Y11 A Christmas Carol by Charles Dickens, Knowledge Organiser

Exam Paper Overview:

Literature Paper 2: A Christmas Carol is on the Literature Paper 2 exam. This part of the exam is usually 1 hour, however, this year you will have 1 hour 20 minutes to respond to the novel question.

Dickens' Intentions and Ideas

Dickens' writing criticised economic, social, and moral issues in the Victorian era. He showed compassion and empathy towards the vulnerable and disadvantaged people in English society, and help to bring about several important social reforms. Dickens' deep social commitment and awareness of social issues come from his traumatic childhood, where his father was imprisoned for debt, and he was forced to work in a shoe-blacking factory at 12 years old. In his adult life, Dickens developed a strong social conscience and empathised with the victims of social and economic injustice. Dickens' intention in A Christmas Carol is to draw readers' attention to the plight of the poor and to highlight the hypocrisy of Victorian society. He juxtaposes the wealth and greed of capitalists with the poorer classes and draws attention to the way in which the greed and selfishness of some impacts on the quality of the lives of others. His moral message appears to be that we should care for our fellow man. The transformation of Scrooge suggests that Dickens feels it is never too late for change and redemption. Dickens emphasises the importance of family, friendship and charity in bringing about this change.

Stave Summaries

Stave 1	Stave 2	Stave 3	Stave 4	Stave 5
1. Introduced to Ebenezer Scrooge on Christmas Eve. He is a lonely miser obsessed with money. He won't pay to heat the office properly – meaning Bob Cratchit is very cold. 2. We learn Jacob Marley, Scrooge's business partner, died exactly 7 years earlier. 3. Scrooge is irritated that Christmas Day seems to be interrupting his business. 4. Scrooge is visited by his nephew Fred, who invites his uncle to Christmas dinner. Scrooge refuses. 5. Scrooge is visited by two charity workers, asking for donations. Scrooge refuses and exclaims he wants to be left alone. 6. Scrooge allows Bob to have Christmas Day off. 7. Scrooge, when he is home, is visited by the Ghost of Jacob Marley – warning him he will be visited by three more ghosts to help him change his ways.	1. Scrooge is visited by the Ghost of Christmas Past who takes him to witness his past. 2. Scrooge is taken first to his schoolboy years and he is reminded how his friends would go home from Christmas while he was left at school. 3. We see him with his sister, who one year took him home for the holidays. 4. Next we are shown Scrooge as a young apprentice, working for Fezziwig. Dickens describes the Christmas ball Fezziwig organised for his employees. 5. Finally, Scrooge is taken to see his ex-fiancée, Belle. We see the scene when they break up, as money has taken over Scrooge's life. 6. Scrooge cannot bear to see any more and struggles with the spirit.	1. Scrooge is then visited by the Ghost of Christmas Present. 2. The spirit shows Scrooge how the Cratchit family celebrate Christmas. Scrooge asked if Tiny Tim will life. The spirit explains unless there are changes, he will die. The spirit reminds Scrooge of his earlier words: 'If he is to die, he had better do it, and decrease the surplus population' 3. Scrooge is then taken to see how others celebrate Christmas: miners, lighthouse workers, sailors on a ship. 4. He is then taken to Fred's house at Christmas, where they are playing games. 5. The spirit then begins to age, and see under the spirit's robes two children: Want and Ignorance. 6. The Ghost of Christmas Future then appears	1. The Ghost of Christmas Future is described. 2. The spirit takes Scrooge to see a group of businessmen discussing someone who has died. 3. Scrooge is then taken to see Old Joe, where he is in the process of buying property of the dead man – which have been stolen. 4. Scrooge then returns to Bob Cratchit's house, where it is revealed Tiny Tim has died. 5. Scrooge is then taken to the graveyard and is shown a grave stone and realises this is for him. 6. Scrooge falls to his knees and begs that he will change his ways.	1. Scrooge wakes up in his own bed. 2. Scrooge wonders how much time has passed and calls to a boy. He then sends the boy to the poulterer for the prize turkey to give to Bob Cratchit, 3. Scrooge meets one of the charity collectors from earlier and whispers to him that he will give a large donation. 4. Scrooge then goes to Fred's house and is welcomed in. He enjoys the dinner and party. 5. On Boxing Day, Scrooge arrives early to work, and plays a trick on Bob. Scrooge then tells him he is going to raise his salary and promises to help Bob's struggling family. 6. Scrooge is described to have completely changed and becomes a 'second father' to Tiny Tim – 'who did not die.'

Assessment Overview: Part A and Part B: 1 hour	**Language**	**Structure and Form**	**Characters**	**Themes**
<u>Part A:</u> You are given an extract from the novella. You need to analyse how Dickens presents a character or relationship. **<u>Criteria:</u>** **3 paragraphs** **Clear point** **Embed evidence** **Include language, structure and form** **Explain what the quote shows** **Analyse the techniques** **Refer to reader** **<u>Part B:</u>** After the extract, you are given a theme shown in the novella. You need to refer to events elsewhere in the novella which relate to that theme. **<u>Criteria:</u>** **3-4 paragraphs** **Clear point** **Event description** **Explain what the event shows** **Explain how it shows the theme** **Explain why it is significant** **Reader effect**	**Alliteration** **Triple Emphasis** **Satire**- use of humour or ridicule to criticise **Simile**- comparing using 'like' or 'as' **Metaphor**- saying one thing is another **Personification**- make object human **Pathetic fallacy**- weather to create mood Pathos- language to evoke pity **Allusion**- reference to another literary work **Hyperbole**- exaggerated statement **Connotation**- associated meaning of word **Characterisation**- built up description of character in text **Semantic field**- words related in meaning **Imagery**- visually descriptive language. **Noun:** Name of person, place, thing **Adjective:** Describes noun **Determiner:** Gives information about the noun: *the/a/every/some* **Abstract Noun:** An idea/concept *love/anger* **Concrete Noun:** Something you can touch/hold **Verb:** Doing word **Adverb:** Describes verb **Modal Verb**: Gives information about the verb: *should/could/might* **Imperative Verb:** A command **Pronoun:** In place of noun *I/he/it/they* **Preposition:** Tells you where something is *on/over/under* **Conjunction:** A connective *and/or/but/although* **Superlative:** The most extreme version *tallest/smallest*	**Order of ideas:** Thinking about what the writer started/finished with; why they saved something until last or shared it early on. **Paragraph length:** Is it particularly long/short? **Sentence length:** As above. **Simple sentence:** A sentence with only one subject and one verb: *The cat sat on the chair.* **Compound sentence:** Two main clauses joined with a connective that both make sense independently: *The cat sat on the chair and the man sat on the floor.* **Complex sentence:** A sentence with a main clause and a subordinate clause: *The cat, who was spoilt, sat on the chair whilst the man sat on the floor.* **Punctuation:** Consider how these devices have been used **Juxtaposition:** Two opposite ideas used close by one another **Repetition:** Using the same words, phrase or ideas more than once **Main Clause:** The main part of a sentence; makes sense on its own. **Subordinate Clause:** A clause which does not make sense on its own. **Conflict**- problem faced by characters **Resolution-** point where conflict is resolved **Foreshadowing-** clue about something later **Foreboding**- sense that something will occur **Backstory**- insight into character's past **Exposition**- revelation of something **Poetic justice-** good rewarded bad punished **Melodrama**- exaggerated characters/events **Motif**- repeated image or symbol **Antithesis**- contrast of ideas in same grammatical structure **Authorial intrusion**- where author pauses to speak directly to reader **Allegory**- characters/events represent ideas about religion, morals or politics **Asyndeton**- list without conjunctions **Polysyndeton**- list with conjunctions (and)	**1.Ebenezer Scrooge:** Miserly, mean, bitter, materialistic, unsympathetic, indifferent, cold, selfish, isolated, cynical, charitable, value driven, generous, happy, sociable, transformed. **2. Marley's Ghost:** Materialistic, self-centred, terrifying, haunting, exhausted, direct, reformed, regretful, hopeful, selfless, wise **3. Bob Cratchit:** Uncomplaining, tolerant, courteous, deferential, patient, civil, eager, pleasurable, good-humoured, playful, caring, tender, cheerful, loving, forgiving. **4. Fred:** Warm-hearted, empathetic, cheerful, optimistic, even-tempered, insightful, determined, generous, forgiving, jovial, enthusiastic, caring **5. Ghost of Christmas Past:** Contradictory, strong, gentle, quiet, forceful, questioning, mysterious **6. Ghost of Christmas Present:** Compassionate, abundant, generous, cheerful, jolly, friendly, severe, sympathetic **7. Ghost of Christmas Future:** Mysterious, silent, ominous, intimidating, frightening, resolute. **8. Tiny Tim:** Frail, ill, good, religious	-Family -Loneliness and isolation -Time -Education -Christmas Spirit -Redemption -Poverty -Social responsibility -Supernatural -Poverty -Fate -Charity -Transformation -Capitalism -Greed -Money -Friendship -Religion -Morality -Isolation/Loneliness, -Choices -Memory and the past -Compassion -Forgiveness -Guilt and blame -Time -Rationality

Knowledge Organiser: Non-Fiction Reading

Module Overview: You will read a variety of unseen Non-Fictions texts and will practise comprehension, analysis, evaluation and comparison. You will write a transactional writing piece.

AO1: Comparison Identify and select key information	**AO2: Analysis** Explaining how and language / structural devices are used.	**AO3: Comparison** Identifying similarities/differences between writers' ideas/perspectives.	**AO4: Evaluation** Exploring how and why a text is effective.	**AO5/6 Writing and SPaG** Use of ideas, language and structure. Accurate and effective SPaG.

Assessment Overview: 2 hours and 5 minutes: The exam paper includes two unseen Non-Fiction Texts and a transactional writing task.

Questions 1-3: Text 1		**Questions 4-6:** Text 2		**Question 7:** Texts 1 and 2		**Q8/9 : Transactional Writing:** Choice of two questions, you will answer one
Q1/2: (3) AO1	**Q3: (15 marks)** AO2	**Q4/5: (3)** AO1	**Q6: (15 marks)** AO4	**Q7a: (6 marks)** AO3	**Q7b: (14 marks)** AO3	**Q8/9:** A05 **(24 marks)** A06 **(16 marks)**
Find and copy key quotes from the text. 5 minutes	Identify key quotes Analyse language devices Analyse structural choice Analyse word choices Explore effect on reader/writer's intentions 20 minutes	Find and copy key quotes from the text. 5 minutes	Embed short, concise quotes Link back to key word in question Explain what writer was trying to do and how they've done it Refer to writers' choices 20 minutes	Find three similarities Include a quote from each text No need to explain or elaborate as long as it's clear. 5 minutes	Build on 7a analysis Refer to the PAF Compare how the texts are similar/different Include key quotes 20 minutes	Communicate clearly, effectively and selecting and adapting tone, style and register for different forms, purposes and audiences. Organise information and ideas, using structural and grammatical features to support coherence and cohesion of texts. Candidates must use a range of vocabulary and sentence structures for clarity, purpose and effect, with accurate spelling and punctuation.

Key Terms:	Formats:	Purposes:
Purpose: The reason the piece if written. **Audience:** Who the piece is written for. **Format:** What type of text is the piece written in. **Analyse:** Examine the text to explain. **Evaluate:** Judge the success of the piece. **Compare:** Find similarities between two texts **Contrast:** Find differences between two texts. **Perspective:** Point of view of the writer.	**Article:** a piece of writing included with others in a newspaper, magazine, or other publication. **Letter:** a written, typed, or printed communication, sent in an envelope by post or messenger. **Speech:** a formal address or discourse delivered to an audience. **Review:** a critical appraisal of a book, play, film, etc. published in a newspaper or magazine.	**Persuade:** To make someone think/do something. **Argue:** To offer both points of view whilst concluding on own judgment. **Inform:** To offer information on a topic. **Advise:** To offer ideas, tips and suggestions. **Review:** judge and critique a book, play, event, restaurant etc.

Structure Devices		Word Classes
Order of ideas: Thinking about what the writer started/finished with; why they saved something until last or shared it early on. **Paragraph length:** Is it particularly long/short? **Sentence length:** As above. **Simple sentence:** A sentence with only one subject and one verb: *The cat sat on the chair.* **Compound sentence:** Two main clauses joined with a connective that both make sense independently: *The cat sat on the chair and the man sat on the floor.* **Complex sentence:** A sentence with a main clause and a subordinate clause: *The cat, who was spoilt, sat on the chair whilst the man sat on the floor.*	**Imperative sentence:** A command or instruction **Interrogative sentence:** A legitimate question **Declarative sentence:** A simple statement **Exclamatory sentence:** An exclamation to show anger/shock/excitement **Punctuation:** Consider how these devices have been used **Juxtaposition:** Two opposite ideas used close by one another **Repetition:** Using the same words, phrase or ideas more than once **Main Clause:** The main part of a sentence; makes sense on its own. **Subordinate Clause:** A clause which does not make sense on its own.	**Noun:** Name of person, place, thing **Adjective:** Describes noun **Determiner:** Gives information about the noun: *the/a/every/some* **Abstract Noun:** An idea/concept *love/anger* **Concrete Noun:** Something you can touch/hold **Verb:** Doing word **Adverb:** Describes verb **Modal Verb**: Gives information about the verb: *should/could/might* **Imperative Verb:** A command **Pronoun:** In place of noun *I/he/it/they* **Preposition:** Tells you where something is *on/over/under* **Conjunction:** A connective *and/or/but/although* **Superlative:** The most extreme version *tallest/smallest*

Figurative Language Devices	Rhetorical Language Devices
Alliteration: Repeated letter/sound **Triple emphasis:** List of three words / sentence structures to create imagery **Imagery:** Description which creates a clear picture **Hyperbole:** Exaggeration of an image **Oxymoron:** Two opposite words used side-by-side to describe one thing **Metaphor:** A comparison without 'like' or 'as' – saying something *is* something else **Simile:** A comparison with 'like' or 'as' **Semantic Field:** A range of vocabulary which all shares a similar theme. **Personification:** Giving something inanimate human qualities **Onomatopoeia:** A word to reflect a sound *pop/bang/crash* **Idiom:** Non-literal phrase we recognise: *raining cats and dogs* **Euphemism:** Polite way of saying something: *the man had passed away* **Litotes:** Play down something negative: *My dog is not the friendliest*	**Anaphora:** Repetition of word/phrase at start of several sentences **Anecdote:** A personal story to exemplify a point **Fact:** Can be proven **Opinion:** Someone's thoughts **Rhetorical Question:** A question used for effect and not answered **Emotive Language:** Words used to provoke an emotional reaction **Statistics:** Facts and figures **Triple Emphasis:** A list of three words or sentence structures used to emphasise a certain point or perspective **Hyperbole:** Exaggeration to prove a point **Sensational Language:** Purposely dramatic or over-the-top language

Y11 Conflict Poetry and Unseen, Knowledge Organiser

Plot Overview:

Students must study and annotate a selection of 'Conflict' poetry from the GCSE Anthology. Additionally, to this they must then become familiar with Unseen Poetry and learn the skills of comparison.

Summary: *After we annotate each Conflict Poem, add a sentence to summarise poem.*

A Poison Tree:
The Destruction of Sennacherib:
Extract from The Prelude:
The Man He Killed:
Cousin Kate:
Half-Caste:
Exposure:
The Charge of the Light Brigade:
Catrin:
War Photographer:
Belfast Confetti:
The Class Game:
Poppies:
No Problem:
What were they Like?

Exam Overview:

Part A and Part B.

Section 1- Anthology

You are given one of the poems from the **Anthology.**

You will be given a theme to then compare with another poem of your choice.

<u>Criteria:</u>
3/4 paragraphs
Clear point
Embed evidence
Include language, structure and form
Explain what the quote shows
Analyse the techniques
Refer to the reader.
Compare and contrast throughout your analysis.

Section 2- Unseen

You will be given two **unseen** poems and asked to compare and contrast the sharing theme.

<u>Criteria:</u>
3-4 paragraphs
Clear point
Embed evidence
Include language, structure and form
Explain what the quote shows
Analyse the techniques
Refer to the reader.
Compare and contrast throughout your analysis.

Techniques:

Language, structure and form.

Language

Imagery: Language which creates vivid sensory ideas in
Simile: An explicit comparison between two things using 'like' or 'as'
Metaphor: An implicit comparison between two things not using 'like' or 'as'.
Personification: Attributing human like qualities to objects, ideas or animals.
Alliteration: the occurrence of the same letter or sound.
Triple emphasis: Description using 3.
Oxymoron: The combination of words or ideas which have opposite or very different meanings.
Assonance: Resemblance of sound between syllables of nearby words, arising particularly from the rhyming of two or more stressed vowels.
Sibilance: The sibilant or hissing sounds are created. These soft consonants are s with sh, and ch, th including three others such as z, x, f and softer c.
Motif: A repeated idea or image used throughout a text.

Structure

Stanza: The verses in the poem. Consider the shape; how it starts; and how the poem ends.
Refrain: Last line repeated
Juxtaposition: The placement of two ideas, statements or events near each other to invite comparison to contrast.
Rhyming: (of a word, syllable, or line) have or end with a sound that corresponds to another.
Rhythm: a strong, regular repeated pattern of movement or sound
Line length: The length of the line.
Repetition: the action of repeating something that has already been said or written.
Enjambement: The continuation of a sentence without a pause beyond the end of a line, couplet, or stanza.
Iambic pentameter: A line of verse with five metrical feet, each consisting of one short (or unstressed) syllable followed by one long (or stressed) syllable.
Caesura: A break between words within a metrical foot

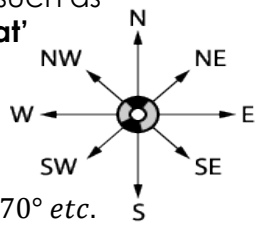
Form

Lyric Poetry: Modern lyric poetry is a formal type of poetry which expresses personal emotions or feelings, typically spoken in the first person.
Monologue Poetry: Dramatic monologue is a type of poetry written in the form of a speech of an individual character.
Narrative Poetry: Narrative poetry is a form of poetry that tells a story, often using the voices of both a narrator and characters; the entire story is usually written in metered verse.
Free Verse: Free verse is an open form of poetry, which in its modern form arose through the French vers libre form. It does not use consistent meter patterns, rhyme, or any musical pattern. It thus tends to follow the rhythm of natural speech
Sonnet: A sonnet is a poem that consists of 14 lines and more than often uses an iambic pentameter structure.
Epic Poetry: An epic poem, or simply an epic, is a lengthy narrative poem typically about the extraordinary deeds of extraordinary characters.

Year 11 Mathematics Knowledge Organiser (Term 1 – Unit 39/40/41/42/43/44/45)

Compass Directions (MW 124)

You can use an acronym such as **'Never Eat Shredded Wheat'** to remember the order of the compass directions in a clockwise direction.



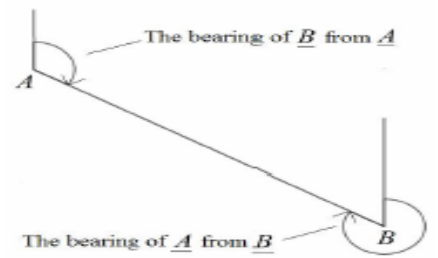
Bearings: $NE = 045°, W = 270°\ etc.$

Bearings (MW 124)

1. Measure from **North** (draw a North line)
2. Measure **clockwise**
3. Your answer must have **3 digits** (eg. 047°)

Look out for where the bearing is measured from.

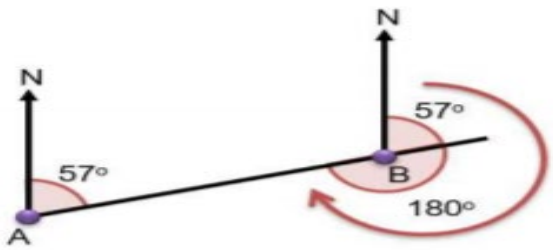
Example.



John runs from A to B and back again

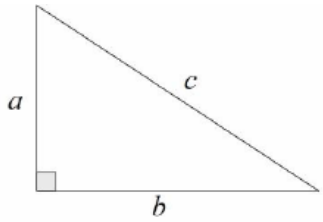
a) What is the bearing of his outward run from A to B?

b) What is the bearing of this return run from B to A? = 057° = 057° + 180° = 237°



Pythagoras' Theorem (MW 150a/b/c)

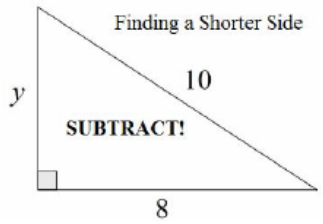
For any **right angled triangle**:



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

Used to find **missing lengths**.
a and b are the shorter sides, c is the **hypotenuse** (**longest side**).

Example.



$$a = y,\ b = 8,\ c = 10$$
$$a^2 = c^2 - b^2$$
$$y^2 = 100 - 64$$
$$y^2 = 36$$
$$y = 6$$

Trigonometry (MW 168)

The **study** of **triangles**.

Sides of a Right-Angle Triangle

Hypotenuse

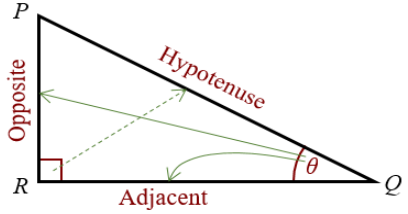
The longest side of a right-angled triangle. Is always opposite the right angle.

Opposite

Side across from the Angle marked.

Adjacent

Next to the angle.



Trigonometric Formulae (MW 168)

Use **SOHCAHTOA**.

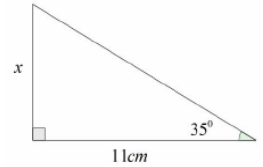
$$\sin\theta = \frac{O}{H} \qquad \cos\theta = \frac{A}{H} \qquad \tan\theta = \frac{O}{A}$$

When finding a missing angle, use the 'inverse' trigonometric function by pressing the 'shift' button on the calculator.

Example.

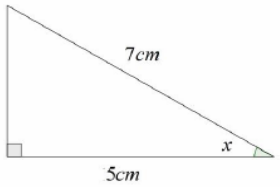
Use *Opposite* and *Adjacent*, so use *'tan'*

$$tan\,35 = \frac{x}{11}$$
$$x = 11\,tan\,35 = 7.70cm$$



Use *Adjacent* and *Hypotenuse*, so use *cos*

$$cos\,x = \frac{5}{7}$$
$$x = cos^{-1}\left(\frac{5}{7}\right) = 44.4°$$

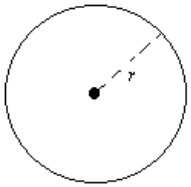


Year 11 Mathematics Knowledge Organiser (Term 1– Unit 46/47/48)

Circle

A circle is the locus of all points equidistant from a central point.

Example



Area of a Circle(MW 117)

$A = \pi r^2$ which means 'pi x radius squared'.

Example

If the radius was 5cm, then:

$$A = \pi \times 5^2 = 78.5cm^2$$

Arc Length of a Sector (MW 1149

The arc length is part of the circumference.

Take the **angle** given **as a fraction over 360°** and **multiply** by the **circumference**.

Example

Arc Length = $\frac{115}{360} \times \pi \times 8$

$$= 8.03cm$$

Parts of a Circle (MW 116)

Radius – the **distance** from the **centre** of a circle to the **edge**

Diameter – the total **distance** across the **width** of a circle **through the centre**.

Circumference – the **total distance** around the **outside** of a circle

Chord – a **straight line** whose **end points lie on a circle**

Tangent – a **straight line** which **touches** a circle at exactly **one point**

Arc – a **part of the circumference** of a circle

Sector – the **region** of a circle enclosed by **two radii** and their intercepted **arc**

Segment – the **region** bounded by a **chord** and the **arc** created by the chord.

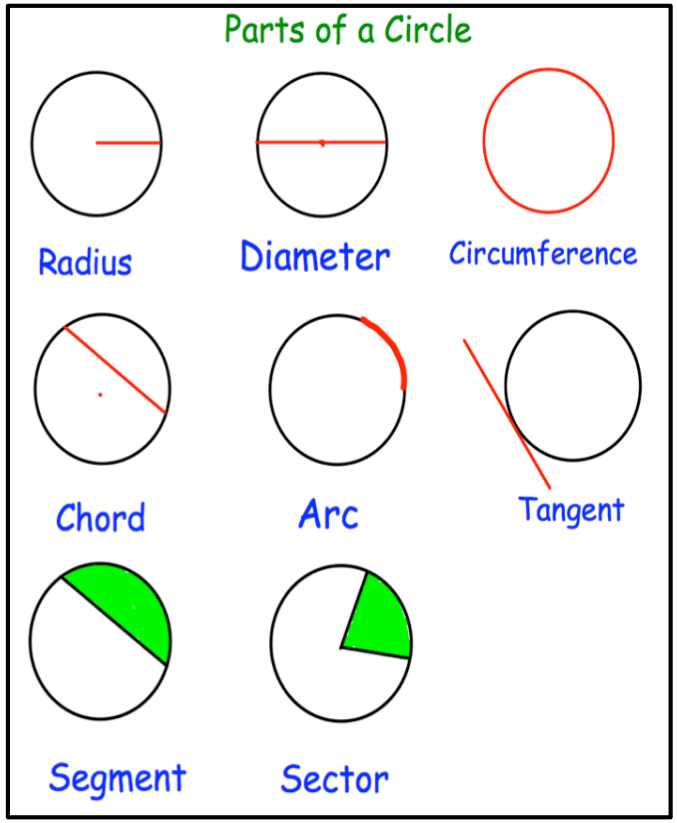
Circumference of a Circle (MW 118)

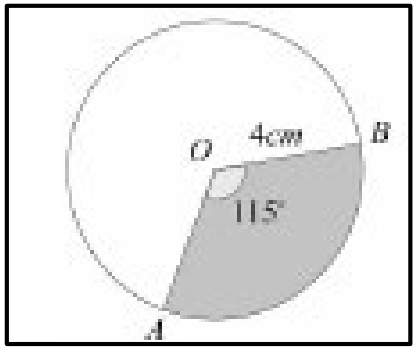
$C = \pi d$ which means 'pi x diameter'

Example

If the radius was 5cm, then:

$$C = \pi \times 10 = 31.4cm$$





Area of a Sector (MW 167)

The area of a sector is part of the total area.

Take the **angle** given **as a fraction over 360°** and **multiply** by the **area**.

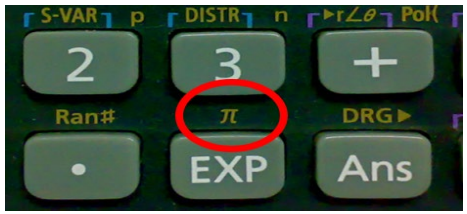
Example

Area = $\frac{115}{360} \times \pi \times 4^2$

$$= 16.1cm^2$$

π ('pi')

Pi is the circumference of a circle divided by the diameter.

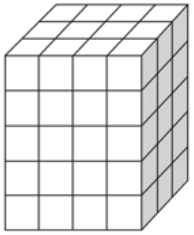


Year 11 Mathematics Knowledge Organiser (Term 1 – Unit 49/50)

Volume

Volume is a measure of the amount of space inside a solid shape.
Units: mm^3, cm^3, m^3 etc.

Example

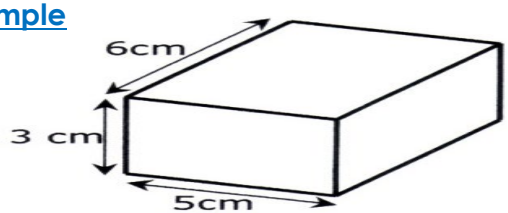


Volume of a Cube/Cuboid (MW 115)

$$V = Length \times Width \times Height$$
$$V = L \times W \times H$$

You can also use the Volume of a Prism formula for a cube/cuboid.

Example

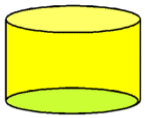


volume = 6 x 5 x 3
= 90 cm^3

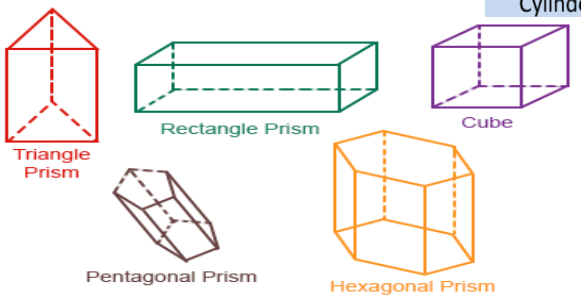
Prism

A prism is a 3D shape whose **cross section Is the same** throughout.

Example



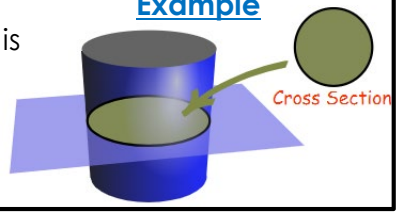
Cylinder



Cross Section

The **cross section** is the **shape** that **continues** all the way **through t he prism**.

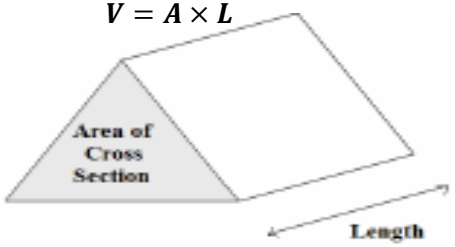
Example



Volume of a Prism (MW 119)

$$V = Area\ of\ Cross\ Section \times Length$$
$$V = A \times L$$

Example

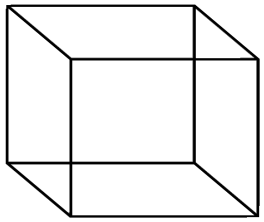


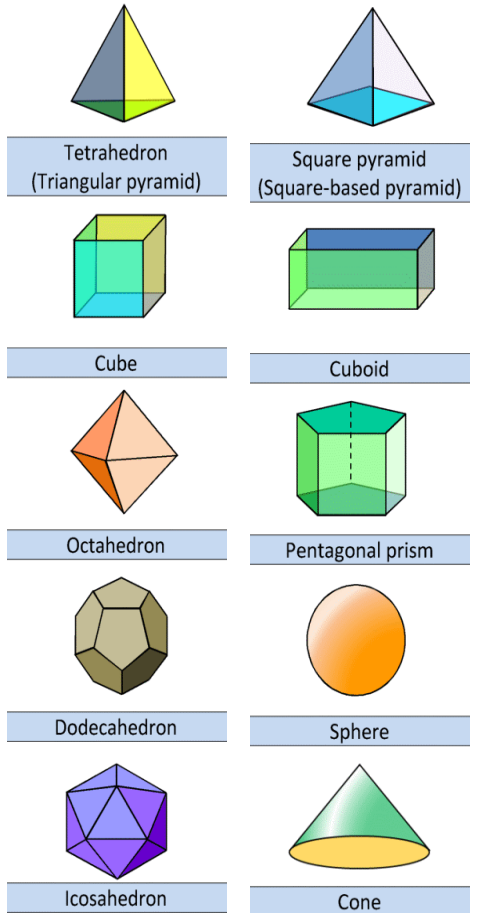
Properties of Solids (MW 43)

Faces = flat surfaces
Edges = sides/lengths
Vertices = corners

Example

A cube has 6 faces, 12 edges 8 vertices.





Surface area a Cube/Cuboid (MW 114a/b)

The total area of all the faces of a cube/cuboid

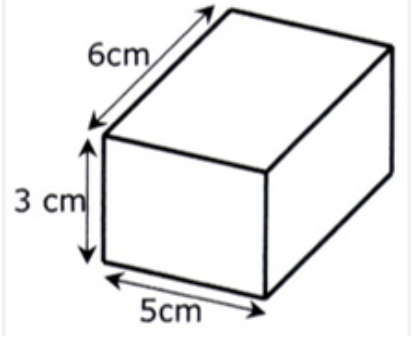
Example

Area of front and back = 3 x 5 x 2 = 30cm^2

Area of left and right = 3 x 6 x 2 = 36cm^2

Area of top and bottom = 5 x 6 x 2 = 60cm^2

Surface area = 30 + 36 + 60 = 126cm^2



Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Recurring Decimal

A decimal with one or a group of digits that repeat itself indefinitely.

