wire – the direction of the magnetic field can be shown by the **right hand grip** rule.

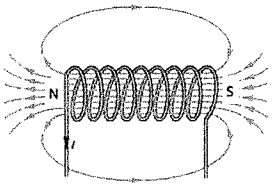
Increasing the Field Strength:

- Increase the current
- Move closer to the wire

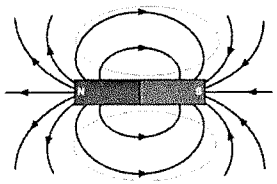


Box 5 – Solenoids

Solenoid – "A coil of wire." This increases the strength of the magnetic field created by the current. The magnetic field around a solenoid is similar to a bar magnet.



Solenoid


Magnet

Electromagnets

Adding an IRON CORE to a solenoid, increasing current and adding more turns will make the field stronger

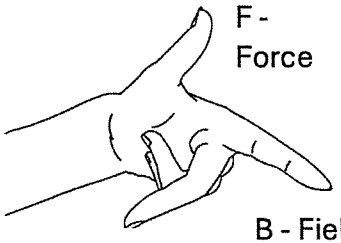
Box 6 – Flemings left hand rule **(HT)**

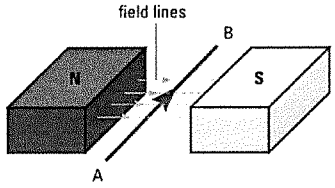
Fleming's Left Hand Rule

Motor Effect - When a conductor carrying a current is placed in a magnetic field the magnet producing the field and the conductor exert a force on each other.

To increase the force / movement of the object two variable can be changed:

1. Increase the current
2. Increase the strength of the magnet





This wire should experience a downwards force.

Box 7 – Calculating Magnetic force **(HT)**

$$F = B \times I \times l$$

Force	**Magnetic flux density**	**Current**	**Length of wire**

Units:

Force – Newtons (N)

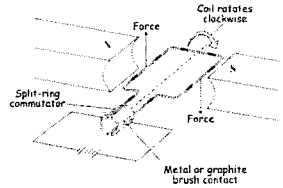
Flux Density – Tesla (T)

Current – Amps (A)

Length – Metres (m)

Box 8 – Electric motors **(HT)**

- The current flows through the coil.
- One side of the coil experiences an upwards force.
- The other side of the coil experiences a downwards force.
- These forces produce a moment which causes the coil to rotate.
- The split ring commutator reverses the current in the coil every half-turn, ensuring that the coil is always rotated in the same direction.



Absolute BTEC PE- Component 3 LAA

A1 Physical Components of Fitness

1.Component	Explanation	Suitable Sport or PA
Aerobic Endurance	The ability to exercise at moderate intensity for extended periods of time.	Events/sports lasting more 30 minutes.
Muscular Endurance	The ability of a given muscle to exert force, consistently and repetitively, over a period of time	Events/sports lasting more 30 minutes.
Muscular Strength	The ability of a muscle to exert a maximal or near maximal force against an object.	Activities requiring force, e.g., throwing events
Flexibility	The ability of a joint or series of joints to move through an unrestricted, pain free range of motion.	Activities requiring a wide range of movement around a joint, e.g., gymnastics, martial arts.
Body Composition	The percentage of fat, bone, and muscle in your body.	Low body fat: gymnastics, long distance running. High muscle mass: sprinters, power activities.
Speed	The ability to move the body in one direction as fast as possible.	Activities requiring fast movement, e.g., sprinting

Absolute BTEC PE- Component 3 LAA

A1 Skill Related Components of Fitness

2.Component	Explanation	Suitable Sport or PA
Power	The product of force multiplied by distance, divided by time.	Activities requiring explosive movement e.g., gymnastics, basketball.
Agility	The ability to rapidly change body direction, accelerate, or decelerate.	Activities requiring quick changes of direction, e.g., dodging the opposition in a team game, freestyle skiing.
Co-ordination	The body's ability to perform smooth and efficient movements	Any activity requiring the movement of two or more body parts and can include the use of sporting equipment, e.g., hand, eyes, and tennis racquet to connect with the tennis ball.
Balance	The ability to retain the centre of mass above the base of support when stationary (static balance) or moving (dynamic balance).	An activity requiring the control of the distribution of weight or to remain upright and steady.
Reaction time	How fast an athlete can respond to stimulus.	Any activity where a quick decision or response to a stimulus is needed.

Principles of Training		
Frequency	The number of training sessions completed over a period of time, usually per week. How often.	e.g. Training muscular strength 2/3 sessions a week
Intensity	How hard an individual will train.	e.g. working at 90% HR therefore training anaerobically.
Time	How long an individual will train for.	60 minute session.
Type	The method of training or exercises to meet the requirements.	Weight training to improve strength

A2 Additional Principles of Training		
Progressive Overload	In order to progress, training needs to be demanding enough to cause the body to adapt, improving performance.	Extra stress is needed on the bodies system for adaptations to take place.
Specificity	Training should meet the needs of the sport, or physical/skill-related fitness goals to be developed.	To ensure that the correct component of fitness is being trained so that improvements take place.
Individual Differences	Training should meet the needs of an individual.	For example if they are older or overweight you will need more low impact exercises.
Adaptations	Changes to the body due to increased training loads.	e.g. increasing your strength through a weight training programme.
Reversibility	If training stops, or the intensity of training is lowered, fitness gains from training is lost.	Overtraining, when too much training takes place can cause injury. When you stop training muscle mass can be lost.
Variation	Altering types of training to avoid boredom and maintain motivation to train.	Keep motivation and enjoyment. Less likely to become bored. Provides challenges. Reduces injury through using the same muscles.
Rest and Recovery	To allow the body to recover and adapt.	To prevent injury, ensure training adaptations take place, recover before the next session.

A3 Measurements/ Calculations and Formulas

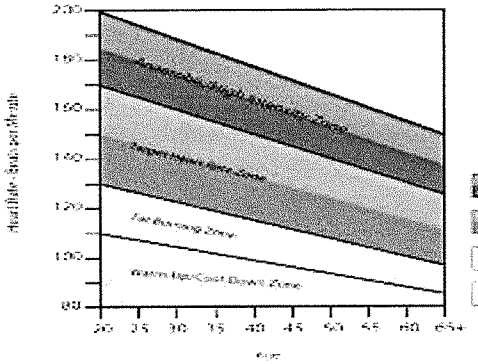
Intensity	
HR- How many times the heart beats within a minute, Beats Per Minute (BPM)	Count radial pulse with two fingers For 15 seconds x 4 = HR
Max HR- An average of what someone's maximum heart rate is depending on their age.	220- Age = Max HR
Training Zones- The target ranges (of heart rate, pace or perceived exertion) that will be used to prescribe workout intensity	MAX HR Divided by 100 x the training zone % Example 16 year old – 204/100 x 85 = 204/100 x 65 =
Strength and Endurance Calculation	
1RM (1 Repetition Max) Used to measure muscular strength	How much weight can be lifted in one repetition.
15RM (15 Repetition Max) Used to measure muscular endurance	How much weight can be lifted in fifteen repetitions.
Borg Scale- Rating of Perceived Exertion (RPE) Scale	
Borg Scale is a way of measuring physical activity intensity level. Perceived exertion is how hard you feel like your body is working.	Rate yourself on a scale of 6-20 depending on your perceived exertion. This value is then x10 for example 12on the scale would equal 120BPM.

Used to:

Monitor Heart Rate- Record Calories- Energy usage- Identify Training Zones

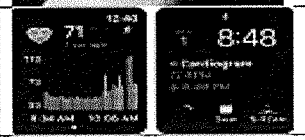
A3 Target Zones

Anaerobic Training Zone 85%-100%	Used for improving speed, power, muscular strength
Aerobic Training Zone 65%- 85%	Used for improving aerobic endurance and muscular endurance



6	No exertion
7	
8	
9	
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	
20	Maximal exertion

Technology to Measure Exercise Intensity

Heart Rate Monitors	
Smart Watches	
Apps	

Investigate IMPORTNACE of fitness testing to determine fitness levels

B1 Reasons for Fitness Testing

1. Gives baseline data: If an athlete completes a test at the beginning and then at the end of their training programme, they can monitor their performance and see if they are improving.
2. Design training programmes: Athletes and coaches can use the results of fitness test and plan training programmes specifically to improve their weaknesses.
3. Determine if training programmes are working Tests can be used as a mid-point in training programmes.
4. Results can give a performer something to aim for: They can provide goal setting aims and give them motivation to improve.

B1 Validity of Results

1. Validity refers to whether a test measures what it aims to measure. If we are aiming to test flexibility however when we are performing the sit and reach and bending our legs the test becomes invalid.
2. Often in our tests to ensure it is valid we perform the test three times to see if we are getting similar results each time.
3. For example, the standing long jump can be completed three times and the highest score taken. However, this cannot happen with the copper run due to the length of the test and the impact it will have on the reliability of the test as the participant will be tired during the second and third time.

B1 Pre-Test Procedures

1. **Calibration of equipment:** Equipment should be checked for wear and tear and damage; measuring must be completed with a tape measure and secured do the distance doesn't change throughout the test.
2. **Complete informed consent:** Informed consent is completed by the participant and allows them to understand what and how they will be tested and know they can remove themselves from the test at any time.
3. **Complete physical activity readiness questionnaire (par-q):** This is completed to ensure the participant is fit and healthy to take part in the test.
4. **Participant pre fitness test check e.g. Prior exercise participation:** This includes checking jewellery, clothing, trainers and completing a warmup.

B1 Reliability of Test

B1 Factors affecting reliability:

1. Calibration of equipment: For example, if person administering the test has not measured out the 400m Cooper run correctly, when the athlete uses the nominal data their scores will be incorrect.
2. Motivation of the participant: If the participant is unwell or isn't trying their best, they will not receive accurate results.
3. Conditions of the testing environment (inside versus outside conditions) If the ground is wet when testing agility, it will be hard for the participant to change direction without falling over.
4. Experience of the person administering the test – compliance with standardised test procedure. If the administrator stops the stopwatch at the correct time the results will be incorrect.

B1 Absolute BTEC PE - Component 3 LAB

B1 Practicality

1. **Cost:** Specialist equipment and facility hire can be expensive to carry out the tests.
2. **Time taken to perform the test:** Tests like the cooper run and multistage fitness test can take a long time to perform.
3. **Time taken to set up the test:** Measuring for test such as the Cooper run, Sprint test and Illinois test can be difficult and time consuming.
4. **Time taken to analyse data:** Collecting and analysing large cohorts of data can be very time consuming and if you are conducting more than one type of test.
5. **Number of participants:** Some tests require specific equipment and if you have 30 participants to complete the test however on one piece of equipment this is not practical.

