



YEAR 10 KNOWLEDGE ORGANISER

LENT TERM 2020/21

Name:

Family Group:



LEARNING - LOVING - LIVING

PAGE NUMBER	SUBJECT	TOPIC
1-3	General information	Knowledge Organiser guidance, Retrieval activity ideas, The science of Learning- How to revise effectively
4-6	English	Jekyll and Hyde
7-10	Mathematics	Foundation, Higher
11-21	Science	Physics, Biology, Chemistry
22-23	Geography	Urban Fieldwork and write-up
24-26	History	Paper 2- Elizabethan England
27	Religious Education	Religion and Family Life
28- 29	Physical Education GCSE	Sports Psychology
30	Sports Studies	Sports leadership
31-34	Computer Science	Programming, Computers
35-36	Drama	Devising Log
37-39	Music GCSE	Music for stage and screen, Schwartz, 'Defying Gravity' from Wicked
40-41	Music Technology	Sequencing Exam
42	Art	
43-45	Food and Nutrition	Food safety & sources, macronutrients
46	Engineering	Engineering
47	French	Vocabulary
48-49	Spanish	Vocabulary
50-51	Statistics	Processing, representing and analysing data; Probability
52-54	Citizenship	Governance
55-57	Business and Enterprise	Understanding resources for Business and Enterprise planning – (Legal Considerations)
58-60	PSHE	Drugs and the Law, Consent

GENERAL INFORMATION

The knowledge organiser is a book that sets out the **important, useful** and **powerful knowledge** of a single topic on one page.

When used effectively, Knowledge Organisers are useful in:

- Helping build a foundation of **factual knowledge**.
- Embedding **revision techniques** for now and future studies (A-Level, College, University)
- Allowing knowledge to become stored in **long term memory** which frees up working memory for more complex ideas. It also allows you to connect concepts together, even across subjects

Other revision tools include:

-FREE **online** revision tools such as www.senecalearning.com, the recently updated BBC BITESIZE and YouTube.

-Other **online** platforms and **apps** like <https://mathswatch.co.uk> and Duolingo.

-Subject **revision guides** (some available at school and book shops)

-Practice **exam questions** (see your teacher)

-**Past Papers** from your teacher or exam board websites.

MICROSOFT TEAMS

Remember to check TEAMS regularly for updates and additional home learning files including copies of your mastery booklets.

You can also ask your teachers questions on teams and view videos of 'how to use your knowledge organiser'.



HOMework TIMETABLE

Year 10	Subject 1	Subject 2	Subject 3
Monday	Maths	Option A	Option C
Tuesday	English	Option B	Option C
Wednesday	Maths	RE	Option D
Thursday	English	Science	Option A
Friday	Maths	Science	Option B

WELLBEING DURING REVISION AND EXAMS- YOUNG MINDS

1. Always take a moment just to breathe, whether in the exam, before or after.
2. Remember that school does offer support, just reach out and ask!
3. Keep your work balanced. Spend time revising, but socialise and relax too.
4. Keep a self-care routine so that your revision is the most productive it can be whilst you feel as good as possible.
5. Break up revision with food and exercise to make sure you stay energised.
6. Remember that results do not define you.
7. Find a revision space and style that works for you: silence, background chatter, music with or without lyrics.
8. Work to your own pace – everyone is different in how they work.
9. If you feel nervous about the time pressure of an exam, practice timing yourself when you revise, or try some test papers.
10. Plan in some treats to reward yourself, and celebrate when it's all over!

Here are some activities that you can try at home with your knowledge organiser to help revise. There are even more strategies on page 3.

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4 Methods of Retrieval Practice

@ImpactWales

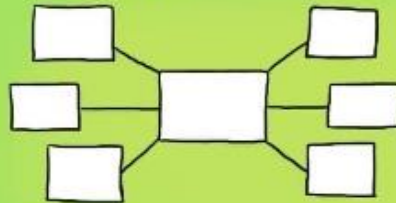
Before you start put away all your books & classroom materials.

Retrieval Practice Examples

- * Exit Tickets
- * Starter quizzes
- * Multiple choice quizzes
- * Short answer tests
- * Free write
- * Think, pair, share
- * Ranking & sorting
- * Challenge grids

BRAIN DUMP

Write, draw a picture, create a mind-map on everything you know about a topic.



Give yourself a time limit, say 3 minutes, then have a look at your books & add a few things you forgot.

QUIZZING

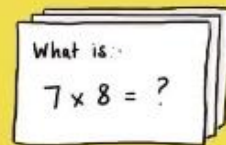
Create practice questions on a topic. Swap your questions with a partner & answer.

Question - What is a metaphor?

- ☐ A comparison using 'like, as, than'.
- ☐ A comparison where one thing is another.
- ☐ A comparison with a human attribute.

FLASHCARDS

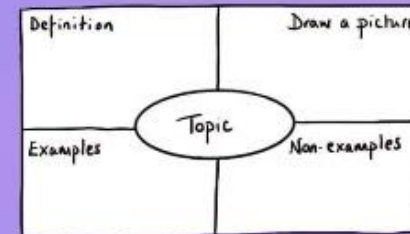
Create your own flashcards, question on one side answer on the other. Can you make links between the cards?



You need to repeat the Q&A process for flashcards you fail on more frequently & less frequently for those you answer correctly

KNOWLEDGE ORGANISERS

Complete a knowledge organiser template for key information about a topic.



You can use knowledge organisers to learn new vocab & make links in between subjects or ideas.

After you have retrieved as much as you can go back to your books & check what you've missed. Next time focus on that missing information

CONCRETE EXAMPLES

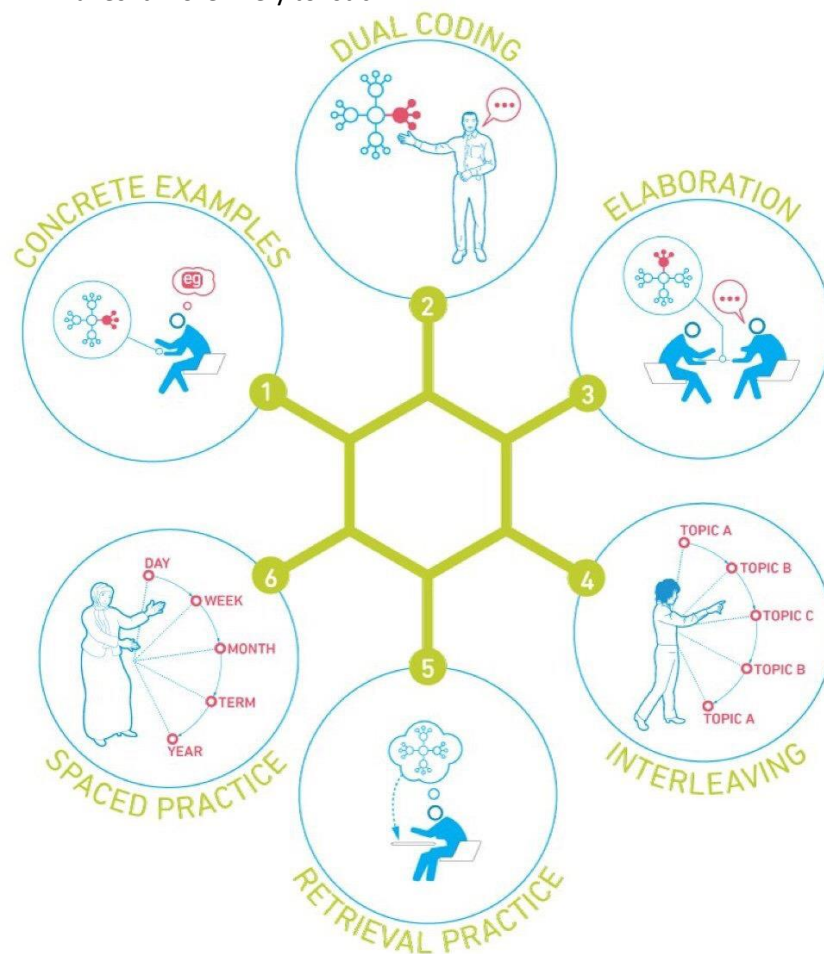
When you're studying, try to think about how you can turn ideas you're learning into concrete examples. Making a link between the idea you're studying and a real life example, concrete example, can help students understand abstract ideas and make it 'stick'.