E.g. $0.\dot{2}\dot{3}$= 0.23232323…

Convert $0.\dot{8}\dot{4}$ to a fraction.

Multiply the decimal so that the repeated decimal digits are on the left side of the decimal point.

$$x = 0.84848484$$
$$100x = 84.848484$$

Subtract x from 100x.

$$99x = 84$$

Isolate x, then simplify:

$$x = \frac{84}{99} = \frac{28}{33}$$

Fractional Indices

The denominator of a fractional power acts as a 'root'. The numerator of a fractional power acts as a normal power.

$$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$$

Example

$$27^{\frac{2}{3}} = \left(\sqrt[3]{27}\right)^2 = 3^2 = 9$$

$$\left(\frac{25}{16}\right)^{\frac{3}{2}} = \left(\frac{\sqrt{25}}{\sqrt{16}}\right)^3 = \left(\frac{5}{4}\right)^3 = \frac{125}{64}$$

Negative Indices

$$a^{-n} = \frac{1}{a^n}$$

Example $\quad 3^{-2} = \frac{1}{3^2}$

$$= \frac{1}{9}$$

Product Rule

To find the total number of outcomes for two or more events, multiply the number of outcomes for each event together. This is called the product rule because it involves multiplying to find a product.

Example:

A restaurant menu offers 4 starters, 7 main courses and 3 different desserts. How many different three-course meals can be selected from the menu?

Multiplying together the number of choices for each course gives 4 x 7 x 3 = 84 different three-course meals.

Upper and Lower Bounds

The upper and lower bound come from the largest and smallest values that would round to a particular number. Take 'half a unit above and half a unit below'. For example rounded to 1 d.p means nearest 0.1, so add 0.05 and subtract 0.05 to get the bounds.

All error intervals look the same like this - ≤ x <

Example - State the upper and lower bound of 360 when it has been rounded to 2 significant figures:

2 significant figures is the nearest 10, so 'half this' to get 5, and add on to 360 and take it off 360,

355 ≤ x < 365

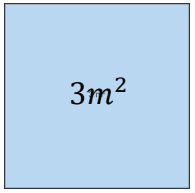
Surds

A surd is an expression with an irrational square root. An irrational number cannot be written as a fraction. We leave them in surd form as the decimal version is too long.

$\sqrt{2}$ and $\sqrt{3}$ are surds

$\sqrt{4} = 2$ *so* $\sqrt{4}$ is not a surd

If we were to write down the exact length of the square it would be $\sqrt{3}$.



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Simplifying Surds

To simplify surds look for square number factors.

Rules:

$\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

e.g. $\sqrt{75} = \sqrt{25} \times \sqrt{3} = 5\sqrt{3}$

e.g. $\sqrt{3} \times \sqrt{15} = \sqrt{45} = \sqrt{9}\sqrt{5} = 3\sqrt{5}$

$m\sqrt{a} + n\sqrt{a} = (m+n)\sqrt{a}$

e.g. $2\sqrt{5} + 7\sqrt{5} = (2+7)\sqrt{5} = 9\sqrt{5}$

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

e.g. $\sqrt{\frac{72}{20}} = \frac{\sqrt{72}}{\sqrt{20}} = \frac{\sqrt{36}\times\sqrt{2}}{\sqrt{4}\times\sqrt{5}} = \frac{6\sqrt{2}}{2\sqrt{5}} = \frac{3\sqrt{2}}{\sqrt{5}}$

Expand (Quadratic)

Each term in one bracket needs to be multiplied by each term in the other bracket.

Example (grid method)

$(x+2)(x+5)$

	x	+5
x	x^2	$+5x$
+2	$+2x$	$+10$

Rationalising the denominator

This is the removing of a surd from the denominator of a fraction by multiplying both the numerator and the denominator by that surd.

$$\frac{a}{\sqrt{b}} = \frac{a}{\sqrt{b}} \times \frac{\sqrt{b}}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$$

Example

e.g. $\frac{6}{\sqrt{12}} = \frac{6}{\sqrt{12}} \times \frac{\sqrt{12}}{\sqrt{12}}$ (multiply both top and bottom by $\sqrt{12}$)

$= \frac{6\sqrt{12}}{12} = \frac{\sqrt{12}}{2}$ (now simplify)

$= \frac{\sqrt{4}\times\sqrt{3}}{2} = \frac{2\sqrt{3}}{2} = \sqrt{3}$

Factorise (Quadratic)

Factorising is writing an expression as a product of terms by 'taking out' a common factor.

What numbers multiply to make the last number in the expression? Which of these factors add /subtract to make the number in the middle?

Example

$x^2 - 2x - 3$

$(x-3)(x+1)$

$x^2 - 6x + 5$

$(x-5)(x-1)$

Expand (Cubic)

Example - $(3x+2)(2x-4)(5x+7)$

First of all expand the first two brackets like normal (FOIL or Grid).

	$3x$	+2
$2x$	$6x^2$	$+4x$
-4	$-12x$	-8

$6x^2 + 8x - 8$

Now expand $(6x^2 + 8x - 8)(5x + 7)$:

	$6x^2$	+8x	-8
$5x$	$30x^3$	$+40x^2$	$-40x$
+7	$42x^2$	-56x	-56

$30x^3 + 2x^2 - 96x - 56$

Factorise (with coefficients)

.Factorise $6x^2 - 11x - 10$

This time we also need to find factors of the first term as well as the last term.

Factors of 10 – 1 and 10 OR 2 and 5
Factors of 6 – 1 and 6 OR 2 and 3.

Now I need to see which pairs of factors will multiply together so they will create 11x.

Answer: $(3x+2)(2x-5)$

Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Subject of a formula

More difficult questions – think about inverse operations to help you!

Examples

Make r the subject of $V = \frac{1}{3}\pi r^2 h$.

To start, isolate r^2 by multiplying by 3 and then dividing by πh.

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

Now we square root both sides.

$$\sqrt{\frac{3V}{\pi h}} = r$$

$$r = \sqrt{\frac{3V}{\pi h}}$$

Make x the subject of $3x + 5 = y - ax$.

When a formula contains the new subject more than once, start by isolating any terms including it on one side of the equals sign.

Here, add ax and subtract 5.

$$3x + ax = y - 5$$

Now we factorise the side with our new subject.

$$x(3 + a) = y - 5$$

Then divide by the bracket to leave x on its own.

$$x = \frac{y - 5}{3 + a}$$

Rearranging formulae (difficult)

More difficult questions may require you to factorise an expression to be able to make a certain variable the subject. This is usually when the variable appears twice in the formulae we need to rearrange.

Make x the subject of $3x + 5 = y - ax$.

When a formula contains the new subject more than once, start by isolating any terms including it on one side of the equals sign.

Here, add ax and subtract 5.

$$3x + ax = y - 5$$

Now we factorise the side with our new subject.

$$x(3 + a) = y - 5$$

Then divide by the bracket to leave x on its own.

$$x = \frac{y - 5}{3 + a}$$

Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Finding the nth term of a linear sequence

1. Find the **difference**.
2. **Multiply that by n.**
3. Substitute $n = 1$ to **find out what number you need to add or subtract to get the first number in the sequence**.

Example

Find the nth term of: 3, 7, 11, 15…

1. Difference is +4
2. Start with $4n$
3. $4 \times 1 = 4$, so we need to subtract 1 to get 3.

nth term = $4n - 1$

Geometric Sequence

A sequence of numbers where each term is found by **multiplying the previous one** by a number called the **common ratio, r**.

Example

An example of a geometric sequence is:

$$2, 10, 50, 250 \ldots$$

The common ratio is 5

Another example of a geometric sequence is:

$$81, -27, 9, -3, 1 \ldots$$

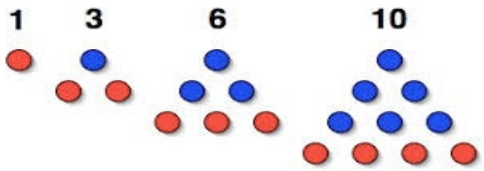
The common ratio is $-\frac{1}{3}$

Triangular numbers

The sequence which comes from a pattern of dots that form a triangle.

$$1, 3, 6, 10, 15, 21 \ldots$$

Example



nth term of a quadratic sequence

1. Find the first and second differences.
2. Halve the second difference and multiply this by n^2.
3. Substitute $n = 1,2,3,4 \ldots$ into your expression so far.
4. Subtract this set of numbers from the corresponding terms in the sequence from the question.
5. Find the nth term of this set of numbers.
6. Combine the nth terms to find the overall nth term of the quadratic sequence.

Substitute values in to check your nth term works for the sequence.

Example

Find the nth term of: 4, 7, 14, 25, 40..

Answer:

Second difference = +4 → nth term = $2n^2$

Sequence: 4, 7, 14, 25, 40

$2n^2$ 2, 8, 18, 32, 50

Difference: 2, -1, -4, -7, -10

Nth term of this set of numbers is $-3n + 5$

Overall nth term: $2n^2 - 3n + 5$

nth term of a geometric sequence

$$r^{n-1}$$

where a is the first term and r is the common ratio

Example

The nth term of $2, 10, 50, 250 \ldots$. Is

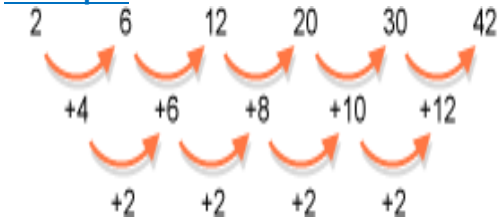
$$2 \times 5^{n-1}$$

Quadratic Sequence

A sequence of numbers where the **second difference is constant**.

A quadratic sequence will have a n^2 term.

Example



Fibonacci type sequences

A sequence where the next number is found by **adding up the previous two terms**

Example

The Fibonacci sequence is:

$$1,1,2,3,5,8,13,21,34 \ldots$$

An example of a Fibonacci-type sequence is:

$$4, 7, 11, 18, 29 \ldots$$

Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Parallel lines

If two lines are parallel, they will have the **same gradient**. The value of m will be the same for both lines.

Are the lines $y = 3x - 1$ and $2y - 6x + 10 = 0$ parallel?

Answer: Rearrange the second equation in to the form $y = mx + c$.

$2y - 6x + 10 = 0 \rightarrow y = \mathbf{3}x - 5$

Since the two gradients are equal (3), the lines are parallel.

Perpendicular lines

If two lines are perpendicular, the product (times together) of their gradients will always equal -1. The gradient of one line will be the **negative reciprocal** of the gradient of the other line.

Find the equation of the line perpendicular to $y = 3x + 2$ which passes through (6,5).

Answer: As they are perpendicular, the gradient of the new line will be −1/3 as this is the negative reciprocal of 3.

$$y = mx + c$$
$$5 = -\frac{1}{3} \times 6 + c$$
$$c = 7$$
$$y = -\frac{1}{3}x + 7$$

or

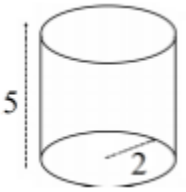
$$3x + x - 7 = 0$$

Surface Area of a cylinder

$$2\pi r^2 + 2\pi rh$$

Example:

$2\pi(2)^2 + \pi(4)(5)$
$= 28\pi$

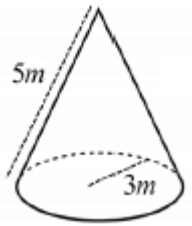


Surface Area of a cone

$$\boldsymbol{\pi rl + \pi r^2}$$

Example:

$\pi(3)(5) + \pi(3)^2$
$= 24\pi$



Surface Area of a sphere

$$\boldsymbol{4\pi r^2}$$

Example:

Find the surface area of a sphere with radius 3cm.

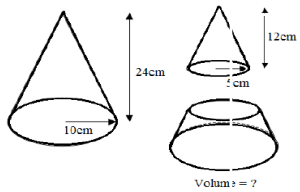
$$SA = 4\pi(3)^2 = 36\pi cm^2$$

Frustum

A frustum is a solid (usually a cone or pyramid) with the top removed.

Volume:

Find the volume of the whole shape, then take away the volume of the small cone/pyramid removed at the top.

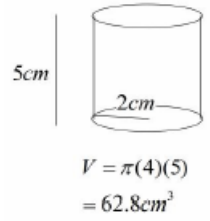


$$\frac{1}{3}\pi(10)^2(24) - \frac{1}{3}\pi(5)^2(12) = 700\pi cm^3$$

Volume of a cylinder

$$\pi r^2 \times height$$

Example:

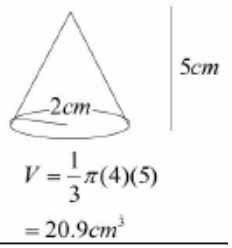


$V = \pi(4)(5)$
$= 62.8cm^3$

Volume of a cone

$$\frac{1}{3} \times \pi r^2 \times height$$

Example:



$V = \frac{1}{3}\pi(4)(5)$
$= 20.9cm^3$

Volume of a sphere

$$\frac{4}{3}\pi r^3$$

Example:

Find the volume of a sphere with diameter 10cm.

$$\frac{4}{3}\pi(5)^3 = \frac{500\pi}{3}cm^3$$

Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Transformations
The movement or manipulation of an object. The four transformations we use are rotation, reflection, translation and enlargement.

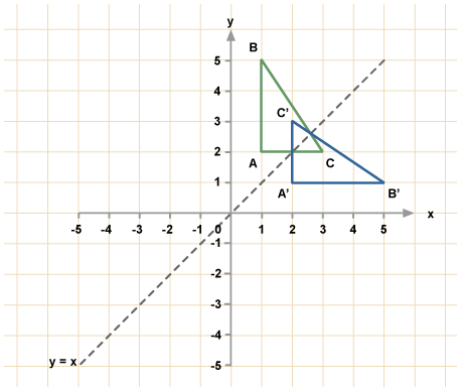
Reflection
The size does not change, but the shape is 'flipped' like in a mirror.

To describe a reflection you need to give the equation of the mirror line

Line x=? is a vertical line.
Line y=? is a horizontal line.
Line y=x is a diagonal line.

Example:
Reflect shape C in the line y=x.

TIP: Reflect each point of the triangle separately then join them up.



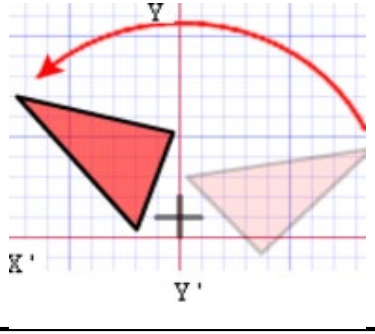
Rotation
The size does not change, but the shape is turned around a point.

Use tracing paper.

To describe a rotation you need to give:
the direction (clockwise or anti-clockwise)
the angle
the centre of rotation (coordinate)

Example:

Rotate shape A 90° anti-clockwise about (0,1)



Translations
Translate means to move a shape.
The shape does **not** change size or orientation.

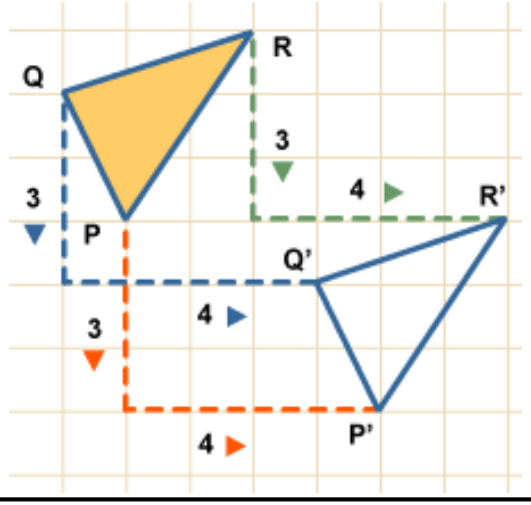
In a column vector, the top number moves left (-) or right (+) and the bottom number moves up (+) or down (-)

$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ means '2 right, 3 up'

$\begin{pmatrix} -1 \\ -5 \end{pmatrix}$ means '1 left, 5 down'

Example:

In the example on the right, the shape has been translated by vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$



Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Enlargement

The shape will get bigger or smaller. Multiply each side by the scale factor.

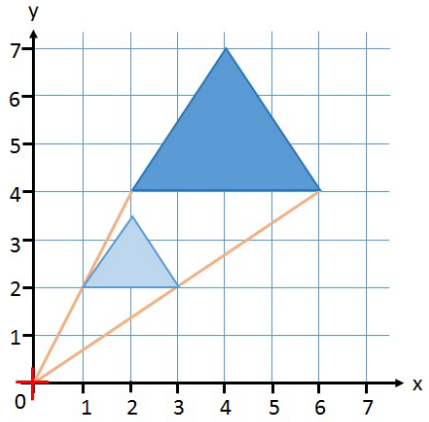
For example:

Scale factor 3 means '3 times larger = multiply all the lengths by 3'
Scale factor ½ means 'half the size = divide all lengths by 2'

Sometimes the shape may need to be enlarged from a specific point.

Example:

This shape has been enlarged by scale Factor 2 at the centre of enlargement (o, 0).

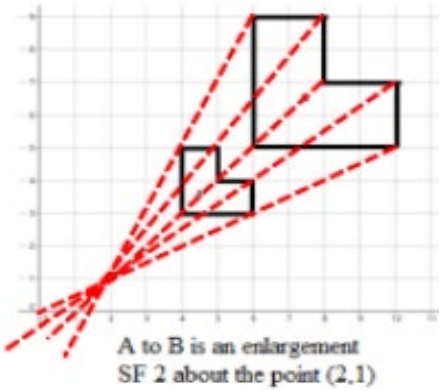


Finding the Centre of Enlargement

Draw straight lines through corresponding corners of the two shapes.
The centre of enlargement is the point where all the lines cross over.

Be careful with negative enlargements as the corresponding corners will be the other way around.

Example:

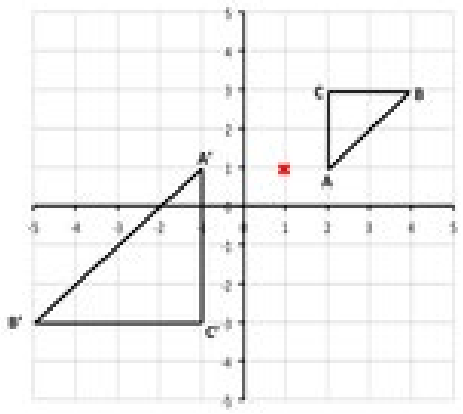


Negative Enlargement

Negative enlargements will look like they have been rotated. They are enlarged in the opposite direction to a positive enlargement.

Example

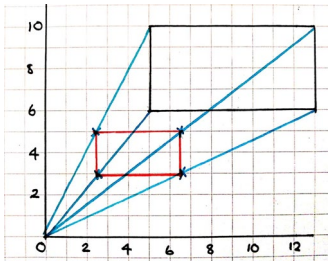
Enlarge ABC by scale factor -2, centre (1,1)



Fractional Enlargement

This is where the shape will get smaller. Such as scale factor 1/3 would make the shape 3 times smaller.

Example
This shape has been enlarged by scale factor ½



Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Iteration

Iteration is the repetition of a mathematical procedure applied to the result of a previous application, typically as a means of obtaining successively closer approximations to the solution of a problem.

Starting with $x_0 = 0$ use the iteration formula

$$x_{n+1} = \frac{2}{x_n^2 + 3}$$

3 times to find an estimate to the solution.

Calculate the values of x_1, x_2, x_3 to find an estimate for the solution to $x^3 + 3x = 2$

$x_{0+1} = \frac{2}{0^2+3} = 0.\dot{6}$ ← We substitute this value into the next step.

$x_{1+1} = \frac{2}{0.\dot{6}^2+3} = 0.5806451613$

$x_{2+1} = \frac{2}{(0.58\ldots)^2+3} = 0.5993140006$

An estimate of the solution is 0.6 because all of the solutions round to 1d.p.

Using the Quadratic Formula

The formula is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Quadratics are usually in the form:

$$ax^2 + bx + c = 0$$

This is how we pick out the values that will be substituted into the formula:

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

$$a = 1 \quad b = 4 \quad c = 2$$

Now that you have the a. b and c values these can now be substituted into the formula – then gradually start to simplify the formula:

$$x = \frac{-4 \pm \sqrt{4^2 - 4 \times 1 \times 2}}{2 \times 1}$$

$$\Rightarrow x = \frac{-4 \pm \sqrt{8}}{2}$$

$$\Rightarrow x = -0.585\ldots$$

$$= -0.59\,(1\text{dp})$$

$$\text{or } x = -3.414\ldots$$

$$= -3.41\,(1\text{dp})$$

Completing the square

A quadratic in the form $x^2 + b + c$ can be written in the form $(x + p)^2 + q$.

1. Write a set of brackets with x in and half the value of b.
2. Square the bracket.
3. Subtract $\left(\frac{b}{2}\right)^2$ and add c.
4. Simplify the expression.

You can **use the completing the square form** to help **find the maximum or minimum** of quadratic graph.

Example:

Complete the square of

$$y = x^2 - 6x + 2$$

$$(x-3)^2 - 3^2 + 2$$

$$= (x-3)^2 - 7$$

The minimum value of this expression occurs when $(x-3)^2 = 0$, which occurs when x=3

When x = 3, y = 0 – 7 = -7

Minimum point = (3,-7)

If there is a coefficient in front of x^2 then use the same method as above, but factorise out a at the start.

Year 11 Higher (Set 1) Mathematics Knowledge Organiser

Simultaneous Equations

This involves finding solutions that work in two (or more) equations at the same time – e.g.:

$$x + 2y = 8$$
$$2x + y = 7,$$

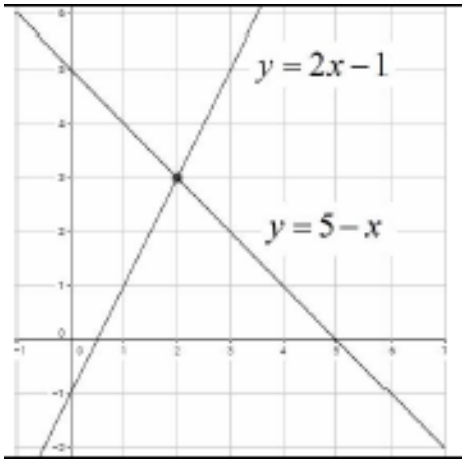
Solving Simultaneous Equations (Graphically)

Draw the graphs of the two equations. The **solutions** will be **where the lines meet**.

The solution can be written as a **coordinate**.

Example

$y = 5 - x$ and $y = 2x - 1$.



They meet at the point with coordinates (2,3) so the answer is $x = 2$ and $y = 3$

Simultaneous Equations

First label the equations

$$x + 2y = 8 \quad (1)$$
$$2x + y = 7 \quad (2)$$

Then multiply to match the coefficients (the number before the letter)

$$2x + 4y = 16 \quad (3) \quad [2 \times (1)]$$
$$2x + y = 7 \quad (2)$$

Next add (or subtract) to remove an unknown

$$2x + 4y = 16 \quad (3)$$
$$2x + y = 7 \quad (2)$$
$$3y = 9 \quad (3) - (2)$$

Here, we can see that y=3.

Finally, substitute into a previous equation to calculate the other unknown. Here we used equation:

$$x + 2 \times 3 = 8$$
$$x + 6 = 8$$

We can see here that x=2

So x = 2 and y = 3.

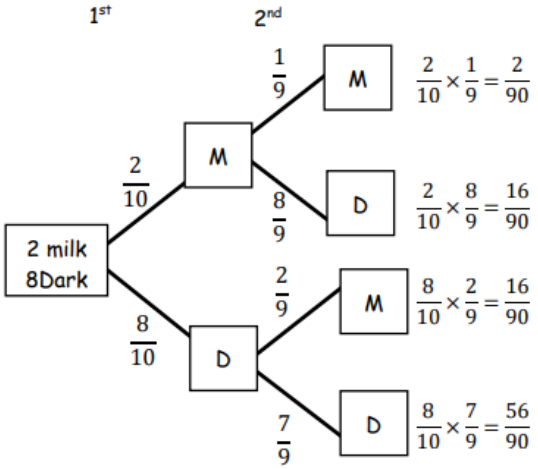
Conditional Probability

When events are dependent, the probability of the second event is called a conditional event because it is conditional on the outcome of the first event.

Example

2 milk and 8 dark chocolates in a box. Kate chooses one and eats it. She chooses a second one.

This can be shown on a tree diagram:



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Direct Proportion (algebra)

Direct: $y = kx$ or $y \propto x$

1. Solve to find k using the pair of values in the question.
2. Rewrite the equation using the k you have just found.
3. Substitute the other given value from the question in to the equation to find the missing value.

Example:

p is directly proportional to q. When p = 12, q = 4.
Find p when q = 20.

1. p = kq
   12 = k x 4
   so k = 3

2. p = 3q

3. p = 3 x 20 = 60, so p = 60

ANSWER: **p = 60** and **q=120** (3 x 60)

Indirect Proportion (algebra)

Direct: $y = kx$ or $y \propto x$

1. Solve to find k using the pair of values in the question.
2. Rewrite the equation using the k you have just found.
3. Substitute the other given value from the question in to the equation to find the missing value.

Example:

p is directly proportional to q. When p = 12, q = 4.
Find p when q = 20.

1. p = kq
   12 = k x 4
   so k = 3

2. p = 3q

3. p = 3 x 20 = 60, so p = 60

ANSWER: **p = 60** and **q=120** (3 x 60)

Congruence

Shapes are congruent if they are identical - same shape and same size.
Shapes can be rotated or reflected but still be congruent.

Similar

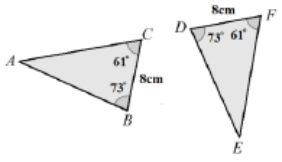
Shapes are similar if they are the same shape but different sizes.
The proportion of the matching sides must be the same, meaning the ratios of corresponding sides are all equal

Proving Congruence

4 ways of proving that two triangles are congruent:

1. SSS (Side, Side, Side)
2. RHS (Right angle, Hypotenuse, Side)
3. SAS (Side, Angle, Side)
4. ASA (Angle, Side, Angle) or AAS

Example:



$BC = DF$
$\angle ABC = \angle EDF$
$\angle ACB = \angle EFD$
$\therefore$ The two triangles are congruent by AAS.

Proving similarity

To show that two triangles are similar, show that:
1. The three sides are in the same proportion
2. Two sides are in the same proportion, and their included angle is the same
3. The three angles are equal

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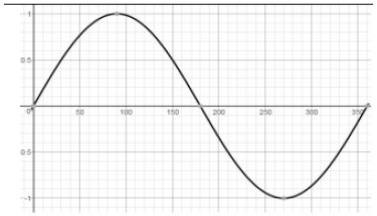
Trigonometry Exact Values

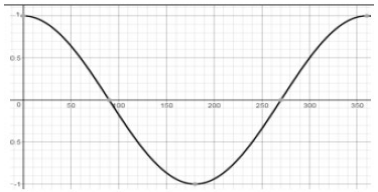
	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	----

Trigonometry Graphs

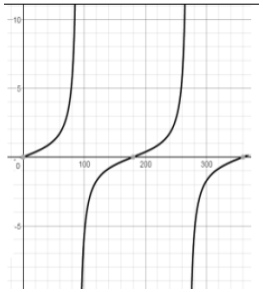
$y = \sin(x)$ for $0 \le x \le 360^o$



$y = \cos(x)$ for $0 \le x \le 360^o$



$y = \tan(x)$ for $0 \le x \le 360^o$

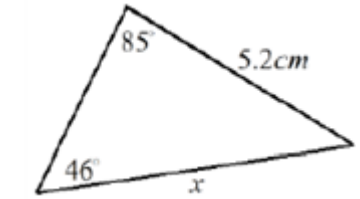


Sine Rule

Use with non right angle triangles.
Use when the question involves 2 sides and 2 angles.

For missing side:

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

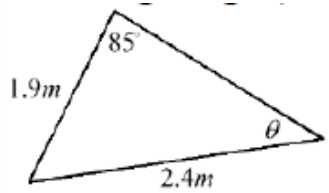


$$\frac{x}{\sin 85} = \frac{5.2}{\sin 46}$$

$$x = \frac{5.2 \times \sin 85}{\sin 46} = 3.75cm$$

For missing angle:

$$\frac{\sin A}{a} = \frac{\sin B}{b}$$



$$\frac{\sin\theta}{1.9} = \frac{\sin 85}{2.4}$$

$$\sin\theta = \frac{1.9 \times \sin 85}{2.4} = 0.789$$

$$\theta = \sin^{-1}(0.789) = 52.1°$$

Cosine Rule

Use with non right angle triangles.
Use when the question involves 3 sides and 1 angle.

.

For missing side:

$$a^2 = b^2 + c^2 - 2bc\cos A$$

For missing angle:

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

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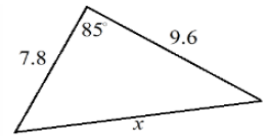
Cosine Rule (missing side)

For missing side:

$$a^2 = b^2 + c^2 - 2bc\cos A$$

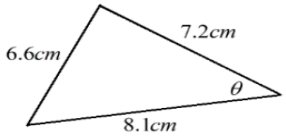


$$x^2 = 9.6^2 + 7.8^2 - (2 \times 9.6 \times 7.8 \times \cos 85)$$

$$x = 11.8$$

Cosine Rule (missing angle)

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

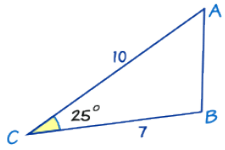


$$\cos\theta = \frac{7.2^2 + 8.1^2 - 6.6^2}{2 \times 7.2 \times 8.1}$$

$$\theta = 50.7°$$

Area of triangle

Area of a Triangle = $\frac{1}{2}\,ab\sin C$



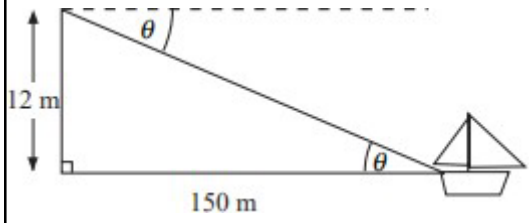
$$\frac{1}{2} \times 7 \times 10 \times \sin 25$$

$$A = 14.8$$

Trig Problem Solving

A man looks out to sea from a cliff top at a height of 12 metres. He sees a boat that is 150 metres from the cliff. What is the angle of depression?

The problem can be represented as this diagram…



We will use SOHCAHTOA as a right angled triangle is involved. Tan is the trig ratio that will apply (hypotenuse is not needed).

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

$$\tan\partial = \frac{12}{150}$$

$$\tan^{-1}\left(\frac{12}{150}\right)$$

$$\partial = 4.6$$

Sampling

Population: the whole group that is being studied.

Sample: a selection taken from the population that will let you find out information about the larger group.

Representative: a sample group that accurately represents the population.

Random sample: a group completely chosen by change. No predictability to who it will include.

Bias: a built-in error that makes all values wrong by a certain amount.

Stratified Sampling

Stratified sampling is used to select a sample that is representative of different groups. The aim is to find a proportional sample based on the group size.

$$\frac{\text{number in category}}{\text{total}} \times \text{sample size}$$

Year 7	Year 8	Year 9
120	80	100

Miss Holland wants to take a stratified sample of 15 students. How many Year 7's should she survey?

$$\frac{120}{300} \times 15 = 6$$

Miss Holland should survey 6 students from year 7

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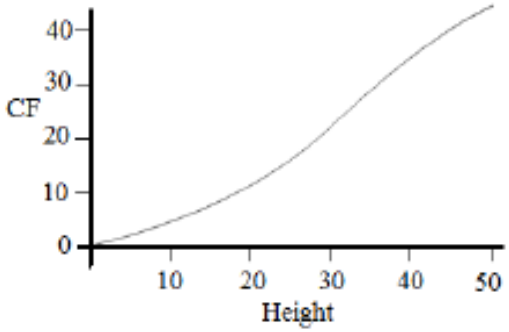
Cumulative frequency

Cumulative Frequency is a running total.