B1 Interpretation of Fitness Test Results

In your exam you will need the following skills

1. To be able to compare results to normative published data: normative data is results taken from people of similar ages and finding out what the average norm is for that age and sex. For Example normative data for the cooper run, female and a range of ages. Not all tests have normative data is they aren't common/ popular tests

Age	Excellent	Above Average	Average	Below Average	Poor
13-14	>2000m	1900-2000m	1600-1899m	1500-1599m	<1500m
15-16	>2100m	2000-2100m	1700-1999m	1600-1699m	<1600m
17-20	>2300m	2100-2300m	1800-2099m	1700-1799m	<1700m
20-29	>2700m	2200-2700m	1800-2199m	1500-1799m	<1500m
30-39	>2500m	2000-2500m	1700-1999m	1400-1699m	<1400m
40-49	>2300m	1900-2300m	1500-1899m	1200-1499m	<1200m
>50	>2200m	1700-2200m	1400-1699m	1100-1399m	<1100m

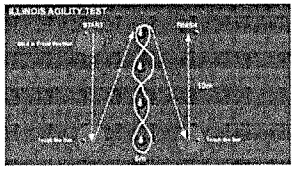
2. Analyse and evaluate test results: Understanding where an athlete's success and weaknesses are based on the results of their tests.

3. Make recommendations for improvements to fitness performer based on test results: This could be a specific type of training which is linked to the

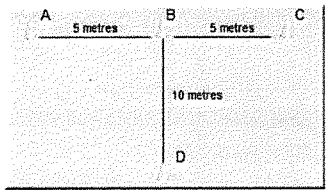
B2 Absolute BTEC PE - Component 3 LAB:

Fitness test methods for components of Skill-related fitness

Agility



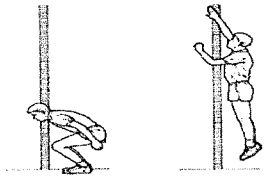
Illinois agility run test



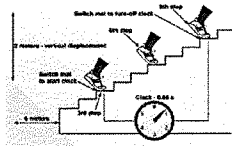
T Test

The Illinois and T test are used to examine the participant's ability to change direction at speed and remain in an upright position.

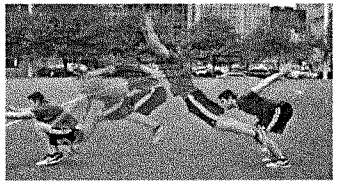
Power



Vertical Jump Test



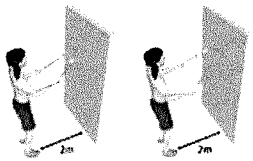
Margaria- Kalamen Test



Standing Long/Broad Jump

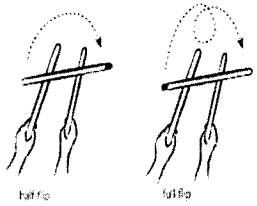
These tests are used to examine explosive movements of the legs.

Coordination



Alternate hand wall toss test.

30 seconds

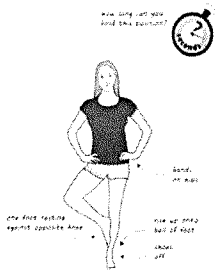


Stick flip test

These tests are used to examine the participants ability to move two or more body parts at the same time smoothly and efficiently, to allow effective application of technique, such as catching the ball or stick.

Balance

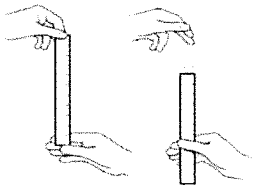
Y balance test



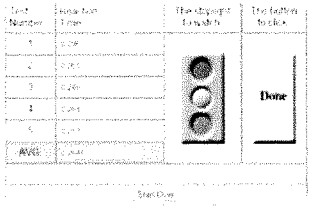
Stork Stand test

These tests are used to examine the participants ability to maintain centre of mass over the base of support, useful to maintain positions in performance sports (static balance) or when on the move in any other sporting examples (dynamic balance).

Reaction Time



Ruler drop test



Online reaction time test

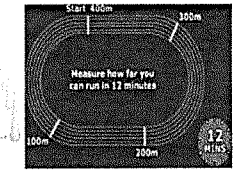
These tests are used to examine how quickly the athlete can respond to a stimulus. In one test the ruler is the stimulus and the quicker athlete catches the ruler. The stimulus on the online test are the lights and the computer examines the speed in which the athlete presses the button.

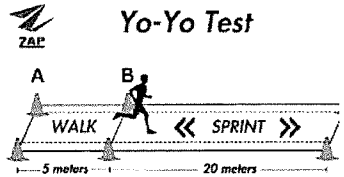
B3 Absolute BTEC PE - Component 3 LAB:

Fitness test methods for components of Physical fitness

Aerobic Endurance

Multistage Fitness test/ 12 min cooper run/ Harvard step/ Yo yo Test



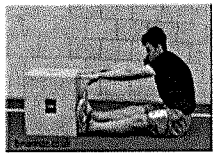


These tests are used to examine the participants ability of the cardiovascular system to provide the muscles with nutrients and oxygen over a long period of time.

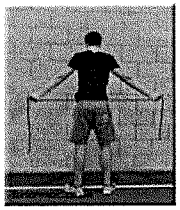
Flexibility

Calf muscle flexibility test

Sit and reach test



Shoulder flexibility test



Each of these tests are used to examine the range of movement at a joint, shoulder hip and ankle joint. There is a range of tests as different sports require flexibility in different joints in the body.

Muscular Endurance

Timed Plank

Sit up Test

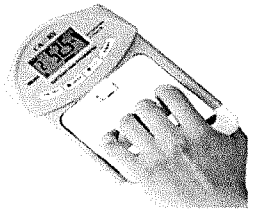
Press up Test

Each test examines how many times the different muscles groups can contract in a length of time.

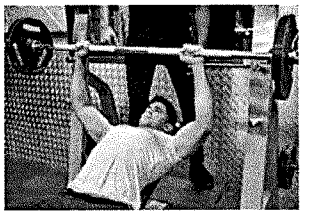
Body Composition

Muscular Strength

Hand Grip Dynamometer

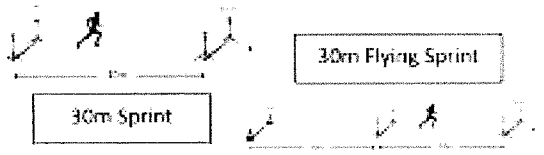


1 Rep Max



These tests are done to examine the amount of force that can be applied against a resistance. For example, the dynamometer tests for strength of grip lower arm and bicep muscle. 1RM test the maximum weight lifted in 1 repetition.

Speed



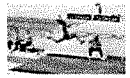
Two test which both examine distance divided by time to reduce the time taken to move the body or body parts. In this case the fast movements of the arms and legs.

30m Sprint form standing start.

The flying sprint tests the athlete at full speed.

Fitness training methods for physical components of fitness

Appropriate physical fitness training methods that could be used for specific sports participants for different ages and different sporting abilities

Flexibility			**Muscular Endurance**		
Static Active	The performer applies internal force to stretch and lengthen the muscle	Quadricep stretch 	Free weights	High repetitions and low loads	e.g. Bicep curl 10 kg X 15 reps
Static Passive	Requires the help of another person or an object, e.g. A wall to apply external force causing the muscle to stretch	Wall calf stretch 12-20 seconds 	Fixed resistance machines	High repetitions and low loads	e.g. Squat 20 kg X 20 reps
Proprioceptive Neuromuscular Facilitation (PNF)	The technique involves the use of a partner or immovable object, isometric muscle contractions to inhibit the stretch reflex.		Circuit training	Using body resistance exercises or weights with low loads and high repetitions.	Series of different exercise stations can be made sport specific E.g. Press ups, sit ups , squats and lunges.
Muscular Strength Training			**Speed**		
Free Weights	High loads and low repetitions	e.g. Bicep curl 15 kg X 6 reps	Acceleration Sprints	Pace is gradually increased from a standing or rolling start to jogging, then to striding, and then to a maximal sprint	Long jumper run up 
Resistance Machines	High loads and low repetitions	e.g. leg press 60 kg X 6 reps	Interval Training	Work period followed by a rest or recovery period. For speed short, high intensity work periods, increasing the number of rest periods and increasing work intensity.	100m 
Aerobic Endurance			Resistance Drills	Hill runs, parachutes, sleds, bungee ropes, resistance bands	Rugby players 
Continuous Training	Steady pace and moderate intensity for a minimum period of 30 minutes	Jogging 30 minutes on a treadmill between 60-80% Ma HR.			
Fartlek Training	The intensity of training is varied by running at different speeds and/or over different terrain	Jogging 10-minute, sprint 1 minute, run 2 min repeat for 30 minutes.	**Aerobic Endurance**		
Interval training	Work period followed by a rest or recovery period o for aerobic endurance decrease the number/length of rest periods and decrease work intensity (compared to speed training)	Netball players walking back into position after a team has scored.	Circuit Training	Use of a number of stations/exercises completed in succession with minimal rest periods in between to develop aerobic endurance.	Step ups. Shuttle runs and skipping to develop aerobic endurance with minimal rest.

Fitness training methods for skill related components of fitness

Agility			Power		
Speed Agility and Quickness training (SAQ)	drills used to develop physical ability and motor skills.	A football agility SAQ course with changes of direction	**Plyometrics Training**	lunging, bounding, incline press-ups, barrier hopping and jumping.	Hopping/ bounding/ two footed jumps
Co-ordination			**Reaction time**		
Co-ordination Training	Use of specific training exercises using two or more body parts together.	Hand eye- coordination moving the tennis racket to the tennis ball at the right time.	**Reaction Time Training**	Use of specific training exercises to practise quick responses to an external stimulus.	Sprinter responding quickly to the sound of a gun in a sprint start.
Balance					
Dynamic Balance Training Static Balance Training	Use of specific training exercises that require balancing on a reduced size base of support.	e.g. lunging, standing on one leg and kicking, single leg lunging. e.g. Handstand, yoga, gymnastics, Pilates.			

C4: Choosing training methods

- Demands of the sport: focus on area of sport or components of fitness involved.
- Cost of equipment: specialist equipment may be needed such as fixed resistance machines.
- Location of training: specific facilities may be needed such as swimming pool.
- Ease of set up: some methods involve setting up e.g. circuit training
- Number of participants: may be limited amounts of space to access

C5: Provision for taking part in fitness training methods

Type of provision	Explanation	Advantages	Disadvantages
Public sectors	include local authorities and school provision	-Funded by local council -Low cost -Accommodate large groups	-Lack of equipment -Poor facilities
Private sector	provided by organisations who aim to make a profit	-specialist services -latest training equipment	-expensive to join -members pay month or yearly -Aime at certain groups of people other than public
Voluntary sector	activities provided by volunteers who have a common interest in the participant.	-fitness or competitive sports -low cost -coaches usually have experience	-opportunities in only one sport -Basica facilities or equipment -Limited training times as they normally don't own the facility.