SPACED PRACTISE

Divide up your revision into short manageable chunks of time. When revising aim for 20 - 30 minutes per session. Five hours spread out over two weeks is better than the same five hours all at once. This is **spaced practice** and it is regarded as one of the most effective revision strategies.

DUAL CODING

Dual coding is the process of combining visual and written materials. You can visually represent materials using methods such as info graphics, timelines, cartoon/comic strips, diagrams and graphic organisers. Combining images with words or explaining an image makes it more likely to 'stick'.



RETRIEVAL PRACTICE

Through the act of retrieval, or calling information to mind, our memory for that information is strengthened and forgetting is less likely to occur. Retrieval practice ideas include: Read, cover, write, check, flashcards and brain dumps.

ELABORATION

When talking about studying, elaboration involves explaining and describing ideas with many details. Elaboration also involves making connections among ideas you are trying to learn. Ask yourself questions about a topic to delve deeper. The more information you have about a specific topic the stronger your grasp and ability to recall.

INTERLEAVING

Interleaving is a process where you combine multiple subjects and topics while you study in order to improve learning. Switch between ideas and make links between them during a study session. Interleaving has been shown to lead to better long-term retention

Chapter 1: Story of the door:

Who	What	Notes
1) Utterson	Never lighted by a smile	U is 'austere', serious, strict, avoids frivolity
	Austere	U represses his desire for pleasure. Strives to conform to restrictive social mores
	I let my brother go to the devil in his own way.	Avoids gossip, doesn't judge: is he tolerant or selfish here?
	When the wine was to his taste something eminently human beamed from his eye	U's 'austere' demeanor could be an act/veneer-drink removes his inhibitions.
2) Setting	The buildings are so packed together	Setting is claustrophobic and restrictive, mirroring the social mores. Gothic fiction involves entrapment!
	Neither bell nor knocker	House is private, mirroring the theme of secrecy.
3) Utterson	Though he enjoyed the theatre, had not crossed the doors of one for twenty years	U is Paranoid: extreme obsession with reputation results in bizarre/absurd behavior. U avoids frivolity
4) U and E	Looked singularly dull BUT chief jewel of each week	U and E walk in public to enhance reputation. Contrived.
5) Enfield	You start a question its like starting a stone	E avoids gossip: is he being tolerant or selfish here? E is a hypocrite: he is fascinated by Hyde's story!
	The more it looks like Queer Street, the less I ask	
6) Hyde	Tramples 'calmly' on a child 'like some damned juggernaut'	H attacks the vulnerable. H is cold, callous. gratuitous violence, like an automaton.
7) Enfield	Make his name stink	E threatens to ruin H's reputation and cause a scandal. H pays money to avoid trouble. E and H are immoral!
8) Enfield on Hyde	Gave me one look so ugly that it brought out the sweat on me like running	H is repulsive, abhorrent, causes psychosomatic reaction in E. Links to U. Class stereotypes of lower class (a group seen as deviant, criminal, immoral).
	There is something wrong with his appearance; something displeasing, something downright detestable A strong feeling of deformity, although I couldn't specify the point	Link to Uncanny: ambiguous/vague. Victorians thought certain physiologies caused criminality (Physiognomy): ugly=criminal.

Chapter 2: The Search for Mr Hyde:

Who	What	Notes
9) Lanyon	Boisterous and decided manner	Stevenson commenting on arrogance of science (challenged traditional/religious beliefs).
10) L on J	Jekyll became too fanciful for me, he began to go wrong, wrong in mind Such unscientific balderdash	J=transcendental medicine. L=empirical science. J=Victorians associated science with supernatural because incomprehensible. L=Victorians associated science with arrogance/immorality (challenged the church)
11) U meets H	Fronted about with an air of defiance	H defies social mores/is immoral/doesn't conform. H represents U. Class repressed desires.
	Snarled aloud into a savage laugh	H is sinister, feral, atavistic (represents Victorian fears of evolution)
	Pale and dwarfish	H is depraved/disease to society. J is 'tall fine build of a man'. Hierarchy of status: J is superior (like class system)
	Murderous mixture of timidity and boldness	H is antithetical. Contradictory nonsensical description (like U. Class prejudice=incoherent/irrational)
12) H	Troglodytic	Link to Victorian fears of evolution. Caveman=uncivilized/feral. U. Class repress all savage/uncivilized impulses.
13) U on J	The ghost of some old sin, the cancer of some concealed disgrace	U suspects J has past vices. U suspects blackmail. 'cancer'=moral depravity and sin are a societal disease to be avoided.
14) U	Humbled to the dust by the many ill things he had done	U is archetypal Victorian Gent-he is perfect! (here U is paranoid and insecure)

Chapter 3: Dr Jekyll was quite at Ease

Who	What	Notes
15) J on L	Hide bound pedant, Lanyon	J (transcendental) vs L (Empirical). Victorian fears and disdain for science
16) J on H	It isn't what you fancy; it is not so bad as that	J implicitly referring to blackmail/illicit homosexuality
17) Jekyll	Asks U to help Hyde if J disappears	Close bonds of support and secrecy between U.Class men

Chapter 4: Carew Murder Case

Who	What	Notes
18) Hyde	Ape like fury	Feral, brutal, savage, malevolent, uncivilized, relentless,
19) The Attack	<ol style="list-style-type: none"> 1) Unprovoked attack: SDC was bowing to greet H. SDC was genteel and polite (paragon of propriety and decorum). SDC is antithesis of H. 2) Victim: old, frail, vulnerable. MP=symbolizes society and civilization-H attacks the establishment 3) Nature of attack: No valuables taken. Makes H hard to understand-he is motivated by sadism. H is volatile 4) Weapon left=H doesn't care about ramifications or being caught 5) 'bones audibly shattered'= visceral, barbaric attack 6) Maid faints: accentuates brutality of attack. 	

Chapter 5: Incident of the Letter:

Who	What	Notes
20) Utterson	Suspects J is covering for H (blackmail/homosexual subtext) Handwriting of J and H are similar	Graphology (Victorian pseudo-science) claimed that personality/morality could be judged by handwriting

Chapter 6: Remarkable Incident of Dr Lanyon

Who	What	Notes
21) Lanyon	<div>his flesh had fallen away</div> <div>Deep seated terror of the mind</div> <div>A doomed man</div>	Shock of seeing H transform to J (explained in CH9) kills L. Links to idea that science is a threat/Victorian fears of science. H symbolizes human capacity for evil: L is shocked by this-like all U.Class men, L aims for perfection/represses desires for sin. When confronted with the thing he tries to ignore (evil/transgression) he is shocked and dies

Chapter 7: Incident at the Window:

Who	What	Notes
22) Jekyll	Slams the window to avoid E and U seeing transformation	J cannot control the transformations now
23) E and	E and U see J through the window	Symbolizes lack of privacy for U.Class men

Chapter 8: The Last Night:

Who	What	Notes
24) Poole on J	My master is a tall fine build of a man	Compare to H 'pale and dwarfish' hierarchy between them: J is supposed to be on top but H ends up more powerful
25) Poole on H	That masked thing like a monkey	Atavism/fears of evolution/feral/primitive/bestial
26)Hyde	H has been asking Poole to get a drug for him	Theme of addiction: to drug/sin/freedom/

Chapter 9: Dr Lanyon's Narrative

Who	What	Notes
27) Lanyon	My life is shaken to its roots	Link to idea that science is a threat/Victorian fears of science
28) Lanyon	After J's party in CH6, L receives letter from J asking L to get a drawer from J's house (containing notebook and vial)	Notebook explains that slowly the potion has stopped working: J has built up tolerance/become immune. Symbolises the normalization of transgression: the more you do, the more acceptable it becomes?
29) Hyde	Transformation in front of Jekyll	Gothic/supernatural/fears of science. L witnesses (like maid witnessing H battering SDC): reader encouraged to share their shock

Chapter 10: Henry Jekyll's Full Statement of the Case

Who	What	Notes
30) Jekyll	That man is not truly one, but truly two	Duality of man. Evil+Good
	Extraneous evil	J claims H is separate (contradicts himself: compare to 'not truly one, but truly two' Is 'extraneous evil' the social mores?
	A solution to the bonds of obligation	H is a 'solution' to problem of restrictive social mores. 'bonds'=Victorian society is imprisoning/an entrapment (Gothic theme)
	Like a school boy, strip off these lendings and spring headlong into the sea of liberty	H excites J: 'like a school boy'=exhilarating. 'sea of liberty'=ignore social mores/indulge in transgressions and immorality.
	Commingled out of good and evil	Human psyche is a mixture not two separate things. evil and good are intertwined
	Like a thick cloak	Similar to 'extraneous evil'. J claims H is separate (contradicts himself) but WHY? 1) human psychology is too complex to comprehend 2) J is deliberately being evasive to avoid culpability 3) J is deluded and is lying to himself to avoid guilt and shame
	I was slowly losing hold of my original and better self, and becoming slowly incorporated with my second and worse	H eventually overpowers J. Evil side begins to take control
	If I am the chief of sinners, I am the chief of sufferers also	'sufferers'=J suffers under societal expectations. Repressing his desire to sin=suffering. Guilt of actions as H=suffering. Evil side taking control=suffering. Denying innate capacity for transgression=suffering.
	The animal within me	Atavism/fears of evolution-humans are similar to animals
	this brief condescension to evil finally destroyed the balance of my soul'	Temptation leads to further damage. repressing sin 'brief condescension' avoids moral depravity.
	Men have before hired bravos to transact their crimes, while their own person and reputation sat under shelter	Secrecy/reputation. Public behavior is a veneer/act. H is a 'bravos' and a 'thick cloak' to 'shelter' J from judgment and criticism
	Secret pleasures	Perhaps he only initially wanted to indulge in transgressions like drinking/prostitution not murder

Keywords

Event: one or more outcomes from an experiment
 Outcome: the result of an experiment
 Intersection: elements (parts) that are common to both sets
 Union: the combination of elements in two sets
 Expected Value: the value/ outcome that a prediction would suggest you will get
 Universal Set: the set that has all the elements
 Systematic: ordering values or outcomes with a strategy and sequence
 Product: the answer when two or more values are multiplied together.

Add, Subtract and multiply fractions

Addition and Subtraction

$$\frac{4}{5} - \frac{2}{3} = \frac{12}{15} - \frac{10}{15} = \frac{2}{15}$$

Use equivalent fractions to find a common multiple for both denominators

Multiplication

$$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12}$$

Modelled: Total number of parts in the diagram: 12. Parts shaded: 6.

Sample space

The possible outcomes from tossing a coin

	1	2	3	4	5	6
H	1H	2H	3H	4H	5H	6H
T	1T	2T	3T	4T	5T	6T

$$P(\text{Even number and takes}) = \frac{3}{12}$$

Independent events

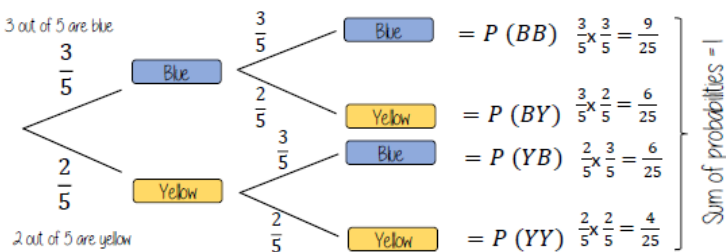
The outcome of two events happening. The outcome of the first event has no bearing on the outcome of the other

$$P(A \text{ and } B) = P(A) \times P(B)$$

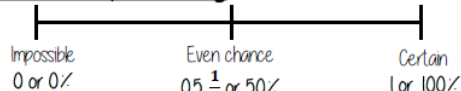
Tree diagram for independent event

Isobel has a bag with 3 blue counters and 2 yellow. She picks a counter and replaces it before the second pick.

Because they are replaced the second pick has the same probability



Likelihood of a probability



The more likely an event the further up the probability it will be in comparison to another event. (It will have a probability closer to 1)

Sum to 1

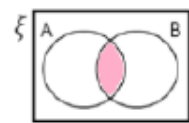


Probability is always a value between 0 and 1

The probability of getting a blue ball is $\frac{4}{5}$
 \therefore The probability of NOT getting a blue ball is $\frac{1}{5}$

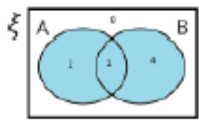
The sum of the probabilities is 1

Venn diagram



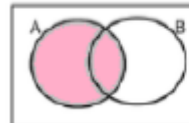
in set A AND set B

$$P(A \cap B)$$



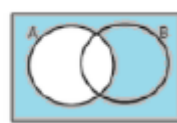
in set A OR set B

$$P(A \cup B)$$



in set A

$$P(A)$$



NOT in set A

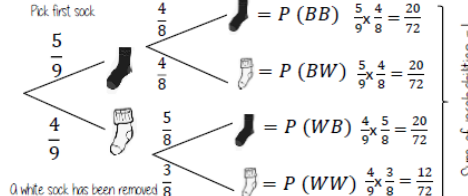
$$P(A')$$

Dependent events

Tree diagram for dependent event

The outcome of the first event has an impact on the second event

A sock drawer has 5 black and 4 white socks, Jamie picks 2 socks from the drawer.



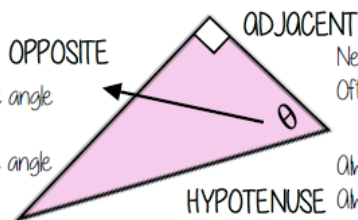
NOTE: as "socks" are removed from the drawer the number of items in that drawer is also reduced \therefore the denominator is also reduced for the second pick.

Keywords

Enlarge: to make a shape bigger (or smaller) by a given multiplier (scale factor)
 Scale Factor: the multiplier of enlargement
 Constant: a value that remains the same
 Cosine ratio: the ratio of the length of the adjacent side to that of the hypotenuse. The sine of the complement.
 Sine ratio: the ratio of the length of the opposite side to that of the hypotenuse.
 Tangent ratio: the ratio of the length of the opposite side to that of the adjacent side.
 Inverse: function that has the opposite effect
 Hypotenuse: longest side of a right-angled triangle. It is the side opposite the right-angle.