Age	Frequency	Cumulative Frequency
$0 < a \leq 10$	15	15
$10 < a \leq 40$	35	$15 + 35 = 50$
$40 < a \leq 50$	10	$50 + 10 = 60$

A cumulative frequency diagram is a curve that goes up. It looks a little like a stretched-out S shape.

Plot the cumulative frequencies at the <u>end-point of each interval.</u>



You can find the Lower Quartile, Median, and Upper quartile by drawing lines ¼ of the way, ½ of the way and ¾ of the way across the cumulative frequency axis. Then see where this line hits the curve and then read down onto the x axis.

Boxplot

The minimum, lower quartile, median, upper quartile and maximum are shown on a box plot.

Example

Students sit a maths test. The highest score is 19, the lowest score is 8, the median is 14, the lower quartile is 10 and the upper quartile is 17. Draw a box plot to represent this information.

Boxplot Keywords

Lower Quartile - represents the first ¼ of the data (halfway between minimum value and median).

Median – the middle value

Upper Quartile – represents ¾ of data (halfway between median and maximum value)

Interquartile Range (IQR) – Difference between upper quartile and lower quartile.

Comparing Boxplots

Write two sentences.

1. Compare the averages using the medians for two sets of data.

2. Compare the spread of the data using the range or IQR for two sets of data.

The smaller the range/IQR, the more consistent the data.

<u>You must compare box plots in the context of the problem.</u>

Example:

'On average, students in class A were more successful on the test than class B because their median score was higher.'

'Students in class B were more consistent than class A in their test scores as their IQR was smaller.'

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Histograms

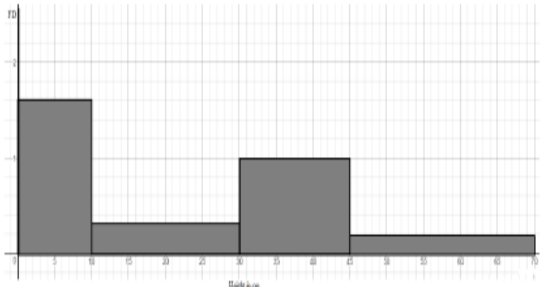
A visual way to display frequency data using bars. Bars can be unequal in width.

Histograms show *frequency density* on the y-axis, not frequency.

$$\textbf{Frequency Density} = \frac{\textbf{Frequency}}{\textbf{Class Width}}$$

Height(cm)	Frequency
$0 < h \leq 10$	8
$10 < h \leq 30$	6
$30 < h \leq 45$	15
$45 < h \leq 70$	5

Frequency Density (FD)
$8 \div 5 = 1.6$
$6 \div 20 = 0.3$
$15 \div 15 = 1$
$5 \div 25 = 0.2$

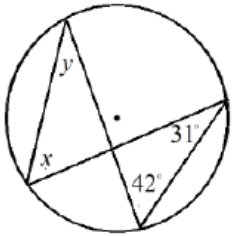


The area of the bar is proportional to the frequency of that class interval.

$$\textbf{Frequency} = \textbf{Freq Density} \times \textbf{Class Width}$$

Circle Theorem: Angles in the same segment are equal.

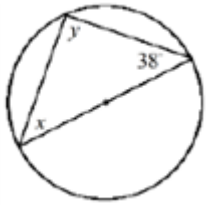
Example:



$x = 42°$
$y = 31°$

Circle Theorem: Angle in a semi-circle has a right angle at the circumference

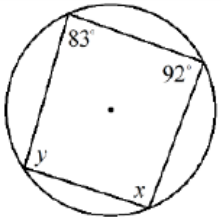
Example:



$y = 90°$
$x = 180 - 90 - 38$
$= 52°$

Circle Theorem: Opposite angles in a cyclic quadrilateral add up to 180°

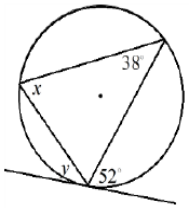
Example:



$x = 180 - 83 = 97°$
$y = 180 - 92 = 88$

Circle Theorem: Alternate segment theorem

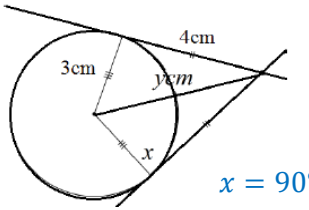
Example:



$x = 52°$
$y = 38°$

Circle Theorem: A tangent meets a radius at 90°

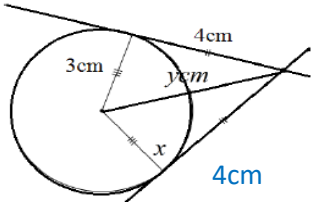
Example:



$x = 90°$

Circle Theorem: Tangents from an external point are equal in length.

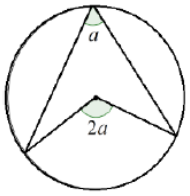
Example:



4cm

Circle Theorem: Angle at centre is twice the angle at circumference.

Example:



$x = 104 \div 2 = 52°$

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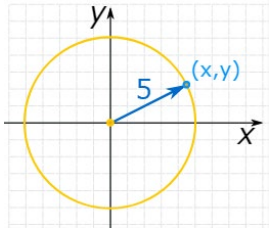
Graphs of circles

The equation of a circle, centre (0,0), radius r, is:

$$x^2 + y^2 = r^2$$



$$x^2 + y^2 = 25$$

The equation of a circle is always in the form:

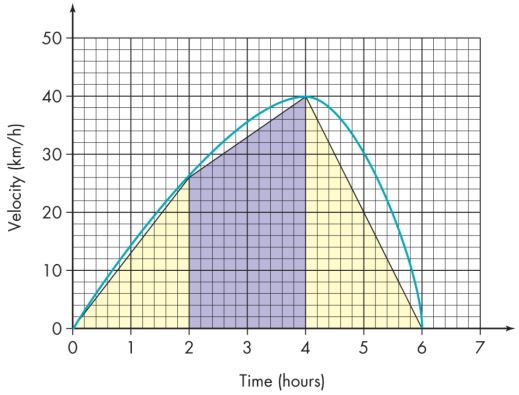
$$x^2 + y^2 = r^2$$

This is provided the centre of the circle is (0,0). This is because you can find the equation of a circle using Pythagoras theorem.

Area under a curve

You can only estimate the area under a curve.

This can be done by splitting the area up into similar shapes (such as rectangles, triangles and trapeziums). You can find the area of each of these shapes and then add them together.



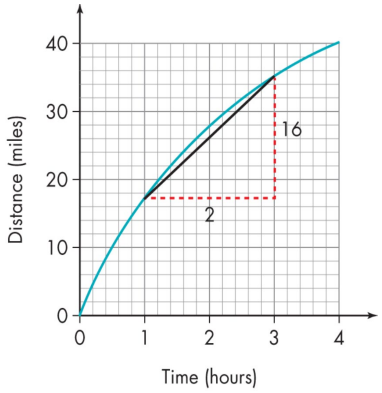
Gradient of a curve

Remember gradient is the change in y over the change in x!

The gradient of a curve at a point is the same as the gradient of the tangent at that point.

1. Draw a tangent carefully at the point.
2. Make a right-angled triangle.
3. Use the measurements on the axes to calculate the rise and run (change in y and change in x)
4. Calculate the gradient.

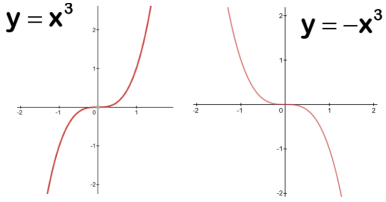
Example:



$$\text{Gradient} = \frac{16}{2} = 8$$

Cubic graph

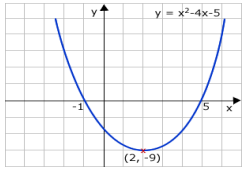
Cubic graphs are a curve shape – the diagram below shows the difference between a positive and negative cubic graph:



Cubic graphs are in the form $ax^3 + bx^2 + cx + d = 0$.

Quadratic graph

A 'U-shaped' curve called a parabola. The equation is of the form $y=ax^2 + bx + c$, where a, b and c are numbers, a≠0.



If a<0, the parabola is upside down.

A root is a solution. The roots of a quadratic are the x-intercepts of the quadratic graph

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Adding and subtracting Algebraic Fractions

Use the same method for adding and subtracting fractions – find a common denominator!

Example:

$$\frac{1}{x}+\frac{x}{2y}$$
$$=\frac{1(2y)}{2xy}+\frac{x(x)}{2xy}$$
$$=\frac{\mathbf{2y+x^2}}{\mathbf{2xy}}$$

Multiplying Algebraic Fractions

Multiply numerators and multiply the denominators!

Example:

$$\frac{x}{3}\times\frac{x+2}{x-2}$$
$$=\frac{x(x+2)}{3(x-2)}$$
$$=\frac{\mathbf{x^2+2x}}{\mathbf{3x-6}}$$

Dividing Algebraic Fractions

Multiply the first fraction by the reciprocal of the second fraction.

Example:

$$\frac{x}{3}\div\frac{2x}{7}$$
$$=\frac{x}{3}\times\frac{7}{2x}$$
$$=\frac{\mathbf{7x}}{\mathbf{6x}}=\frac{\mathbf{7}}{\mathbf{6}}$$

Functions

A function is the relationship between two sets of values.

Notation:

f(x)

x is the input value

f(x) is the output value.

Composite Functions

A combination of two or more functions to create a new function. fg(x) is the composite function that substitutes the function g(x) into the function f(x).

fg(x) means 'do g first, then f'
gf(x) means 'do f first, then g'

Example:

$f(x)=5x-3,\ g(x)=\frac{1}{2}x+1$

What is $fg(4)$?

$$g(4)=\frac{1}{2}\times 4+1=3$$

$$f(3)=5\times 3-3=12=fg(4)$$

What is $fg(x)$?

$$fg(x)=5\left(\frac{1}{2}x+1\right)-3=\frac{5}{2}x+2$$

Inverse Functions

$f^{-1}(x)$

A function that performs the opposite process of the original function.

1. Write the function as y=f(x)
2. Rearrange to make x the subject.
3. Replace the y with x and the x with $f^{-1}(x)$

Example:

$f(x)=(1-2x)^5$. Find the inverse.

$$y=(1-2x)^5$$
$$\sqrt[5]{y}=1-2x$$
$$1-\sqrt[5]{y}=2x$$
$$\frac{1-\sqrt[5]{y}}{2}=x$$

$$f^{-1}(x)=\frac{1-\sqrt[5]{x}}{2}$$

Algebraic Proof

To demonstrate or show that a statement is true, we use examples. To prove that a statement is true you can use algebra.

Some useful generalisations

Consecutive Integers	n, n + 1, n + 2,...
Even Numbers	2n
Odd Numbers	2n + 1
Consecutive Evens	2n, 2n + 2, 2n + 4,...
Consecutive Odd	2n +1, 2n + 3,....

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Algebraic proof - Example:

Prove that the square of an odd number is always odd.

Let the odd number be $2n + 1$.

So $(2n + 1)^2 = (2n + 1)(2n + 1)$

$= 4n^2 + 4n + 1$

We can take out a factor of 2 (ignore the 1).

As $2(2n^2 + 2n)$ is even, then when we add 1, the number must be odd.

Prove for any 3 consecutive integers the difference between the product of the first 2 and the product of last two is always twice the middle number

Let the consecutive integers be $n, n + 1$ *and* $n + 2$.

The product of the first and second

$$n(n + 1) = n^2 + n$$

The product of the second and third

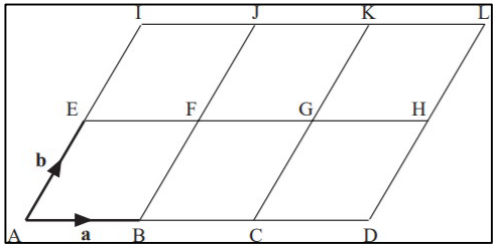
$$(n + 1)(n + 2) = n^2 + 3n + 2$$

So the difference between these products is

$$n^2 + 3n + 2 - n^2 + n = 2n + 2$$

This equals $2(n + 1)$ which is twice the middle number

Vectors can be used to describe movements in Geometry as seen below:



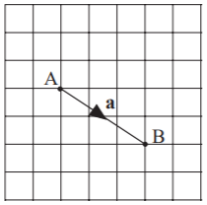
$\vec{AC} = 2\mathbf{a}$

$\vec{AF} = \mathbf{a} + \mathbf{b}$

$\vec{AL} = 3\mathbf{a} + 2\mathbf{b}$

$\vec{LE} = -3\mathbf{a} - \mathbf{b}$

Vectors describe a movement.
A vector has a direction and a distance.

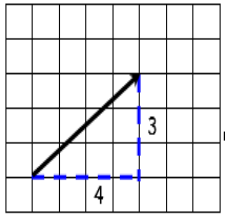


This diagram shows the vector: $\vec{AB} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$

Magnitude

Magnitude is defined as the **length** of a vector.

Example



Magnitude (length) can be calculated using Pythagoras Theorem:
$3^2 + 4^2 = 25$
$\sqrt{25} = 5$

Scalar of a Vector

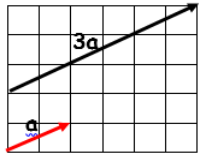
A **scalar** is the **number** we **multiply** a vector by.

Example

$3a + 2b = 3\begin{pmatrix} 2 \\ 1 \end{pmatrix} + 2\begin{pmatrix} 4 \\ -1 \end{pmatrix}$

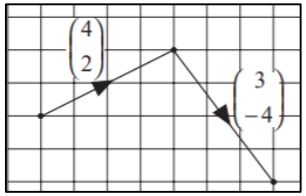
$= \begin{pmatrix} 6 \\ 3 \end{pmatrix} + \begin{pmatrix} 8 \\ -2 \end{pmatrix}$

$= \begin{pmatrix} 14 \\ 1 \end{pmatrix}$



You can add vectors to get a resultant vector as seen below:

$$\begin{pmatrix} 4 \\ 2 \end{pmatrix} + \begin{pmatrix} 3 \\ -4 \end{pmatrix} = \begin{pmatrix} 7 \\ -2 \end{pmatrix}$$



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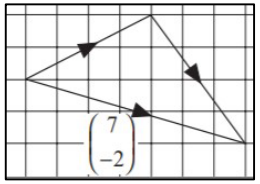


Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Depreciation

This is where the value of something devalues at the same percentage rate each year.

Example

John buys a car for £17000. It depreciates in value every year by 8%. What will it be worth after 5 years?

Cost - interest
100% - 8% = 92% = 0.92
$17000 \times 0.92^5 = 11204.39$

Answer £11204.39

Compound Interest

Amount of interest changes each year based on what is in the bank at the end of the year.

Example

John invests £3000 in a bank that pays 1.5% compound interest. How much will he have after 4 years?

Investment + interest
100% + 1.5% = 101.5% = 1.015
$3000 \times 1.015^4 = 3184.09$
Answer £3184.09

Simple Interest

Same amount of interest is added on each year.

Example

£200 is invested into a bank account with a rate of 3% simple interest for 2 years.

3% of 200 = £6

Year 1 = £200 + £6 = £206
Year 2 = £206 + £6 = £212

ANSWER: **£212 in bank account at end of the year.**

Reverse percentage

Example

Jane buys a pair of trousers in a sale for £68 after they were reduced by 15%. What was the original cost of the trousers?

Trousers now worth 85% of original price
85% = 68
1% = 68 ÷ 85 = 0.8
100% = 0.8 x 100 = 80
Original cost = £80

Subject of a formula

A formula usually has a single variable on one side of the equals sign. This is called the subject of the formula. Sometimes you will want to rearrange the formula so that one of the other variables becomes the subject. To do this you use inverse operations (in a similar way to solving equations) in order to isolate the new subject.

Examples

Make r the subject of $C = 2\pi r$.

To isolate r, divide by 2π.

$$\frac{C}{2\pi} = r$$

We often write formulae with the subject on the left-hand side, so this becomes

$$r = \frac{C}{2\pi}$$

Make x the subject of $y = \frac{x}{5} + 3$.

To isolate x, start by subtracting 3.

$$y - 3 = \frac{x}{5}$$

Next, multiply by 5 – remember to multiply each term of the left-hand side.

$$5(y - 3) = x$$

$$x = 5(y - 3)$$

Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Subject of a formula

More difficult questions – think about inverse operations to help you!

Examples

Make r the subject of $V = \frac{1}{3}\pi r^2 h$.

To start, isolate r^2 by multiplying by 3 and then dividing by πh.

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

Now we square root both sides.

$$\sqrt{\frac{3V}{\pi h}} = r$$

$$r = \sqrt{\frac{3V}{\pi h}}$$

Make x the subject of $3x + 5 = y - ax$.

When a formula contains the new subject more than once, start by isolating any terms including it on one side of the equals sign.

Here, add ax and subtract 5.

$$3x + ax = y - 5$$

Now we factorise the side with our new subject.

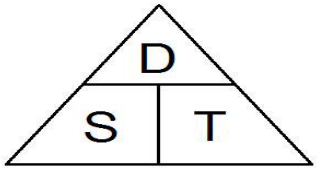
$$x(3 + a) = y - 5$$

Then divide by the bracket to leave x on its own.

$$x = \frac{y - 5}{3 + a}$$

Speed, Distance, Time

Speed = Distance ÷ Time
Distance = Speed x Time
Time = Distance ÷ Speed

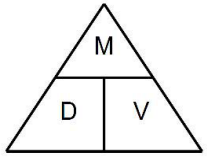


Example
Speed = 4mph
Time = 2 hours
Find the Distance.

$D = S \times T = 4 \times 2 = 8\ miles$

Density, Mass, Volume

Density = Mass ÷ Volume
Mass = Density x Volume
Volume = Mass ÷ Density



Example
Density = 8kg/m³
Mass = 2000g

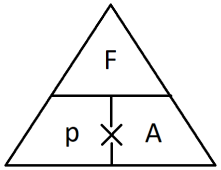
Find the Volume.

$V = M \div D = 2 \div 8$
$= 0.25m^3$

Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Pressure, Force, Area

Pressure = Force ÷ Area
Force = Pressure x Area
Area = Force ÷ Pressure



Remember the correct units.

Example
Pressure = 10 Pascals
Area = 6cm²

Find the Force
$F = P \times A = 10 \times 6$
$= 60\ N$

Sampling

Population: the whole group that is being studied.

Sample: a selection taken from the population that will let you find out information about the larger group.

Representative: a sample group that accurately represents the population.

Random sample: a group completely chosen by change. No predictability to who it will include.

Bias: a built-in error that makes all values wrong by a certain amount.

Primary data: data collected from an original source for a purpose.

Secondary data: data taken from an external location. Not collected directly.

Outlier: a value that stands apart from the data set

Stratified Sampling

Stratified sampling is used to select a sample that is representative of different groups. The aim is to find a proportional sample based on the group size.

$$\frac{\text{number in category}}{\text{total}} \times \text{sample size}$$

Year 7	Year 8	Year 9
120	80	100

Miss Holland wants to take a stratified sample of 15 students.
How many Year 7's should she survey?

$\frac{120}{300} \times 15 = 6$

Miss Holland should survey 6 students from year 7

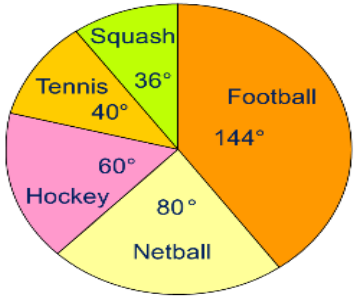
Pie Chart

Used for showing **how data breaks down into** its constituent **parts**.

Remember to **label** the category that each sector in the pie chart represents.

Example

If there are 40 people in a survey, then each person will be worth 360÷40=9° of the pie chart.



Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Find the angle in a Pie Chart

When drawing a pie chart, **divide 360° by the total frequency**. This will tell you how many degrees to use for the frequency of each category.

$$\text{Angle} = \frac{Frequency}{Total\ Frequency} \times 360$$

Example

In a survey of 30 people, each person would be represented by $\frac{1}{30}$ of the full circle.

$$360 \div 30 = 12°$$

Each person would get 12°

In a survey of 30 people, 12 said their favourite colour is red.

$$\frac{12}{30} \times 360 = 144°$$

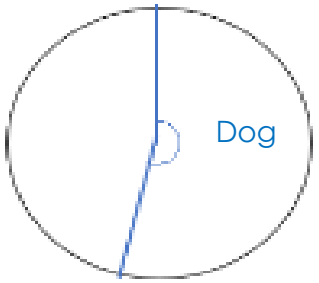
Draw and interpret Pie Charts

Example

Type of pet	Dog	Cat	Hamster
Frequency	32	25	3

There were 60 people asked in this survey (Total frequency)

"32 out of 60 people had a dog" (32/60)
This fraction of the 360 degrees represents dogs is
32/60 X 360 = 192°
Use a protractor to draw
This is 192°



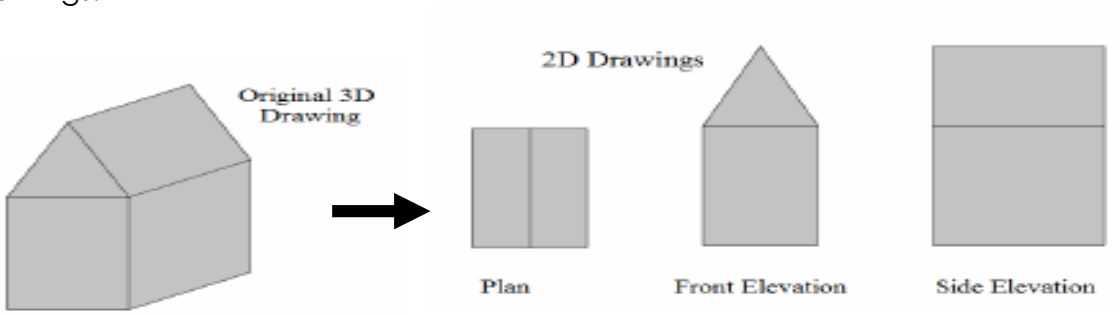
Multiple method
As 60 goes into 360 – 6 times.
Each frequency can be multiplied by 6 to find the degrees (proportion ot 360)

Comparing Pie Charts:
You NEED the overall frequency to make any comparisons

Plans and Elevations

This takes 3D drawings and produces 2D drawings.
Plan View: from **above**
Side Elevation: from the **side**
Front Elevation: from the **front**
Example

See to the right for the example.

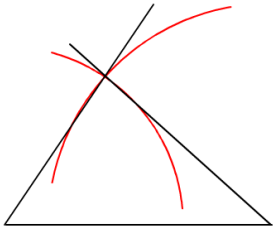


Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Constructing Triangles (Side, Side, Side)

Angle Bisector: Cuts the angle in half.

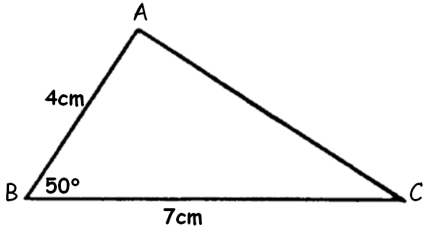
1. Draw the base of the triangle using a ruler.
2. Open a pair of compasses to the width of one side of the triangle.
3. Place the point on one end of the line and draw an arc.
4. Repeat for the other side of the triangle at the other end of the line.
5. Using a ruler, draw lines connecting the ends of the base of the triangle to the point where the arcs intersect.



Constructing Triangles (Side, Angle, Side)

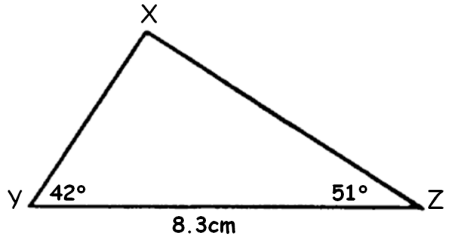
Perpendicular Bisector: Cuts a line in half and at right angles.

1. Draw the base of the triangle using a ruler.
2. Measure the angle required using a protractor and mark this angle.
3. Remove the protractor and draw a line of the exact length required in line with the angle mark drawn.
4. Connect the end of this line to the other end of the base of the triangle.



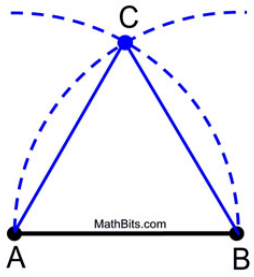
Constructing Triangles (Angle, Side, Angle)

1. Draw the base of the triangle using a ruler.
2. Measure one of the angles required using a protractor and mark this angle.
3. Draw a straight line through this point from the same point on the base of the triangle.
4. Repeat this for the other angle on the other end of the base of the triangle.



Constructing an Equilateral Triangle (also makes a 60° angle)

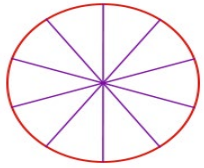
1. Draw the base of the triangle using a ruler.
2. Open the pair of compasses to the exact length of the side of the triangle.
3. Place the sharp point on one end of the line and draw an arc.
4. Repeat this from the other end of the line.
5. Using a ruler, draw lines connecting the ends of the base of the triangle to the point where the arcs intersect.



Equidistant

A point is equidistant from a set of objects if the **distances between that point and each of the objects is the same.**

Example

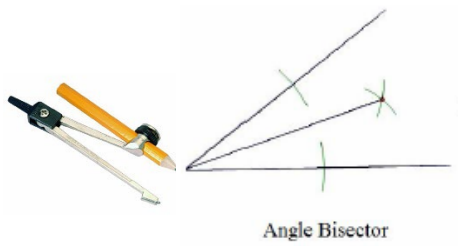


Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Angle Bisector

Angle Bisector: Cuts the angle in half.

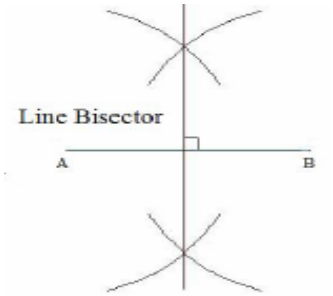
1. Place the sharp end of a pair of compasses on the vertex.
2. Draw an arc, marking a point on each line.
3. Without changing the compass put the compass on each point and mark a centre point where two arcs cross over.
4. Use a ruler to draw a line through the vertex and centre point.



Perpendicular Bisector

Perpendicular Bisector: Cuts a line in half and at right angles.

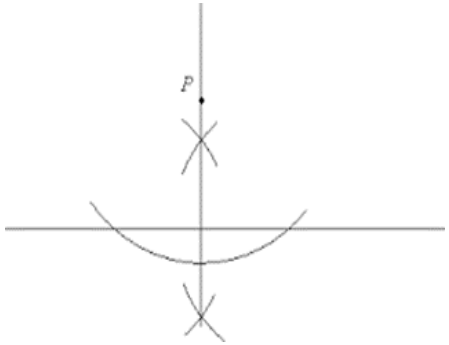
1. Put the sharp point of a pair of compasses on A.
2. Open the compass over half way on the line.
3. Draw an arc above and below the line.
4. Without changing the compass, repeat from point B.
5. Draw a straight line through the two intersecting arcs



Perpendicular from an External Point

The **perpendicular distance** from a point to a line is the **shortest distance** to that line.

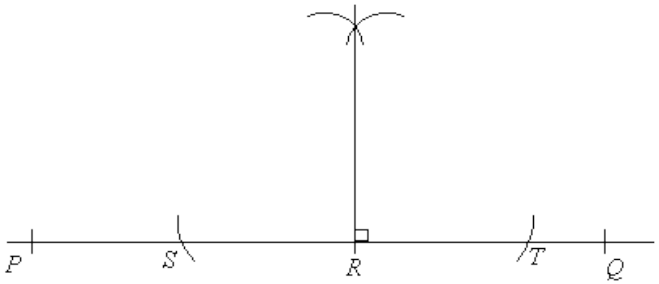
1. Put the sharp point of a pair of compasses on the point.
2. Draw an arc that crosses the line twice.
3. Place the sharp point of the compass on one of these points, open over half way and draw an arc above and below the line.
4. Repeat from the other point on the line.
5. Draw a straight line through the two intersecting arcs.



Perpendicular from a Point on a Line

Given line PQ and point R on the line:

1. Put the sharp point of a pair of compasses on point R.
2. Draw two arcs either side of the point of equal width (giving points S and T)
3. Place the compass on point S, open over halfway and draw an arc above the line.
4. Repeat from the other arc on the line (point T).
5. Draw a straight line from the intersecting arcs to the original point on the line.

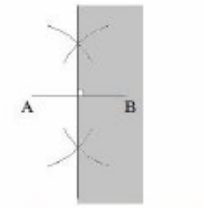


Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Loci and Regions

A **locus** is a **path of points that follow a rule**.

For the locus of points **closer to B than A**, create a **perpendicular bisector** between A and B and shade the side closer to B.



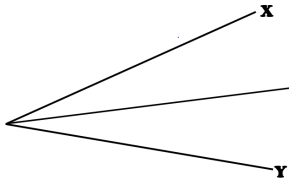
Points Closer to B than A

For the locus of points **equidistant from A**, use a compass to draw a **circle**, centre A.

Points less than 2cm from A

Points more than 2cm from A

For the locus of points **equidistant to line X and line Y**, create an **angle bisector**.



For the locus of points a set **distance from a line**, create **two semi-circles** at either end joined by **two parallel lines**.

Congruence

Shapes are congruent if they are identical - same shape and same size.
Shapes can be rotated or reflected but still be congruent.

Similar

Shapes are similar if they are the same shape but different sizes.
The proportion of the matching sides must be the same, meaning the ratios of corresponding sides are all equal

Proving similarity

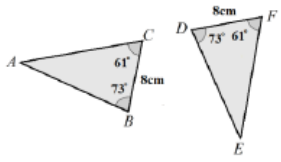
To show that two triangles are similar, show that:
1. The three sides are in the same proportion
2. Two sides are in the same proportion, and their included angle is the same
3. The three angles are equal

Proving Congruence

4 ways of proving that two triangles are congruent:

1. SSS (Side, Side, Side)
2. RHS (Right angle, Hypotenuse, Side)
3. SAS (Side, Angle, Side)
4. ASA (Angle, Side, Angle) or AAS

See the example on the right.



$BC = DF$

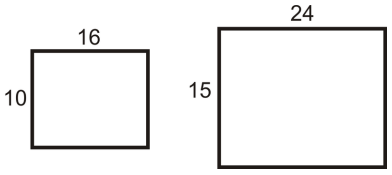
$\angle ABC = \angle EDF$

$\angle ACB = \angle EFD$

$\therefore$ The two triangles are congruent by AAS.

Finding a scale factor

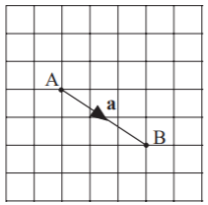
To find a scale factor, divide a length on one shape by the corresponding length on a similar shape.



Scale Factor = 15÷10=1.5

Year 11 Higher (Set 2) Mathematics Knowledge Organiser

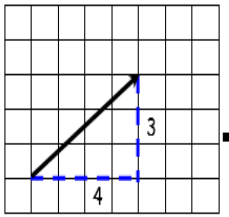
Vectors describe a movement.
A vector has a direction and a distance.



This diagram shows the vector:

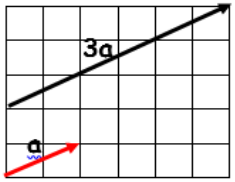
$$\vec{AB} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

Magnitude
Magnitude is defined as the **length** of a vector.
Example



Magnitude (length) can be calculated using Pythagoras Theorem:
$3^2 + 4^2 = 25$
$\sqrt{25} = 5$

Scalar of a Vector
A **scalar** is the **number** we **multiply** a vector by.