C6 Absolute BTEC PE - Component 3 LAC

The effects of long-term fitness training on the body systems

How training methods affect the different body systems, which can lead to adaptations to improve specific components of fitness.

Aerobic Endurance Training:

- Adaptations to the cardiovascular and respiratory systems
- Cardiac hypertrophy
- Decreased resting heart rate
- Increased strength of respiratory muscles
- Capillarisation around alveoli.

Flexibility Training:

- Adaptations to the muscular and skeletal systems
- Increased range of movement permitted at a joint
- Increased flexibility of ligament and tendons
- Increased muscle length.

Muscular Endurance Training:

- Adaptations to the muscular system
- Capillarisation around muscle tissues increased muscle tone.

Muscular Strength and Power Training:

- Adaptations to the muscular and skeletal systems
- Muscle hypertrophy
- Increased tendon and ligament strength
- Increased bone density.

Speed Training:

- Adaptations to the muscular system
- Increased tolerance to lactic acid.

Requirements for Each of the Following Fitness Training Methods

To ensure a fitness training plan is carried out safely and effectively it must include the following.

- **Warm-Up:** prior to taking part in the fitness training method – pulse raiser- increase heart rate and body temperature, mobility- increase range of movement and stretch; reduce the risk of injury, prepare the body for exercise.
- **Cool Down:** after taking part in the fitness training method – gradually lower pulse and breathing rate to resting levels; remove lactic acid; stretch to help return muscles to pre-exercise length.
- **Fitness Training Method**: linked to the associated component of fitness.
- **Application of the basic (FITT) and additional principles of training:** to each fitness training method.
- **Application of appropriate training intensities**: to fitness training methods.

Additional requirements for each of the fitness training methods

Advantages and disadvantages

- To include number of people that can take part
- Cost of equipment
- Ease of set up, access to venue/location of training
- Risk of injury to the performer if performed incorrectly, effectiveness of training for given sports performer
- Specificity to component of fitness
- Replicating demands of the sport

D1 Personal Information to Aid Training Fitness Programme Design

Aims – details of what they would like to achieve for the selected sport.

Objectives – how they intend to meet their aims using an appropriate component of fitness and method of training.

Lifestyle and physical activity history.

Attitudes, the mind and personal motivation for training.

D2 Use Personal Information to Aid Training Programme Design.

Selection of appropriate training method/activity for improving/maintaining the selected components of physical and/or skill-related fitness.

Application of the FITT principles and additional principles of training.

D3 Motivational Techniques for Fitness Programming

Motivation – the internal mechanisms and external stimuli that arouse and direct behaviour.

Two types of motivation:
Intrinsic- From within e.g. I want to go to the gym because its good for me.
Extrinsic – from the outside e.g. Rewards

Principles of setting goals to increase and direct motivation.

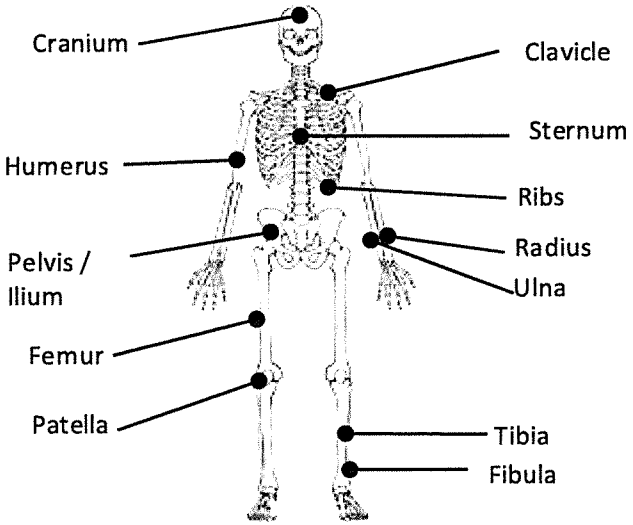
Personal goals – (SMARTER):
Specific: The goal must be specific to what you want to achieve, e.g. I want to improve upper body strength
Measurable: Goals must be stated in a way that is measurable, I want to increase my chest press 1RM to 100kg.
Achievable: The person has to have access to training and the time to take part in it in order to meet the goal.
Realistic: It must be possible to actually reach this goal and not expect improvements beyond what can be achieved in the time frames and current fitness or ability or ability level of the person setting the goals.
Time: Their must be a set time or deadline on the goal. This means you can review your success. It is best you put the date you wish to achieve the goal by.
Exciting: The goal must be something the person really wants to achieve and have an impact on their sports performance in order for them to be motivated to attend their regular training and work hard while training to achieve the goal.
Recorded: The results should be written down so the performer can see how close they are to achieving their goal and how long it takes to reach it

Goals:
Short-term goals (set over a short period of time, between one day and one month)
Long-term goals (what they want to achieve in the long term, and the best way of doing this).

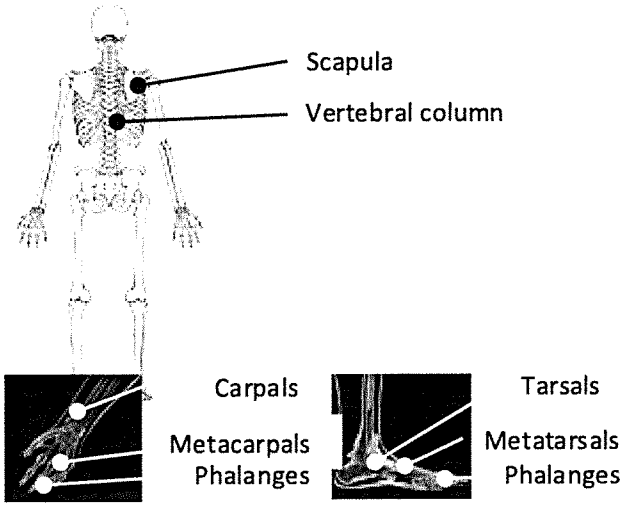
- Influence of goal setting on motivation: Provide direction for behaviour, maintain focus on the task in hand
- Benefits of motivation on the sports performer: Increase participation
- Maintain training and intensity Increased fitness Improved performance.

PAPER 1 **ALL SAINTS' ABSOLUTE 1.1 GCSE Physical Education – The structure and functions of the skeletal system**

1. Structure of the skeletal system



Structure of the skeletal system

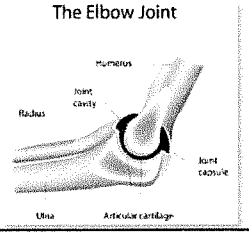


3. Synovial Joints

These are **freely movable** joints where the joint surfaces are covered in **cartilage**, they are connected by a fibrous tissue capsule (joint capsule) and lined with fluid (synovial fluid).

Synovial membrane – secretes the synovial fluid

Synovial fluid– found within the joint capsule to prevent friction between the articulating bones



2. Function of the skeleton

Support - It gives the body **support**, enabling us to stand. The bones of the body are held together by **ligaments**. The skeleton provides a framework for the muscles, which are attached to bones by **tendons**.

Posture- The skeleton acts as a framework. Muscles are firmly attached to bones forming our body shape and holds us upright.

Movement - to allow **movement** of the body – by providing areas or sites for muscle attachment. This also provides for a system of levers that helps us move.

Protection - to give protection to the vital internal organs – such as heart, lungs, spinal cord and the brain. For example, the cranium protects the brain when heading a football.

Blood cell production – The ends of long bones and some other bones eg the ribs, humerus, femur and even vertebrae bones, contain red bone marrow. This is where the red blood cells are produced which carry oxygen.

Storage of minerals – such as phosphorous, calcium, potassium and iron. Iron helps in the transport of oxygen to working muscles and calcium is needed to

4. Key Terms : Cartilage: This is a soft connective tissue. The role of cartilage is to reduce friction and act as a shock absorber for the joint. This is important for athletes, for example a Triple jumper to protect the joint on landing. Another example is *It helps act as a shock absorber when applying a large force when tackling in football. In long distance running, not having fiction will allow the joint to move smoothly.*

Ligaments – attaches bone to bone to add joint stability. When performing a bicep curl they stabilises the joint. (keeps the joint together)

Tendons – attaches muscles to bone and contributes to joint movement as a result of muscle contraction. They help transmit the power needed to move bones. E.g. when extending the knee the quadriceps contract. It also pulls on the bone to create movement. Ligaments and tendons become more pliable meaning they are flexible/elastic or can stretch.

5. Synovial Joint 1: Ball and Socket joint

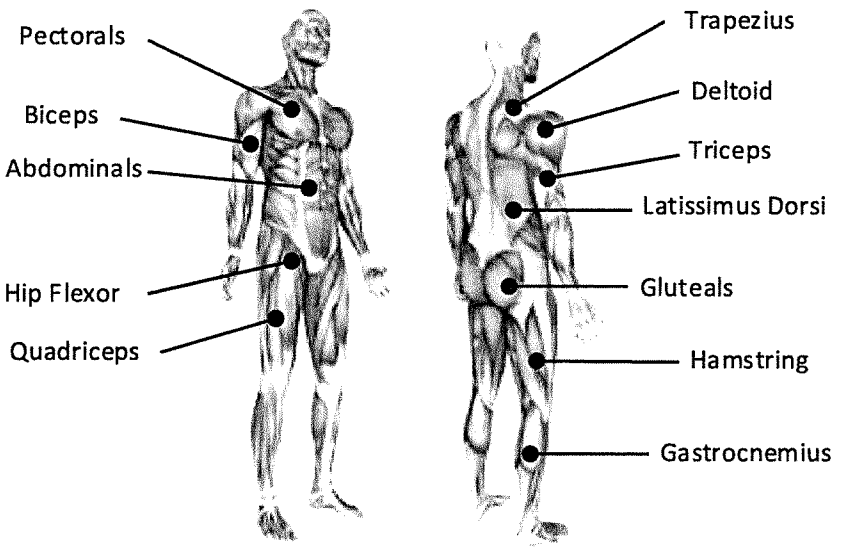
Movement	Practical example at the shoulder/ Hip
Flexion	Shoulder: Lifting the arms out of the water during the backstroke in swimming.
Extension	Hip- A rugby player extends the hip in preparation for kicking through the ball, to get maximum power.
Rotation	Shoulder-A tennis player uses external rotation at the shoulder joint during the backswing of the serve.
Abduction	Hip- A gymnast with her leg lifted to the side of the body shows abduction
Adduction	Shoulder- A rugby player tackling another player will hold on to the player by adducting their arms as they tackle.
Circumduction	Shoulder- A swimmer during the front crawl arm action will take their arm out and round and back into the water. Circumduction is a combination of rotation, adduction, abduction, flexion and extension

6. Synovial Joint 2: Hinge Joint

Type of movement	At the knee: Femur– Tibia	At the elbow : Humerus– Ulnar/ Radius
Flexion- Reduced angle of a joint.	Bending your leg at the knee when preparing to make a pass in football.	Bending your elbow joint when lifting a dumb bell in a bicep curl.
Extension- Increased angle at a joint.	When a basketball player drives up to the basket from bent legs to straight, extension occurs at the knee	When making a basketball set shot the elbow straightens as you release the ball and extension occurs at the elbow joint.