Hypotenuse, adjacent and opposite

ONLY right-angled triangles are labelled in this way



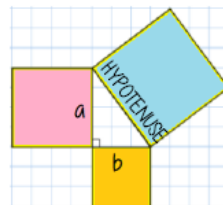
Always opposite an acute angle
 Useful to label second
 Position depend upon the angle in use for the question

Next to the angle in question
 Often labelled last
 Always the longest side
 Always opposite the right angle
 Useful to label this first

Pythagoras theorem

R

$$\text{Hypotenuse}^2 = a^2 + b^2$$



This is commutative — the square of the hypotenuse is equal to the sum of the squares of the two shorter sides

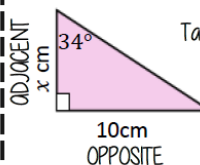
Places to look out for Pythagoras

- Perpendicular heights in isosceles triangles
- Diagonals on right angled shapes
- Distance between coordinates
- Any length made from a right angles

Tangent ratio: side lengths

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

Substitute the values into the tangent formula



$$\tan 34 = \frac{10}{x}$$

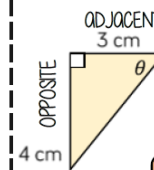
Equations might need rearranging to solve

$$x \times \tan 34 = 10$$

$$x = \frac{10}{\tan 34} = 14.8 \text{ cm}$$

Sin, Cos, Tan: Angles

Inverse trigonometric functions



Label your triangle and choose your trigonometric ratio
 Substitute values into the ratio formula

$$\tan \theta = \frac{3}{4}$$

$$\theta = \tan^{-1} \frac{3}{4}$$

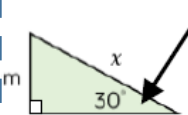
$$\theta = 36.9^\circ$$

$$\theta = \tan^{-1} \frac{\text{opposite side}}{\text{adjacent side}}$$

$$\theta = \sin^{-1} \frac{\text{opposite side}}{\text{hypotenuse side}}$$

$$\theta = \cos^{-1} \frac{\text{adjacent side}}{\text{hypotenuse side}}$$

When the angle is the same the ratio of sides a and b will also remain the same



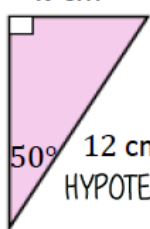
$$a : b$$

$$0.07 : x$$

$$0.07 : 0.14$$

Sin and Cos ratio: side lengths

OPPOSITE
 $x \text{ cm}$

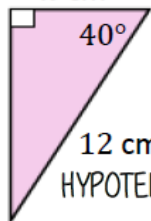


$$\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse side}}$$

NOTE

The $\sin(x)$ ratio is the same as the $\cos(90-x)$ ratio

ADJACENT
 $x \text{ cm}$



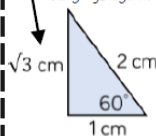
$$\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse side}}$$

Substitute the values into the ratio formula

Equations might need rearranging to solve

Key angles

This side could be calculated using Pythagoras



Because trig ratios remain the same for similar shapes you can generalise from the following statements

$$\tan 30 = \frac{1}{\sqrt{3}}$$

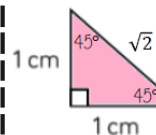
$$\tan 60 = \sqrt{3}$$

$$\cos 30 = \frac{\sqrt{3}}{2}$$

$$\cos 60 = \frac{1}{2}$$

$$\sin 30 = \frac{1}{2}$$

$$\sin 60 = \frac{\sqrt{3}}{2}$$



$$\tan 45 = 1$$

$$\cos 45 = \frac{1}{\sqrt{2}}$$

$$\sin 45 = \frac{1}{\sqrt{2}}$$

Key angles 0° and 90°

$$\tan 0 = 0$$

$$\tan 90$$

This value cannot be defined — it is impossible as you cannot have two 90° angles in a triangle



$$\sin 0 = 0$$

$$\sin 90 = 1$$

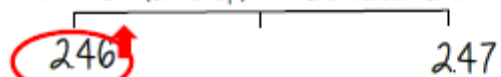
$$\cos 0 = 1$$

$$\cos 90 = 0$$

Rounding



2.46192 (to 2dp) - is this closer to 246 or 247



2.46192

This shows the number is closer to 246

Significant Figures

370 to 1 significant figure is 400

37 to 1 significant figure is 40

3.7 to 1 significant figure is 4

0.37 to 1 significant figure is 0.4

0.00000037 to 1 significant figure is 0.0000004

SF: Round to the first nonzero number

Estimation



Round to 1 significant figure to estimate

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

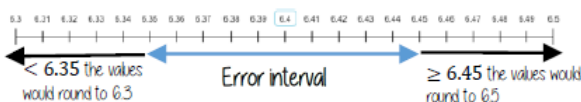
The equal sign changes to show it is an estimation

This is an underestimate because both values were rounded down

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

Limits of accuracy

A width w has been rounded to 6.4cm correct to 1dp.

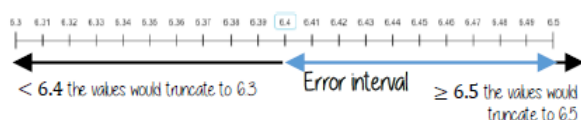


The error interval

$$6.35 \leq w < 6.45$$

Any value within these limits would round to 6.4 to 1dp

A width w has been truncated to 6.4cm correct to 1dp.



$$6.4 \leq w < 6.5$$

Any value within these limits would truncate to 6.4 to 1dp

A **surd** is an irrational number expressed as the root of a natural number.

E.g. $\sqrt{5}$ or $3\sqrt{2}$

These two laws are often used to simplify expressions involving surds.

$$\sqrt{m} \times \sqrt{n} = \sqrt{mn} \quad \frac{\sqrt{m}}{\sqrt{n}} = \sqrt{\frac{m}{n}}$$

For non-zero values of m and n

$$\sqrt{m} + \sqrt{n} \neq \sqrt{m+n}$$

$$\sqrt{m} - \sqrt{n} \neq \sqrt{m-n}$$

For example

$$\sqrt{75} = \sqrt{25 \times 3} = \sqrt{25} \times \sqrt{3} = 5\sqrt{3} \quad \text{and} \quad \sqrt{\frac{32}{49}} = \frac{\sqrt{16 \times 2}}{\sqrt{49}} = \frac{\sqrt{16} \times \sqrt{2}}{\sqrt{49}} = \frac{4\sqrt{2}}{7}$$

To simplify surds of the form \sqrt{n} write n as a product including a square number.

Rationalise the denominator of a $\frac{1}{\sqrt{3}}$ and b $\frac{2\sqrt{3}}{\sqrt{8}}$

a Multiply the top and the bottom by $\sqrt{3}$:

$$\frac{1 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{3}}{3}$$

b Multiply the top and the bottom by $\sqrt{8}$:

$$\frac{2\sqrt{3} \times \sqrt{8}}{\sqrt{8} \times \sqrt{8}} = \frac{2\sqrt{24}}{8} = \frac{4\sqrt{6}}{8} = \frac{\sqrt{6}}{2}$$

Square and cube numbers

Square numbers

1, 4, 9, 16, ...

$$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

$$(2 \times 2 \times 3) \times (2 \times 2 \times 3)$$

Prime factors can find square roots

$$\sqrt{144} = 12$$

Cube numbers

1, 8, 27, 64, 125, ...

$$216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$$

$$(2 \times 3) \times (2 \times 3) \times (2 \times 3)$$

$$6 \times 6 \times 6$$

$$\sqrt[3]{216} = 6$$

Standard form

Any number between 1 and less than 10

$$A \times 10^n$$

Any integer

$$\begin{aligned} 0.001 &= 1 \times \frac{1}{1000} \\ &= 1 \times 10^{-3} \end{aligned}$$

10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
10^1	10^0	10^{-1}	10^{-2}	10^{-3}
10	1	0.1	0.01	0.001

R

Example

$$\begin{aligned} 3.2 \times 10^4 \\ &= 3.2 \times 10 \times 10 \times 10 \times 10 \\ &= 32000 \end{aligned}$$