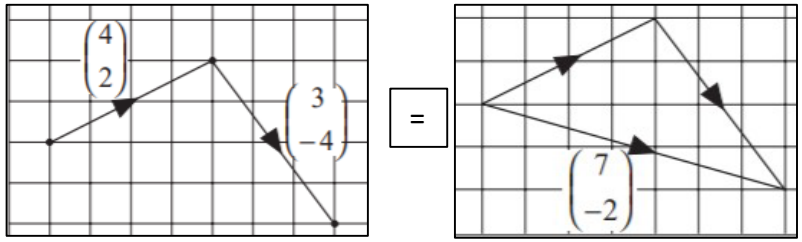


Example

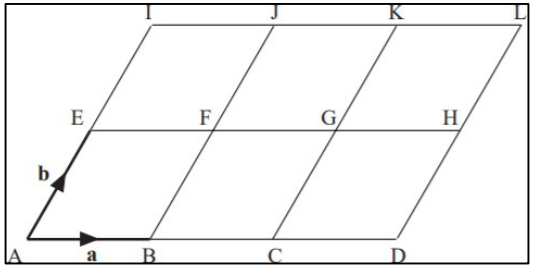
$3a + 2b =$
$= 3\begin{pmatrix} 2 \\ 1 \end{pmatrix} + 2\begin{pmatrix} 4 \\ -1 \end{pmatrix}$
$= \begin{pmatrix} 6 \\ 3 \end{pmatrix} + \begin{pmatrix} 8 \\ -2 \end{pmatrix}$
$= \begin{pmatrix} 14 \\ 1 \end{pmatrix}$

You can add vectors to get a resultant vector as seen below:

$$\begin{pmatrix} 4 \\ 2 \end{pmatrix} + \begin{pmatrix} 3 \\ -4 \end{pmatrix} = \begin{pmatrix} 7 \\ -2 \end{pmatrix}$$



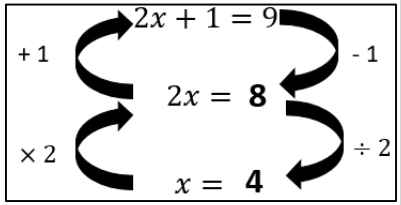
Vectors can be used to describe movements in Geometry as seen below:



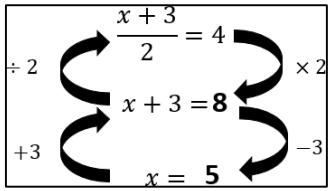
For the diagram on the left:

$\vec{AC} = 2\mathbf{a}$
$\vec{AF} = \mathbf{a} + \mathbf{b}$
$\vec{AL} = 3\mathbf{a} + 2\mathbf{b}$
$\vec{LE} = -3\mathbf{a} - \mathbf{b}$

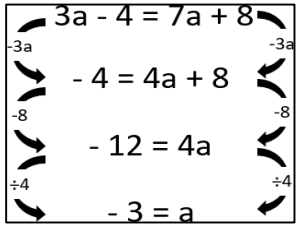
Solving Two Step Equations Finding the value of an unknown, by identifying operations performed and doing the inverse operation:



Solving Equations involving fractions
Finding the value of an unknown. To eliminate a denominator, multiply every term by the denominator:



Solving Equations with unknowns on both sides
Add/subtract the smallest algebraic term from both sides:



Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Forming Equations / Formulae

Substitute letters for words in the question.

Example

Bob charges £3 per window and a £5 call out charge.

$$C = 3N + 5$$

N=number of windows and C=cost

Simultaneous Equations

Finding solutions that work in two (or more) equations at the same time, like the ones below…

$$x + 2y = 8$$
$$2x + y = 7,$$

is called solving simultaneous equations.

Simultaneous Equations (substitution)

The idea here is to rearrange one of the equations into the for y=. Then substitute this equation into the other equation.

$$y - 2x = 3$$
$$3x + 4y = 1$$

Rearrange: $y - 2x = 3 \rightarrow y = 2x + 3$

Substitute: $3x + 4(2x + 3) = 1$

Solve: $3x + 8x + 12 = 1$

$$11x = -11$$
$$x = -1$$

Substitute: $y = 2 \times -1 + 3$

$$y = 1$$

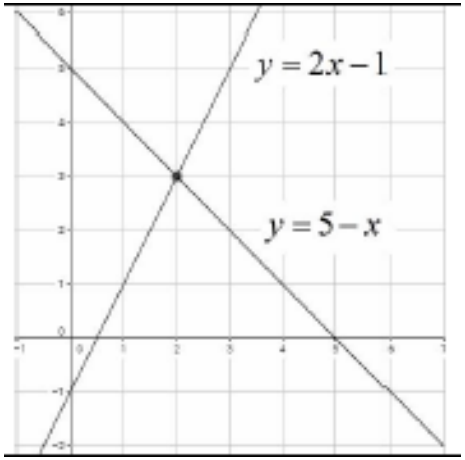
Solution: $x = -1, y = 1$

Solving Simultaneous Equations (Graphically)

Draw the graphs of the two equations.
The **solutions** will be **where the lines meet**.
The solution can be written as a **coordinate**.

Example

$y = 5 - x$ and $y = 2x - 1$.



They meet at the point with coordinates (2,3) so the answer is $x = 2$ and $y = 3$

Simultaneous Equations

First label the equations

$$x + 2y = 8 \quad (1)$$
$$2x + y = 7 \quad (2)$$

Then multiply to match the coefficients (the number before the letter)

$$2x + 4y = 16 \quad (3) \quad [2 \times (1)]$$
$$2x + y = 7 \quad (2)$$

Next add (or subtract) to remove an unknown

$$2x + 4y = 16 \quad (3)$$
$$2x + y = 7 \quad (2)$$
$$3y = 9 \quad (3) - (2)$$

Here, we can see that y=3.

Finally, substitute into a previous equation to calculate the other unknown. Here we used equation:

$$x + 2 \times 3 = 8$$
$$x + 6 = 8$$

We can see here that x=2

So x = 2 and y = 3.

Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Proportion

Proportion compares the size of one part to the size of the whole.
Usually written as a fraction.

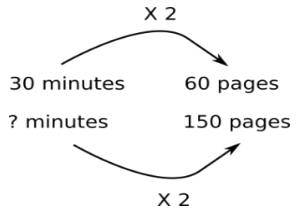
Example

In a class with 13 boys and 9 girls, the proportion of boys is $\frac{13}{22}$ and the proportion of girls is $\frac{9}{22}$

Proportional Reasoning

Comparing two things using multiplicative reasoning and applying this to a new situation.
Identify one multiplicative link and use this to find missing quantities.

Example



Best Buys

Find the unit cost by dividing the price by the quantity.
The lowest number is the best value.

Example

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.

Unitary Method

Finding the value of a single unit and then finding the necessary value by multiplying the single unit value.

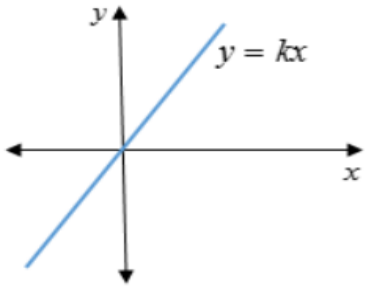
Example

3 cakes require 450g of sugar to make.
Find how much sugar is needed to make 5 cakes.
3 cakes = 450g
So 1 cake = 150g (÷ by 3)
So 5 cakes = 750 g (x by 5)

Direct Proportion

If two quantities are in direct proportion, as one increases, the other increases by the same percentage. k is the ratio between x and y

Example



Y is directly proportional to x
When x = 500 y = 10
Calculate the value of y when x = 150
Y = k x
10 = 500k therefore k = 1 / 5 0
Y= 1 / 5 0 x
y =1 / 5 0 x 150 y = 3

Indirect proportion

If two quantities are in indirect proportion, as one increases, the other decreases by the same percentage.
$1/k$ is the ratio between x and y

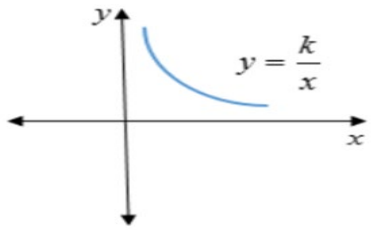
Example

P is inversely proportional to V
When P = 6 V = 8
Calculate the value of P when V = 2
P =k/v 6 = k/8
therefore k = 48
P = 48/2 P=24

Inverse proportion

If two quantities are inversely proportional, as one increases, the other decreases by the same percentage.
If y is inversely proportional to x, this can be written as $y \propto \frac{1}{x}$
An equation of the form $y = \frac{k}{x}$ represents inverse proportion.

Example



Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Recurring Decimal

A decimal with one or a group of digits that repeat itself indefinitely.

E.g. $0.\dot{2}\dot{3}$= 0.23232323…

Convert $0.\dot{8}\dot{4}$ to a fraction.

Multiply the decimal so that the repeated decimal digits are on the left side of the decimal point.

$$x = 0.84848484$$
$$100x = 84.848484$$

Subtract x from 100x.

$$99x = 84$$

Isolate x, then simplify:

$$x = \frac{84}{99} = \frac{28}{33}$$

Fractional Indices

The denominator of a fractional power acts as a 'root'. The numerator of a fractional power acts as a normal power.

$$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$$

Example

$$27^{\frac{2}{3}} = \left(\sqrt[3]{27}\right)^2 = 3^2 = 9$$

$$\left(\frac{25}{16}\right)^{\frac{3}{2}} = \left(\frac{\sqrt{25}}{\sqrt{16}}\right)^3 = \left(\frac{5}{4}\right)^3 = \frac{125}{64}$$

Negative Indices

$$a^{-n} = \frac{1}{a^n}$$

Example $3^{-2} = \frac{1}{3^2}$

$= \frac{1}{9}$

Expand (Linear)

To expand a bracket, **multiply** each term **in the bracket** by the expression **outside** the bracket.

Example

$$3(m + 7) = 3x + 21$$

Factorise (Linear)

The **reverse** of **expanding**.

Factorising is writing an expression as a product of terms by '**taking out' a common factor**.

Example

$$6x - 15 = 3(2x - 5),$$

where 3 is the common factor.

Expand (Quadratic)

Each term in one bracket needs to be multiplied by each term in the other bracket.

Example (grid method)

$(x + 2)(x + 5)$

	x	+5
x	x^2	$+5x$
+2	$+2x$	$+10$

Factorise (Quadratic)

What numbers multiply to make the last number in the expression? Which of these factors add /subtract to make the number in the middle?

Example

$$x^2 - 2x - 3$$
$$(x - 3)(x + 1)$$

Upper and Lower Bounds

The upper and lower bound come from the largest and smallest values that would round to a particular number. Take 'half a unit above and half a unit below'. For example rounded to 1 d.p means nearest 0.1, so add 0.05 and subtract 0.05 to get the bounds.

All error intervals look the same like this - ≤ x <

Example - State the upper and lower bound of 360 when it has been rounded to 2 significant figures:

2 significant figures is the nearest 10, so 'half this' to get 5, and add on to 360 and take it off 360,

355 ≤ x < 365

Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Solving Quadratics By Factorising

Make the equation equal to 0 and factorise. The solutions of the unknowns is the value to make each bracket equal to 0:

$x^2 - 3x = 18$

+18 $\quad x^2 - 3x - 18 = 0$ $\quad$ +18

Factorise

$$(x+3)(x-6) = 0$$

$$x+3=0 \qquad x-6=0$$

$$x=-3 \quad \text{or} \quad x=6$$

The Quadratic Formula

This is a proven formula to solve quadratics. The $\pm$ part is how you get more than one solution.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

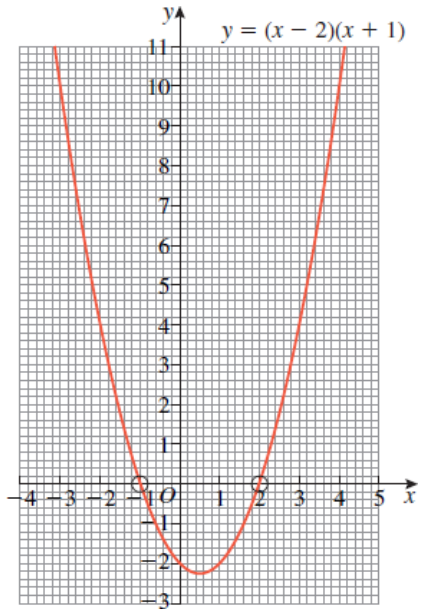
The quadratic expression must be equal to zero first. This formula needs to be memorised!

Solving Quadratics graphically

Quadratics can also be solved graphically.

Draw the graph of the quadratic – by substituting in values from the graph.

x	−3	−2	−1	0	1	2	3	4
y	10	4	0	−2	-2	0	4	10



The Solutions or Roots are where y=0, at the points (-1,0) and (2,0)

Using the Quadratic Formula

Quadratics are usually in the form:

$$ax^2 + bx + c = 0$$

This is how we pick out the values that will be substituted into the formula:

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

$$a=1 \quad b=4 \quad c=2$$

Now that you have the a. b and c values these can now be substituted into the formula – then gradually start to simplify the formula:

$$x = \frac{-4 \pm \sqrt{4^2 - 4\times1\times2}}{2\times1}$$

$$\Rightarrow x = \frac{-4 \pm \sqrt{8}}{2}$$

$$\Rightarrow x = -0.585\ldots$$

$$= -0.59\,(1\text{dp})$$

$$\text{or } x = -3.414\ldots$$

$$= -3.41\,(1\text{dp})$$

NOTE:

Another way you can solve quadratics is to 'complete the square' and 'iteration'. You will come across these later in the year.

Year 11 Higher (Set 2) Mathematics Knowledge Organiser

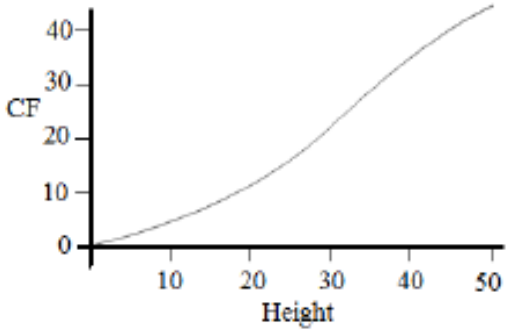
Cumulative frequency

Cumulative Frequency is a running total.

Age	Frequency	Cumulative Frequency
$0 < a \leq 10$	15	15
$10 < a \leq 40$	35	$15 + 35 = 50$
$40 < a \leq 50$	10	$50 + 10 = 60$

A cumulative frequency diagram is a curve that goes up. It looks a little like a stretched-out S shape.

Plot the cumulative frequencies at the <u>end-point of each interval.</u>



You can find the Lower Quartile, Median, and Upper quartile by drawing lines ¼ of the way, ½ of the way and ¾ of the way across the cumulative frequency axis. Then see where this line hits the curve and then read down onto the x axis.

Boxplot

The minimum, lower quartile, median, upper quartile and maximum are shown on a box plot.

Example

Students sit a maths test. The highest score is 19, the lowest score is 8, the median is 14, the lower quartile is 10 and the upper quartile is 17. Draw a box plot to represent this information.

Boxplot Keywords

Lower Quartile - represents the first ¼ of the data (halfway between minimum value and median).

Median – the middle value

Upper Quartile – represents ¾ of data (halfway between median and maximum value)

Interquartile Range (IQR) – Difference between upper quartile and lower quartile.

Comparing Boxplots

Write two sentences.

1. Compare the averages using the medians for two sets of data.

2. Compare the spread of the data using the range or IQR for two sets of data.

The smaller the range/IQR, the more consistent the data.

<u>You must compare box plots in the context of the problem.</u>

Example:

'On average, students in class A were more successful on the test than class B because their median score was higher.'

'Students in class B were more consistent than class A in their test scores as their IQR was smaller.'

Year 11 Higher (Set 2) Mathematics Knowledge Organiser

Histograms

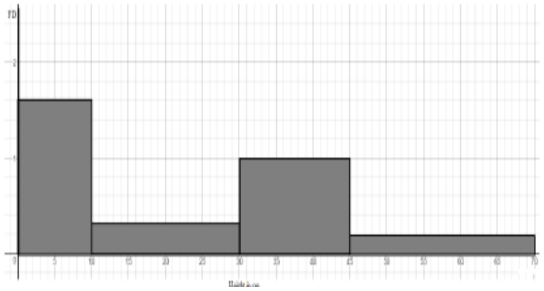
A visual way to display frequency data using bars. Bars can be unequal in width.

Histograms show *frequency density* on the y-axis, not frequency.

$$\textbf{Frequency Density} = \frac{\textbf{Frequency}}{\textbf{Class Width}}$$

Height(cm)	Frequency
$0 < h \leq 10$	8
$10 < h \leq 30$	6
$30 < h \leq 45$	15
$45 < h \leq 70$	5

Frequency Density (FD)
$8 \div 5 = 1.6$
$6 \div 20 = 0.3$
$15 \div 15 = 1$
$5 \div 25 = 0.2$

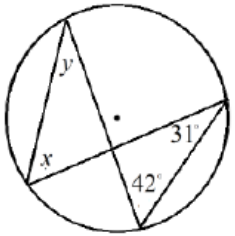


The area of the bar is proportional to the frequency of that class interval.

$$\textbf{Frequency} = \textbf{Freq Density} \times \textbf{Class Width}$$

Circle Theorem: Angles in the same segment are equal.

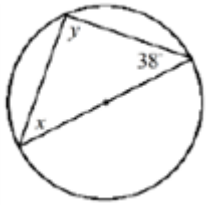
Example:



$x = 42°$
$y = 31°$

Circle Theorem: Angle in a semi-circle has a right angle at the circumference

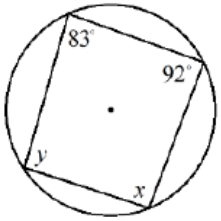
Example:



$y = 90°$
$x = 180 - 90 - 38$
$= 52°$

Circle Theorem: Opposite angles in a cyclic quadrilateral add up to 180°

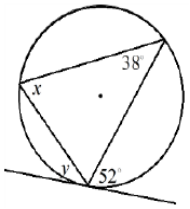
Example:



$x = 180 - 83 = 97°$
$y = 180 - 92 = 88$

Circle Theorem: Alternate segment theorem

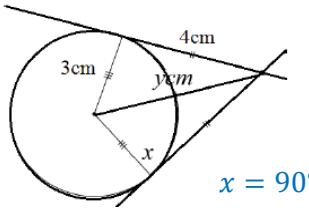
Example:



$x = 52°$
$y = 38°$

Circle Theorem: A tangent meets a radius at 90°

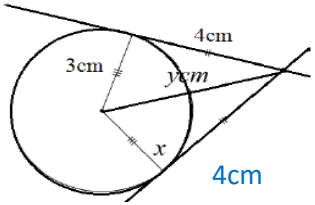
Example:



$x = 90°$

Circle Theorem: Tangents from an external point are equal in length.

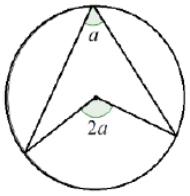
Example:



4cm

Circle Theorem: Angle at centre is twice the angle at circumference.

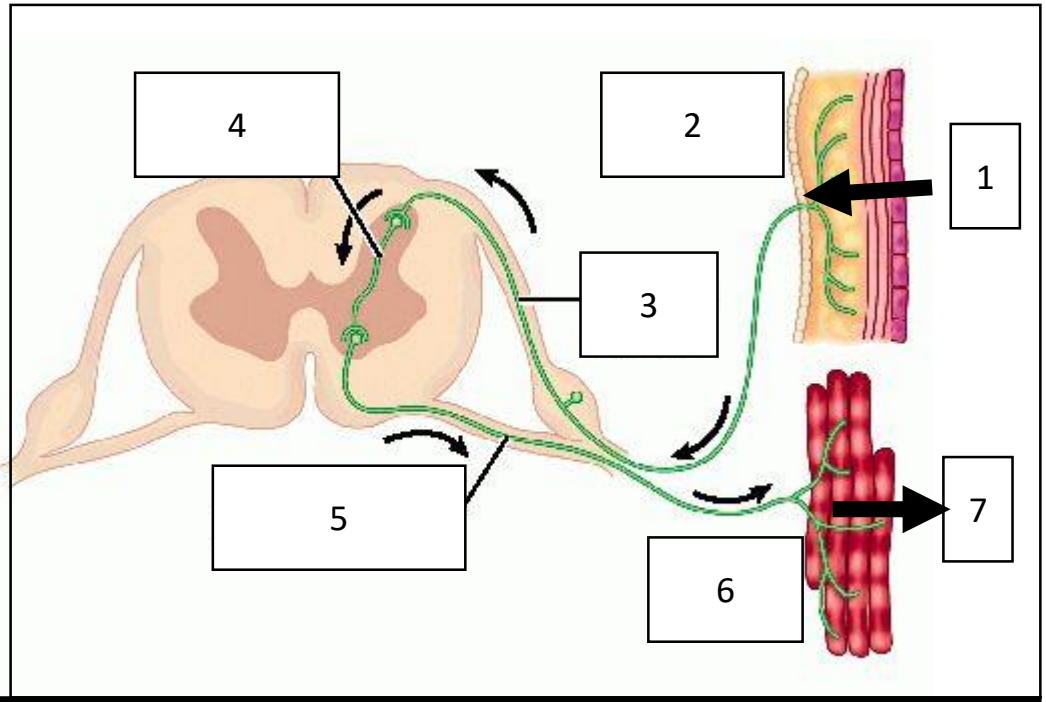
Example:



$x = 104 \div 2 = 52°$

Biology Topic 5: Homeostasis and response

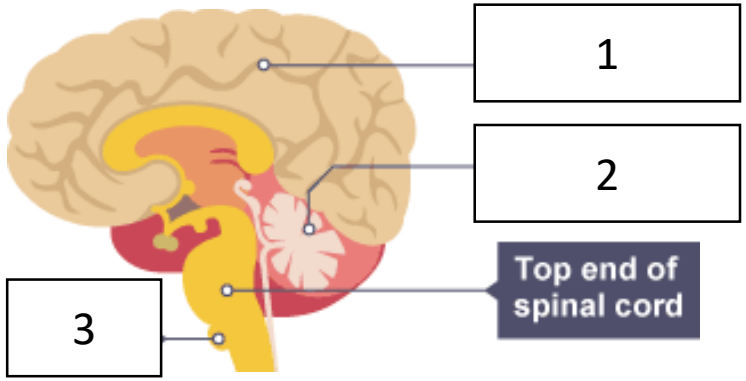
1. Keywords	
Homeostasis	The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes.
Optimum conditions	The perfect conditions for an organism to survive and grow. E.g. blood glucose level, body temperature and water level.
Nervous response	Uses electrical signal in nerves to make fast changes
Chemical response	Uses hormones in the blood to make changes.
Reflex arc	A nervous response that is fast and automatic for protection. Does not involve the conscious brain.
CNS	(Central nervous system) The brain and the spinal chord
Neurone	Nerve cell. Carries an electrical signal from one end to the other



2. Nervous system: Reflex arc							
No.	1	2	3	4	5	6	7
Section	Stimulus →	Receptor →	Sensory neurone →	Co-ordinator →	Motor neurone →	Effector →	Response
Definition	A change to the environment that triggers a nervous response	A cell which detects a specific stimulus	A neurones which carries electrical signal from receptor to CNS	The area that receives and processes the information	Neurone that connects the CNS to the effector	The organ that creates the correct response form the stimulus	The effect of the stimulus. Often designed to prevent injury
Example	Touching a flame	Pain receptor in skin	Sensory neurone	Brain Relay neurone	Motor neurone	Muscle gland	Movement

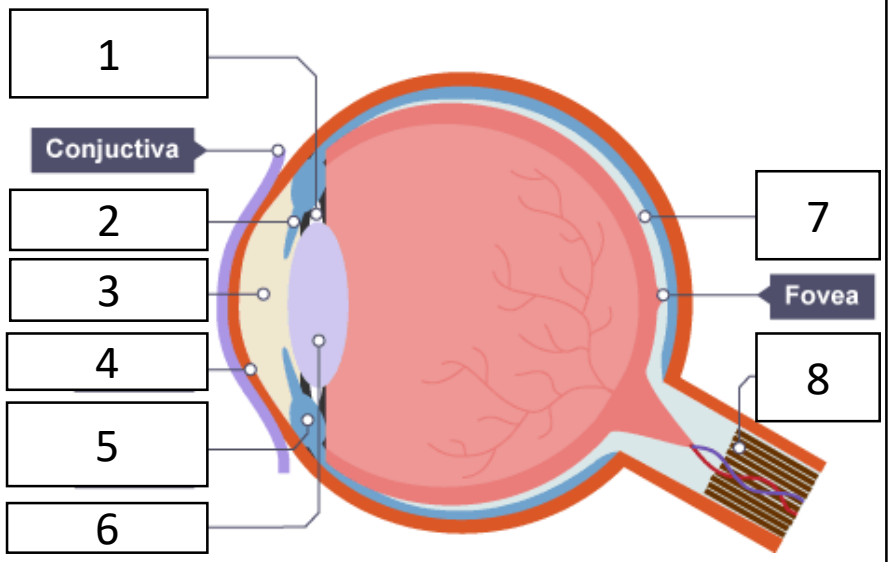
3. The brain (TRIPLE ONLY)

No	Name	Function
1	Cerebral cortex	High level functions like language, memory and consciousness
2	Cerebellum	Balance and coordination of muscles in the body
3	Medulla	Controls life supporting functions like breathing and heart rate. Key for homeostasis



4. The eye (TRIPLE ONLY)

No	Name	Function
	Sclera	White outer protective layer.
1	Suspensory ligaments	Connect ciliary muscles to lens
2	Iris	Controls the size of the pupil
3	Pupil	Hole in eye that lets light through. Wide in dark conditions small in light conditions
4	Cornea	Transparent protective layer
5	Ciliary muscles	Contract to change shape of lens to see near and far objects
6	Lens	Refracts light onto retina
7	Retina	Contain light sensitive rod and cone cells
8	Optic nerve	Send signals from retina to brain to make image

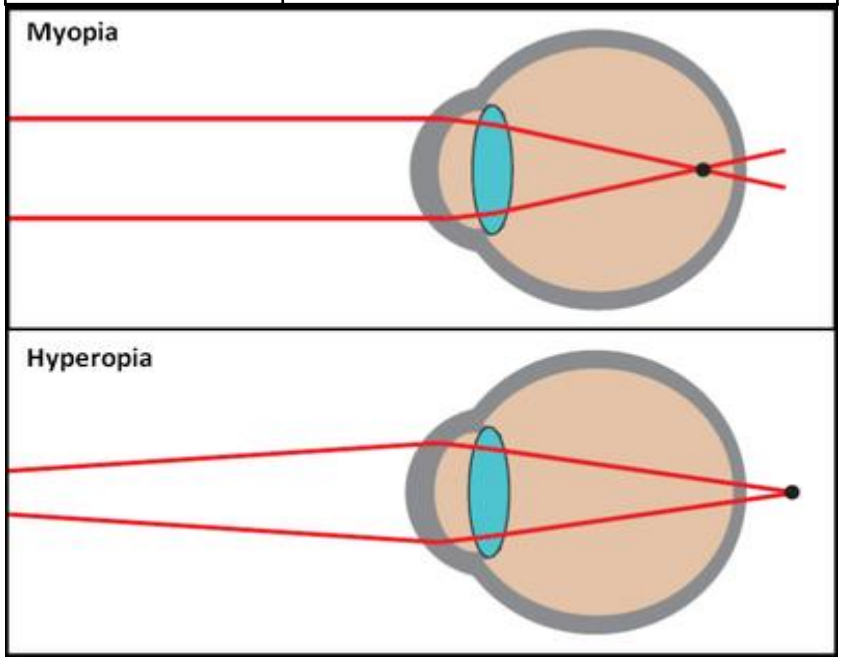


5. Adjusting focus (TRIPLE ONLY)

Object	Near	Distant
Ciliary muscles	Contract	Relax
Suspensory ligaments	Loosen	Tighten
Lens	Is thicker	Is thinner

6. Vision problems (TRIPLE ONLY)

Name	Myopia	Hyperopia
Common name	Short-sighted	Long-sighted
Corrected by	• Glasses • Contact lenses • Laser eye surgery	



7. Control of body temperature (TRIPLE ONLY)

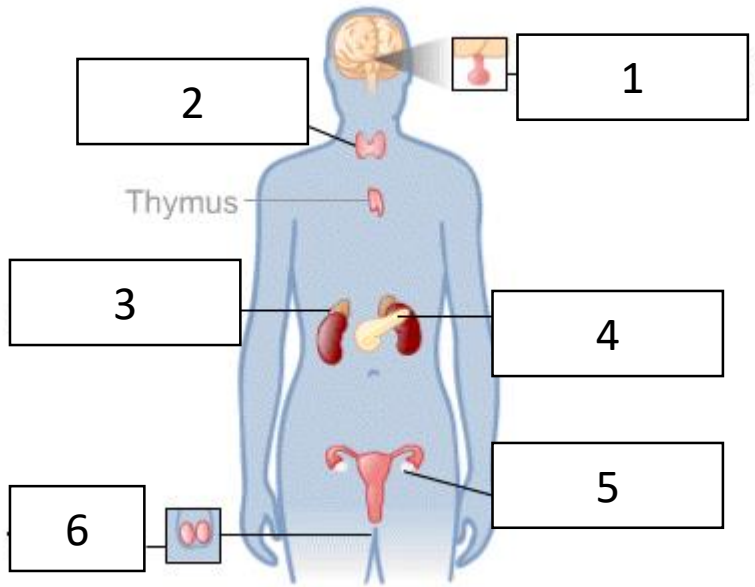
Thermoregulatory centre	Part of the brain that receives signals about temperature of the blood and skin
37°C	Optimum internal body temperature
Vasodilation	The widening of blood vessels near the surface of the skin
Vasoconstriction	The narrowing of blood vessels near the surface of the skin
Sweat	Liquid released from pores on skin to cool the body as it evaporates
Shivering	Involuntary muscle contractions to generate heat

How the body responds to changes in temperature

Too hot	Too cold
1. **Vasodilation** bring blood near the surface 2. **Sweating** increases 3. Heat is lost through evaporation and radiation 4. Body temp drops	1. **Vasoconstriction** take blood away from surface 2. **Sweating** stops 3. Muscles contractions **(shivering)** generate heat 4. Body temp increases

8. Hormonal control: Endocrine system	
Endocrine system	A chemical response where glands secrete hormones into the blood which make changes around the body
Glands	Special tissues designed to produce specific chemical (hormones)
Secrete	Release

9. Major glands on the body		
1	Pituitary gland	The 'master gland' makes hormones which affect other glands causing them to secrete hormones
2	Thyroid gland	Controls metabolism
3	Adrenal gland	Makes adrenalin
4	Pancreas	Controls blood sugar levels
5	Ovary	Produces female sex hormones
6	Testes	Produce male sex hormone



10. Control of blood glucose levels	
Type 1 diabetes	When the pancreas is damaged from infection and cannot make insulin. Needs injections to treat
Type 2 diabetes	When poor diet and obesity cause body cells to not respond to insulin anymore. Treated with diet and exercise
Insulin	Hormone made in pancreas that reduces glucose levels in the blood
glycogen	The long term store of sugar in the body. Made in the liver

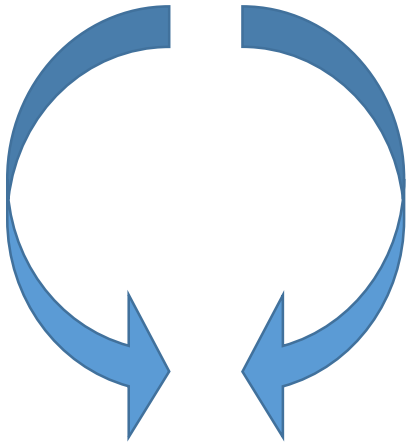
11. Control of blood glucose continued (HT ONLY)	
Glucagon	A hormone which reduces blood glucose concentration by turning it into glycogen

Normal blood glucose

Blood glucose increases

Pancreas secretes insulin into blood

Liver absorbs glucose and turns it to glycogen



Blood glucose drops

Pancreas secretes glucagon into blood

Liver converts glycogen to glucose and releases it into blood stream

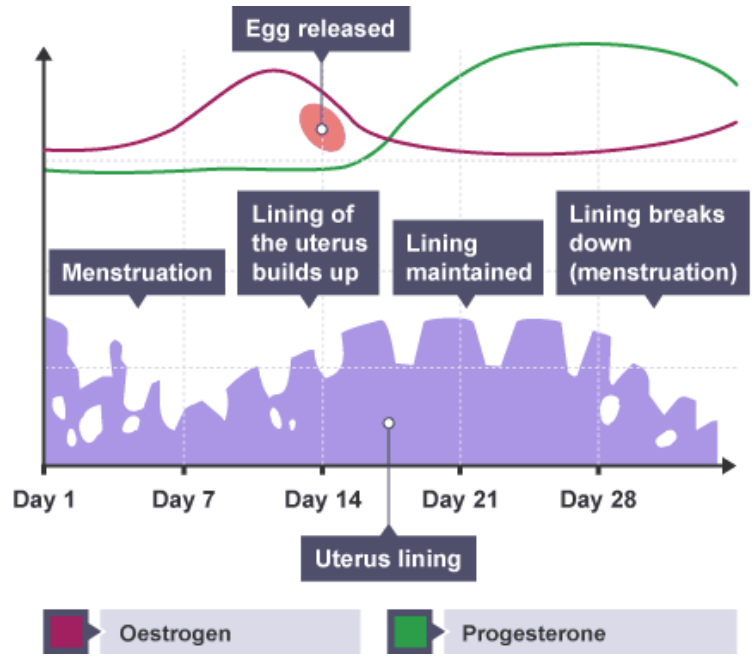
Normal blood glucose

12. Controlling water and nitrogen levels (TRIPLE ONLY)	
Urea	The waste product made by the breakdown of amino acids in the liver.
Urine	The urea, excess water and ions not needed by the body. Made by the kidneys
Kidneys	The organ responsible for filtration and selective reabsorption
Selective reabsorption	When the kidneys reabsorb: • All of the glucose • Some of the mineral ions • Some of the water
Dialysis	A way of manually filtering the blood when the kidneys are no longer functioning. Whilst waiting for a transplant

13. Hormones and the kidneys (TRIPLE HT ONLY)	
ADH (anti-diuretic hormone)	A hormone made in the pituitary gland which increase the reabsorption of water by kidney tubules
How ADH works:	
1. Blood is too concentrated 2. Pituitary gland releases ADH into blood. 3. ADH increase permeability of kidney tubules 4. More water is reabsorbed 5. Blood dilutes to normal levels. Urine is yellow.	