PAPER 1 ALL SAINTS ABSOLUTE 1.2 GCSE Physical Education – The structure and functions of the muscular system

1. Structure of the muscular system



Tips: You must know all muscles, including a sporting example for each.
For example the deltoid causes abduction of the shoulder, when performing the outward action of a star jump.
The quadriceps created extension, when striking a football.

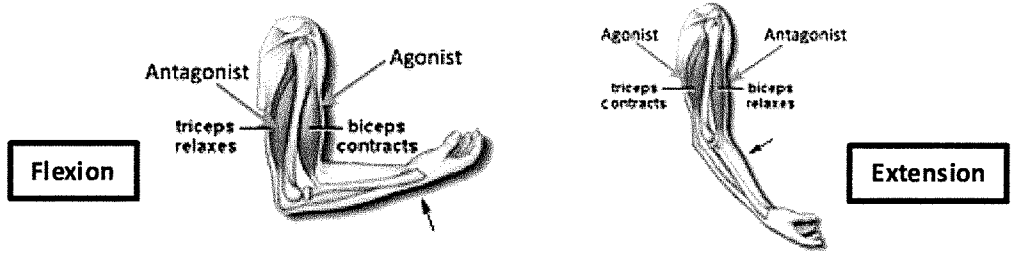
Key terms

1. **Tendon-** Tough tissue connects muscle to bone. When the muscle contracts it pulls the bone to create movement
2. **Hypertrophy**- Increase in size of skeletal / Cardiac muscle. Develops through strength training.

The **short term effects** of exercise on the muscles:

1. Working muscles produce heat
2. Increased muscle fatigue due to lactic acid accumulation
3. Blood is re-distributed to working muscles (blood shunting)
4. Increase in cross sectional size

2. Antagonistic pairs - Muscles are arranged in antagonistic pairs.
As one muscle contracts (shortens) its partner relaxes (lengthens) *i.e. Biceps and Triceps.*



Agonist = the muscle that contracts to produce movement.
Antagonist = the muscle that relaxes to allow the movement to occur.
Fixator = Stabilises joint / body part / limb **OR** assists agonist to work effectively **OR** prevents unintended movements

Examples in the body:

- Biceps & Triceps
- Quadriceps & Hamstring
- Hip Flexor & Gluteus Maximus

3. The roles of muscles in movement

To produce movement muscles either shorten, lengthen or remain the same length when they contract. Muscles work in pairs: as one muscle contracts, the other relaxes. Muscles that work together like this are called **antagonistic pairs.** This type of action enables the body to move with stability and control.

4. Examples of antagonistic pairs

Example: When a darts player prepares to throw a dart he decreases the angle at his elbow joint (flexion). When his elbow is bent the biceps are the agonist and triceps are the antagonist.
When he releases the dart he increases the angle at his elbow joint (extension). When his arm is straight the triceps are the agonist and the biceps are the antagonist.

Hamstrings and quadriceps – at the knee joint, which is a hinge. The hamstrings contract and the quadriceps relax and the knee joint flexes. As the knee joint extends, the quadriceps (quads) contract and the hamstrings relax. E.g. when performing a free kick in Football.

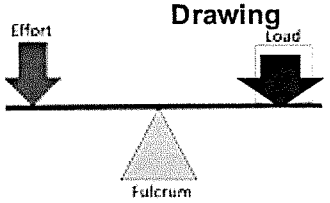
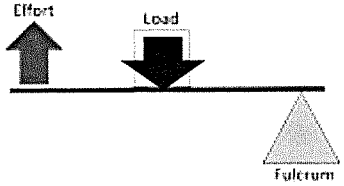
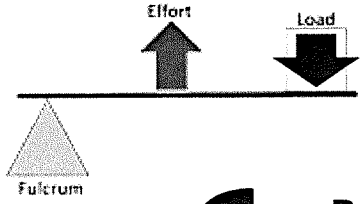
Link of the muscular and skeletal system – both systems work together to produce movement. *i.e. a contracting muscle pulls on a bone which changes the angle at a joint.*

PAPER 1 ALL SAINTS' ABSOLUTE 1.3 GCSE Physical Education – Movement analysis

1. Levers – Levers are important in movement because they allow efficiency and force to be applied to the body's movements.

Fulcrum (F)	Effort (E)	Load (L)
A fixed pivot point 	The source of energy that will be applied 	The weight/resistance to be moved 

2. Classes of lever

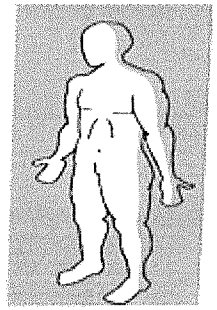
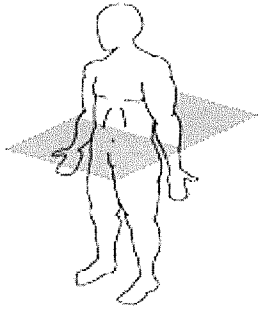
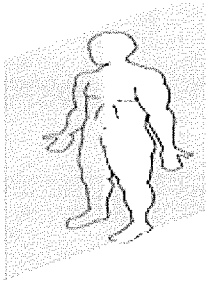
Example	Drawing	
First class lever:		E.g. The neck joint when heading a ball in Football
Second class lever:		E.g. The ankle joint when kicking a football with your ankle or Striking a take off board in long Jump.
Third class lever:		E.G The elbow joint when performing a bicep curl. Extension of the knee when kicking a ball.

Remember FLE-1,2,3

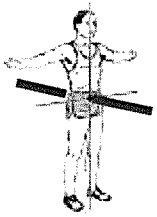
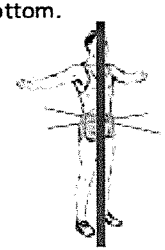
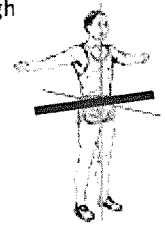
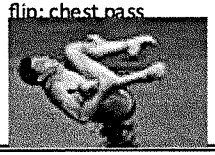
Mechanical advantage The ability to move large loads with a small amount of effort.
The effort arm for the lever must be longer than the load arm.
- All 2nd class lever systems have MA
- 1st class levers can have MA if the fulcrum is nearer the load than the effort
- 3rd class levers do not have MA

Example description:
First class levers – the fulcrum (sometimes called the pivot) is located between the effort force and the load force on the lever arm which are acting down. An example of this type of lever is the neck joint.
Practical example: At the neck – heading a ball in football.

3. Planes – imagery lines that divide the body into two.

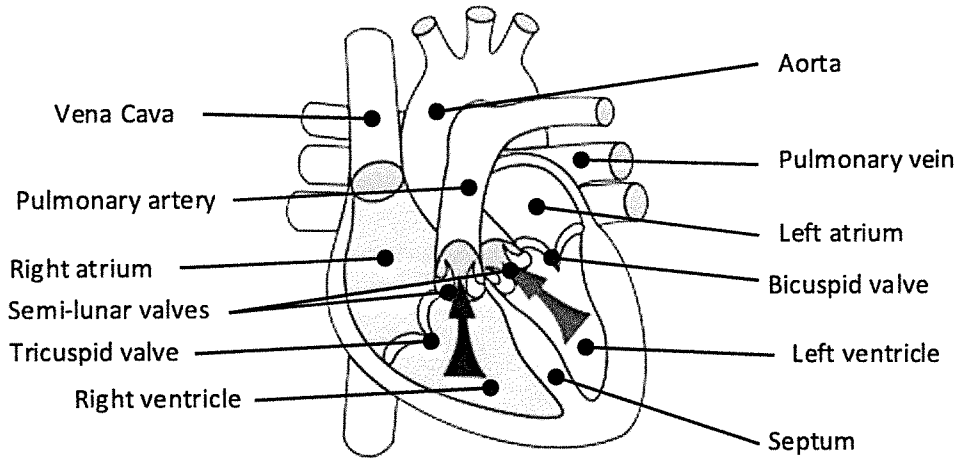
Frontal plane Front to back	Transverse plane Top to bottom	Sagittal plane Side to side (L to R)
A vertical plane but this divides the body into **Front** and **back. Creates Abduction and Adduction e.g. jumping jacks, star jumps, cartwheel.** 	A horizontal plane that divides the body into **upper** and **lower** halves. Creates rotation. e.g. bowling in cricket, full twist in trampolining. 	A vertical plane that divides the body into **right** and **left** sides. Creates flexion and extension e.g. kicking, running, lunging, bicep curl, sit ups, forward roll, football throw in, squats, deadlifts. 

4. Axes – imagery lines that the whole body turns around. **Remember:** Axis must pass through centre of body.

Frontal axis	Longitudinal axis	Transverse axis
Runs through the body horizontally from the back to front.  Example: Cartwheel 	Runs through the body vertically from the top to bottom.  Example: Full twist, log roll, spinning kick, pirouette, spin in ice skating, pivot in netball 	Runs through the body horizontally from the left to righ  Example: Flexion/extension e.g. Somersault; forward/backward roll; kicking a ball; front/back flip; chest pass 

ALL SAINTS ABSOLUTE 1.4 GCSE Physical Education – The structure and functions of the cardiovascular

1. Structure of the cardiovascular system



Deoxygenated blood = BLUE (Right side)
Oxygenated = **RED** (Left side)
Bicuspid and Tricuspid valves prevent backflow of blood from the ventricles to the atria.

4. Vascular Shunting/redistribution of blood

Vasoconstriction – NARROWING of the blood vessels
Vasodilation – EXPANDING of the blood vessels
EG When exercising the demand for oxygen is greater therefore is redistributed to the working muscles.
Muscles supplied with more oxygen or less oxygen to body parts with a lower demand.
Vasodilation of blood vessels so that they can keep working for longer.
Vasoconstriction of blood vessels so that blood flow to working muscles is maximised.
Heart gets same percentage of blood but an increase in amount of blood flow.
Skin gets less as a percentage but an increase in amount of blood flow.
Vital organs still get enough blood to function effectively.