Non-example

$$\begin{aligned} (0.8) \times 10^4 \\ 5.3 \times 10^{0.7} \end{aligned}$$

Any value to the power 0 always = 1

Numbers in standard form with negative powers will be less than 1

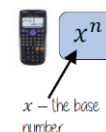
Negative powers do not indicate negative solutions

$$3.2 \times 10^{-4} = 3.2 \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = 0.00032$$

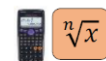
Addition/ Subtraction Laws

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

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



n - power
(number of times
multiplied by
itself)



Finding the n th
root of any value

Zero and negative indices

$$x^0 = 1$$

Any number divided by itself = 1

$$\begin{aligned} \frac{a^6}{a^6} &= a^6 \div a^6 \\ &= a^{6-6} = a^0 = 1 \end{aligned}$$

Negative indices do not indicate negative solutions

$$\begin{aligned} 2^2 &= 4 \\ 2^1 &= 2 \\ 2^0 &= 1 \\ 2^{-1} &= \frac{1}{2} \\ 2^{-2} &= \frac{1}{4} \end{aligned}$$

Looking at the sequence can help to understand negative powers

Powers of powers

$$(x^a)^b = x^{ab}$$

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

The same base and power is repeated. Use the addition law for indices

$$(2^3)^4 = 2^{12} \quad \leftarrow a \times b = 3 \times 4 = 12$$

NOTICE the difference

$$(2x^3)^4 = 2x^3 \times 2x^3 \times 2x^3 \times 2x^3$$

The addition law applies ONLY to the powers. The integers still need to be multiplied

$$(2x^3)^4 = 16x^{12}$$

Standard form calculations

Addition and Subtraction

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

Method 1

$$\begin{aligned} 6 \times 10^5 + 8 \times 10^5 \\ &= 600000 + 800000 \\ &= 1400000 \\ &= 1.4 \times 10^6 \end{aligned}$$

Multiplication and division

$$\begin{aligned} \frac{1.5 \times 10^5}{0.3 \times 10^3} \\ &= \frac{1.5}{0.3} \times \frac{10^5}{10^3} \\ &= 5 \times 10^2 \end{aligned}$$

$$\begin{aligned} (1.5 \times 10^5) \div (0.3 \times 10^3) \\ &= 5 \times 10^2 \end{aligned}$$

Method 2

$$\begin{aligned} &= (6 + 8) \times 10^5 \\ &= 14 \times 10^5 \\ &= 1.4 \times 10^1 \times 10^5 \\ &= 1.4 \times 10^6 \end{aligned}$$

This is not the final answer

Division questions can look like this

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

Arithmetic/ Geometric sequences

Arithmetic Sequences change by a common difference. This is found by addition or subtraction between terms

Geometric Sequences change by a common ratio. This is found by multiplication/ division between terms

Term to term rule — how you get from one term (number in the sequence) to the next term

Position to term rule — take the rule and substitute in a position to find a term. E.g. Multiply the position number by 3 and then add 2

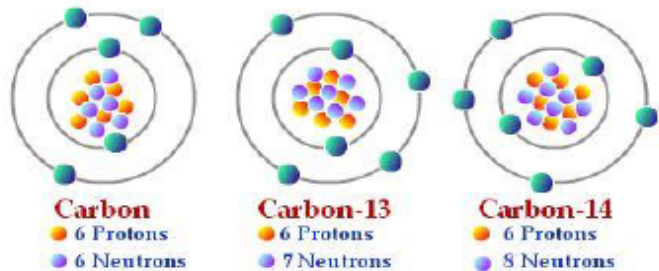
The structure of the atom and isotopes

You've already studied the structure of the atom – the small central nucleus surrounded by electrons – in the first chemistry topic. Go back and recap that first.

An important point about the shells, or energy levels, where electrons are found is that the energy level of an electron can *change*:

- Electrons move *up* an energy level with the **absorption** of a specific wavelength of EM radiation
- Electrons move *down* an energy level by **emitting** a specific wavelength of EM radiation.

Atoms of a particular element always have the same number of protons (the atomic number in the periodic table). However, they don't all have to have the same number of *neutrons* to be the same element. If the number of neutrons varies between atoms of an element (but number of protons stays the same), we call the atoms **isotopes** of the element. Look at the diagram for the example of three isotopes of carbon.

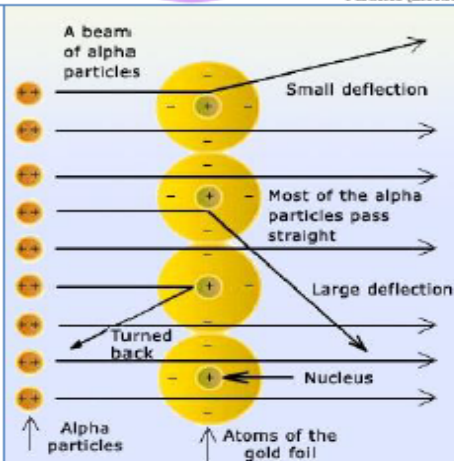
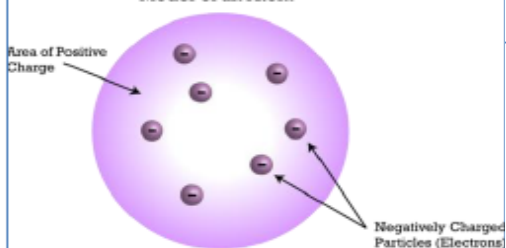


Radioactive decay

Some atomic nuclei are **unstable**. For instance, carbon-14 above is unstable. The nucleus will spontaneously and randomly change to become more stable. When the nucleus does this, it gives out nuclear radiation.

Since it is a random process, it is impossible to predict which particular nucleus will decay next. However, with a huge number of them, it is possible to measure the rate at which the whole source of radiation is decaying. This rate is measured in number of decays per second: the unit is the **becquerel (Bq)**. One Bq = 1 decay per second. This can be measured with a detector called a Geiger-Muller tube – in this case, 1 Bq = 1 count per second.

The Plum Pudding Model of an Atom



Key Terms	Definitions
isotopes	Isotopes of an element have the same number of protons but different numbers of neutrons in the nucleus.
energy level	The other name for electron 'shells'. Each energy level is a specific distance from the nucleus and holds a limited number of electrons.
radioactive decay	The process of an unstable nucleus becoming stable and giving out nuclear radiation in the process.
nuclear radiation	Types of radiation that come from the nucleus of atoms during decay. Four types: alpha, beta, gamma, and neutrons.

How the modern model of the atom was developed

The model of the atom that you know all about has changed over time. Here's a brief timeline:

1. Before electrons were discovered, atoms were thought of as simply **tiny, hard spheres** that couldn't be divided into smaller particles.
2. **Electrons** were discovered (which are smaller than atoms!), so the model was modified. The **plum pudding** model of the atom was described: the atom as a ball of positive charge with negative electrons embedded in it like pieces of fruit in a pudding (see diagram).
3. A famous experiment by the scientists **Rutherford** and **Marsden** showed that the plum pudding model was wrong. Particles named **alpha particles** (more on these later) were fired at a sheet of atoms and some rebounded, some were deflected and others went straight through (see diagram). This showed that atoms have a hard, very small concentration of mass in the centre – which was named the **nucleus**. It also showed that the nucleus was charged, and we now know that is due to the protons in the nucleus. This model, that you use, is sensibly called the **nuclear model** of the atom.
4. The nuclear model was further developed to include the idea that electrons orbit at specific distances from the nucleus: in energy levels. The key scientist presenting this model was **Niels Bohr**.
5. Next, the nucleus was investigated further. It was found that the nucleus can be split up, producing particles with an equally-sized positive charge. These particles are named '**protons**' – of course!
6. Then, in 1932, a scientist named **James Chadwick** proved that there were also uncharged particles in the nucleus. He called these particles '**neutrons**' as they are neutral: no charge. This was about 20 years after the nucleus had already been accepted as the right idea about atoms.