14. Reproductive hormones		
Hormone	Made in	Function
Testosterone	Testes	Creates male sexual changes at puberty including sperm production
Oestrogen	Ovary	Creates female sexual changes at puberty including ovulation
Follicle stimulating hormone (FSH)	Pituitary gland	Causes egg to mature in ovary
Luteinising hormone (LH)	Pituitary gland	Causes egg to be released by ovary
Progesterone	Ovary	Maintains lining of womb

15. Menstrual cycle (HT ONLY)



16. Contraception	
Type	How it works
Oral (the pill)	Stops FSH so no egg released
Injection/implant	Release progesterone which prevents egg maturation for months or years
Barrier (condoms)	Prevent sperm and egg meeting
Intrauterine (the coil)	Prevents embryo implanting
Spermicides	Kill sperm
Abstinence	Not having sex
Surgical (vasectomy/hysterectomy)	Surgically sterilising the adult permanently

17. Hormones in fertility (HT ONLY)	
Fertility drugs	Drugs which stimulate the production and release of eggs. Eg FSH and LH
IVF (in vitro fertilisation)	The process of creating an embryo in the lab when couples struggle to conceive a baby
Stages of IVF:	
1. FSH and LH stimulate production of many eggs 2. Eggs are harvested and fertilised by fathers sperm in a lab 3. Fertilised eggs grow in lab 4. A few embryos are implanted into mother womb	
Possible consequences of IVF	Physical and emotional fatigue Low success rate Risk of multiple births simultaneously

18. Negative feedback (HT ONLY)	
Negative feedback	A system where the product reduces the stimulus to return the change to normal levels
Adrenalin	Fight or flight hormone. Increases heart rate and boosts blood supply of oxygen and glucose
Thyroxine	Controls metabolic rate and affects growth and development. Controlled by negative feedback.

19. Plant hormones (TRIPLE ONLY)	
Phototropism	The shoot of a plant growing towards light. The root growing away form light
Gravitropism (geotropism)	The shoot of a plant growing up and the roots growing down
Auxin	Group of plant hormones which make cells in shoots grow more and cells in roots grow less. Used as rooting powder and weedkiller.
How tropisms work	
Phototropism	1. Shaded side contains more auxin 2. So grows faster 3. Plant leans towards light
Gravitropism	1. Bottom of shoot has more auxin 2. So grows slower 3. Roots bends downwards

20. Other plant hormones (TRIPLE HT ONLY)	
Gibberellins	Start seed germination. Used to promote fruit development and flowering
Ethene	Cell division and ripening fruit

Biology Topic 6: Inheritance, variation and evolution

1.Keywords	
Mitosis	A type of cell division which create two identical daughter cells
Meiosis	A type of cell division the create 4 unique gametes
Gametes	Sex cells eg sperm + egg and pollen + ovum
Sexual reproduction	Reproduction involving the fusion of gametes. Make unique offspring that resemble both parents
Asexual reproduction	Reproduction involving only one parent. No gametes fuse. Offspring are identical to parent
DNA	Deoxyribose nucleic acid. Polymer made of 2 strands forming a double helix. Contains the instructions for an organism.
Chromosomes	Long strands of DNA found in the nucleus. Humans have 23 pairs
Gene	A section of DNA which codes for a protein
Genome	All the genes of an organism

2. Meiosis
1. DNA replication: chromosome number doubles
2. Cell divides: two cells now
3. Those cells divide: four gametes now with half the number of chromosomes

3. Advantages of reproduction (TRIPLE ONLY)	
Advantages sexual	Advantages asexual
Causes variation	Only need 1 parent
If environment changes natural selection can occur	Energy and time efficient (fast)
Humans can selectively breed organisms for beneficial characteristics	Lots of offspring can be produced when conditions are good
Organisms that can use both	• Malaria • Fungi • Plants

4. DNA structure (TRIPLE ONLY)	
Nucleotide	The monomer of DNA. Consists of a sugar, phosphate and a base
Base	One of 4 different chemicals that make the triplet code. A G T C
Triplet code	3 bases in a row give a code for a specific amino acid

5. Protein synthesis and gene expression (HT TRIPLE ONLY)	
Pairing of nucleotide bases	A → T T→A G → C C→G
Transcription	When the DNA is read and converted into messenger RNA (mRNA)
Translation	When the mRNA is read by ribosomes and use to build the amino acid sequence
Transfer RNA (tRNA)	Carries the correct amino acid to the ribosome for the mRNA triplet code
Coding DNA	DNA which codes for a protein, a gene
Non-coding DNA	DNA which does not code for a protein. Can be involved in turning on or off genes.
Mutation	A change to the DNA sequence. Most are harmless but some can stop proteins working correctly

6. Genetic inheritance	
Allele	Different forms of the same gene. eg hair colour
Dominant	When only one copy of the allele is needed to show in the offspring
Recessive	When the allele only shows when there are two copies
Homozygous	Two copies of the same allele
Heterozygous	Two different alleles
Genotype	The set of genes in our DNA
Phenotype	The outward appearance a set of genes displays

7. Inherited disorders	
Inherited disorders	Disorders that are caused by inheriting faulty genes from parents
Polydactyly	A dominant inherited disorder which causes extra fingers or toes to form
Cystic fibrosis	A recessive inherited disorder which causes sticky mucus to block air ways

8. Sex determination	
No of chromosomes in a human	23 pairs (22 normal, 1 pair of sex)
Male	XY (50% chance)
Female	XX (50% chance)
Sperm	Can hold Y or X chromosome so determine gender of embryo

9. Variation	
Variation	Changes within a population. Caused by mutation
Genetic variation	Changes due to inheriting different alleles of genes
Environmental variation	Changes due to the effect the environment has

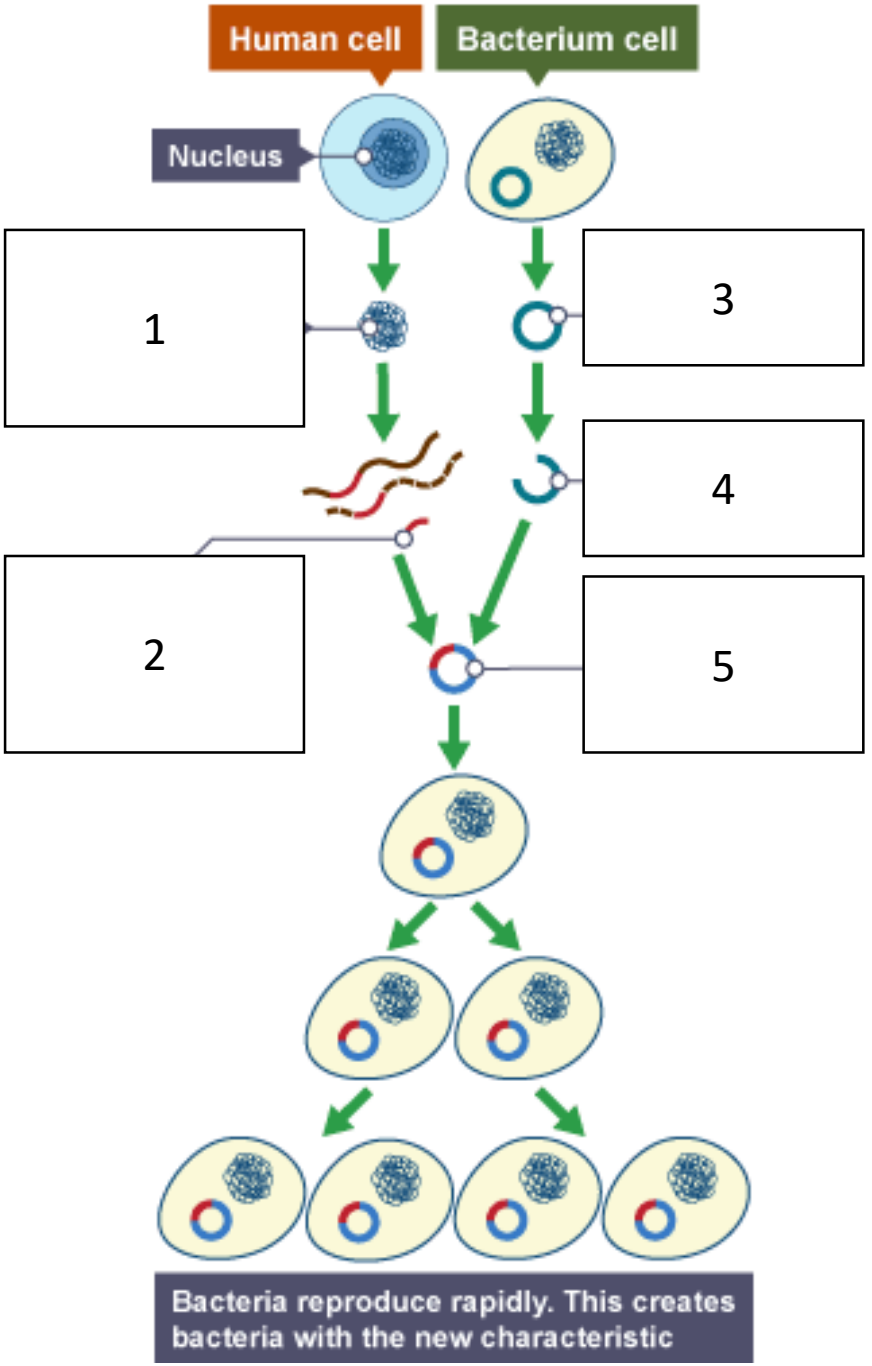
10. Evolution	
Evolution	The change in the inherited characteristics of a population due to natural selection. May result in a new species
Natural selection	The process where the organism best adapted to the environment survives and passes on their characteristics
Species	A group of organisms with similar features which can breed to make fertile offspring

Stages of evolution
1. Population shows variation due to their genes
2. Environment changes
3. Some individuals are best adapted and live longer
4. These can breed and produce more offspring
5. Over a long period of time the offspring dominate the population

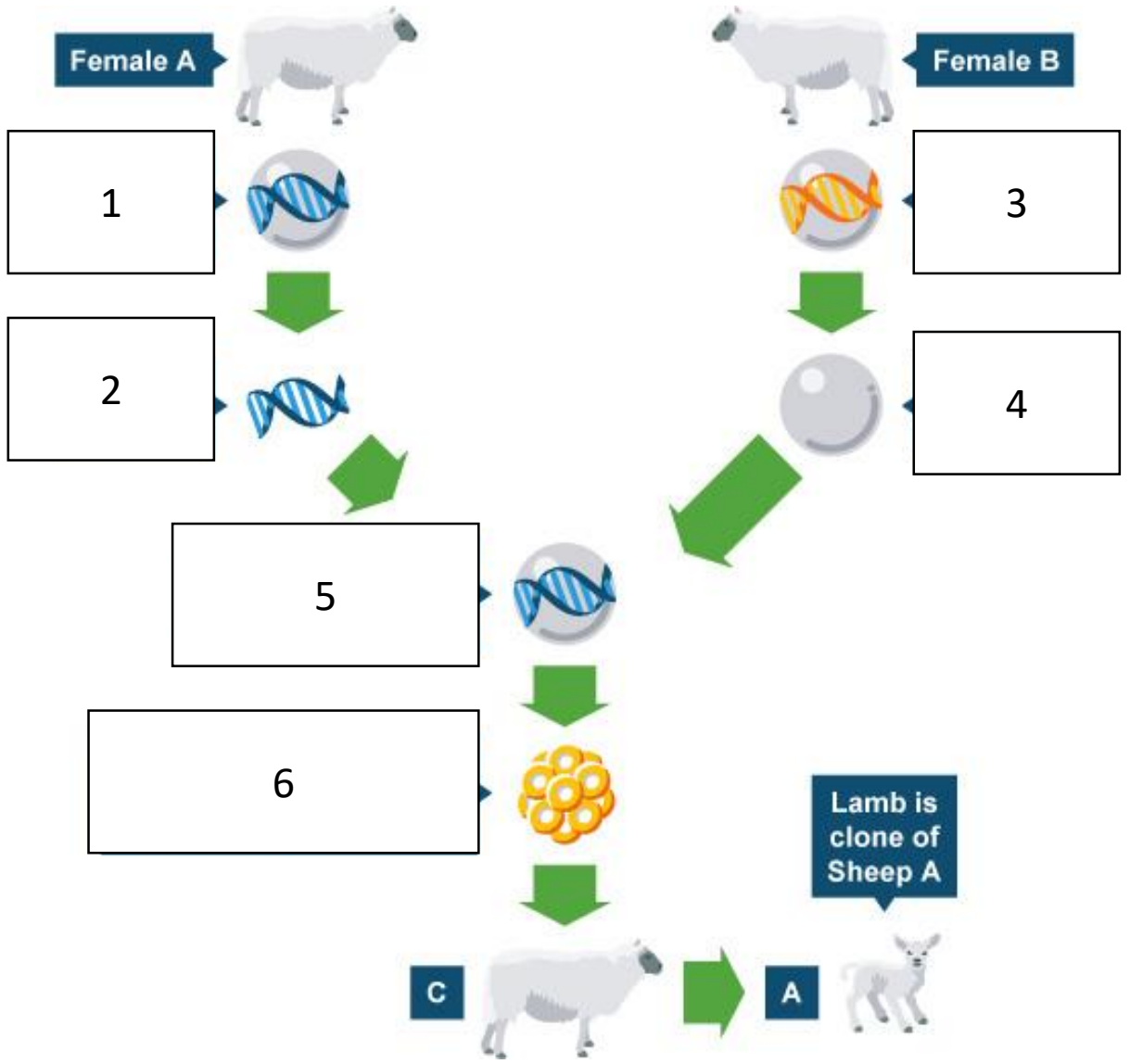
11. Selective breeding	
Selective breeding	The ancient practice of artificially selecting animals and plants to breed together to create certain characteristics
Inbreeding	The consequence of too much selective breeding. Can lead to disease or defects
Outcomes of selective breeding	• Disease resistance in crops • Increased meat and milk production • Domestication of pets • Large unusual flowers

12. Genetic engineering	
Genetic engineering	The process of changing the genome by adding a desirable gene from another organism
GM crops	Genetically modified crops that are resistant to disease or grow bigger crops. Controversial to some

13. Process of genetic engineering (HT ONLY)	
1	DNA containing desired gene removed from cell
2	Enzyme cuts out gene
3	Plasmid taken from bacteria
4	Plasmid cut by same enzyme
5	Plasmid and human gene joined by an enzyme



14. Cloning (TRIPLE ONLY)	
Tissue cloning	Using groups of cells from a plant to grow a identical new plants
Cuttings	Old fashioned simple method of growing a new plant from part of an old plant
Embryo transplant	Splitting apart unspecialised animal cells from an embryo and transplanting them into host mother
Adult cell cloning	
1	Body cell taken from Sheep A
2	DNA removed
3	Egg taken from Sheep B
4	Nucleus removed
5	DNA and cell fused with electric shock
6	Cell develops into embryo and implanted into surrogate (c)



15. Theory of evolution (TRIPLE ONLY)	
Charles Darwin	Proposed the theory of evolution in his book 'on the origins of species'
Darwin's theory took a long time to be accepted because:	• It challenged the idea that God made all creatures • There was not enough evidence at the time • Mechanism of inheritance was not understood for another 50 years.
Jean-Baptiste Lamarck	Had a different theory about inherited characteristics. He believed they were acquired through the life of the parents. He was wrong
Alfred Russell Wallace	Independently came up with the idea of evolution and natural selection at the same time as Darwin. Worked on the idea of speciation
Speciation	Formation of a new species as a result of evolution

16. Understanding genetics (TRIPLE ONLY)	
Mid 19th century	Gregor Mendel a monk who carried out breeding experiments on plants. Discovered the inheritance of characteristics as 'units'
Late 19th century	Chromosomes observed
Early 20th century	Chromosomes linked to inheritance. Genes discovered.
Mid 20th century	Structure of DNA discovered and the way genes code for proteins.
Today	Antibiotic resistance provides real time evidence of evolution in action

17. Fossils	
Fossil	Remains of a plant or animal that were alive millions of years ago. Found in rocks. Normally only the hard parts
Fossil formation	• Parts of organisms that have not decayed because one or more of the conditions needed for decay are absent • Parts of the organism are replaced by minerals as they decay • Preserved traces of organisms, such as footprints
What they tell us	Early life was simple As the fossils get newer the life becomes more complex
Why do we not have a fossil for every living thing	• Early life forms were soft bodied so not fossils formed • Geological activity destroyed fossils

18. Extinction	
Extinction	When an entire species has died
Causes of extinction	1. Disease 2. New predators 3. Famine 4. Natural disaster (meteor, volcano)

19. Resistant bacteria	
MRSA	A type of bacteria that has evolved to be resistant to antibiotics
How to prevent antibiotic resistance	1. Not prescribing antibiotic for viral and non-threatening infections 2. Completing the course of antibiotic given 3. Restricting the use of agricultural antibiotics

20. Classification of organisms	
Carl Linnaeus	Invented the groups we classify organisms into 1. Kingdom 2. Phylum 3. Class 4. Order 5. Family 6. Genus 7. Species
Binomial name	The official name of all organism consisting of genus and species
3 domain system	
Archaea	Primitive bacteria normally found in extreme environments
Bacteria	True bacteria
Eukaryotes	Plants, animals, fungi and protists

Mnemonic Device

Kingdom	• King
Phylum	• Phillip
Class	• Came
Order	• Over
Family	• For
Genus	• Good
species	• Soup

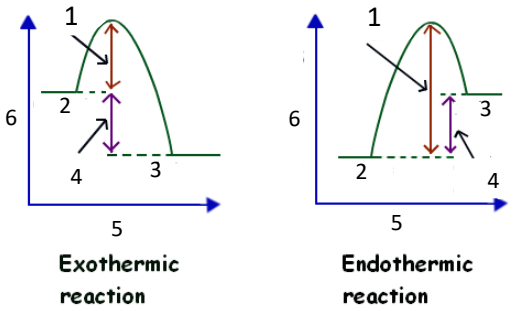
Chemistry Topic 5: Energy changes

1. Keywords

Conservation of energy	Energy can not be created or destroyed just transferred from one for to another
Exothermic reaction	Reaction which releases heat to the surroundings. Causing an increase in temperature
Endothermic reaction	Reaction which absorbs heat from the surroundings. Causing a decrease in temperature

2. Reaction profiles

1	Activation energy
2	Reactants
3	Products
4	Energy released
5	Reaction progress
6	Potential energy



3. Energy changes of reactions (HT ONLY)

Reaction type	**Temperature change**	**Amount of energy absorbed to break bonds**	**Amount of energy released when making new bonds**
Exothermic	Increases	Less	More
Endothermic	Decreases	More	Less

4. Cells and batteries (TRIPLE ONLY)

Simple cell	Made from connecting two different metals in contact with an electrolyte
Battery	Two or more cells joined together in series to make a greater voltage
Non-rechargeable cell	Type of cell where the reactions stop when one of the reactants is used up. E.g Alkali batteries
Rechargeable cell	Type of cell where the chemical reactions can be reversed when an electric current is supplied
Fuel cell	Type of cell that makes electricity from reacting a fuel (eg Hydrogen) with oxygen

5. Hydrogen fuel cell (TRIPLE ONLY)

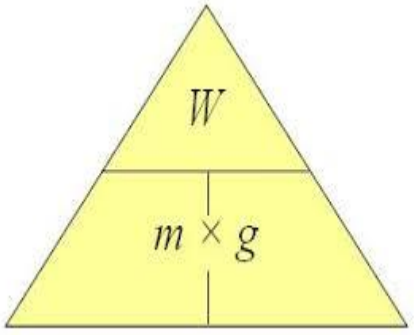
Overall equation	$2H_2 + O_2 \rightarrow 2H_2O$
Anode equation (HT ONLY)	$4H^+(aq) + O_2(g) + 4e^- \rightarrow 2H_2O(g)$
Cathode equation (HT ONLY)	$H_2(g) - 2e^- \rightarrow 2H^+(aq)$

Physics topic 5a: Forces

1. Forces keywords	
Force	Something that makes a change happen
Magnitude	The value of a force in newtons
Scalar	Things that have magnitude but not direct
Vector	Things that have a magnitude and a direction. Forces are always vectors
Contact force	Can only act when two things touch
Non-contact force	Can act on things not touching
Balanced (forces)	When forces are equal and opposite each other also called **equilibrium**
Unbalanced (forces)	When opposing forces are not equal to each other
Resultant (force)	The overall force once all the forces are considered
Force arrows	Show direction and size of a force
Newton	Unit force is measured in
Newtonmeter	A spring calibrated so it has a scale to measure force
Centre of mass	A point in the middle of an object where all its mass acts
Elastic	A material that returns to its original shape after being deformed
Plastic	A material that does NOT return to its original shape after being deformed

2. Types of force			
Force	**Between**	**Contact or non-contact**	**Example**
Friction	Two moving surfaces	Contact	Brakes
Upthrust	An object and water	Contact	Boat
Reaction	Two stationary objects	Contact	Book on shelf
Air resistance	A moving object and air	Contact	Plane
Gravity	Two masses	Non-contact	You and the earth
Tension	Two ends of an elastic material	Contact	Spring
Magnetic	Magnets and magnetic materials	Non-contact	Magnet picking up a nail

3. Calculating weight		
Symbol	**Name**	**Calculated by..**
W	Weight (N)	= Mass x Gravity
m	Mass (Kg)	= Weight ÷ Gravity
g	Gravitational field strength	= Weight ÷ mass
On earth g = 10 N/kg		



4. Calculating work

Symbol	Name	Calculated by..
W	Work (J)	= Force x Distance
F	Force (N)	= Work ÷ Distance
s	Distance (m)	= Work ÷ Force

$$W = Fs$$

5. Hooke's law

Symbol	Name	Calculated by..
F	Force (N)	= Spring constant x Extension
k	Spring constant (N/m)	= Force ÷ Extension
e	Extension (m)	= Force ÷ Spring constant

$$F = ke$$

6. Energy stored in a spring

Symbol	Name	Calculated by..
Ep	Elastic potential energy stored (J)	$Ep = \frac{1}{2}ke^2$
$\frac{1}{2}$	Half (0.5)	N/A
k	Spring constant (N/m)	$k = \frac{2\,Ep}{e^2}$
e	Extension (m)	$e = \sqrt{\frac{2\,Ep}{k}}$

$$Ep = \frac{1}{2}ke^2$$

To calculate extension:

1. Measure the original length of the object
2. Measure the stretched length of the object
3. Extension = stretched length – original length

7. Moments:

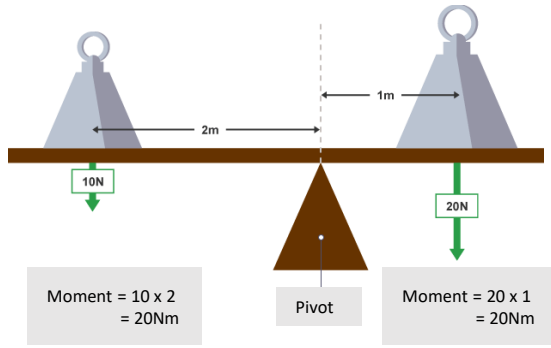
1.To calculate a moment you need to know:

- How much force is being applied (Newtons, N)
- The distance from the pivot that the force is being applied (Meters, m)

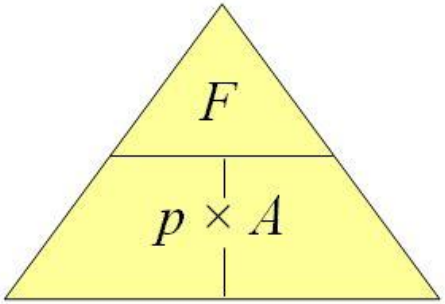
Moment = force x distance

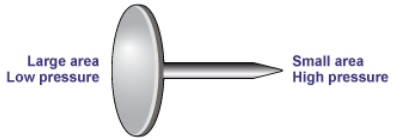
2.The unit for moment is newton metre (Nm)

3.A small force over a large distance can generate the same moment as a large force over a small distance.



8. Calculating pressure		
Symbol	**Name**	**Calculated by..**
F	Force (N)	= pressure x area
p	Pressure (Pa = n/m^2)	= force ÷ area
A	Area (m^2)	= force ÷ pressure





9. Calculating pressure in column of liquid (HT ONLY)		
Symbol	**Name**	**Calculated by..**
g	Gravitational field strength (10 N/Kg)	$g = \frac{p}{h\rho}$
p	Pressure (Pa =n/m^2)	$p = h\rho g$
h	Height (m)	$h = \frac{p}{g\rho}$
ρ	Density (kg/m^3)	$\rho = \frac{p}{gh}$
$p = h\rho g$		

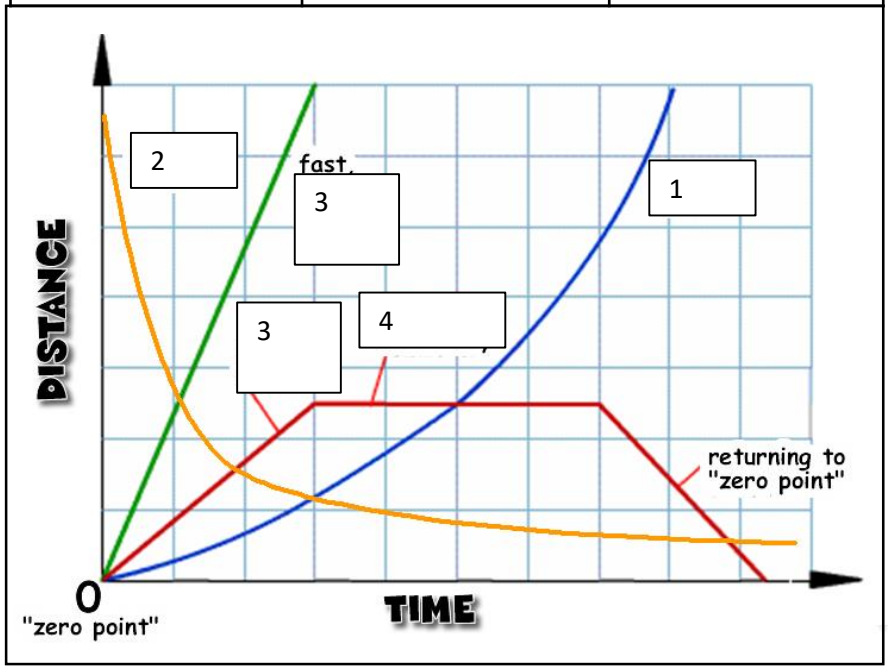
Physics Topic 5b: Forces in motion

1. Keywords	
Speed	Distance ÷ time. Scalar quantity
Velocity	Distance (in a certain direction) ÷ time. Vector quantity
Distance	How far and object moves. Scalar quantity
Displacement	The straight line distance from the start point to the end point. Vector quantity
Terminal velocity	The maximum speed reached when the forces are balanced

2. Typical speeds	
Walking	1.5 m/s
Running	3 m/s
Cycling	6 m/s
Sound	330 m/s

3. Calculating speed		
Symbol	**Name**	**Calculated by..**
S	Distance (m)	= speed x time
v	Speed/Velocity (m/s)	= distance ÷ time
t	Time (s)	= distance ÷ speed
S = v t		

4. D/T graph keywords		
Keyword	**Meaning**	**Position on distance time graph**
Accelerate	Speeding up	1
Decelerate	Slowing down	2
Constant speed	Staying the same speed	3
Stationary	Not moving	4
Speed	Distance covered in a certain time	The steepness of the line



5. Acceleration

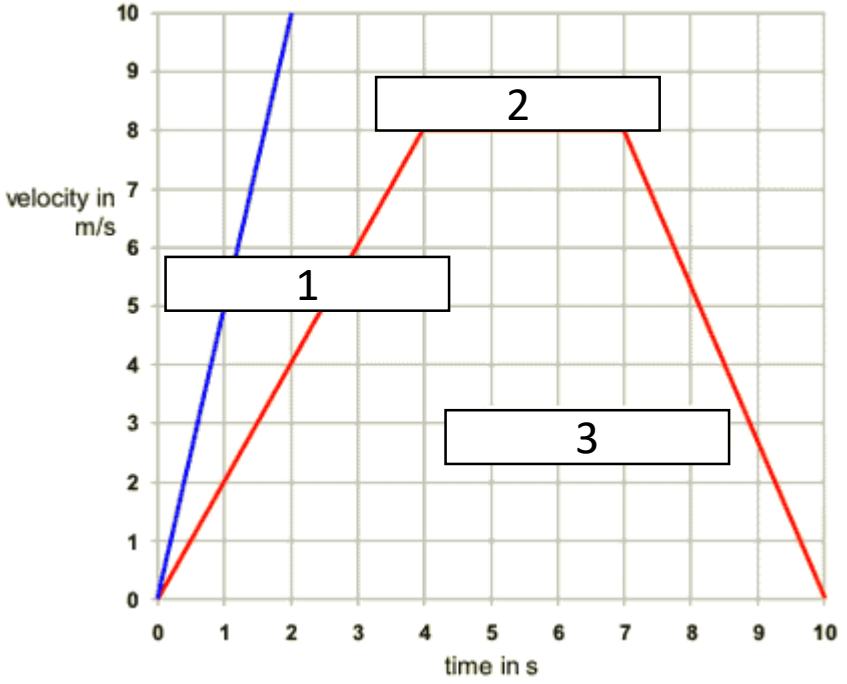
a	Acceleration (m/s^2)	$a = \frac{\Delta v}{t}$
Δv	Change in velocity (m/s)	$\Delta v = at$
t	Time (s)	$t = \frac{\Delta v}{a}$
$a = \frac{\Delta v}{t}$		

7. Uniform acceleration

$$v^2 - u^2 = 2as$$

v	Final velocity (m/s)
u	Start velocity (m/s)
a	Acceleration (m/s^2)
s	Distance (m)

6. Velocity-time graphs



1	Constant acceleration
2	Constant speed/velocity
3	Constant deceleration
HT	Area under graph = total distance travelled

8. Newtons laws of motion	
1st	If the resultant force on an object is zero the object either remains stationary or at a constant speed
2nd	Force = mass x acceleration
3rd	When two objects interact the forces are equal and opposite

9. Forces and braking	
Stopping distance	The thinking distance + braking distance
Thinking distance	The distance travelled in the time it takes to react (typically 0.2s)
Factors affecting thinking distance	1. Tiredness 2. Drugs 3. Alcohol 4. Distractions (phones)
Braking distance	The distance travelled under a braking force
Factors affecting braking distance	1. Road conditions (ice, water) 2. Tyre condition 3. Brake condition

10. Momentum (HT ONLY)		
p	Momentum (Kgm/s)	p=mv
m	Mass (Kg)	m=p÷v
v	Velocity (m/s)	v=p÷m
Conservation of momentum	The total momentum before = the total momentum after	

11. Changes in momentum (PHYSICS ONLY)		
$$F = \frac{m\Delta v}{\Delta t}$$		
F	force	N
$m\Delta v$	Change in momentum	Kgm/s
Δt	Change in time	s
To reduce the force we need to extend the collision time		

Level 1/2 Hospitality and Catering: Unit 2-2.1.1 -
Nutrition at different life stages & special dietary needs

Nutrition at different life-stages

Adults:

- **Early** – Growth in regard to height of the body continues to develop until 21 years of age. Therefore, all micro-nutrients and macro-nutrients especially carbohydrates, protein, fats, vitamins, calcium and iron are needed for strength, to avoid diseases and to maintain being healthy.
- **Middle** – The metabolic rate starts to slow down at this stage, and it is very easy to gain weight if the energy intake is unbalanced and there isn't enough physical activity.
- **Elderly** – The body's systems start to slow down with age and a risk of blood pressure can increase as well as decrease in appetite, vision and long-term memory. Because of this, it is essential to keep the body strong and free from disease by continuing to eat a healthy, balanced diet.