Components of blood - Red blood cells (RBC)
Carry oxygen from the lungs to the working muscles + Removes CO2.
Haemoglobin binds the oxygen

CHALLENGE

2. Function of the cardiovascular system

- Transport of oxygen, carbon dioxide and nutrients
- Clotting of open wounds
- Regulation of body temperature

3. Key Terms

Stroke volume (SV) This is the volume/amount of blood pumped out of the **left ventricle/ventricles/heart** in one **contraction**. (ml per beat).

Heat rate (HR) Number of beats per minute (bpm). Fitter you are the lower your HR.

Cardiac Output (Q)- The volume of blood pumped from the **Left ventricle/heart** in one minute. (litres/min) or stroke volume x heart rate
Capillarisation - An increase in the number of / more capillaries.

Arteries (arterioles – smaller arteries)	Veins (venules – smaller veins)	Capillaries
1. Away from the heart 2. Predominantly carries oxygenated blood **(except pulmonary artery)** 3. Thick **walls** 4. Elastic **walls** 5. **Thick** smooth muscle 6. Small/narrow **lumen** 7. Does NOT have valves 8. Higher **speed** of blood flow 9. High blood **pressure**	1. Back to the heart 2. Predominantly carries deoxygenated blood **(except pulmonary vein)** 3. Thin **walls** 4. Larger/wider **lumen** 5. **Thin** smooth muscle. 6. Valves to prevent back flow of blood. 7. Lower **speed** of blood flow. 8. Non-elastic **walls** 9.. Low blood **pressure**	1. In the tissue 2. Site of gaseous exchange 3. Very thin walls 

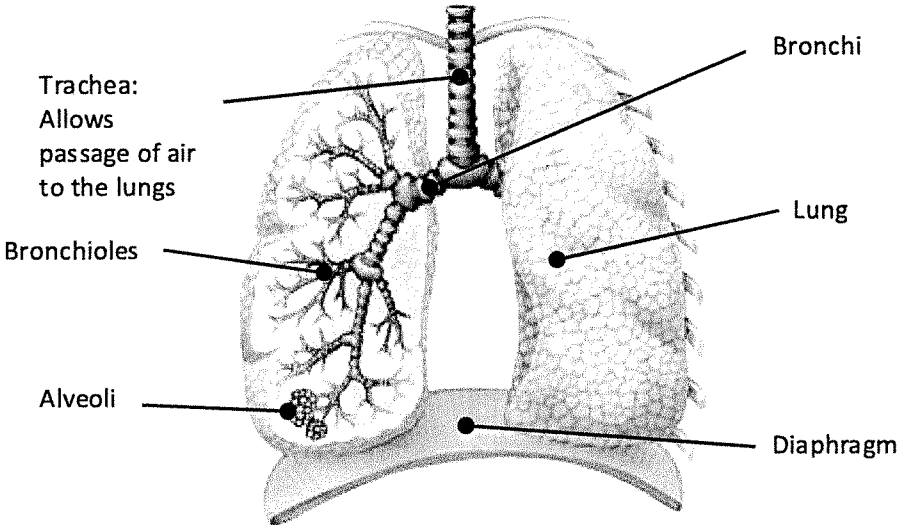
6. The double circulatory system: Blood in the body continuously flows through a network of blood vessels that forms a double circuit. This circuit connects the heart to the lungs, known as the pulmonary system, the process of gaseous exchange occurs in this system. Then the heart to the other organs in the body, known as the systemic. Whereby transporting O2.

Pulmonary circuit : Deoxygenated blood from muscles/organs into **Vena cava** – right atrium – tricuspid valve – right ventricle – pulmonary valve – **pulmonary artery** – lungs to be oxygenated then returns to the heart.

Systemic circuit: Oxygenated blood from lungs **into pulmonary vein** – left atrium – bicuspid valve – left ventricle – aortic valve – **aorta** – muscles/organs.

Septum: keeps oxygenated blood separate from deoxygenated blood.

1. Structure of the respiratory system



2a. Alveoli (feature): 1. Thin walls/1 cell thick / semi permeable; 2. Moist walls; 3. Surrounded by capillaries; 4. Large surface area/large number of alveoli.

2b . Gaseous exchange at the alveoli (functions)

1. More efficient/faster gaseous exchange / diffusion – small distance for gases (CO2/O2)to pass through faster.
2. Gases dissolve to pass through or More efficient/gaseous exchange / diffusion
3. To provide blood for gaseous exchange / diffusion.
4. More gases (CO2/O2) can pass through or more efficient gaseous exchange/diffusion.
5. Allows the walls to increase surface are slightly during inspiration.

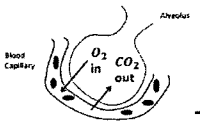
The process of gaseous exchange.

- The movement of gases taking place at the alveoli and capillaries: Oxygen diffuses into blood/capillaries/red blood cells– Carbon dioxide diffuses from blood/capillaries or Carbon dioxide diffuses into alveoli
- Diffusion is the movement of molecules from an area of high concentration to a low one.

During exercise

7. Gaseous exchange increases as the intensity of the activity increases to cope with:
8. An increase demand for oxygen at working muscles
9. An increase in carbon dioxide production and the need to rid this waste product.

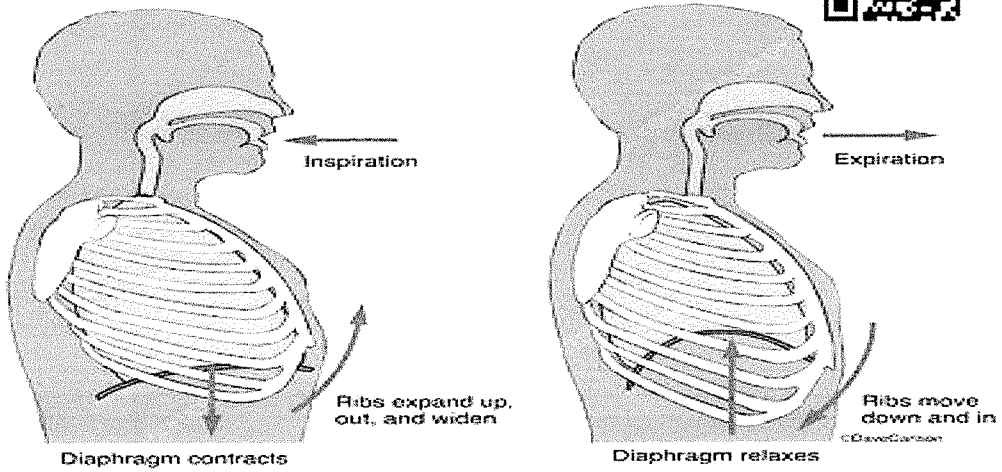
10. E.G A marathon runner will require oxygen into the lungs quickly to allow oxygenated blood to the working muscles to make them finish the race in a quicker time.



3. Pathway of air:

Nose----- trachea------- bronchi-------- bronchioles----------alveoli

4. Mechanics of Breathing



5. Inspiration (breathing in)

1. External intercostal muscles and diaphragm contract/flatten
2. The ribs move up and out
3. The lungs/thoracic cavity volume increases
4. The lung pressure decreases
5. Gases move from high to low pressure
6. Air moves into the lungs

6. Expiration (breathing out)

1. External intercostal muscles and diaphragm relax/go into dome shape
2. The ribs move down and in
3. The lungs/thoracic cavity volume decreases
4. The lung pressure increases
5. Gases move from high to low pressure
6. Air moves out of the lungs

7. Key terms

1. Breathing rate- Sometimes called the respiratory rate or ventilation rate, it is the frequency of breathing measured in breaths per minute. Normal breathing rate at rest is approximately 72 breaths per minute.

2. Tidal Volume – the amount of **air** inhaled and exhaled **per breath**. Resting value = 500ml

3. Minute Ventilation – The amount of **air** inhaled and exhaled **per minute**. Measured in litres.

VE = TV X F

PAPER 1 ALL SAINTS ABSOLUTE 1.5 GCSE Physical Education – Short Term effects of exercise

The **short term** effects are what happens to the body's systems as we exercise.

Muscular system

1. The immediate effects of exercise on the muscular system involve an increase in the temperature of muscles and metabolic activity or metabolism.
2. There is also an increase in the production of lactic acid in the muscles depending on the type of exercise. This increase in the production of lactic acid is a result of prolonged high-intensity exercise when there is a lack of oxygen in the muscles.
3. Increase rate of diffusion in the capillaries
4. Increase speed of contraction

The respiratory system

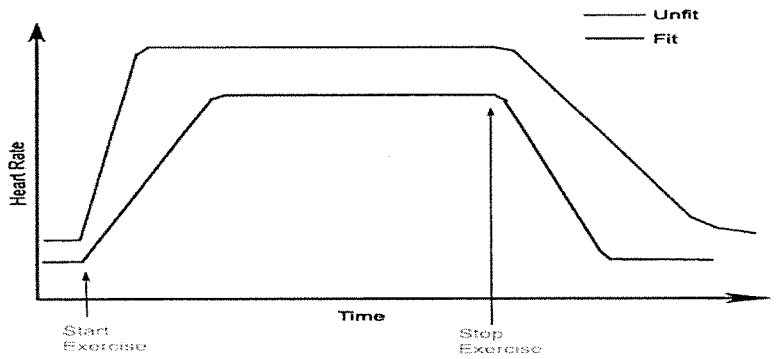
1. The short-term response of the respiratory system to exercise includes a rise in the respiratory rate (breathing rate) due to the body's demands for more oxygen.

2. Respiratory / intercostal / diaphragm muscles work harder / contract stronger / contract faster

3.Tidal volume (TV) also **increases** during exercise or increased breathing depth. This is the volume of air either inspired or expired per breath.

4.Minute ventilation/volume also **increases** during exercise- This is the volume of air that is inspired and expired in one minute.

5. Increase in gaseous exchange/diffusion.



The cardiovascular system

1. In the short term, the heart rate is raised just before exercise and will increase during exercise to ensure that there is enough supply of oxygen to the working muscles and that waste products, such as carbon dioxide, are removed.

2. The raising of the heart rate before exercise is called the anticipatory rise.

3. When exercise begins the heart rate will rise rapidly. As exercise continues, the heart muscle also becomes warmer.

4. Increase Cardiac output

5. Increase Stroke volume

6. Increases blood flow/oxygen transport to (working) muscles directs blood away from other organs OR less blood to other organs
7. Increase in blood pressure due to the increase in demand for oxygen (from the working muscles)
8. Increase in blood lactate/lactic acid/CO_2 because muscles are working
9. Blood temperature increases
10. Vascular shunt **OR** vasodilation of blood vessels to muscles **OR** vasoconstriction of blood vessels to other organs **OR** less blood to other organs
11. Blood vessels near skin dilate.