Types of nuclear radiation

As you've seen, the rate of decay is measured in Bq, or can be measured as the count rate in Bq. What it actually 'counts' is the amount of radiation hitting the detector each second. The radiation emitted from the nucleus thanks to radioactive decay can be:

- An **alpha particle** (symbol: α). An alpha particle is made of two protons and two neutrons (making it identical to the nucleus of helium atoms). Since there are four subatomic particles in one alpha particle, it has a mass number of 4. Since there are two protons in an alpha particle, it has a proton number of 2.
- A **beta particle** (symbol: β). A beta particle is a high speed electron. Beta particles are emitted during a type of radioactive decay where a neutron turns into a proton. This process also makes an electron, and electrons aren't 'allowed' in nuclei, so it gets fired out.
- A **gamma ray** (symbol: γ). Yes, the same wave as in the electromagnetic spectrum. It has a very high frequency and very short wavelength.
- A **neutron** (symbol: n). An uncharged particle – you know all about them already.

Alpha, beta and gamma

As well as being different in form, alpha, beta and gamma are also different in terms of how they behave after emission from a nucleus.

Type of nuclear radiation	Range in air	Penetrating power	Ionising power
Alpha	A few centimetres	Not very penetrating at all: absorbed by a thin sheet of paper.	Strongly ionising (as alpha particles are large and have a +2 charge)
Beta	A few metres	Fairly penetrating: completely absorbed by a sheet of aluminium 5mm thick.	Moderately ionising (as not as big as alpha particles and their charge is smaller, -1)
Gamma	Enormous distances	Penetrates most materials. Absorbed only by several metres of concrete or a thick sheet of lead.	Only weakly ionising.

Key Terms	Definitions
emission	Releasing or giving out. Nuclear radiation is emitted during radioactive decay.
penetration	Passing through a material. Different types of nuclear radiation can penetrate different materials, and are absorbed by certain materials.
ionisation	The process of making an ion by 'knocking off' electrons. Ionising radiation causes this, and can break up molecules into ions which go on to react with other chemicals. This is very dangerous in living organisms.

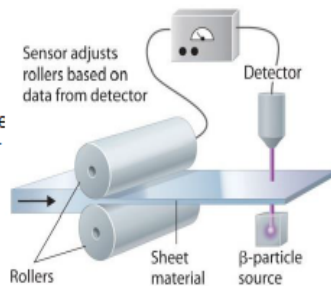
Using nuclear radiation

Nuclear radiation can be very useful. Here are some examples to know; notice that the type of nuclear radiation used depends on exactly what you need it for, so it links to the properties in the table opposite.

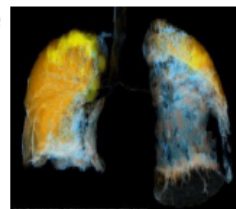
Radiotherapy: this is a treatment for cancer, using gamma rays. Gamma rays easily penetrate body tissues, so they can reach a tumour e.g. in the brain. The gamma rays can kill the cancer cells. However, since gamma rays are dangerous to healthy tissue, they use beams of gamma rays from many angles to the tumour, so healthy cells between source and tumour are not affected too badly.

Monitoring thickness of paper in a factory:

As the diagram shows, a beta source is used. This is because beta will pass through materials such as paper. The detector on the other side of the sheet will measure a lower count rate if the sheet gets too thick, and a higher count rate if it gets too thin. The rollers can be automatically adjusted to fix this.



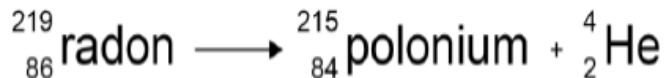
Medical diagnosis: sources of radiation can be taken into the body and the nuclear radiation monitored from the outside to give information about body function. Obviously, alpha is NOT suitable for this as it won't penetrate body tissues to get to the detector! For example, a radioactive xenon isotope can be inhaled to check lung function. On the image, the left lung isn't getting much air to the bottom parts.



Nuclear equations

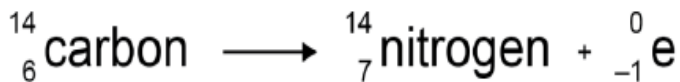
To show what happens to an atom when it radioactively decays, we use nuclear equations. In these equations, we represent alpha and beta particles as shown in the key terms table.

Recalling what an alpha particle actually is (2 protons and 2 neutrons), it is clear that a nucleus going through alpha decay loses 4 subatomic particles (so the mass number has to **decrease** by four). Two of those are *protons*, so the *atomic number* must decrease by 2. Here's an example:



This shows that a radon nucleus decays to produce a polonium nucleus and an alpha particle.

Beta decay results in a beta particle, and happens because a neutron turns into a proton and an electron. The electron is ejected from the nucleus. Since neutrons and protons have the same mass, the mass number does not change. However, there is an *extra proton*, so the atomic number must increase by one (therefore the charge of the nucleus increases by 1). Here's an example:



This shows that the carbon nucleus decays to produce a nitrogen nucleus and a beta particle.

NB: emission of a gamma ray DOES NOT cause any change to the mass or atomic number.

Radioactive contamination

It is vital to realise that being exposed to nuclear radiation DOES NOT make something radioactive! (Despite what comic books show.) We say the exposed material/object is **irradiated**, and it is dangerous for living cells, as you know.

So, **radioactive contamination** is NOT being exposed to nuclear radiation. It means getting unwanted radioactive materials onto other materials. For instance, spilling a powdered radioactive source onto clothes. This is dangerous because the radioactive material keeps on emitting nuclear radiation through nuclear decay, so it can keep on irradiating the thing it's on.

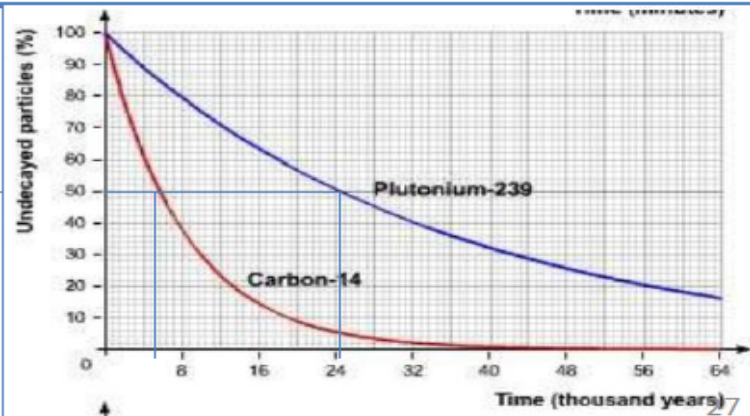
The hazards due to irradiation or contamination mean that *precautions* must be taken. For instance, the radioactive materials (e.g. uranium) used in nuclear power plant is only transferred, stored and used in containers that nuclear radiation can't penetrate. There is ongoing research by scientists into the effects of nuclear radiation on human health. Like all scientific findings, this research should be **published** and receive **peer review** – where other scientists check the methods and analysis performed, to make sure it is right!

Key Terms	Definitions
mass number	The total number of subatomic particles in the nucleus of an atom (protons + neutrons).
atomic number	The number of protons in the nucleus of an atom. In other words, the number of positive (+1) charges in the nucleus.
alpha particle	Can be represented with the symbol: ${}_2^4\text{He}$
beta particle	Can be represented with the symbol: ${}_{-1}^0\text{e}$
half-life	The half-life of a radioactive isotope is the average time it takes for the number of radioactive nuclei to halve. It can be also be measured as the time it takes for the count rate of the sample to decrease to half its starting count rate.