Children:

- **Babies** – All nutrients are essential and important in babies, especially protein as growth and development of the body is very quick at this stage. Vitamins and minerals are also important. You should try to limit the amount of salt and free sugars in the diet.
- **Toddlers** – All nutrients remain very important in the diet at this stage as growth remains. A variety of foods are needed for toddlers to have all the micro-nutrients and macro-nutrients the body needs to develop.
- **Teenagers** – The body grows at a fast pace at different times at this stage as the body develops from a child to an adult, therefore all nutrients are essential within proportions. Girls start their menstruation which can sometimes lead to anaemia due to not having enough iron in the body.

Special Dietary needs

Different energy requirements based on:

- Lifestyles / Occupation / Age / Activity level

The amount of energy the body needs is determined with each of the above factors e.g. active lifestyle or physical activity level would need more energy compared to a person being sedentary.

Medical conditions:

- **Allergens** – Examples of food allergies include milk, eggs, nuts and seafood.
- **Lactose intolerance** – Unable to digest lactose which is mainly found in milk and dairy products.
- **Gluten intolerance** – Follows a gluten free diet and eats alternatives to food containing wheat, barley and rye.
- **Diabetes (Type 2)** – High level of glucose in the blood, therefore changes include reducing the amount of fat, salt and sugar in the diet.
- **Cardiovascular disorder** – Needing a balanced, healthy diet with low levels of salt, sugar and fat.
- **Iron deficiency** – Needing to eat more dark green leafy vegetables, fortified cereals and dried fruit.

Dietary requirements:

- **Religious beliefs** – Different religions have different dietary requirements.
- **Vegetarian** – Avoids eating meats and fish but does eat dairy products and protein alternatives such as quorn and tofu.
- **Vegan** – Avoids all animal foods and products but can eat all plant-based foods and protein alternatives such as tofu and tempeh.
- **Pescatarian** – Follows a vegetarian diet but does eat fish products and seafood.

Level 1/2 Hospitality and Catering: Unit 2-2.1.1 -
Understanding the importance of nutrition

The importance of nutrition

Listed below are the macro-nutrients and micro-nutrients. You need to know their function in the body and know examples of food items for each. You need to know why they are needed in the diet and why there is a need for a balanced/varied diet.

Macro-nutrients

Carbohydrates - Carbohydrates are mainly used in the body for energy. There are two types of carbohydrates which are:

- **Starch** - Examples include bread, pasta, rice, potatoes and cereals.
- **Sugar** - Examples include sweets, cakes, biscuits & fizzy drinks.

Fat - This is needed to insulate the body, for energy, to protect bones and arteries from physical damage and provides fat soluble vitamins. There are two main types of fat which are:

- **Saturated fat** - Examples include butter, lard, meat and cheese.
- **Unsaturated fat** - Examples include avocados, plant oils such as sunflower oil, seeds and oily fish.

Protein - Protein is mainly used for growth and repair in the body and cell maintenance. There are two types of protein which are:

- **High biological value (HBV) protein** - Includes meat, fish, poultry, eggs, milk, cheese, yogurt, soya and quinoa.

- **Low biological value (LBV) protein** - Includes cereals, nuts, seeds and pulses.

Micro-nutrients

Vitamins

- **Fat soluble vitamin A** - Main functions include keeping the skin healthy, helps vision in weak light and helps children grow. Examples include leafy vegetables, eggs, oily fish and orange/yellow fruits.
- **Fat soluble vitamin D** - The main function of this micro-nutrient is to help the body absorb calcium during digestion. Examples include eggs, oily fish, fortified cereals and margarine.
- **Water soluble vitamin B group** - Helps absorbs minerals in the body, release energy from nutrients and helps to create red blood cells. Examples include wholegrain foods, milk and eggs.
- **Water soluble vitamin C** - Helps absorb iron in the body during digestion, supports the immune system and helps support connective tissue in the body which bind cells in the body together. Examples include citrus fruits, kiwi fruit, cabbage, broccoli, potatoes and liver.

Minerals

- **Calcium** - Needed for strengthening teeth and bones. Examples include dairy products, soya and green leafy vegetables.
- **Iron** - To make haemoglobin in red blood cells to carry oxygen around the body. Examples include nuts, beans, red meat and green leafy vegetables.
- **Sodium** - Controls how much water is in the body and helps with the function of nerves and muscles. Examples include salt, processed foods and cured meats.
- **Potassium** - Helps the heart muscle to work correctly and regulates the balance of fluid in the body. Examples include bananas, broccoli, parsnips, beans, nuts and fish.
- **Magnesium** - Helps convert food into energy. Examples include wholemeal bread, nuts and spinach.
- **Dietary fibre (NSP)** - Helps digestion and prevents constipation. Examples include wholegrain foods (wholemeal pasta, bread and cereals), brown rice, lentils, beans and pulses.
- **Water** - Helps control temperature of the body, helps get rid of waste products from the body and prevents dehydration. Foods that contain water naturally include fruits and vegetables, milk and eggs.

Level 1/2 Hospitality and Catering: Unit 2-2.1.2 -
How cooking methods can impact on nutritional value

Boiling

- Up to 50% of vitamin C is lost when boiling green vegetables in water.
- The vitamin B group is damaged and lost in heat.

Poaching

- The vitamin B group are damaged in heat and dissolve in water.

Roasting

- Roasting is a method of cooking in high temperatures and so this will destroy most of the group C vitamins and some of the group B vitamins.

Frying

- Using fat whilst frying increases the amount of vitamin A the body can absorb from some vegetables
- Cooking in fat will increase the calorie count of food e.g deep fat frying foods.

Stir-frying

- The small amount of fat used whilst stir-frying increases the amount of vitamin A the body can absorb from some vegetables.
- Some vitamin C and B are lost due to cooking in heat for a short amount of time.

Steaming

- Steaming is the best cooking method for keeping vitamin C in foods.
- Only up to 15% of vitamin C is lost as the foods do not come into contact with water.

Grilling

- Using this cooking method can result in losing up to 40% of group B vitamins.
- It is easy to overcook protein due to the high temperature used in grilling foods.

Baking

- Due to high temperatures in the oven, it is easy to overcook protein and damage the vitamin C and B group vitamins.

Level 1/2 Hospitality and Catering: Unit 2: 2.2.1 Factors affecting menu planning – Environmental issues

Sustainability

Many diners are interested in hospitality and catering provisions that provide sustainable dining.

The aim of the three Rs of sustainability is to conserve natural resources and prevent excess waste. By following the rules of reduce, reuse, and recycle, hospitality and catering provisions can save money at the same time as attracting more diners and bringing in more profit.

Sustainability also means buying local produce, using organic ingredients, buying meat and poultry from farm assured producers who guarantee better welfare for the animals, using Marine Stewardship Council sustainable fish and offering meat-free versions of favourite dishes.

Reduce

Food waste: If food and waste were its own country, it would be the third largest producer of greenhouse gas in the world! If it cannot be used to make new dishes or given away, then as much food waste as possible should be composted.

Energy use: Hospitality and catering provisions can save energy in many ways including using low-energy lighting, maintaining and upgrading equipment, putting lids on saucepans, batch baking and cooking.

Food miles: Using local suppliers means that the food does not have to travel as far from 'field to fork'.

Water usage: Use less in cooking by only just submerging vegetables or using a steamer. Use an energy and water efficient dishwasher.

Reuse

Food that is past its best, for example a brown banana, or scraps such as bones can be used to create new dishes which in turn will decrease food waste. www.lovefoodhatewaste.com has a vast range of recipe ideas for using surplus food.

- Bread: breadcrumbs, bread and butter pudding, bread sauce and croutons.
- Meat and poultry: bones can be used to make stocks.
- Fruit: banana muffins, apple crumble, fruit coulis, smoothies.
- Vegetables: bubble and squeak, vegetable stock, vegetable bakes, omelettes.
- Eggs: whites can be used to make meringue; yolks can be used to make mayonnaise.

Recycle

Many hospitality and catering provisions have separate bins for recyclable materials. Professional kitchens should also have areas to separate waste into recyclable, non-recyclable and compostable materials. All staff should be trained to know how to dispose waste correctly.

Coffee grounds can be composted. Compost can be used to grow fruit, vegetables and herbs for use in the kitchen.

Jars and plastic containers can be used for storage in the kitchen. Glass bottles can be used to hold flowers or candles as table decorations.

Too Good To Go, Karma and *Olio* are apps used by restaurants and supermarkets. Customers can buy discounted food which would otherwise go into landfill.

Level 1/2 Hospitality and Catering – Unit 2-2.2.2:
How to plan production

You need to be able to plan dishes for a menu as well as know, understand and include the following:

Commodity list with quantities

This means naming all the ingredients needed to make all dishes and how much of each one e.g. grams (g), ounces (oz), millilitres (ml), etc.

Timing

You need to state realistic timings of how long each step is likely to take throughout your plan to give accurate information of how long your dishes take to complete.

Contingencies

This means stating, in the plan, what you would do to deal with a problem if something were to go wrong.

Mise en place

This is all the preparation you undertake before cooking. Examples of this include weighing out ingredients, collecting equipment and washing hands.

Equipment list

Naming all pieces of equipment you would need to cook the dishes, which also includes specialist equipment such as pasta machines and ice cream makers as well as saucepans, chopping boards, knives, etc.

Cooking

Throughout your plan, you will need to state how you ensure food is cooked correctly, e.g. chicken is white in the middle, using a temperature probe, etc.

Health, safety and hygiene

Stating in the plan, points regarding the health, safety and hygiene. The use of temperature probes to ensure foods are cooked, correctly using colour coded chopping boards or washing hands after handling raw meat are a few examples.

Cooling and hot holding

Cooling dishes correctly within 1.5hrs to 8 degrees and keeping hot dishes for service at 63 degrees should be mentioned in your plan for relevant dishes, as well as how you would ensure these temperatures are met, e.g. by using temperature probes.

Quality points

These include naming any quality points to consider in the preparation, cooking and serving stage of the plan. Examples could include checking foods are in use by/best before dates, dishes are cooked to minimum temperatures, ingredients stored in correct places and correct temperature, etc.

Serving

Once you have finished cooking your dish or dishes, you need to state how you would present your dish/dishes, e.g. on plate, bowl, etc., as well as what decoration, garnishes and sauces you include before serving.

Sequencing or dovetailing

This means you fit together the different steps and activities in logical order when planning to cook more than one dish.

Storage

In your plan, you should state where different kinds of ingredients need to be stored, e.g. raw chicken in the fridge or frozen fruit in the freezer and at what temperatures these pieces of equipment need to be (fridge needs to be 0–5 degrees and freezer needs to be -18 degrees).

Level 1/2 Hospitality and Catering: Unit 2: 2.3.2 Presentation techniques

Creativity

It is said that 'we eat with our eyes'. Creativity in plating dishes enhances the diner's experience – diners want to be 'wowed' when their meal appears!

Serving dishes: Start with the plate – varied sizes, shapes and colours can add immediate impact to your dish. Dishes served in bowls or dessert glasses should be placed on a plate to aid serving.

Elements: Each dish will consist of several elements – the main protein, accompaniments, garnish and decoration.

Volume: Do not overcrowd the plate – leave some space so that the diner can see each element of the dish. The rule of thumb is that only two-thirds of the plate should be full.

Height: Food can be stacked to add height to the overall dish, but each element should be visible.

Colour: Accompaniments, garnishes and decoration can add colour to dishes where the main elements are similar in colour. An example is fish and chips: bright green peas and a slice of yellow lemon will enhance the overall appearance of the meal.

Functionality: The dish should be beautiful to look at, but easy for the diner to eat.

Temperature: Hot food should be served on hot plates. Cold food should be served on chilled plates.

Accompaniments

Accompaniments should be chosen to complement the main part of the dish. Examples include:

Carbohydrate accompaniments:

- Savoury: bread, dauphinoise potatoes, pilau rice.
- Sweet: shortbread, brandy snaps, macaron.

Fruit and vegetable accompaniments:

- Savoury: pea purée, roasted root vegetables, griddled asparagus.
- Sweet: berry compote, fruit kebabs, grilled peaches.

Sauces:

- Savoury: gravy, red wine jus, parsley sauce.
- Sweet: custard, salted caramel sauce, chocolate sauce.

Portion control

It is important that the customer is satisfied with their portion without the plate being overcrowded. Keeping portion control accurate allows hospitality and catering provisions to order adequate supplies of ingredients. Accurate portion control will also help prevent food waste.

Garnish

Garnishes are additions to a dish which both add to the overall taste and enhance the overall appearance.

Savoury: parmesan crisps, crispy onions, caviar, watercress, lemon wedges, fresh herbs, salsa, edible flowers.

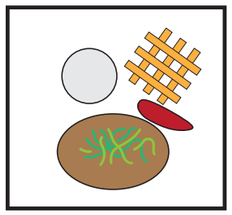
Sweet: chocolate dipped strawberries, tuile biscuits, chopped nuts, tempered chocolate work, spun sugar work, edible flowers.

Decoration

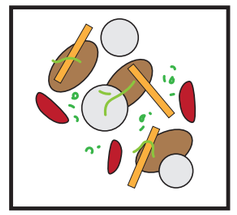
Decoration adds drama to the finished dish but it is not meant to be eaten or add to the overall flavour of the dish. Examples include:

- whole spices added to pilau rice
- gold leaf
- hollow eggshell as serving dish.

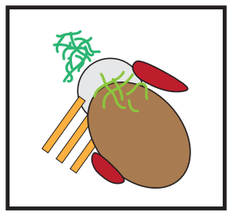
Plating styles



Classic



Freeform



Landscape

Level 1/2 Hospitality and Catering: Unit 2: 2.3.3 Food safety practices

Food safety practices

During your practical session, you must demonstrate that you can work safely and hygienically. Your plan should show that you have thought about food safety and hygiene during all parts of your practical session. Your personal safety and hygiene practices will be observed during your practical session.

Personal safety and hygiene practices

Hands:

- Wash before, during and after preparing food especially after touching raw meat, dirty vegetables and fridge handles.
- Wash after going to the toilet.
- Wash after sneezing or blowing your nose.
- Wash after disposing of waste.

Clothing and hair:

- Clean apron and/or chef's whites.
- Non-slip closed-toe shoes.
- Tie hair back.
- Wear a bandana or hair net.

Cuts:

- Cover with a blue, waterproof plaster.

Equipment:

- Handle knives safely.
- Use oven gloves when carrying hot items.
- Keep electrical equipment away from water.
- Clean spills immediately.

Food safety and hygiene practices

Ingredients:

- Check use-by and best before dates.
- Check ingredients for freshness; no bruises on fruit, fish should not smell.
- Store correctly until needed.

Cleaning:

- Clean worktops before preparation.
- Clean workstation and equipment after preparing high-risk foods.
- Wash up throughout the session – do not leave it all until the end!

Temperatures:

- Keep high-risk foods in the fridge (0°C – 5°C) until needed.
- Use a temperature probe to check core temperature of high-risk foods.

Waste management:

- Keep waste separate from ingredients during preparation, cooking and serving.
- Recycle and compost waste if possible.

Management of accidents

- Ensure that you know the location of the First Aid box.
- Ensure that you know how to use a fire blanket or fire extinguisher.

Level 1/2 Hospitality and Catering: Unit 2: 2.4.1 Reviewing of dishes

Dish production

- Were you able to keep to your time plan?
- Did you have any problems during the practical? How did you resolve them?

Dish selection

- Did your dishes contain the right nutrients for your two groups?
- Were they expensive or cheap to produce?
- Did they contain seasonal or local produce?

Organoleptic

How did your dishes:

- Look (appearance)?
- Taste (flavour and texture)?
- Smell (aroma)?

Hygiene

- Did you follow all hygiene guidelines?
- Did you wear correct PPE?
- Did you wash up between jobs?

Reviewing of dishes

PEE: **P**oint, **E**vidence, **E**xplain

You need to write a self-reflection of how you performed during your practical session. There are 8 areas to consider when you write your review of your dishes.

Presentation

- Were the portions the right size for your two groups?
- How did you add colour to your dishes?
- Were your garnishes and decorations appropriate?

Health and safety

- Were you able to use equipment safely?
- Did you store ingredients correctly?

Waste

- Did you separate your waste into categories? (Food waste, recyclable materials, general waste.)
- Did you buy the right amount of ingredients?

Improvements

- If you made your dishes again, what would you do differently?
- If you had to do the task again, would you change your choice of dishes?
- Would you add additional accompaniments?

Level 1/2 Hospitality and Catering: Unit 2: 2.4.2 Reviewing own performance

Decision making

- What were your strengths in completing the written tasks?
- What were your strengths in choosing dishes?
- How could you improve weak decisions?
- Were the dishes easy to make together?
- What were the disadvantages of the chosen dishes?
- Did your dishes meet the needs of the provision?
- Did your dishes meet the needs of your two groups (nutrition and cost)?

Planning

Was the practical session plan in a logical order?

- Discuss your strengths.
- Discuss your weaknesses.
- Suggest improvements.

Were you able to keep to the plan during the practical session?

- Discuss your strengths.
- Discuss your weaknesses.
- Suggest improvements.

Organistation

How did you organise your written tasks?

- Discuss your strengths.
- Discuss your weaknesses.
- Suggest improvements.

How did you organise your workstation during the practical session?

- Discuss your strengths.
- Discuss your weaknesses.
- Suggest improvements.

Time management

How did you manage your time when completing the written tasks?

- Discuss your strengths.
- Discuss your weaknesses.
- Suggest improvements.

How did you manage your time during the practical session?

- Discuss your strengths.
- Discuss your weaknesses.
- Suggest improvements.

Level 1/2 Hospitality and Catering:
Unit 2-2.2.1: Factors affecting menu planning

Factors affecting menu planning

You need to be aware of the following factors when planning menus:

- **cost** (ingredients as well as business costs)
- **portion control** (value for money without waste)
- **balanced diets/current national advice**
- **time of day** (breakfast, lunch, and dinner menus as well as small plates and snacks)
- **clients/customers** (a menu with prices that will suit the people who visit your establishment).

Equipment available

You need to know and understand the type of equipment needed to produce a menu. The choice of dishes will be influenced by the equipment available to the chef.

This includes kitchen equipment such as:

- hobs, ovens, and microwaves
- fridge, freezer and/or blast chiller
- specialist equipment, for example a *sous vide* or pizza oven
- hand-held equipment, for example electric whisks or hand-blenders
- other electric equipment, for example food processors.

Skills of the chef

The skills of the chef must be suited to the type of provision and the menu offered.

A Michelin starred restaurant will require a chef who has complex skills in preparation, cooking and presentation of dishes.

A café will require a chef who has a range of medium and complex skills to produce a suitable menu.

A large restaurant will normally have a full kitchen brigade while a smaller establishment may only have a single chef with one or two assistants.

Time available

The type of provision will influence the amount of time a customer may be willing to wait for their dish to be prepared. Can the chef prepare, cook, and present more than one dish at the same time? Can some items be made in advance?

Time of year

The time of year can affect menu choices. Light and cold dishes such as salads are better suited to the summer months. Hearty dishes such as stews are more suited to the winter. Special dishes linked to holidays such as Christmas and Valentine's Day may also be included. The availability of **seasonal** produce can also affect menu choices as certain commodities, for example strawberries, are less expensive when in season.

Environmental issues

The chef will need to think about environmental issues when planning a menu. Can the chef **reduce** the amount of ingredients bought as well as reducing food waste? Can the chef **reuse** ingredients to create new dishes for example stale bread made into bread-and-butter pudding? Can the kitchen **recycle** waste wherever possible? Running the kitchen sustainably will save money.

Organoleptic properties

Organoleptic properties are the sensory features of a dish (**appearance**, **aroma**, **flavour**, and **texture**).

The chef will need to think about how the dish will look and taste. Is there a range of colours? Do the flavours go well together? Are there a variety of textures?

Level 1/2 Hospitality and Catering:
Unit 2-2.3.1: Practical skills and techniques

Skills and techniques

You need to be able to identify the different types of skills you need to produce your selected dishes. Some dishes will require the use of more complex skills. You will need to demonstrate a range of skills when producing your chosen dishes.

Preparation and cooking skills are categorised as follows: **basic**, **medium**, and **complex**.

Presentation

You should know and understand the importance of using the following appropriate presentation techniques during the production of dishes:

- creativity
- garnish and decoration
- portion control
- accompaniments.

Basic preparation skills and techniques

Blending, beating, chopping, grating, hydrating, juicing, marinading, mashing, melting, peeling, proving, sieving, tenderising, trimming, and zesting.

Medium preparation skills and techniques

Baton, *chiffonade*, creaming, dehydrating, deseeding, dicing, folding, kneading, measuring, mixing, puréeing, rub-in, rolling, skinning, slicing, spatchcocking, toasting (nuts/seeds) and weighing.

Complex preparation skills and techniques

Brunoise, crimping, de-boning, filleting, *julienne*, laminating (pastry), melting using *bain-marie*, mincing, piping, and segmenting, shaping, unmoulding and whisking (aeration).

Basic cooking skills and techniques

Basting, boiling, chilling, cooling, dehydrating, freezing, grilling, skimming, and toasting.

Medium cooking skills and techniques

Baking, blanching, braising, deglazing, frying, griddling, pickling, reduction, roasting, sautéing, steaming, stir-frying, and using a *sous vide* (water bath).

Complex cooking skills and techniques

Baking blind, caramelising, deep fat frying, emulsifying, poaching, and tempering.

GCSE ART & DESIGN HT1-6 KNOWLEDGE ORGANISER

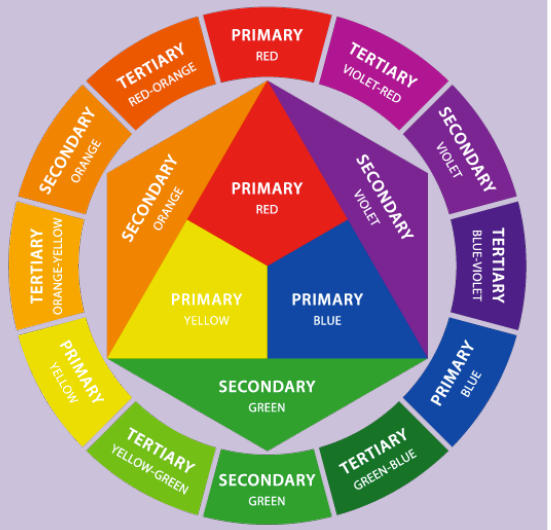
ASSESSMENT OBJECTIVE 2

EXPERIMENTATION/REFINMENT: REFINE WORK BY EXPLORING IDEAS AND EXPERIMENTING WITH A RANGE OF MEDIA, MATERIALS, TECHNIQUES AND PROCESSES

MEDIA	BEST PRACTICE
COLOURED PENCILS	• Apply using a soft circular motion • Start with the lightest colours and build up colour/tone • Analogue colours add depth • Complimentary colours add definition • A sharp pencil will create a crisp finish • Avoid applying a thick stripy line of tone, blur it by applying soft pressure on the edge
WATERCOLOUR	• Mix your own variations of colour instead of using them straight out of the palette • Avoid adding too much water to your paint or the paper will start to bobble/wave • Apply colour in layers to build up tone • To blend colours on the page work quickly and place wet next to wet • When you want colour to stay separate make sure you don't apply wet next to wet • Consider layering mark-making on top of dry layers to add interest • Change your water regularly to avoid cross contamination
COLLAGE	• Rip OR cut (not both) • Use small pieces or use the trace and cut method for whole sections • Overlap to avoid leaving gaps • Use a variety of tones to make your work look more interesting • Apply the paper right up to the drawn line to create a crisp edge
ACRYLIC PAINT	• Mix your own colours instead of using them straight out of the tub • Add complimentary colours to darken your paint and show shadows • Add white to your paint to show highlights • Consider how elements within the image impact on each other • Foreground is lighter, background is darker
TONAL PENCILS	• Know your pencils- B- soft and dark LINE (the higher the number the softer and darker they are) H- hard pencils create a thin, light line (the higher the number the harder and lighter they are) • Rest your hand on a paper towel to avoid smudging • Make sure your work transitions smoothly from light to dark • Use a soft circular motion AND BUILD UP TONE GRADUALLY
OIL PASTELS	• Start with the lightest colours • Press on heavily to apply a strong coverage • Blend colours together by slightly overlapping • Be gestural with the marks you apply
INK/PEN	• Work from left to right (or right to left if you are left handed) to avoid smudging • Use a paper towel to blot any excess ink of the nib • Work quickly to avoid letting too much ink collect on the page • Experiment with thickness of line and mark-making techniques

COLOUR THEORY

PRIMARY = RED, YELLOW, BLUE	ANALOGUE COLOURS = NEXT TO EACHOTHER
SECONDARDY = PRIMARY + PRIMARY	COMPLIMENTARY = OPPOSITE
TERTIARY = SECONDARY + PRIMARY	MONOCHROMATIC = SHADES, TONES & TINTS OF ONE COLOUR
SHADES = ADD BLACK	HUE = THE PIGMENT
TINT = ADD WHITE	WARM = RED, ORANGE, YELLOW COLD = BLUE, GREEN, PURPLE



MEDIA	THE SUBSTANCE AN ARTIST USES TO CREATE ART. E.G. COLLAGE, COLOURED PENCILS, ACRYLIC PAINT ETC.
MATERIALS	THE SAME AS MEDIA BUT CAN ALSO REFER TO WHAT THE ART WORK IS CREATE ON. E.G. CANVAS, PAPER, CLAY.
TECHNIQUES	THE METHOD USED TO COMPLETE THE ART WORK, CAN BE GENERIC SUCH AS PAINTING, OR MORE FOCUSED SUCH AS BLENDING.
PROCESSES	THE METHOD USED TO CREATE ARTWORK THAT USUALLY FOLLOWS A RANGE OF STEPS RATHER THAN JUST ONE SKILL.

Year 10 HT2 Drama Knowledge Organiser

Summary of topic

Through theory sessions and controlled conditions students will complete their timed evaluation of 900 words as a guide.

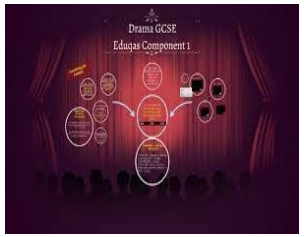
Aims of the topic

To understand how to write a well structured and analytical evaluation.

Devising Plays Knowledge Organiser

Evaluation

Y11 GCSE



Assessment & Performance Tips

Students will complete their final evaluation of the devised performance.

The evaluation should have a title 'Component 1 Devising Evaluation'

It should have 3 main sections. It should be roughly 900 words.

Remember this is about the final performance only not the process.

Skills & Definitions

Analysis – Describing and saying why.

Evaluation – A summary sentence(s) at the end of the section. PEE (point, evidence, explain).

Structure – The evaluation it written in 3 main sections – introduction (name of play, stimuli and practitioner/genre, Section 1 Analysis of character portrayal, Section 2 Analysis of own performance skills (practitioner/genre), effectiveness of final performance linking back to stimuli and intentions and final evaluation.

Stimuli – The starting point set by exam board e.g. picture, quote, word or song. You chose one.

Practitioner – Brecht or Artaud and how they influenced the performance.

Brecht – Famous for Political and Epic Theatre. (See practitioner knowledge organiser). Made the audience think and bring real change.

Artaud – Famous for Theatre of Cruelty (See practitioner knowledge organiser). Made the audience feel uncomfortable.

Genre – Physical theatre is NOT a practitioner, it is a STYLE of drama focused upon storytelling using movement.

Techniques – The key skills which are relevant to the practitioner or genre (see practitioner knowledge organiser).

Effectiveness – How successful was the final performance?

Final performance – The end performance of the piece.

Word count – There is a word count of roughly 900 words.

Bullet points – You are allowed 2 pages of bullet point notes for this assessment.

Year 10 HT1 Drama Knowledge Organiser

Summary of topic

Through theory sessions and homework students will complete their portfolios based on their practical devising work.

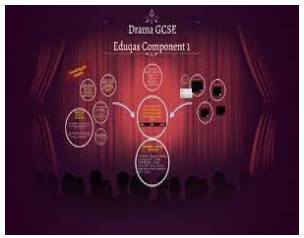
Aims of the topic

To understand how to write a structured, coherent portfolio.

Devising Plays Knowledge Organiser

Portfolio

Y11 GCSE



Assessment & Performance Tips

Students will complete a draft of their 900 word portfolio and have the opportunity to RAMP this to final edit.

The portfolio should have a title 'Component 1 Devising Portfolio'
It should have 3 paragraphs of around 300 words. Add word count after each section.

Remember this is about the process not the final performance which is the evaluation.