When exercise stops, the heart rate will fall rapidly and the level of adrenaline falls, along with a drop in temperature of the heart. The heart rate then returns to around its pre-exercise rate.

During exercise, the working skeletal muscles require more and more oxygen. The increase in stroke volume, cardiac output and heart rate enables more oxygen to be delivered, but this is often not enough and therefore the vascular shunt mechanism takes effect.

Key Vocabulary

1. Anticipatory rise- This is the raising of the heart rate before exercise begins. It is caused through the release of adrenaline, which is a hormone.

2. Adrenaline- This is a hormone released from the adrenal glands and its major action is to prepare the body for 'fight or flight'.

3. Vascular shunts- Occur when more blood is distributed to the working muscles and less to the non-essential organs. The vascular shunt mechanism involves two processes. When exercising 80% of the blood will be shunted to the working muscles, and 20% to the organs. This is due to the demand of oxygen required.

-> The graph to the left demonstrates the change in HR for a fit and unfit person.

Lactic acid can cause fatigue and tiredness, pain/soreness/discomfort or aches in muscles and a decrease in performance/ causes pain or soreness/ decrease performance.

PAPER 1 ALLSAINTS ABSOLUTE 1.5 GCSE Physical Education – Aerobic/Anaerobic and long term effects of exercise

1. Aerobic and Anaerobic exercise – two methods of energy production by the body (Energy: the capacity to do work)
Two factors determine which method is used: **Intensity & duration**

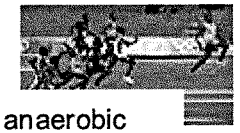
2. Aerobic energy production – takes place in the presence of oxygen

glucose + oxygen ➡ energy + carbon dioxide + water

Exercise intensity is moderate/low and continuous for 3+minutes, oxygen is used with no oxygen debt and lactic acid not produced. E.g. marathon runner, triathlon, long distance cyclist.
Aerobic capacity - Ability to take in and use oxygen / ability of (heart and lungs) to get oxygen to the muscles **OR** the ability to continuously exercise without tiring.

3. Anaerobic energy production – takes place in the absence of oxygen

glucose ➡ energy + lactic acid



Short bursts of exercise for up to 30 seconds. Intensity of anaerobic activity is high as muscle contraction are powerful & quick time. No or little oxygen used and oxygen debt is created as a result lactic acid is produced. E.g. *100m sprinter/long jump/50m swimmer* ***or*** long jump, triple jump, high jump **or** javelin, shot, discus, hammer **or** pole vault

4. Cardiovascular system Long term effects of exercise

1. **Lower resting** heart rate
   - Bradycardia
   - Heart doesn't need to work as hard / more efficient
2. **Larger / stronger** heart **OR** (cardiac) hypertrophy
   - Stronger contractions
3. **Increase** in stroke volume
   - At rest and high intensity
   - More blood pumped from the heart in one beat
4. **Increase** in **maximum** cardiac output
   - Higher volume of blood ejected from left ventricle in one minute **during high intensity exercise**
5. **Capillarisation OR Increased** capillary density
   - Improved circulation
   - Greater surface area for gaseous exchange **OR** more efficient / faster diffusion
   - More oxygen to muscles **OR** faster removal of CO_2 / lactic acid
6. **More efficient** vascular shunt mechanism
   - More blood to (working) muscles / body
7. **Lower** blood pressure
   - Less strain on the heart / blood vessels
   - Reduced risk of heart complications / strokes / heart attacks
8. **Increase** in red / white blood cells
   - (red) more haemoglobin / haemocrit
   - (red) Increased oxygen carrying capacity to supply working muscles
   - (white) better able to fight infections / disease
9. **Increased** plasma / blood volume
   - Decrease in blood viscosity
   - Blood flow is easier through blood vessels
10. **Faster / shorter** recovery rate

5. Respiratory system: Long term effects of exercise

1. Increased capillarisation – better blood supply around the alveoli.
2. Increased surface areas of alveoli – results in better gaseous exchange (oxygen delivery and waste product removal)
3. Increased strength of diaphragm and intercostal muscles – this increased tidal volume and vital capacity.
4. Increase in Tidal volume
5. Increase minute ventilation
6. Decrease in lung disease/healthier lungs
7. Reduced resting respiratory rate
8. Increase in pulmonary ventilation.

6. Skeletal system Long term effects of exercise

1. Increased bone density – stronger bones reduce the risk of injuries.
2. Reduced risk of osteoporosis.
3. Increased strength of ligaments and tendons – allows the body to change direction quickly without injury occurring. This also allows more force on a joint due to it being stronger.

7. Muscular system: Long term effects of exercise

1. Muscular hypertrophy – increase muscle mass. Increase size or number of muscle fibres
2. Increase strength of tendons
3. Greater speed of contraction
4. Increase size and number of mitochondria – produces more energy aerobically.
5. Increased tolerance to lactic acid/greater removal of lactic acid – reduces muscle fatigue.
6. Increase in muscular endurance /able to work for longer/less prone to fatigue
7. Increase strength of respiratory muscles e.g. intercostal ,muscles allowing more air to forcibly enter the lungs.
8. Greater flexibility / increased elasticity
9. Increased stores of glycogen / PC
10. Less prone to injury /faster recovery from injury / quicker recovery rate

Year 10 German Half-Term 3 – Celebrity Culture

Quiz 3.1 – celebrity vocab

Mein Lieblingsstar ist reich und berühmt	My favourite celebrity is rich and famous
Er ist Schauspieler aber auch Sänger in einer Band	He is an actor but also a singer in a band
Sie sind für ihre Musik bekannt	They are known for their music
Sein letzter Film war erfolgreich	His last film was successful
Sie ist jung, musikalisch und höflich	She is young, musical and polite
Manche Stars sind drogensüchtig oder betrunken	Some stars are addicted to drugs or drunk

Quiz 3.2 – opinions on celebrities

Mein Lieblingskünstler ist ---	My favourite artist is ---
Ich mag ihn / sie, weil er glücklich ist	I like him /her because he is happy
Manchmal haben Stars zu viel Einfluss	Sometimes stars have too much influence
Die Karten für Konzerte sind zu teuer	The tickets for concerts are too expensive
Berühmte Leute müssen ein Vorbild sein	Famous people must be a role model
Ich bin Fan von dieser Band, weil die Lieder kreativ sind	I am a fan of this band because the songs are creative
Man bekommt viel Kritik in der Öffentlichkeit	You get a lot of criticism in the public

Quiz 3.3 – celebrity jobs and activities

Der Charakter ist ein guter Vorbild	The character is a good role model
Diese Mannschaft ist sehr talentiert	This team is very talented
Dieser Chef kann gut kochen	This chef can cook well
Dieser Jugendliche hat Interesse an Mode	This teenager is interested in fashion
Sie singt auf der Bühne	She sings on the stage
Seine Stimme ist für Filmen berühmt	His voice is famous for films

Quiz 3.4 – using verbs to discuss aspects of fame

aussehen – to look	Die Stars sehen immer reich aus
unterstützen – to support	Die Fans unterstützen die Stars
berichten – to report	Die Zeitungen berichten über ihren Erfolg
sich unterhalten – to entertain yourself	Wir unterhalten uns, wenn wir diese Musik hören
sich treffen – to meet up	Die Stars treffen sich auf dem roten Teppich
leisten – to afford	Er kann sich ein grosses Haus leisten

Example 90 word task: You are emailing your Canadian friend about celebrities. Describe

- the advantages and disadvantages of being famous
- a celebrity you saw on screen or in person recently
- why you would like (or not like) to be famous one day

Ein Vorteil ist, dass man ein Luxusauto und ein grosses Haus kaufen kann. Ausserdem kann man sich Markenkleidung leisten und Schmuck kaufen, die teuer ist. Jedoch hat der Star keine Freiheit denn es gibt überall Fans. Neulich habe ich einen Film mit meinem Lieblingsschauspieler im Kino gesehen. Es war super spannend und es hatte total viel Spaß gemacht. Er sah sehr gut aus, weil er reicht und berühmt ist. Wenn ich mehr Geld hätte, würde ich den Film nochmal sehen. In der Zukunft möchte ich berühmt sein, vielleicht auf Insta denn ich will Filme drehen und Fotos machen. Ich könnte viel Geld für meine Familie verdienen und auch würde ich viel Einfluss haben. Ich muss ein gutes Vorbild sein! Jedoch bekommt man viel Kritik in der Öffentlichkeit und ich würde Angst haben.	An advantage is that you can a luxury car and a big House buy. In addition, you can yourself designer clothes afford and jewellery buy, that expensive is. However has the star no freedom because there are every-where fans. Recently have I a film with my favourite actor in the cinema seen. It was super exciting and it had totally lots of fun made. He looked very good, because he rich and famous is. If I more money were to have, would I the film again see. In the future would i like famous to be, may on Instagram because I want to films film und photos make. I could lots of money for my family earn und also would I lots of influence have. I must a good role model be! However gets one lots of criticism in the public and I would have angst!

Example 150 word task: You are writing an article about celebrity culture.

Describe

- the positive aspects of being a celebrity
- when you watched your favourite celebrity recently.

Die Stars sind sehr reich und berühmt und sie haben viel Spass im Leben. Man kann ein teueres Auto kaufen und sie tragen teuere Markenkleidung, wenn sie ganz erfolgreich sind. Ich wäre unglaublich glücklich, ein gutes Vorbild zu sein und meine Eltern würden sehr stolz sein, denke ich. Jedoch kann man viel Kritik bekommen und man muss jeden Tag fleißig arbeiten, um Geld zu verdienen. Meine Lieblingssängerin heißt Adele. Am liebsten höre ich ihre Musik, wenn ich mich abends nach der Schule entspannen möchte. Ich denke, dass sie eine freundliche Charakter hat und sie ist wirklich empfehlenswert live auf der Bühne, jedoch sind die Karten wirklich teuer deswegen kann man nicht oft live Konzerts sehen. Letztes Jahr habe ich ein Live-Konzert mit meinen Freunden gesehen und ich muss zugeben, dass es sehr empfehlenswert war. Ich habe viele Fotos gemacht und habe ganz tolle Erinnerungen.	Stars are very rich and famous and they have lots of fun in life. You can an expensive car buy and they wear expensive branded clothing, when they quite successful are. I would be unbelievably happy, a good role model to be and my parents would very proud be, think I. However can you lots of criticism get and you must every day hard work, in order money to earn. My favourite singer is called Adele. The most listen I her music love, when I myself in the evenings after school relax would like. I think, that she a friendly personality has and she is really recommendable live on the stage, however are the tickets really expensive therefore can you not often live concerts see. Last year have I a live concert with my friends seen and I must admit, that it very recommendable was. I have lots of photos taken and have quite great memories.