Half life

Radioactive decay is **random** – so you don't know which nucleus will decay next. However, with a **large number** of radioactive nuclei, the time it takes for **HALF** of them to decay *is* predictable. This differs depending on the particular isotope involved. This length of time is called a **half-life** (see definitions too). Plotting the number of radioactive nuclei OR the count rate against time makes half-life easy to find. Read off the time it takes for the number on the y-axis to decrease by a half. So, in this example, we can see that the half-life of carbon-14 is 5.5 thousand years, whereas the half-life of plutonium-239 is 24 thousand years.

The y-axis could also show count rate (Bq) – the shape of the graph would be identical





1. Metal oxides

Metals and oxygen	Metals react with oxygen to form metal oxides	magnesium + oxygen → magnesium oxide $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
Reduction	This is when oxygen is removed from a compound during a reaction	e.g. metal oxides reacting with hydrogen, extracting low reactivity metals
Oxidation	This is when oxygen is gained by a compound during a reaction	e.g. metals reacting with oxygen, rusting of iron

4. Oxidation and reduction

Oxidation and reduction in terms of electrons (HT ONLY)

Oxidation is Loss (of electrons)
Reduction is Gain (of electrons)

Ionic half equations (HT only)		
For displacement reactions	Ionic half equations show what happens to each of the reactants during reactions	<p>For example: The ionic equation for the reaction between iron and copper (II) ions is: $\text{Fe} + \text{Cu}^{2+} \rightarrow \text{Fe}^{2+} + \text{Cu}$</p> <p>The half-equation for iron (II) is: $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$</p> <p>The half-equation for copper (II) ions is: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$</p>

2. The reactivity series

Metals form positive ions when they react	The reactivity of a metal is related to its tendency to form positive ions	The reactivity series arranges metals in order of their reactivity (their tendency to form positive ions).
Carbon and hydrogen	Carbon and hydrogen are non-metals but are included in the reactivity series	These two non-metals are included in the reactivity series as they can be used to extract some metals from their ores, depending on their reactivity.
Displacement	A more reactive metal can displace a less reactive metal from a compound.	Silver nitrate + Sodium chloride → Sodium nitrate + Silver chloride

potassium most reactive K
sodium Na
calcium Ca
magnesium Mg
aluminium Al
carbon C
zinc Zn
iron Fe
tin Sn
lead Pb
hydrogen H
copper Cu
silver Ag
gold Au
platinum least reactive Pt

3. Extraction of metals and reduction

Extraction using carbon

Metals less reactive than carbon can be extracted from their oxides by reduction.

For example:
zinc oxide + carbon → zinc + carbon dioxide

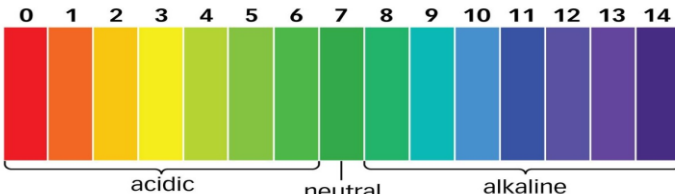
Unreactive metals, such as gold, are found in the Earth as the metal itself. They can be mined from the ground.

	Reactions with water	Reactions with acid
Group 1 metals	Reactions get more vigorous as you go down the group	Reactions get more vigorous as you go down the group
Group 2 metals	Do not react with water	Observable reactions include fizzing and temperature increases
Zinc, iron and copper	Do not react with water	Zinc and iron react slowly with acid. Copper does not react with acid.



<div>5. Reactions of acids and metals</div> <div>HT ONLY: Reactions between metals and acids are redox reactions as the metal donates electrons to the hydrogen ions. This displaces hydrogen as a gas while the metal ions are left in the solution.</div>			<div>6. Neutralisation of acids and salt production</div> <div>sodium hydroxide + hydrochloric acid → sodium chloride + water calcium carbonate + sulfuric acid → calcium sulfate, + carbon dioxide + water</div>		<table><tr><th>Acid name</th><th>Salt name</th></tr><tr><td>Hydrochloric acid</td><td>Chloride</td></tr><tr><td>Sulfuric acid</td><td>Sulfate</td></tr><tr><td>Nitric acid</td><td>Nitrate</td></tr></table>		Acid name	Salt name	Hydrochloric acid	Chloride	Sulfuric acid	Sulfate	Nitric acid	Nitrate
Acid name	Salt name													
Hydrochloric acid	Chloride													
Sulfuric acid	Sulfate													
Nitric acid	Nitrate													
Reactions with acids	metal + acid → metal salt + hydrogen	magnesium + hydrochloric acid → magnesium chloride + hydrogen zinc + sulfuric acid → zinc sulfate + hydrogen	Neutralisation	Acids can be neutralised by alkalis and bases	An alkali is a soluble base e.g. metal hydroxide. A base is a substance that neutralises an acid e.g. a soluble metal hydroxide or a metal oxide.									

6. Soluble salts	
Soluble salts	Soluble salts can be made from reacting acids with solid insoluble substances (e.g. metals, metal oxides, hydroxides and carbonates).
Production of soluble salts	Add the solid to the acid until no more dissolves. Filter off excess solid and then crystallise to produce solid salts.

7. The pH scale and neutralisation		In neutralisation reactions, hydrogen ions react with hydroxide ions to produce water: H ⁺ + OH ⁻ → H ₂ O
Acids	Acids produce hydrogen ions (H ⁺) in aqueous solutions.	
Alkalis	Aqueous solutions of alkalis contain hydroxide ions (OH ⁻).	
You can use universal indicator or a pH probe to measure the acidity or alkalinity of a solution against the pH scale.		

8. Titrations (Chemistry only)

Titration is used to work out the precise volumes of acid and alkali solutions that react with each other.



1. Use the pipette to add 25 cm³ of alkali to a conical flask and add a few drops of indicator.

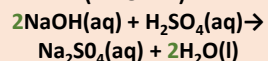


2. Fill the burette with acid and note the starting volume. Slowly add the acid from the burette to the alkali in the conical flask, swirling to mix.



Stop adding the acid when the end-point is reached (the appropriate colour change in the indicator opens). Note the final volume reading. Repeat steps 1 to 3 until you get consistent readings.

Calculating the chemical quantities in titrations involving concentrations in mol/dm³ and in g/dm³ (HT ONLY):



It takes 12.20cm³ of sulfuric acid to neutralise 24.00cm³ of sodium hydroxide solution, which has a concentration of 0.50mol/dm³.