Skills & Definitions

Analysis – Describing and saying why.
Evaluation – A summary sentence(s) at the end of the section. PEE (point, evidence, explain)
Paragraph – The portfolio should have three sections (idea development from stimuli, practitioner/genre technique, amendments made before final performance).
Ideas – How the characters, story developed, movement and key scenes.
Stimuli – The starting point set by exam board e.g. picture, quote, word or song. You chose one.
Practitioner – Brecht or Artaud and how they influenced the performance.
Brecht – Famous for Political and Epic Theatre. (See practitioner knowledge organiser). Made the audience think and bring real change.
Artaud – Famous for Theatre of Cruelty (See practitioner knowledge organiser). Made the audience feel uncomfortable.
Genre – Physical theatre is NOT a practitioner, it is a STYLE of drama focused upon storytelling using movement.
Techniques – The key skills which are relevant to the practitioner or genre (see practitioner knowledge organiser).
Amendments – Changes made during the process.
Rehearsal process – The journey from initial ideas to final performance.
Word count – Max word count is 999 to avoid a penalty. Each section should be around 300 words.

Year 10 BTEC Dance Subject Term Knowledge Organiser

Component 1- Exploring the Performing Arts Musical Theatre

Students participate as a performer in musical theatre workshops and will explore and participate in classes to develop their knowledge and understanding of the interrelationships between processes, techniques and approaches that contribute to performance repertoire.

Jerry Mitchell- choreographer

Jerry Mitchell, the choreographer of the Broadway version of Hairspray, was also involved with the adaptation of the film choreography.
Mitchell resides in Manhattan and St. Louis and in 2003 was nominated to revive an award for outstanding choreographer for the Hairspray musical.

Costume Designer: Rita Ryack

Every single costume worn in the show (and movies) is very stylized and reflective of the times. Full skirts, sweater sets, bobby socks, plaid print, pearls, and BIG hair are a part of almost every girl's outfit throughout the films and stage production. Pastel colours, floral print, and Mary-jane shoes are also heavily featured.

Dance Craze- The Twist

The Twist is named after the Billboard no.1 Chubby Checker song which was released in September 1960. It was also number 1 again in January 1962.
The song and dance became popular in Hairspray town Baltimore on DJ Buddy Dean's television dance show.

The Mashed Potato

This popular dance craze was most popular in 1962, after it was made famous by James Brown as well as by Dee Dee Sharp's hit "Mashed Potato Time"

Hairspray the Musical

Tony Award-winning Hairspray continues to be one of the most widely produced musicals today, not only because of its wit and charm, but also because of the beautiful message of acceptance and progress that it portrays. The bright, energetic story of Tracy Turnblad teaches us all to look past the colour of one's skin and fight for every human being's equal rights. Hairspray is a story of acceptance, inner beauty, and the civil rights movement of the '60s.

Tracy Turnbald- main character

- An optimistic teenager with big hair, big dreams, and a big personality! She is the main character who is sweet but strong in her convictions. She is bigger in size than the other girls, but she can still dance.

Link Larkin- main character

The star heartthrob on The Corny Collins Show. He is extremely attractive and talented. Hoping to get his big break with a recording contract, he unexpectedly falls for Tracy.

Historical context

The piece was set in 1924 and Chicago was Based on real stories. In particular, the 1926 play by Maurine Dallas about the murders and trials of Belva Gaertner and Beulah Annen. This meant Chicago's press and public became riveted by the subject of homicides committed by women. The Time of vaudeville was a very popular art form in the 1920's consisting of a diverse series of short acts. In the 2000 film version before Velma goes on stage you can hear the director say "on in five" meaning that this was part of a Vaudeville variety show.

Year 10 HT2 Knowledge Organiser for BTEC Sport—
Unit 1 Fitness for Sport and exercise

Exercise Intensity

Aerobic endurance = It is the ability of the cardio-respiratory system to efficiently supply nutrients and oxygen to working muscles during sustained physical activity.

Muscular strength = The maximum force a muscle or muscle group can produce. (Measured in N or KG)

Muscular endurance = It is the ability of a muscle or group of muscles to keep contracting over a period of time against light to moderate load.

Flexibility = Having an adequate range of motion in all joints of the body. It is the ability to move a joint through its complete range of movement.

Speed = The ability to perform a movement or cover a distance in a short period of time = distance/time taken.

Body composition = This is the relative ratio of fat mass to fat free mass (vital organs, muscle, bone) in the body

Components of Fitness — Skill

Balance = The ability to maintain your centre of mass over a base of support. A performer may need static or dynamic balance.

Agility = The ability of a sports performer to quickly and precisely move or change direction without losing their balance.

Coordination = The smooth flow of movement needed to perform a task efficiently and accurately. It often involves being able to use 2 or more body parts together.

Reaction Time = The time taken for a sports performer to respond to a stimuli and the start their response.

Power = The work done in a unit of time. It is the ability to apply a combination of strength and speed. Power = Force (kg) x Distance (m)/time (min or s)

Keywords

Cardio-Respiratory = The heart and blood vessels working with the lung and the airways to carry oxygen to the muscle.

Contracting = This is when the muscles shortens to create a movement Accelerative

Speed = Gradually increasing your speed Pure Speed = Your maximum speed.

Endurance = The ability to prolong the amount of time near maximum speed Static

Balance = Balancing without moving Dynamic Balance = Balancing when moving

Stimuli = Something which causes a response or movement

Year 10 HT2 Knowledge Organiser for BTEC Sport—
Unit 1 Fitness for Sport and exercise

Exercise Intensity

Measuring Heart Rate

1. Sit Down
2. Locate your radial with your index and middle finger
3. Don't use your thumb—it has its own pulse
4. Count the beats from 30 seconds and times it by 2 to find your BPM

Training Zones

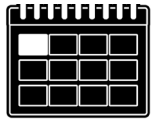
Speed Zone = 95% to 100% of MHR
Anaerobic Training Zone = 85% to 95% of MHR
Aerobic Training Zone = 60% to 85% of MHR

The Borg Scale - Rate of Perceived Exertion (RPE)

The Borg scale is used to predict or estimate the Heart Rate of an individual.
Practice by the individual is needed to make their predictions as accurate as possible
The individual rates themselves from 7 to 20 on the scale.
They then times this by 10 to get an estimated HR
RPE x 10 = HR (BPM)

Basic Principles of Training

We apply principles of training to our training programmes so that we make it affective and make sure it aids progression.



The Basic Principles of Training

Frequency = How often we train Increasing the number of days
Intensity = How hard we train Increasing the number or reps
Time = How long we train Increasing the time we train
Type = How we train selecting the correct training method

The FITT principle is part of the Additional Principle of PROGREESIVE OVERLOAD.

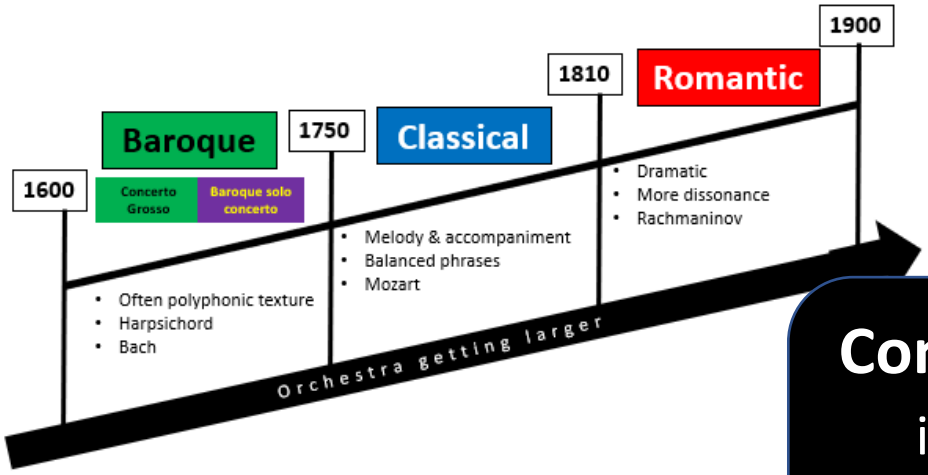
This is the gradual increase of a training load, when done correctly it will progressively increase Frequency, Intensity, Time and Type to develop fitness gains

Key terms

Heart Rate (HR) = The amount your heart beats in 1 minute (BPM)
Maximum Heart Rate (MHR) = The maximum your heart will beat in 1 minute, 220 - Age = MHR
RPE = Rate of Perceived Exertion (How hard we think we have worked)

GCSE MUSIC HT2 Knowledge Organiser

Three eras to learn about:



Learn these composers:

- Baroque - Bach
- Classical - Mozart
- Romantic - Tchaikovsky

Concerto = Solo instrument backed by the orchestra.

Baroque era

The Baroque era has TWO different types of concerto to learn about:

Concerto Grosso

Small group of instruments backed by an orchestra

Baroque solo concerto

Solo instrument backed by an orchestra

Classical era.

1750-1810

- **The concerto was also popular in the Classical era.**
- Newly invented or developed instruments were featured.
- Composers could write for larger orchestras.
- Concertos became longer.
- Soloists were given more freedom, they could show off their skills and the capabilities of their instruments in the cadenza.
- It still had 3 movements – **Fast, slow, fast.**
- Classical composers who wrote concertos include Mozart, and Haydn.

Romantic era

1810-1900

- Even larger orchestra
- More dramatic music
- Portrayal of emotion
- Nationalist styles
- Still diatonic, but added chromaticism and more dissonance
- Modulation to distant keys
- Thicker textures
- Woodwind and brass more prominent
- Dramatic contrasts – textures, pitches, dynamics and timbre
- Rubato used
- Doubling of the melody

Orchestra getting larger

Resource Reliance

What is Resource Reliance?

Resources are things that humans require for life or to make our lives easier. Humans are becoming increasingly dependent on exploiting these resources, and as a result they are in high demand.

Resource Required

Resources such as food, energy and water are what is needed for basic human development.

FOOD	WATER	ENERGY
Without enough nutritious food, people can become **malnourished**. This can make them ill . This can prevent people working or receiving education.	People need a supply of **clean and safe water** for drinking, cooking and washing. Water is also needed for food, clothes and other products.	A good supply of energy is needed for a basic standard of living. People need **light and heat** for cooking or to stay warm. It is also needed for industry.

Demand outstripping supply

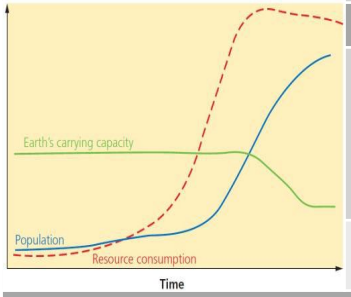
The demand for resources like food, water and energy is rising so quickly that supply cannot always keep up. Importantly, access to these resources vary dramatically in different locations

1. Population Growth

- Currently the global population **is 7.3 billion**.
- Global population has risen **exponentially** this century.
- Global population is expected to reach **9 billion by 2050**.
- With more people, the **demand** for food, water, energy, jobs and space **will increase**.

2. Economic Development

- As **LIDCs** and **EDCs** develop further, they require **more energy** for industry.
- **LIDCs** and **EDCs** want similar lifestyles to **ACs**, therefore they will need to **consume more resources**.
- Development means **more water is required** for food production as diets improve.



Resource Reliance Graph

Consumption – The act of using up resources or purchasing goods and produce.
Carry Capacity – A maximum number of species that can be supported.

Resource consumption exceeds Earth's ability to provide!

3. Changing Technology and Employment

- The demand for resources has driven **the need for new technology** to reach or gain more resources.
- More people in the **secondary and tertiary industry** has increased the **demand for resources** required for electronics and robotics.

Reasons for NOT Meeting Modern Resource Demands.

Climate	• **Global warming** effects cycles and seasons and therefore farming. • **Rainfall patterns** are changing and are becoming unpredictable. This is a problem for farming.
Geology	• Not all countries have **access to fossil fuels** or suitable landscape for renewables. • Many **minerals are finite** and therefore once used will reduce the resources available. • **Rock types** might limit the availability to store water.
Conflict	• **War** can disrupt transport of resources by damaging roads and water pipes.
Poverty	• LIDCs are unable to **afford technology** to effectively exploit the natural resources available.
Natural Hazards	• **Increase in hazard events** due to climate change. • Prime agricultural regions in Asia and Africa and are also in **hazard zones**. • Has the ability to **destroy infrastructure** needed to transport resources.

Environment and Food: Fishing and Farming

	Methods	Environmental and Ecosystems
Fishing	**Bigger nets and fishing boats** have allowed for greater catches. **GPS and sonar** has also find the fish easily.	• **Overfishing** of certain fish has caused their decline. • **Dredging** can damage seafloor habitats. • Decline of one species has a **knock on** effect on other marine species.
Farming	**Tractors, computer programming** and **GPS** technology is producing food more effectively and at a larger scale.	• Field sizes have caused **hedgerows to decline** in biodiversity. • **Fertilisers and pesticides** enter water courses and harm or kill organisms. • Heavy machinery can cause **soil erosion**.

Environment and Energy: Deforestation and Mining

	Methods	Environmental and Ecosystems
Deforestation	Logging using **modern machinery** and **transportation** has made deforestation more productive & convenient.	• **2 billion people depend on wood** for fuel, which therefore creates high **CO2 emissions** • Forests provide for **important habitats**. • Clearing of forests leads to **soil erosion**. • Tree intercepts rain and **prevents flooding**.
Mining	Large machines and drill technology can remove and reach through material effectively.	• Mining waste **can pollute soil and contaminate water** supplies. • **Habitats are destroyed** in mining zones. • Fossil fuels burnt **release greenhouse gases**

Environment and Water: Reservoirs and Water Transfer

	Methods	Environmental and Ecosystems
Reservoirs	Increasing **storage to hold more water** and constructing more dams to **control river flow** can provide a reliable source of water.	• Can **flood** a large area of land and damage **habitats** and **natural landscapes**. • Dams can be **a barrier for certain species** to migrate upstream. • Natural flow of sediment is disrupted, which then **reduces fertility of land** further down.
Water Transfer	Constructing pipes and canals to divert water surplus to areas in need of a water supply.	• Large-scale engineering works can **damage ecosystems** along the route. • **Lots of energy** is required to pump water over long distances.

Food Security

'Food Security' is when people at all times need to have physical & economic access to food to meet their dietary needs for an active & healthy life. This is the opposite to **'Food Insecurity'** which is when someone is unsure when they might next eat.

Human

- **Poverty** prevents people affording food and farmers buying modern equipment.
- **Poor infrastructure** makes food difficult to transport fresh food.
- **Conflict** disrupts farming and prevents supplies.
- **Food waste** due to poor transport and storage.
- **Climate Change** is affecting rainfall patterns making food production difficult.

Physical

- **Temperature** needs to be ideal for certain crops to grow.
- The **quality of soil** is important to ensure crops have the necessary nutrients.
- **Water supply** needs to be reliable to allow food to grow.
- **Pest, diseases and parasites** can destroy vast amounts of crops that are necessary to feed large populations.
- **Extreme weather** events can damage crops (i.e. floods).

Malthus and Boserup's Theories about Food Supply

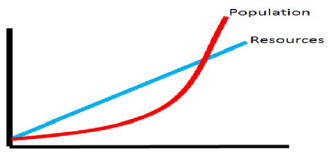
With the population growing very quickly, there are different ideas about whether or not this will lead to a food crisis.

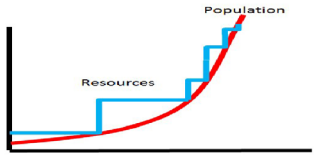
Malthus Theory

- Believed that **population would increase faster than food supply**.
- This would lead to a lack of food being available.
- Malthus believed this would cause **large scale famine, illness** and **war**
- This would occur until population returned to level that can be supported.

Boserup Theory

- Believed that however big the population grew, **people would find ways to manage**.
- If food supplies became limited, **people would find new ways** to increase production.
- These solutions would often involve **creating new technologies**.

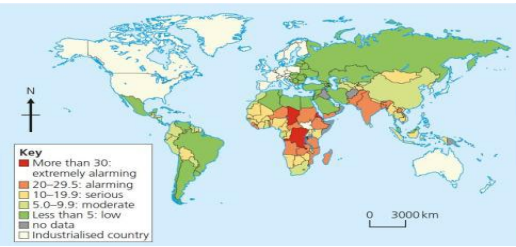




Measuring Food Security

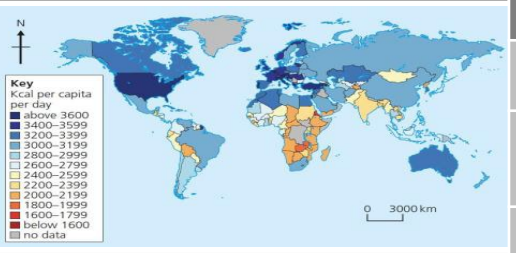
Food security varies around the world. Some people and places are more food secure than others. This can often depend on how much a country can grow and is able to afford.

The Global Hunger Index



- This shows how many people are suffering from **hunger or illness** caused by lack of food.
- The index gives a value for each country from **0** (no hunger) to **100** (extreme hunger).

Daily Calorie Intake



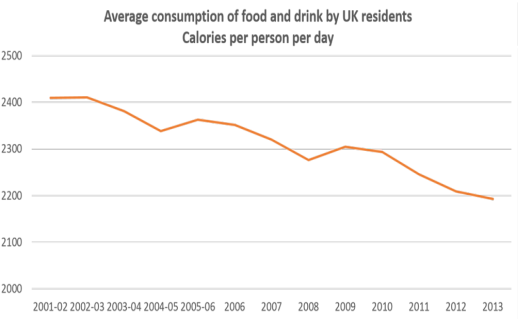
- This shows how many **calories per person** that are consumed on average for each country.
- This can indicate the global distribution of **available food** and **food inequality**,

Case Study: UK Food Security

Food Availability in the UK

The UK population is around **65 millio**n and enjoys a **high level of food security**.

- The UK **produces 68% of its own food** but this is steadily decreasing.
- The **UK has to import** the rest, especially seasonal food such as fruit and vegetables.
- Food production in the UK has increased by **intensifying agriculture**.



Food consumption in the UK

Average daily calorie intake in the UK has **decreased** from **2600** in **1960** to **2150** by **2000**.
Reasons for this decrease includes:

- More people being **more active in the past** and having physical jobs.
- More **awareness of having a good diet** and problems surrounding obesity.
- The price of food has increased.

Success in securing local food security

Food Banks

- This is food that is **donated** by the public.
- They help people with **a sudden loss of income**.
- It is estimated that **1 million people** rely on food banks for their own food security.

Urban Gardens

- These **are large projects** where groups work together to grow food and **promote healthy living**.
- This can involve planting crops in urban environments such as roundabouts.

Effectiveness of pasts attempt at food security

Intensification of farming from **1940s** to the **1980s** attempted to increase production by;

- **Higher yields** of crops and animals
- **Monoculture** by growing one crop in a large area.
- **Irrigation** with better groundwater pumping.
- **Chemicals** with improved fertilisers and pesticides.
- **Mechanisation** for sowing and harvesting.

Effectiveness of present attempts at food security

Recently the UK has been promoting sustainable intensification, involving food security and supporting the environment.

- **New technology** such as **hydroponics** help a range of foods to be grown all year round.
- However, this method is **expensive** for producer and consumer.

Attempts to Achieve Food Security

There are various measures to maintain or even improve our food security. These measures are often taken to be socially, economically, environmentally viable for the longer term.

Social	Economic	Environmental

Ethical Consumerism

This involves buying products that have a positive social, economic and environmental impact today, without compromising future generations.

Fairtrade	• This is a global movement to give farmers a **fairer price for their products**. • The profits benefit the community **with schools and medical facilities**. • Involves using farming methods that **protects rather than destroys environments**.
Food Waste	• One-third of all food gets lost or wasted. • Aim to **eat locally sourced food** to reduce waste through transport. • Eating 'ugly' food despite it not being 'ideal' can prevent waste and **save money**. • Prevents wasted energy for producing food and therefore **reduces CO2 emissions**.

Food Production

This involves producing as much food as possible in as small a space as possible. They often involve using machines and chemicals to gain as much produce as they can.

Intensive Farming	• Makes the most of the land and allows for higher yields. This can make growing food more **productive and therefore cheaper** to produce. • Chemical fertilisers, pesticides and herbicides can **pollute the environment** and **harm people**, animals and insects.
Organic Methods	• This involves the banned use of chemicals and **ensuring animals are raised naturally**. • This can lead to **lower yields of 20%** and products being **more expensive**.

Technological Developments

Through better understanding of science and improved technology, it is now possible to change the food we grow and protect and harvest the crops more effectively.

Genetically modified (GM)	• Involves changing the DNA of foods to enhance their productivity and properties. • Crops can be **better protected from disease and drought**, but also made larger or include more **health benefits**.
Hydroponics	• This is a method of growing plants without soil. Instead they use nutrient solution. • Less water is needed and a **reduced need for pesticides** to be used. • However, this method is **very expensive** so only used for high value crops.

Small Scale 'Bottom Up' Approaches

This involves a small scale production of food and relies on individuals and communities, rather than government or large organisations.

Allotments	• This is an area of land that is divided into plots and rented to **individuals to grow their own fruit and vegetables**. • Allows people in urban areas to produce their **own cheap** & **healthily food** close to home.
Permaculture	• This involves **people growing their own food** and **changing their eating habits**. • This can create **more natural ecosystems** and fewer resources are required.

LAS FIESTAS

Special events

Christmas in Spain

Festivals

Christmas and New Year

Mi cumpleaños – my birthday **El cumpleaños de mi madre…** – my mum's birthday **Navidad/ (el) día de Navidad** – Christmas/(on) Christmas day **La Nochebuena** – Christmas Eve **La Nochevieja** – New year's Eve **Pascua/ El Domingo de Pascua** – Easter/ Easter Sunday **El día de Reyes** – 6th January	**abro/abrimos/abren regalos** – I/we/they open presents **busco/buscamos/buscan huevos de chocolate** – I/we/they look for chocolate eggs **canto/cantamos/cantan villancicos** – I/we sing Christmas carols **como/comemos/comen dulces navideños/ doce uvas/ pavo** – I/we eat Christmas sweets/ 12 grapes/ turkey **me acuesto/nos acostamos/se acuestan muy tarde** – I/we/they stay up very late **me levanto/nos levantamos/se levantan muy temprano** –I/we/they get up very early **rezo/rezamos/rezan** – I/we/they pray **voy/vamos/van a la iglesia/mezquita** – I/we/they go to church/mosque
En España – In Spain	**Santa no es tan popular como en Inglaterra** – Santa isn't as popular as in England **los Reyes Magos traen los regalos el 6 de enero** – the 3 kings bring the presents on 6th January **mucha gente va a la Misa de Gallo la Nochebuena** – lots of people go to midnight mass on Christmas Eve **la gente come las doce uvas a medianoche la Nochevieja para tener buena suerte** – people eat 12 grapes at midnight on NYE for good luck **se come la cena de Navidad en Nochebuena** – they eat Christmas dinner on Christmas eve

Pavo trufado de Navidad – turkey stuffed with truffles

Polvorones – almond biscuits

Turrón – nougat usually containing almonds

Roscón de Reyes – traditional cake. Usually contains a coin

La fiesta que me interesa más es el Día de los Muertos	The festival that interests me most is the Day of the Dead
que se celebra en México en noviembre.	which is celebrated in Mexico in November.
Es una fiesta para recorder los seres queridos muertes	It's a festival to remember dead loved ones
y la gente decora las tumbas y las casas	and the people decorate graves and houses
con áltares, velas y flores.	with altars, candles and flowers.
La gente ve desfiles y lleva disfraces y	People watch processions and wear costumes
me parece una fiesta con mucha tradición.	and it seems like a very traditional festival.
Además, siempre he soñado con ir a España	Also, I've always dreamed of going to Spain
para ver una corrida de toros	to watch a bullfight
sin embargo pienso que es un poco anticuado	however I think that it's a bit old fashioned
y mucha gente dice que es una tradición cruel.	And lots of people say it's a cruel tradition

A model text on festivals

Festivals

La fiesta de… – the festival of… **Esta tradición antigua** – this old tradition	**se celebra en…** – is celebrated in…	**España** – Spain **México** – Mexico **muchos países hispanohablantes** – in lots of Spanish speaking countries **Inglaterra** – English	**donde** – where	**se queman figuras de madera** – wooden figures are burnt **se construyen hogueras** – bonfires are built **se disparan fuegos artificiales** – fireworks are set off **se lanzan huevos/tomates** – eggs/tomatoes are thrown

las calles se llenan de… – the streets are filled with…	**niños** – children **jóvenes** – young people **familias** – families
la gente – the people	**come manzanas de caramelo** – eat toffee apples **decora las casas/las tumbas** – decorate houses/graves **con flores/velas** – with flowers/candles **prepara linternas/áltares** – prepare lanterns/altars **ve desfiles** – watch processions **lleva disfraces** – wear costumes **lleva un pañuelo rojo** – wear a red scarf **huye de un grupo de toros** – run away from a group of bulls
un hombre – a man	**lucha contra un toro** – fights a bull

Module 8 - Environment

Ce qui est important pour moi	What's important to me		
Ce qui est important pour moi, c'est …	*What's important to me is …*	ma famille	*my family*
		ma santé	*my health*
l'argent (m)	*money*	mes amis	*my friends*
le sport	*sport*	mes animaux	*my animals*
la musique	*music*	mes études	*my studies*
Ce qui me preoccupe	**What concerns me**		
Ce qui me préoccupe, c'est …	*What concerns me is …*	la faim	*hunger*
l'environnement	*the environment*	la guerre	*war*
l'état (m) de la planète	*the state of the planet*	l'injustice (f)	*injustice*
le racisme	*racism*	la pauvreté	*poverty*
la cruauté envers les animaux	*cruelty to animals*	la violence	*violence*

Quel temps fera-t-il?	What will the weather be like?		
Il y aura …	*There will be …*	Il fera …	*It/The weather will be …*
de la pluie	*rain*	beau	*nice/good*
de la neige	*snow*	mauvais	*bad*
du vent	*wind*	chaud	*hot*
du tonnerre	*thunder*	froid	*cold*
des averses	*showers*	frais	*chilly*
des éclairs	*lightning*	Le temps sera …	*The weather will be …*
des éclaircies	*sunny intervals*	ensoleillé	*sunny*
		nuageux	*cloudy*
		orageux	*stormy*

Les problèmes environnementaux	Environmental problems		
Le plus grand problème environnemental, c'est …	*The biggest environmental problem is …*	les incendies	*fires*
le changement climatique	*climate change*	Les arbres nous donnent de l'oxygène et nous les coupons tous les jours.	*Trees give us oxygen, and every day we cut them down.*
le manque d'eau potable	*the lack of drinking water*		
la disparition des espèces	*the extinction of species*	Beaucoup de personnes n'ont pas accès à cette ressource vitale.	*Lots of people don't have access to this vital resource.*
la destruction des forêts tropicales	*the destruction of the rainforests*		
la surpopulation	*overpopulation*	On détruit la planète	*We are destroying the planet*

Les problèmes environnementaux

Le plus grand problème environnemental, c'est …
- le changement climatique
- le manque d'eau potable
- la disparition des espèces
- la destruction des forêts tropicales
- la surpopulation
- la pollution de l'air
- la sécheresse
- les inondations
- les incendies

Les arbres nous donnent de l'oxygène et nous les coupons tous les jours.

Beaucoup de personnes n'ont pas accès à cette ressource vitale.

On détruit la planète.

C'est très inquiétant.

C'est catastrophique.

Environmental problems

The biggest environmental problem is …
- *climate change*
- *the lack of drinking water*
- *the extinction of species*
- *the destruction of the rainforests*
- *overpopulation*
- *air pollution*
- *drought*
- *flooding/floods*
- *fires*

Trees give us oxygen, and every day we cut them down.

Lots of people don't have access to this vital resource.

We are destroying the planet.

It's very worrying.

It's catastrophic.

Que doit-on faire pour sauver notre planète?

On doit/On peut …
- recycler
- trier les déchets
- faire du compost
- consommer moins d'énergie
- éteindre les appareils électriques et la lumière
- mettre un pullover au lieu d'allumer le chauffage
- faire des achats responsables
- utiliser du papier recyclé
- acheter des produits verts et des produits bio
- voyager autrement
- utiliser les transports en commun
- aller au collège à vélo
- réutiliser
- refuser les sacs en plastique
- avoir une bouteille d'eau au lieu de prendre un gobelet jetable
- économiser l'eau
- boire l'eau du robinet
- prendre une douche au lieu de prendre un bain
- tirer la chasse d'eau moins fréquemment
- fermer le robinet en se lavant les dents
- installer des panneaux solaires

What should we do to save our planet?

You/We should/can …
- *recycle*
- *separate the rubbish*
- *make compost*
- *consume less energy*
- *turn off electrical appliances and the light*
- *put on a jumper instead of turning on the heating*
- *make responsible purchases*
- *use recycled paper*
- *buy green and organic products*
- *travel differently*
- *use public transport*
- *go to school by bike*
- *reuse*
- *turn down plastic bags*
- *have a bottle of water instead of taking a disposable cup*
- *save water*
- *drink tap water*
- *take a shower instead of a bath*
- *flush the toilet less frequently*
- *turn off the tap while brushing your teeth*
- *install solar panels*

Year 11 Subject Term Knowledge Organiser: Business Studies

2.1: Growing the Business: Behaving Ethically

Key Terms:
Ethics: The moral principles that govern a businesses behaviour by doing the right thing.

A pressure group: An organised group that seeks to influence a business' behaviour.

Trade off: A balance between 2 different objectives, such as making a profit and spending money on ethical activities that will enhance the businesses reputation

Green Audit: A detailed review of a businesses impact on the environment, either conducted by the business itself or by an independent organisation

Finite resources: A resource that does not renew itself quickly enough to meet society's consumption of the resource, such as oil and natural gas
Sustainability: Business Practices that do not damage or deplete natural resources

Advantage of behaving ethically/behaving in a way that is environmentally sustainable
- Good reputation as the business is seen to do the right thing and therefore won't get targeted by a pressure group
- Won't get fined – won't have unnecessary expense and therefore costs are lower
- Unique Selling Point (Fair Trade etc.) advantage over competition

Disadvantages of behaving ethically
- It's expensive and do customers actually care

What can a pressure group do?
- writing letters to MPs
- contacting the press
- organising marches
- Campaigning outside shops
- running campaigns on social media asking people to boycott the store

Ways a business can damage the environment?
- Pollution to air and water, noise pollution and light pollution
- The use of non-renewable resources such as oil and coal
- Failure to dispose of toxic and dangerous waste safely

Ways a business can protect the environment
- Reducing the use of unnecessary packaging.
- Dispose of all their packaging safely
- Changing their vehicles to electric vehicles

Reason to conduct a green audit.
Can highlight to the business if their working practices damage the environment and therefore if they damaging the environment
- Could get a fine
- They could get targeted by a pressure group

Explain the trade-off between profit and being ethical/being environmentally sustainable (3)
If a business behaves ethically than a business may get a good reputation and therefore more sales and profit. However, to behave ethically/environmentally sustainable is likely to cost the business money and therefore that will impact profit. However, if the customers do not care that the business is behaving ethically/environmentally sustainable and doesn't make them pick you over another business then it may be seen as a waste of money.

Year 11 Subject Term Knowledge Organiser: Business Studies

2.1: Growing the Business: Globalisation and International Trade

Key Terms

Globalisation: Where businesses operate internationally
Imports: Buying products and raw materials from another county
Exports: Selling products you make to customers in other countries
Relocation: Moving the premises of a business to another country – it's usually a factory.
Trade Barrier: A Strategy used by a government who wants to control the amount of Imports and Exports
Tariff: A tax put on a product Imported into the country which makes it more expensive for buyers in that country
Trading Bloc: a group of countries that agree to act together to promote trade amongst themselves – can put tariffs on products from countries outside the block e.g. EU The North American Free Trade Association (NAFTA) and The Association of SouthEast Asian Nations (ASEAN)

Advantage of Importing Goods

- Can find cheaper suppliers
- Can find better quality suppliers

Disadvantage of Importing Goods

- The business now faces competition from around the world – may have to lower prices

Advantage of Exporting Goods

- Can now sell world wide – more customers
- As the business can now potentially sell world wide they can benefit from economies of scale (can reduce their unit costs)

Disadvantage of Exporting Goods

- Expensive – may have to adapt and change the product to meet local tastes
- Tariffs can be put on goods making them more expensive

Reasons for Trade Barriers

- Protects domestic jobs – people more likely to buy from UK business as foreign goods are more expensive or limited
- Raises money from the taxes for the government from Tariffs

Relocation:
Advantage:

- Cheaper wages = lower costs which means the business can make more profit or lower the price to attract more customers

Disadvantage

- Can damage the reputation of the business if they have had to make workers redundant
- Extra delivery costs
- It takes longer for delivery
- Can't have a USP, that lots of Britain's value, that the product is made in Britain.