All Saints Absolutes Year 9 German / Term 2b – Celebrity culture (Musik, Fernsehen und Kino)

Quiz 4.1 – Music

The singer is musical	Der Sänger ist musikalisch
The event is very creative	Die Veranstaltung ist sehr kreativ
I **like listening** to pop music	Ich **höre gern** Popmusik
I **like** rock music	Ich **mag** Rockmusik
Ihre Stimme ist klasse	Her voice is great
The tickets are quite expensive	Die Karten sind ziemlich teuer

Quiz 4.2 – Saying what you like and don't like to watch on TV

I like to watch a soap opera	Ich sehe gern eine Seifenoper
I don't like watching the news	Ich sehe nicht gern die Nachrichten
I prefer watching a sport programme	Ich sehe lieber eine Sportsendung
I most like to watch a TV series	Am liebsten sehe ich eine Fernsehserie
A thriller pleases me / doesn't please me	Einen Krimi gefällt mir / gefällt mir nicht
I like documentaries	Ich mag Dokumentation**en**

Quiz 4.3 – Giving opinions on TV

Ein Krimi **ist** faszinierend	A thriller **is** fascinating	Tiersendung**en sind** Quatsch	animal programmes **are** nonsense
informativ	informative	unrealistisch	unrealistic
spannend	exciting/tense	echt doof	really stupid
entspannend	relaxing	aggressiv	aggressive
einmalig	unique	schrecklich/furchtbar	terrible
echt klasse	really great	Es ist nicht mein Ding / es ist nicht für mich	It's not my thing / it's not for me

Quiz 4.4 – fashion

fashion is very important	Mode ist sehr wichtig
her clothing is great	Ihre Kleidung ist toll
he has lots of tattoos	Er hat viele Tätowierungen
a pretty skirt	einen schön**en** Rock (m)
a black jacket	eine schwarz**e** Jacke (f)
a great t-shirt	ein toll**es** T-Shirt (n)
small shoes	klein**e** Schuhe (pl)

Parallel texts – 90 word version 1

*what you like and don't like to watch on TV and why

*what music you like and don't like and why

*how important fashion is to you

I see like a soap opera, **because** it entertaining **is.** In addition, **see I** like in the evening the news, **because** it informative **is.** **On the other side** see I not like quiz shows because they are extremely boring **in my opinion** I listen like rock music **because** it always cool and loud is. **However listen I** not like pop music, because it is silly, **although** it popular **is.** Fashion is **to me** very important. **Every day wear I** a black jacket and white shoes with a jeans, **because** it cool and fashionable **is.**	Ich sehe gern eine Seifenoper, **da** es unterhaltsam **ist.** Außerdem **sehe ich** gern am Abend die Nachrichten, **weil** es informativ **ist.** **Auf der anderen Seite** sehe ich nicht gern Quizshows denn sie sind ganz langweilig **meiner Ansicht nach.** Ich höre gern Rockmusik, **weil** es immer cool und laut **ist. Jedoch höre ich** nicht gern Popmusik, denn es ist doof, **obwohl** es berühmt **ist.** Mode ist **mir** sehr wichtig. **Jeden Tag trage ich** eine schwarze Jacke und weisse Schuhe mit einer Jeans, **weil** es cool und modisch **ist.**

Parallel texts – 90 word version 2

*the celebrity

*what he or she has done

*your opinion of the celebrity

Kai Havertz and he is a football player. He has short, brown hair and he is worldwide famous. He loves sport, **particularly** football. Kai **has** football for Chelsea **played** and **he has** also in The Euros 2024 for Germany **played, because** he very talented is. His team has last year lots of games won. In my opinion **is** Kai Havertz really happy, proud and unbelievably rich **as** (a) football player. **I think, that** he a good role model for teenagers **is,** **because** he successful **is.**	Er heisst Kai Havertz und er ist Fussballspieler. Er hat kurze, braune Haare und er ist weltweit berühmt. Er liebt Sport, **besonders** Fussball. Kai **hat** Fussball für Chelsea **gespielt** und er **hat** auch in der Europameisterschaft 2024 für Deutschland **gespielt,** **da** er sehr talentiert **ist.** Seine Team hat letztes Jahr viele Spiele gewonnen. Meiner Meinung nach **ist** Kai Havertz wirklich glücklich, stolz und unglaublich reich **als** Fussballspieler. **Ich denke, dass** er ein guter Vorbild für Jugendliche **ist,** **weil** er erfolgreich **ist.**

Year 10 French Half-Term 3 – Celebrity Culture

Quiz 3.1 – celebrity vocab

Ma **célébrité** préférée est une **actrice internationale.**	My favourite **celebrity** is an **international actress**.
Quelquefois elle fait **des films**, mais elle est aussi dans **les émissions de télé.**	Sometimes she makes **films**, but she is also on **TV programmes.**
J'adore regarder mon **influenceur** préféré sur TikTok.	I love to watch my favourite **influencer** on TikTok.
Il fait **des vidéos** sur **la mode.**	He makes **videos** about **fashion.**
Stromae est **un chanteur** belge **célèbre**.	Stromae is a **famous** Belgian **singer.**
L'année dernière je suis allé(e) à son **spectacle.**	Last year I went to his **show.**

Quiz 3.2 – opinions on celebrities

Je suis un fana de ce **chanteur** car ses **paroles** sont **belles**.	I am a fan of this **singer** because his **lyrics** are **beautiful.**
J'ai horreur de cet **influenceur** parce qu'il **ne respecte pas** les autres.	I really hate this **influencer** because he **doesn't respect** others.
Mon **auteur** préféré écrit **des romans** fantastiques.	My favourite **author** writes fantastic **books.**
Je n'aime pas cette **actrice** vu qu'elle a **une personalité** horrible.	I don't like this **actress** because they have a horrible **personality.**
J'adore **ce groupe** étant donné que sa musique est **extraordinaire.**	I love **this band** because their music is **extraordinary.**
Je suis **fier (fière)** de mon ami **célèbre**!	I am **proud** of my famous **friend**!

Quiz 3.3 – celebrity jobs and activities

Cette **athlète** est **championne du monde** et elle a gagné une **médaille d'or** l'été dernier.	This **athlete** is **world champion** and she won a **gold medal** last summer.
Ce **rappeur chante** et **danse** pendant ses **concerts.**	This **rapper sings** and **dances** during his **concerts.**
Un **humoriste raconte** les histoires et amuse **le public.**	A **comedian tells** stories and amuses **the public**.
Cet **écrivain** parle des problèmes du racisme et de la pauvreté.	This **writer** talks about the problems of racism and poverty.
Cette ancienne **chanteuse travaille** maintenant dans la politique.	This old **singer** now **works** in politics.
Un **acteur découvre** beaucoup de nouveaux endroits et **rencontre** des gens passionnants.	An **actor discovers** lots of new places and **meets** exciting people.

Quiz 3.4 – PALMCOW

Sur la photo il y a.../je peux voir...	In the photo there is.../I can see...
Ils sont contents.	They are happy.
Ils sont au concert.	They are at the concert.
À mon avis, j'aime aller aux concerts car c'est amusant.	In my opinion, I love going to concerts because it is fun.
Il y a du soleil.	It is sunny.
Sur la photo il y a un garçon, une fille et deux adultes.	In the photo there is a boy, a girl and two adults.

Example 90 word task: You are emailing your Canadian friend about celebrities.

Describe

- the advantages and disadvantages of being famous
- a celebrity you saw on screen or in person recently
- why you would like (or not like) to be famous one day

An advantage of being famous is that you can buy some cars expensive and some houses enormous. However, a person famous does not have freedom as the fans are everywhere. Recently I have watched a film of my actor favourite at the cinema. It was super exciting! He was handsome and nice, and he had the hair brown and the eyes blue. I have liked the film because his character in the film was very important. In the future, I would like to be famous. I would like to be an influencer famous and I will make videos on the subject of make-up and fashion as I love to talk about clothes. I hope to earn lots of money because I would like to buy a very big house for me and my family.	Un avantage d'être célèbre est qu'on peut acheter des voitures chères et des maisons énormes. Cependant, une personne célèbre n'a pas de liberté car les fans sont partouts. Récemment, j'ai regardé un film de mon acteur préféré au cinema. C'était super passionnant! Il était beau et sympa, et il avait les cheveux bruns et les yeux bleus. J'ai aimé le film vu que son personnage dans le film était très important. À l'avenir, j'aimerais être célèbre. Je voudrais être une influenceuse fameuse et je vais faire des vidéos au sujet du maquillage et de la mode car j'adore parler des vêtements. J'espère gagner beaucoup de l'argent étant donné que j'aimerais acheter une très grande maison pour moi et ma famille.

Example 150 word task: You are writing an article about celebrity culture.

Describe

- the positive aspects of being a celebrity
- when you watched your favourite celebrity recently.

The celebrities are very rich and live in some houses enormous. They buy some cars expensive and they wear some clothes of good quality. I would be very happy if I had a life like that. What's more, all the world likes to follow celebrities. You them see always on the networks social because their life seems to be so exciting. They are always in the process of doing things very interesting. My celebrity favourite is the singer Adele. I love her music and she seems to be a person nice. Recently, I went to her concert and she sang all her songs popular. it was truly super. I have taken lots of photos. She was also on the television the weekend last and I watched the programme. She just recorded a new song. I it have downloaded yesterday evening and I it have a lot liked.	Les célébrités sont très riches et habitent dans des maisons énormes. Elles achètent des voitures chères et elles portent des vêtements de bonne qualité. Je serais très heureux si j'avais une vie comme ça. En plus, tout le monde aime suivre les célébrités. On les voit toujours sur les réseaux sociaux parce que leur vie semble être tellement passionnante. Elles sont toujours en train de faire des choses très intéressantes. Ma célébrité préférée est la chanteuse Adele. J'adore sa musique et elle semble être une personne sympa. Récemment, je suis allé à son concert et elle a chanté toutes ses chansons populaires. C'était vraiment super. J'ai pris beaucoup de photos. Elle était aussi à la télévision le week-end dernier et j'ai regardé l'émission. Elle vient d'enregistrer une nouvelle chanson. Je l'ai téléchargée hier soir et je l'ai beaucoup aimée.

Year 10 French Half-Term 3 – Celebrity Culture

Quiz 4.1 – music

J'aime **écouter** de **la musique française.**	I like **listening** to **French music.**
Il y a beaucoup de **chanteurs** français intéressants.	There are lots of interesting French **singers.**
Parfois **les paroles** sont difficiles à comprendre.	Sometimes **the words** are difficult to understand.
C'est amusant de regarder **des vidéos** en ligne.	It is fun to watch **music videos** online.
Je voudrais voir **mon groupe** préféré **au concert.**	I would like to see **my** favourite **band in concert.**
Cette **chanteuse chante** bien.	This **singer (f) sings** well.

Quiz 4.2 – tv

Je trouve **la télé** vraiment **divertissant.**	I find **TV** really **entertaining.**
Mon émission préférée c'est **une émission de télé-réalité.**	**My** favourite **programme** is **a reality tv show.**
Je pense que **les feuilletons** sont assez barbants.	I think that **soaps** are quite boring.
J'ai regardé **une émission** intéressante hier soir.	I watched **an** interesting **programme** last night.
Je préfère regarder **les émissions** en ligne car c'est facile.	I prefer to watch **programmes** online because it is easy.
Le weekend prochain je vais rester à la maison pour regarder la nouvelle **série.**	Next weekend I will stay at home to watch the new **series.**

Quiz 4.3 – advantages and disadvantages of being a celebrity

Les célébrités sont très riches et elles habitent dans les maisons énormes.	**Celebrities** are really rich and live in enormous houses.
Elles achètent des voitures chères et elles portent des vêtements de bonne qualité.	They buy expensive cars and they wear good quality clothes.
Tout le monde aime suivre **les célébrités** sur les reseaux sociaux.	Everybody loves to follow **celebrities** on social media.
Cependant, les commentaires en ligne peuvent être méchants.	However, comments online can be nasty.
Les journalistes peuvent prendre votre photo n'importe où.	**Journalists** can take your photo anywhere.
On n'as pas de **vie privée car les fans** sont partout.	You have **no private life because fans** are everywhere.

Example 90 word task: You are emailing your Canadian friend about celebrities.

Describe

- the advantages and disadvantages of being famous
- a celebrity you saw on screen or in person recently
- why you would like (or not like) to be famous one day

An advantage of being famous is that you can buy some cars expensive and some houses enormous. However, a person famous does not have freedom as the fans are everywhere. Recently I have watched a film of my actor favourite at the cinema. It was super exciting! He was handsome and nice, and he had the hair brown and the eyes blue. I have liked the film because his character in the film was very important. In the future, I would like to be famous. I would like to be an influencer famous and I will make videos on the subject of make-up and fashion as I love to talk about clothes. I hope to earn lots of money because I would like to buy a very big house for me and my family.	Un avantage d'être célèbre est qu'on peut acheter des voitures chères et des maisons énormes. Cependant, une personne célèbre n'a pas de liberté car les fans sont partout. Récemment, j'ai regardé un film de mon acteur préféré au cinema. C'était super passionnant! Il était beau et sympa, et il avait les cheveux bruns et les yeux bleus. J'ai aimé le film vu que son personnage dans le film était très important. À l'avenir, j'aimerais être célèbre. Je voudrais être une influenceuse fameuse et je vais faire des vidéos au sujet du maquillage et de la mode car j'adore parler des vêtements. J'espère gagner beaucoup de l'argent étant donné que j'aimerais acheter une très grande maison pour moi et ma famille.

Example 150 word task: You are writing an article about celebrity culture.

Describe

- the positive aspects of being a celebrity
- when you watched your favourite celebrity recently.

The celebrities are very rich and live in some houses enormous. They buy some cars expensive and they wear some clothes of good quality. I would be very happy if I had a life like that. What's more, all the world likes to follow celebrities. You them see always on the networks social because their life seems to be so exciting. They are always in the process of doing things very interesting. My celebrity favourite is the singer Adele. I love her music and she seems to be a person nice. Recently, I went to her concert and she sang all her songs popular. it was truly super. I have taken lots of photos. She was also on the television the weekend last and I watched the programme. She just recorded a new song. I it have downloaded yesterday evening and I it have a lot liked.	Les célébrités sont très riches et habitent dans des maisons énormes. Elles achètent des voitures chères et elles portent des vêtements de bonne qualité. Je serais très heureux si j'avais une vie comme ça. En plus, tout le monde aime suivre les célébrités. On les voit toujours sur les réseaux sociaux parce que leur vie semble être tellement passionnante. Elles sont toujours en train de faire des choses très intéressantes. Ma célébrité préférée est la chanteuse Adele. J'adore sa musique et elle semble être une personne sympa. Récemment, je suis allé à son concert et elle a chanté toutes ses chansons populaires. C'était vraiment super. J'ai pris beaucoup de photos. Elle était aussi à la télévision le week-end dernier et j'ai regardé l'émission. Elle vient d'enregistrer une nouvelle chanson. Je l'ai téléchargée hier soir et je l'ai beaucoup aimée.

2.2.3 Additional Programming Techniques

- **The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional arrays (2D)**
- **How to use sub programs (functions and procedures) to produce structured code**
- **Random number generation**

Definition of an array
An array is a series of memory locations or 'boxes' each of which holds a single item of data, but with each box sharing the same name. All data in an array must be of the same data type

Use of arrays
Indexes usually start at 0 for the first data item (known zero indexed).
Arrays may be single or multiple dimensions.

One-Dimensional Array
Holds one set of data e.g. this Array holds the scores for player 1

0	1	2	3	4	5	6	7	8	9
100	110	85	80	92	72	66	98	100	120

Two-dimensional Array
Holds than one set of data e.g. this 2D Array holds the store for both player 1 and 2

	0	1	2	3	4	5	6	7	8	9
0	100	110	85	80	92	72	66	98	100	120
1	90	99	102	88	78	100	67	120	88	105

Structure of arrays
Arrays are made up of elements (items) holding related data.
Every item in an array has an index – like a room number in a hotel that we can access it by.
Some arrays can have 'multiple floors' – then we call them 'two-dimensional' or 'nested'.
To write or read an item, we provide its floor (row) first and its room number on that floor (column).
An array is an ordered collection of related data where each element is accessible by a number, known as an index.
Arrays usually have fixed sizes and occupy a fixed (static) amount of memory.

INDEX	0	1	2	3	4	5	6	7
VALUE	45	87	23	101	2	42	11	92

Array item/element

Subprograms are small programs that are written within a larger, main program. The purpose of a subprogram is to perform a specific task.
Sub programs can be used to save time and simplify code.
When you want your program to repeat in different places you only need to call the name of the sub program.
This saves time and simplifies code by avoiding repetition of code.
There are two types of subprogram:
- procedures
- functions

Procedures are a set of instructions stored under a name so that you can call the procedure to run the whole set of instructions.
A **function** is like a procedure but always returns a value.
Parameters are variables used to pass values into a function or procedure.

EXAMPLE PROCEDURE

```
procedure clear_screen(x)
  for i = 1 to x:
  print(" ")
endprocedure
```

EXAMPLE FUNCTION

```
function f_to_c(temperature_in_f)
    temperature_in_c= (temperature_in_f –32) * 5/9
    return temperature_in_c
endfunction
```

Python doesn't use Arrays it uses lists

Random number generators are used a lot in computer systems in a whole range of situations, from computer games to weather simulations to encryption algorithms.
A typical method of generating random numbers might look like this:

```
import random
diceScore = random.randint(1,6)
```

```
month:= getRandBetween(1,12)
```

```
number = random(1,10)
```

2.3.1 Defensive design

Defensive design considerations:

- Anticipating misuse
- Authentication

Input validation

Maintainability:

- Use of sub programs
- Naming conventions
- Indentation
- Commenting

Authentication is a coding method to check that a user is who they say they are and allowed to accesses the program.
This can be as simple as the user entering a user name and password which is compared against a stored user name and password.
If they match then the user is authenticated.

Input Validation is a check made by a computer to ensure that the data entered is sensible or reasonable.
It cannot check that it is correct because a user may lie or make a mistake.
It attempts to ensure that it is within certain limits or rules.

Type of check	How it works	Example
Check digit	The last 1 or 2 digits in a code are used to check the other digits are correct	Bar code readers in supermarkets use check digit
Format check	Checks the data is in the correct format	A national insurance number is in the form LL 99 99 99 L where L is any letter and 9 is any number
Length check	Checks to make sure the data isn't to short or long	Phone numbers are 11 characters or passwords that need to be more than 6 characters
Lookup table	Looks for acceptable values in a table	There are seven possible days in the week
Presence check	Checks to make sure data has been entered into a field	In most databases the key field can not be left blank
Range check	Check the value falls within a specific range	Number of hours worked must be less than 50 but more than 0
Spell check	Looks up words in a dictionary	MS word uses red lines to underline misspelt words

Defensive program design will consider and **anticipate misuse.**
Misuse may be in the form of a brute force attack on the program.

- Many programs and systems only allow a user to enter a password three or four times before it locks out the system.

The program should be able to identify when a user keeps inputting the same data.
Consider Twitter which allows you to send the same tweet only once.

- If you send the same Tweet twice the program identifies this and removes the tweet, sending you an error message.

Authentication can also be physical.
Programs often requires a **key code:**

- this is generated by an app on a users phone
- the user then enters this as extra security.

Online banking requires a user to enter details into a webpage:

- a number is generated which is entered into a key device.
- this returns a number code which is entered into the webpage as well
- without the second part of the code the user is not authenticated.

This is know as **2-factor authentication.**

If a program is to be defensive against attacks, it has to be maintained and up to date.
API (Application Program Interface) and code changes, which means that programs will need to adapt to complement new requirements.

Code is indented for a number of reasons:
To group together a function, The code does not use a { syntax and indentation is used instead, If altering a function in the future it can be easily found, Makes the program much easier to read and understand.

There are two main types of sub programs:

- procedure
- function.

Procedures carry out a set of instructions and do no not return a value.
A function is a similar to a procedure but it will return a value.
The main benefit that is fact sub programs give a program structure.

Comments in programs serve a number of purposes:
To inform them reader of a bug or issues, To explain the code and its function in more detail, To stop a line of section of code from executing
Common symbols used for commenting are
', #, */, //, /**

To make code easier to follow, programmers follow standard **naming Conventions.**
When creating identifiers they should be meaningful and easy to read.
e.g. First_Name is much better than firstname.

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

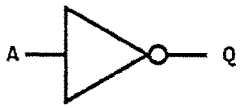
The possible values for each gate can be represented using a TRUTH TABLE.

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'

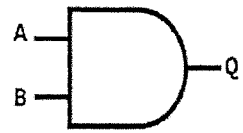
NOT gate



A	Q
0	1
1	0

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

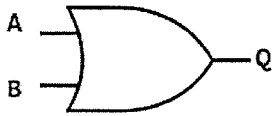
AND gate



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

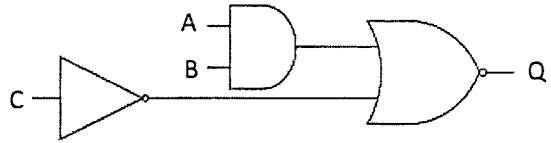
A OR gate has two possible inputs – 'A' and 'B'

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.