Globalisation and Changing the marketing mix

Price: Some countries can have lower standards of living so therefore the price of the product may have to be reduced
Product: May have to be adapted to meet the tastes or cultures of different people – therefore expensive
Promotion: These will have to be converted into different languages and the business must make sure that the translation is done correctly
Place: E-commerce has meant that businesses can now sell world wide

Ways a business can compete internationally:

- Using e-commerce
- Changing the marketing mix

Year 11 Subject Term Knowledge Organiser: Business Studies

2.1: Growing the Business: Behaving Ethically

Key Terms:
Ethics: The moral principles that govern a businesses behaviour by doing the right thing.

A pressure group: An organised group that seeks to influence a business' behaviour.

Trade off: A balance between 2 different objectives, such as making a profit and spending money on ethical activities that will enhance the businesses reputation

Green Audit: A detailed review of a businesses impact on the environment, either conducted by the business itself or by an independent organisation

Finite resources: A resource that does not renew itself quickly enough to meet society's consumption of the resource, such as oil and natural gas
Sustainability: Business Practices that do not damage or deplete natural resources

Advantage of behaving ethically/behaving in a way that is environmentally sustainable
- Good reputation as the business is seen to do the right thing and therefore won't get targeted by a pressure group
- Won't get fined – won't have unnecessary expense and therefore costs are lower
- Unique Selling Point (Fair Trade etc.) advantage over competition

Disadvantages of behaving ethically
- It's expensive and do customers actually care

What can a pressure group do?
- writing letters to MPs
- contacting the press
- organising marches
- Campaigning outside shops
- running campaigns on social media asking people to boycott the store

Ways a business can damage the environment?
- Pollution to air and water, noise pollution and light pollution
- The use of non-renewable resources such as oil and coal
- Failure to dispose of toxic and dangerous waste safely

Ways a business can protect the environment
- Reducing the use of unnecessary packaging.
- Dispose of all their packaging safely
- Changing their vehicles to electric vehicles

Reason to conduct a green audit.
Can highlight to the business if their working practices damage the environment and therefore if they damaging the environment
- Could get a fine
- They could get targeted by a pressure group

Explain the trade-off between profit and being ethical/being environmentally sustainable (3)
If a business behaves ethically than a business may get a good reputation and therefore more sales and profit. However, to behave ethically/environmentally sustainable is likely to cost the business money and therefore that will impact profit. However, if the customers do not care that the business is behaving ethically/environmentally sustainable and doesn't make them pick you over another business then it may be seen as a waste of money.

Year 11 Subject Term Knowledge Organiser: Business Studies

2.1: Growing the Business: Globalisation and International Trade

Key Terms

Globalisation: Where businesses operate internationally
Imports: Buying products and raw materials from another county
Exports: Selling products you make to customers in other countries
Relocation: Moving the premises of a business to another country – it's usually a factory.
Trade Barrier: A Strategy used by a government who wants to control the amount of Imports and Exports
Tariff: A tax put on a product Imported into the country which makes it more expensive for buyers in that country
Trading Bloc: a group of countries that agree to act together to promote trade amongst themselves – can put tariffs on products from countries outside the block e.g. EU The North American Free Trade Association (NAFTA) and The Association of SouthEast Asian Nations (ASEAN)

Advantage of Importing Goods

- Can find cheaper suppliers
- Can find better quality suppliers

Disadvantage of Importing Goods

- The business now faces competition from around the world – may have to lower prices

Advantage of Exporting Goods

- Can now sell world wide – more customers
- As the business can now potentially sell world wide they can benefit from economies of scale (can reduce their unit costs)

Disadvantage of Exporting Goods

- Expensive – may have to adapt and change the product to meet local tastes
- Tariffs can be put on goods making them more expensive

Reasons for Trade Barriers

- Protects domestic jobs – people more likely to buy from UK business as foreign goods are more expensive or limited
- Raises money from the taxes for the government from Tariffs

Relocation:
Advantage:

- Cheaper wages = lower costs which means the business can make more profit or lower the price to attract more customers

Disadvantage

- Can damage the reputation of the business if they have had to make workers redundant
- Extra delivery costs
- It takes longer for delivery
- Can't have a USP, that lots of Britain's value, that the product is made in Britain.

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THEMES: Christian Practises

Key terms

Evangelism	Telling others about Christianity with the view to convert them.
Baptism	Being cleansed of original sin and being welcomed in the church.
Prejudice	Judging people to be inferior or superior without any reason behind it.
Eucharist	Taking the body and blood to remember Jesus' sacrifice.
Practises	Things people do.
Denomination	A group within a group.
Sacrament	Events through which people can eb blessed by God.
Liturgical	Formal, structured worship.
Non-Liturgical	Informal, unstructured worship.

Crucial Commands:

Describe:Say in detail what something or someone is like, and the impact it has. E.g. Describe the meaning of the word Omnibenevolent.

Explain: Say why something or someone is important, and the impact it has. E.g. Explain why Jesus' death is important to Christians.

Discuss: Write about at least two points of view and explain why these points of view are valuable or not. E.g. "The most important Christian belief is Jesus' resurrection" (15 marks)

What is worship

- Worship derives from the word 'Worth-ship'. Referring to how much worth (love and devotion) you give to God.

1. **Liturgical worship** = church service that follows a set structure and pattern.
2. **Non-liturgical worship** = church service that does not follow a set text or ritual.

Worship can also be split into Charismatic or Private worship. Worship can be to praise God, give thanks, forgiveness, to strengthen a relationship etc.

Baptism

- Infant baptism = is for babies and young children.
- Believers' baptism = people who are old enough to make the decision to be baptised.

Why are people baptised? To become a member of the Church, to be cleansed of sin, follow in Jesus' footsteps

Believer's Baptism	Infant Baptism
Attend baptism classes	`Parents make promises
Gives a brief testimony	Removes original sin

"Get up, be baptised and wash your sins away" Acts 22:16

Missionary work

Mission = vocation or calling to spread the faith.

The Great Commission Jesus instructs his disciples to go and spread the gospels and make disciples of others through baptism. "Go and make disciples of all nations."

Missionary work:
Aims of missionary work is to persuade people to accept Jesus as their Saviour. Alpha is an example of evangelism in the UK. It is an introductory course to Christianity for those that are interested.

The Sacraments

Christianity and Easter

Easter and Christmas are both Holy Days in the life of a Christian. Christmas celebrates the birth of Jesus Christ, and Easter celebrates the resurrection of Christ into Heaven.

The interesting question when discussing these practises are whether that is what makes the religion popular or is it just a cultural practise? Is the UK Christian?

PEE paragraph structure

Point – "Some people argue…"

Example – "Evidence for this can be found in…"

Explain – "This is significant because…"

***You also need to include quotes with Sources of Authority, discuss strong/ weak arguments and most importantly evaluate the IMPACT your point has on individuals, groups or societies!**

THEMES: Christian Practises

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Year 11 3D Design Knowledge Organiser

Longdendale HIGH SCHOOL

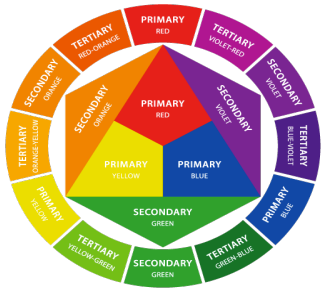
ASSESSMENT OBJECTIVE 2

Experimentation/Refinement: Refine Work By Exploring Ideas And Experimenting With A Range Of Media, Materials, Techniques And Processes.

Key Terms

Media	The substance an artist uses to create art. E.G. Collage, coloured pencils, acrylic paint etc.
Materials	The same as media but can also refer to what the art work is create on. E.G. Clay, Pewter, Wire etc.
Techniques	The method used to complete the art work, can be generic such as painting, or more focused such as blending.
Processes	The method used to create artwork that usually follows a range of steps rather than just one skill.

Colour Theory



Primary = Red, yellow, blue

Secondary = primary + primary

Tertiary = secondary + primary

Shades = Add black

Analogue colours = Next to each other

Complimentary = opposite

Monochromatic = one colour

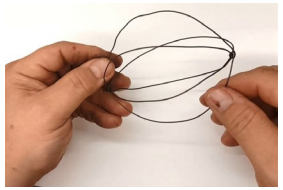
Hue =The pigment

Warm = Red, orange, yellow
Cold = blue, green, purple

Materials

Pewter

- File and sand down your pewter casting for a refined finish.
- Consider texture when designing your pewter cast.
- Safety first, make sure to wear gloves and goggles and be aware that pewter will burn



Wire

- Use a print out image to get the right proportions to your wire sculpture.
- Utilise masking tape to hold pieces together whilst you secure it properly with another piece of wire.
- Consider adding beads and other embellishments to add texture and interest to the sculpture.

Clay

- Use armature to keep clay in position if creating a large and unusual form.
- Use tools to etch, carve and shape the clay to create interesting textures
- Keep your clay sculpture moist to prevent cracks and drying out whilst sculpting it.

Cardboard

- Anchoring your sculpture to a solid, flat piece of wood, stone or some other material will prevent it from falling over and potentially getting damaged.
- Be sustainable with your cardboard use.
- Build in details last – start with the basic shape and form of your desired sculpture.

Experimenting in response to your chosen artists.
Use relevant materials and techniques to experiment with
Experiment with new materials, tools and techniques as well as familiar ones.
Try out different combinations of media and techniques.

Year 11 Subject Term Knowledge Organiser: Enterprise and Marketing

Branding
A brand is an identity for a product and/or business. Brands help build a personality for a product or business; some brands are perceived as **value for money**, for example. Other brand personalities include being **durable**, **luxurious**, **sporty** or **exciting**.

A brand can be created through a **brand name**, **logo**, **sound** (or **jingle**), **strapline**, **characters** or **celebrity endorsement** and brands often use a combination of these branding methods.

Brand Identity
In addition to a brand name and logo, the colour scheme a business uses, the font style they use and the placement of their logo can all help build their brand identity. Ask anyone to name a 'green colour supermarket brand' for example!

Why is branding used?

- **Trust** – people often trust products that are branded compared to non-branded items.
- **Brand recognition** – having a brand name and logo helps people recognise a product and/or business.
- **Product image** – the perception of a product and/or business is often a result of branding.
- **Differentiation** – having a brand can support a business's aim to be different to what's already on the market (it could convey this message through a strapline, for example).
- **Adding value** – branded products are often priced higher than non-branded products.
- **Customer loyalty** – it is often the case that people repeatedly buy the same brand of product, with branding helping to secure repeat purchases.

Competitor Analysis
When launching a new product, a business often looks at their competitors to find out what is already available on the market. Businesses look at their competitors' strengths, weaknesses, unique selling points and how their product idea is different to what brands already exist.

The External Environment
When developing new products, businesses often look at opportunities and threats that exist outside of the business itself (externally).

Economic Factors relating to the economy such as inflation and unemployment.	**Social** Trends in fashion, changes in taste and changing buying habits.
Technological Changes and advances in technology which can affect new product development.	**Ethical** The morals and values people have including environmental factors.

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Promotional Objectives
A promotional campaign is a series of activities a business plans to help promote a product. The reason the business carries out a promotional campaign is known as their **promotional objectives**.

Promotional objectives could be:
- To raise awareness of a product or service
- To differentiate
- To create market presence
- To increase market share

Promotional Campaigns
The material used as part of a promotional campaign (such as a poster) must be appropriate for the product and the target customer profile.

A successful promotional campaign needs planning in advance with a clear timeframe for the whole campaign and each activity within the campaign. Promotional campaigns also need to be reviewed so, beforehand, a business will identify what they think will be the outcomes if the campaign is to be considered a success; these are known as **key performance indicators** (**KPIs**).

Professional Pitches
A professional pitch is a presentation of a new product or service to an audience, similar to those you see on Dragon's Den. When someone prepares a professional pitch, they consider a number of factors beforehand:

The objectives
The objectives of the pitch are to inform the audience or to persuade the audience. This influences the presenter's style and language used.

The audience
The presenter needs to be aware of who they are pitching their ideas to, tailoring the content and style of pitch to match.

The venue
A suitable venue needs to be selected based on size, layout and equipment.

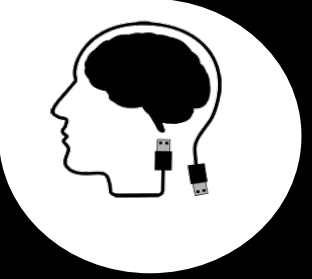
Media/materials
The type of media (such as a presentation) used will be considered beforehand.

Personal Appearance
The presenter needs to consider their appearance and ensure it suits the style of pitch being delivered (formal).

Pitch Structure
Considering the order in which the pitch will be presented is an important factor; starting with an introduction, ending with a conclusion and with logically sequenced information.

Use of Visual Aids
Including presentations and video clips.

Audience Questions
Presenters often plan answers to audience questions before their pitch.



OCR GCSE Computer Science (9-1)
Unit 1: Computer Systems

Cs – Revision Booklet
Data Representation

1.2.3 Units

Why do computers use bits?

Binary is a number system that only uses two digits: 1 and 0. All information that is processed by a computer is in the form of a sequence of 1s and 0s. Therefore, all data that we want a computer to process needs to be converted into binary. These digits 1 and 0 are often referred to as bits.

Units of data storage:

Order (Smallest to largest)	Unit	Equivalent
1	Bit	0 or 1
2	Nibble	4 bits
3	Byte	8 bits
4	KB	1,000 Bytes
5	MB	1,000 KB
6	GB	1,000 MB
7	TB	1,000 GB
8	PB	1,000 TB

Sound file size:

Formula:
sound file size = sample rate x duration (s) x bit depth

Worked example:

Sample rate = 3
Duration = 1 minute 30 seconds
Bit depth = 2

3 x 90 x 2 = 540 bits

Image file size:

Formula:
image file size = colour depth x image height (px) x image width (px)

Worked example:

An image that is 400 x 400 with a colour depth of 4 bits.

(400 x 400) x 4 = 640000 bits
640000/8 = 80,000 bytes

Text file size:

Formula:
text file size = bits per character x number of characters

Worked example

Document that consists of 56 characters.

50 x 8 = 400 and 6 x 8 = 48
(400 + 48 = 448 bits)

Exam tip:

Use of 1,024 for conversions and calculations would be acceptable.
Allowance for metadata in calculations may be used

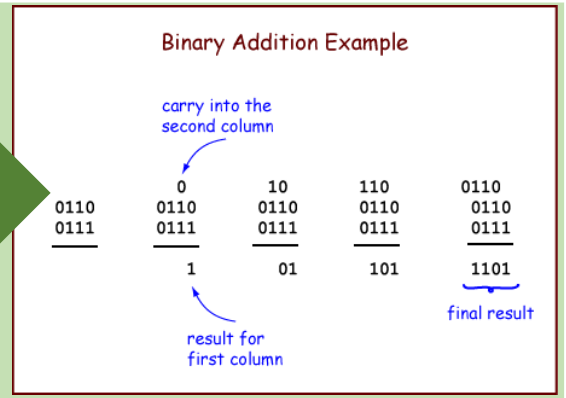
1.2.4 Data Storage

Binary

Binary is the language of the computer. Computers are made up of complex circuitry. These consist of billions of transistors that act as switches and they can only be in one of two states. ON (1) or OFF (0). In a binary number, the most significant bit is furthest to the left and the least significant bit is the furthest to the right.

Binary addition:

Addition		Result	Carry
0 + 0	=	0	0
0 + 1	=	1	0
1 + 0	=	1	0
1 + 1	=	0	1



Denary to Binary:

1 Denary (decimal) to Binary

Example: Convert 81 to an 8-bit binary number.

128	64	32	16	8	4	2	1
0	1	0	1	0	0	0	1

=81

TIP:

1. Best way to remember this is what numbers do we use to make the number 81?
2. In this example, **64+16+1 = 81**
3. Because we used these numbers, they are represented by **1**.
4. The others are represented by **0** as they were **not** used.

2 Binary to Denary (decimal)

Example: Convert the 8-bit binary number 00110111 into a denary (decimal) number.

128	64	32	16	8	4	2	1
0	0	1	1	0	1	1	1

\- + - + 32 + 16 + - + 4 + 2 + - = 55

TIP:

1. The blanks represent the 0's because they were not used in this calculation.
2. Once the numbers were identified, it was easy to input the 1's in the correct place.

Binary shift:

9 Binary Shift

When working directly with binary numbers, a binary shift to the left and right can be used for multiplication and division respectively.

A left shift will multiply a binary number by 2

For example, a left shift of 1 (binary number x2)

128	64	32	16	8	4	2	1
0	0	1	0	1	1	0	0

=44

128	64	32	16	8	4	2	1
0	1	0	1	1	0	0	

=88

A right shift does the opposite

It will divide a binary number by 2. For example, a right shift of 1 (binary number / 2)

Binary overflow

When numbers are added together, there is a risk that a binary overflow may occur. This is when there is not enough space to store a piece of data. For example, 255 bits can be stored in one byte. So the number 256.

1.2.4 Data Storage

Hexadecimal

In 1859, Nystrom proposed a hexadecimal (base 16) system of notation, arithmetic, and metrology called the Tonal system. Hexadecimal numerals are widely used by computer system designers and programmers because they provide a human-friendly representation of binary-coded values.

Hexadecimal to Binary:

5 Binary to Hexadecimal

Example: Convert 10110011 to hexadecimal.

Method

First you need to split them into two nibbles.

128	64	32	16	8	4	2	1
1	0	1	1	0	0	1	1

8	4	2	1
1	0	1	1

Add the first nibble 8 + 2 + 1 **= 11**

8	4	2	1
0	0	1	1

Add the first nibble 2 + 1 **= 3**

Remember is 11 is B in hex so the answer would be **B3.**

6 Hexadecimal to Binary

Example: Convert 5E to binary

Method - For this you must split them into two nibbles.

5E

8	4	2	1
0	1	0	1

This represents 5.

8	4	2	1
1	1	1	0

This represents E, which is hex for 14.

128	64	32	16	8	4	2	1
0	1	0	1	1	1	1	0

You bring them together to form an 8-bit binary number. So the answer is **01011110**

Hexadecimal to Denary:

3 Denary (decimal) to Hexadecimal

Example: How to convert 74 to hexadecimal. (Look at Hex table)

Method

1. How many digits represent hexadecimals? **16**
2. The formula would then be *number to be converted/number of digits* **(74/16)**
3. If the number is not equally divisible then we must check how many times it goes into 16.
4. In this example, 74 goes into 16 **4** times.
5. It means the first part of the hexadecimal number is 4.
6. What remains? 16 x 4 = 64 (74-64 = 10)
7. The remainder is 10 and in the hex table 10 is represented by **A**, and that completes the hexadecimal number.
8. Therefore the hexadecimal number of **74** is **4A**

4 Hexadecimal to Denary (decimal)

Example: Convert 5E to decimal

Method

1. How many digits represent hexadecimals? **16**
2. The formula would then be *first number*number of digits* **(5*16= 80)**
3. Find out the value of E which is 14.
4. Add the 14 to the 80
5. 80 + 14 = 94
6. Therefore the denary number of **5E is 94.**

Hex Table:

Denary	Hex
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F

1.2.4 Data Storage

Characters

Every word is made up of symbols or characters. When you press a key on a keyboard, a number is generated that represents the symbol for that key. This is called a character code. A complete collection of characters is a character set. A character set is a defined list of characters used so they can be encoded by a computer.

Binary representation of ASCII:

Example:

On the right is a section of the ASCII table which identifies each character and it's ASCII (Decimal) and Binary representation.

For example, the acronym ASCII in binary would be….

01000001 01010011 01000011 01001001 01001001

Symbol	Decimal	Binary
A	65	01000001
B	66	01000010
C	67	01000011
D	68	01000100
E	69	01000101
F	70	01000110
G	71	01000111
H	72	01001000
I	73	01001001
J	74	01001010
K	75	01001011
L	76	01001100
M	77	01001101
N	78	01001110
O	79	01001111
P	80	01010000
Q	81	01010001
R	82	01010010
S	83	01010011
T	84	01010100
U	85	01010101
V	86	01010110
W	87	01010111
X	88	01011000
Y	89	01011001
Z	90	01011010

Symbol	Decimal	Binary
a	97	01100001
b	98	01100010
c	99	01100011
d	100	01100100
e	101	01100101
f	102	01100110
g	103	01100111
h	104	01101000
i	105	01101001
j	106	01101010
k	107	01101011
l	108	01101100
m	109	01101101
n	110	01101110
o	111	01101111
p	112	01110000
q	113	01110001
r	114	01110010
s	115	01110011
t	116	01110100
u	117	01110101
v	118	01110110
w	119	01110111
x	120	01111000
y	121	01111001
z	122	01111010

Character sets:

ASCII	Unicode
Consists of up to 128 characters (0-127)	Consists of 143,859 characters.
Uses 7 bits	UTF-8/UTF-16
Contains letters, numbers, control characters, and other symbols.	A universal encoded character set that supports storage of information from most languages in a single character set

Exam tip

Don't define a character set as a 'set of characters'. As this just repeats the question. You run the risk of losing marks in the examination.

Exam tip

Remember uppercase and lowercase are represented by different binary numbers. Also numbers represented as characters are also different to their denary equivalent.

1.2.4 Data Storage

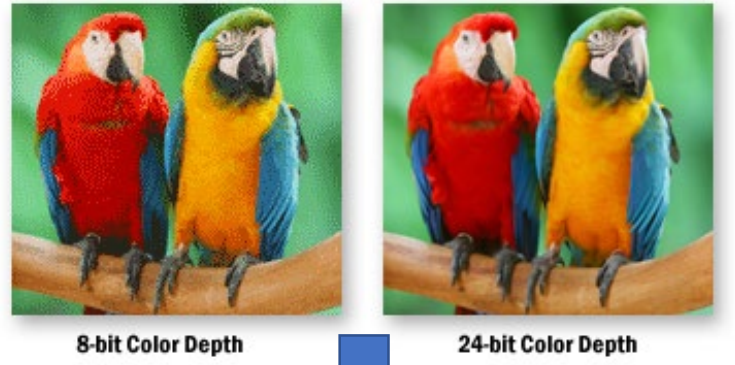
Images

A bitmap image is a digital image that is made up of a series of picture elements (known as pixels) which are used to display images on our screen.

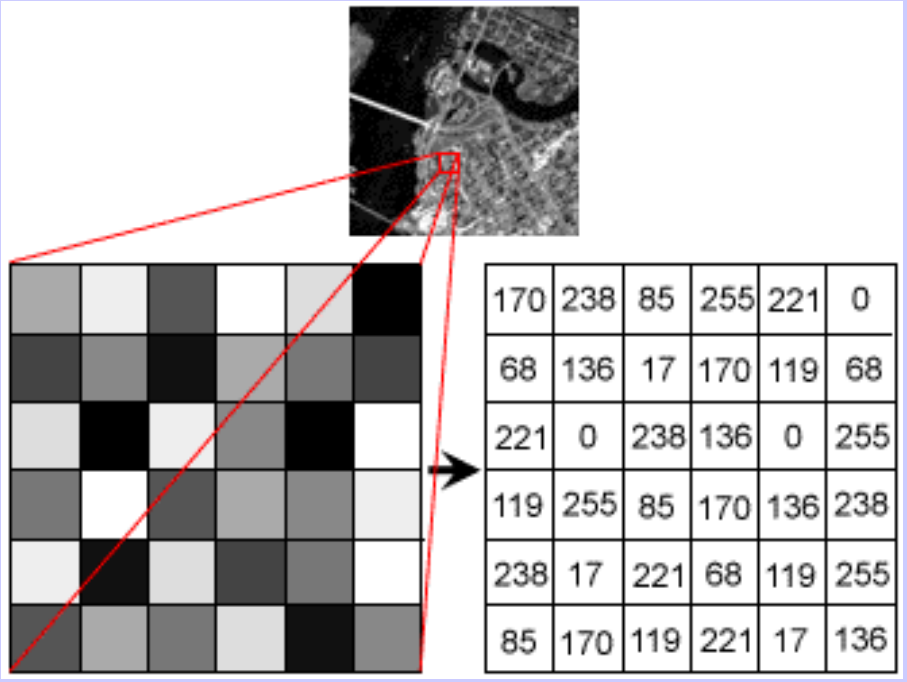
Colour Depth and Resolution:

Colour Depth:
Colour depth refers to how many possible colours can be represented in each pixel (bits per pixel)

Resolution:
Image resolution is typically described in PPI, which refers to how many pixels are displayed per inch of an image.



How an image is represented on a computer



170	238	85	255	221	0
68	136	17	170	119	68
221	0	238	136	0	255
119	255	85	170	136	238
238	17	221	68	119	255
85	170	119	221	17	136

- Each square is known as a Pixel
- Each pixel has the ability to store binary value.
- The binary value depends on how many bits can be stored in each pixel.
- Each binary value represents a unique colour.

Impact:

The impact of an increase in colour depth and resolution results in more pixel information and creating a high-quality, crisp image.
On the other hand, it does increase the size of the file.

Metadata

Metadata is 'data about data'. In other, it's data about the image itself.

Examples include:
Dimensions (Height and Width), File type, File size, Time/Date, Resolution, Colour depth.

1.2.4 Data Storage

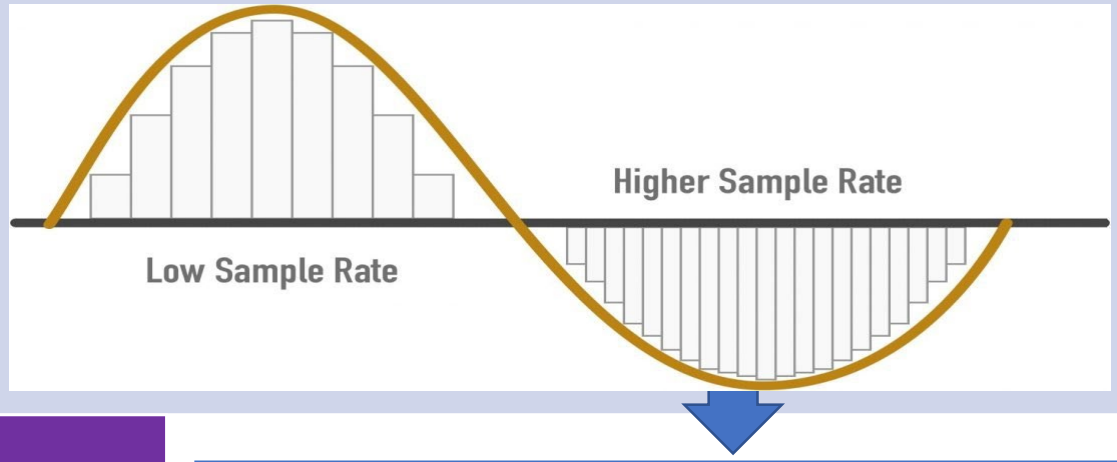
Sound

When we make sounds, it causes vibrations in the air thus creating sound waves. Technology has the ability to convert these sound waves into digital form.

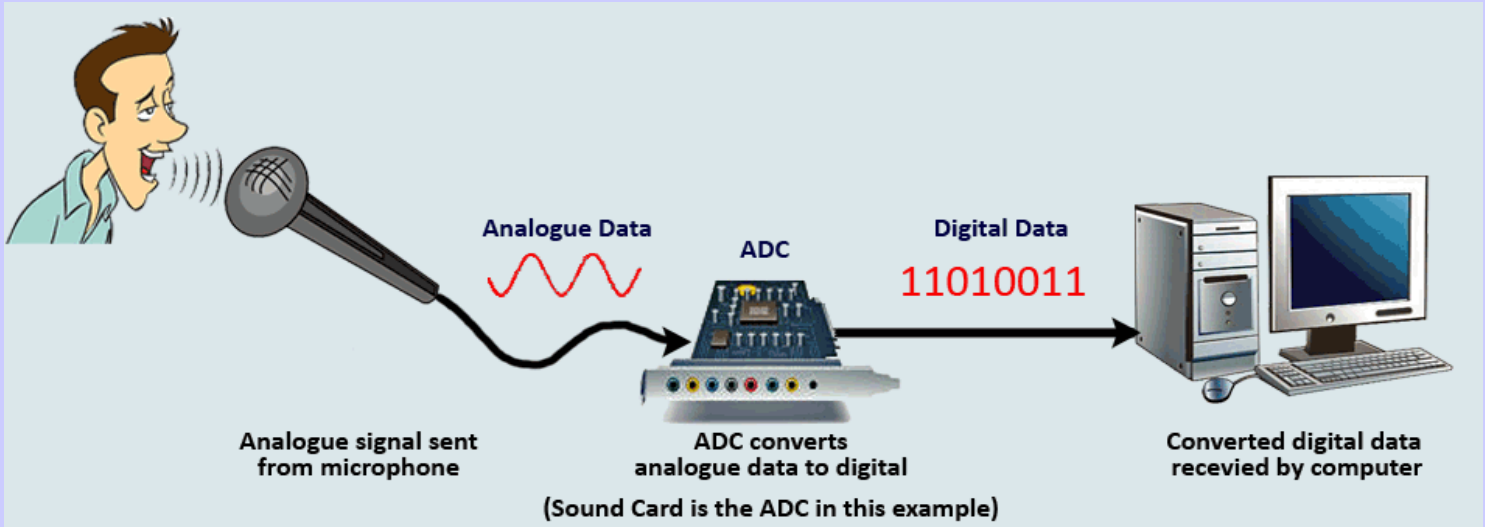
Sampling:

Definition

When sound is recorded, samples are taken at regular intervals as you can see in the diagram on the right. The sample rate is measured in Hz (Hertz)



How sound becomes digitised:



Analogue to Digital:

During the conversion process, samples are taken that are then converted from analogue into a digital recording.

Impact:

The impact of more samples being taken at regular intervals will lead to an increase in the quality of a file and it will create a more accurate representation of the original sound. However, it will lead to an increase in file size.

Bit depth

Bit depth is the number of bits available for each sample . If the bit depth increases it can increase the dynamic range of volume (this affects how loud the sound will be). This will also contribute to the quality of the sound file improving.

1.2.4 Data Storage

Compression

Compression is an algorithm designed to reduce the size of a file. There are two types of compression: Lossy and Lossless.

Impact on size:

cafe wonderland teaparty	08/09/2020 12:38	JPG File	84 KB
cafe wonderland teaparty	10/05/2019 10:51	Adobe Photoshop...	2,449 KB

Example:

The top file has been compressed using lossy and this will:

- Save space on the device it's being stored.
- Use less bandwidth if file is transferred over a network (i.e. e-mail)

Lossy and Lossless Compression:

Lossy Compression	Lossless Compression
It reconstructs all the original data but this means data is lost during the compression process.	Data is reconstructed and doesn't remove any data.
Once data is removed, it's permanent and cannot be restored. It's irreversible.	Because data is retained, it's reversible so changes can continue to be made.
This can impact the overall quality of the graphic.	The overall quality of the graphic is retained.
It does significantly reduce the overall size of the file.	The size of these files tend to be large.
JPG is a common file format that uses lossy compression.	PNG/PSD are common file formats that use lossless compression.

Impact on quality:

Example:

As you can see above, the image at the top has been saved in a lossless format whereas the image below, has been saved in a lossy format. You can see that the quality of the image below has reduced because data has been permanently removed.