Calculate the concentration of the sulfuric acid in g/dm³
 $0.5 \text{ mol/dm}^3 \times (24/1000) \text{ dm}^3 = 0.012 \text{ mol of NaOH}$

The equation shows that 2 mol of NaOH reacts with 1 mol of H₂SO₄, so the number of moles in 12.20cm³ of sulfuric acid is $(0.012/2) = 0.006 \text{ mol of sulfuric acid}$

Calculate the concentration of sulfuric acid in mol/ dm³
 $0.006 \text{ mol} \times (1000/12.2) \text{ dm}^3 = 0.49 \text{ mol/dm}^3$

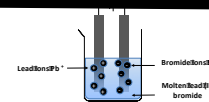
Calculate the concentration of sulfuric acid in g/ dm³
 $\text{H}_2\text{SO}_4 = (2 \times 1) + 32 + (4 \times 16) = 98 \text{ g}$
 $0.49 \times 98 \text{ g} = 48.2 \text{ g/dm}^3$

9. Strong and weak acids (HT ONLY)

Strong acids	<i>Completely ionised in aqueous solutions e.g. hydrochloric, nitric and sulfuric acids.</i>
Weak acids	<i>Only partially ionised in aqueous solutions e.g. ethanoic acid, citric acid.</i>
Hydrogen ion concentration	<i>As the pH decreases by one unit (becoming a stronger acid), the hydrogen ion concentration increases by a factor of 10.</i>

Process of electrolysis	<i>Splitting up using electricity</i>	When an ionic compound is melted or dissolved in water, the ions are free to move. These are then able to conduct electricity and are called electrolytes. Passing an electric current through electrolytes causes the ions to move to the electrodes.
Electrode	<i>Anode Cathode</i>	The positive electrode is called the anode. The negative electrode is called the cathode.
Where do the ions go?	<i>Cations Anions</i>	Cations are positive ions and they move to the negative cathode. Anions are negative ions and they move to the positive anode.
Higher tier: You can display what is happening at each electrode using half-equations: At the cathode: $\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}$ At the anode: $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$		

10. Electrolysis



At the negative electrode	Metal will be produced on the electrode if it is less reactive than hydrogen. Hydrogen will be produced if the metal is more reactive than hydrogen.
At the positive electrode	Oxygen is formed at positive electrode. If you have a halide ion (Cl ⁻ , I ⁻ , Br ⁻) then you will get chlorine, bromine or iodine formed at that electrode.
The ions discharged when an aqueous solution is electrolysed using inert electrodes depend on the relative reactivity of the elements involved.	
Extracting metals using electrolysis	<i>Metals can be extracted from molten compounds using electrolysis.</i>
	<i>This process is used when the metal is too reactive to be extracted by reduction with carbon.</i>
	<i>The process is expensive due to large amounts of energy needed to produce the electrical current. Example: aluminium is extracted in this way.</i>

Variation

Organisms vary, both organisms of different species (obviously) and organisms of the same species (also obviously!). Variation (differences) are caused by both genetic causes and environmental causes.

- Some differences are only due to **inherited** genes – they are entirely **genetic**;
- Some differences are only due to the conditions in which an organism developed and lives – they are entirely **environmental**;
- Some differences are due to a **combination** of genetic and environmental influences. In this case, we say the genome of an organism and its environment **interact** to affect the **phenotype** of the organism.

In most populations of most species of organism, there is a lot of genetic variation. The general term for versions of the same organism (i.e. different individuals of a species) is with different genetic information is **variants**. All variants arise from **mutations**. Mutations can be dangerous (remember your work on cancer, for instance), but usually have no effect. Sometimes, they have a beneficial effect. Overall:

- Mutations happen continuously;
- most mutations will not affect the phenotype at all;
- some will influence the phenotype (maybe change it a bit);
- very few mutations cause a total change in phenotype.

The last case is rare, but very important. If a mutation occurs that leads to a new phenotype, and the new phenotype makes the organism better suited to the environment, it will lead to a rather rapid change in the species, by **natural selection**.

Evolution by natural selection

Evolution is the change in inherited (genetic) characteristics of organisms over time. Many theories of evolution have been suggested, but Darwin's theory of natural selection is the one with by far the most evidence. Darwin noticed that all organisms produce more offspring than they need to replace themselves, and yet population sizes stay pretty steady from generation to generation. He also observed that all species show variation, and that life is tough for organisms – only the best adapted survive. So, based on these observations, we can explain evolution by natural selection like this:

1. A population of organisms shows variation – there are **variants** in the population
2. The organisms are in **competition** to survive
3. **Survival of the fittest** – only the variants with the phenotypes best suited to the environment get to survive
4. **Reproduction** – those who survive get to reproduce
5. **Genetic inheritance** – their offspring inherit the genes from their parents, so the successful phenotype becomes more common in the next generation. This continues from generation to generation.

Key Terms	Definitions
variation	Differences in the characteristics of individuals in a population.
genetic variation	Differences in the genome between individuals. This often causes differences in physical characteristics.
variants	Different versions of the same thing. Often this term is used to describe individuals who are different from others in a specific <u>genetic</u> way – for instance the 'long haired cat variant' from earlier.
mutation	A change to DNA. Mutations can cause a change in the sequence of amino acids being produced, affecting the protein being produced from the DNA code.
evolution	Change in the inherited characteristics of organisms over time. Evolution happens through natural selection .
natural selection	The process that changes the inherited characteristics of organisms over time. This explains the adaptations of organisms to their environment AND the formation of new species of organism.
common ancestor	An ancestor in common. For instance, if you have a sister, your granddad is a common ancestor to you both.

New species

The theory of evolution by natural selection tells us that all species of living things have evolved from a single, simple type of life form. We know this **common ancestor** was alive on Earth over three billion years ago. How we ended up with millions of different species from this single species is also explained by evolution by natural selection.

Essentially, two populations of one species (e.g. a population of fish is divided into two populations by geographical changes such as the joining of North and South America) can become two different species. This happens when the two populations become so different in their phenotypes that they can no longer **interbreed** to produce **fertile offspring**. This is the point when we define them as different species. For example, tigers and lions are different species (the population of their common ancestor has been separated for a long time) – they can interbreed (producing a liger), but ligers are infertile. So their parents are different species.

Evidence for evolution

There is a vast haul of evidence to support Darwin's theory of evolution by natural selection. This evidence has built up over time: for example, Darwin didn't know about genes so found it hard to explain inheritance from parents in full. Obviously, we've got this knowledge now.

Thanks to all this evidence, Darwin's theory for evolution is now very widely accepted. Two key bodies of evidence for you to know are: the fossil record, and the evolution of resistant bacteria.

Fossils

Fossils are the remains of organisms. They are always old, typically millions of years old, and are found in rocks. They can form by:

1. The organism or parts of the organism don't decay because the conditions are not right for decay by microorganisms. For example, mammoths have been preserved in frozen mud.
2. Parts of the organism are replaced by minerals from the surrounding rocks as they decay. Most often, this results in soft tissues (e.g. muscle, skin) *decaying* normally, but the form of bones is preserved by the minerals in bones being swapped for minerals from the *rocks/sediments* that the dead organisms were buried under.
3. Preserved traces of organisms – so not their actual bodies, but traces like footprints, droppings, burrows and the traces of roots.

As most fossils are formed from bones, and many early forms of life had **soft bodies** (no bones), there are few traces of early forms of life. Any traces there were tend to have been destroyed by geological activity (movements of tectonic plates, volcanic activity and so on). This means the fossil record is **incomplete** and scientists cannot be totally sure about the origin of life on Earth.

The fossil record helps scientists fill in timelines and **evolutionary trees** to show how life has changed over time on Earth. Using evolutionary trees shows the closeness of relationships between different species.

Extinction

Extinctions of a species can happen for many reasons, and often extinction is due to more than one factor working together. Some key factors that may contribute to extinction of a species:

- Development of **new** species, so the old species doesn't exist any more
- **New** diseases affecting a species, which they aren't adapted to and can't survive
- **New** predators, to which a species cannot adapt fast enough to survive
- **Changes** to the environment, to which the species cannot adapt by natural selection, including **catastrophic** events (like the meteor strike that caused extinction of loads of species, e.g. dinosaurs)
- **New** competitors that are better adapted to the environment than the species.

Key Terms	Definitions
fossil	The remains of organisms from millions of years ago, found in rocks. They are formed in different ways – see main text.
strain	A variant of microorganism within a species – so they are not a different species to other variants, but have a key difference in their phenotype (e.g. being resistant to an antibiotic). New strains are produced by mutations .
resistant strain	Describes a variant form of bacteria with resistance (NOT immunity) to a specific antibiotic.
MRSA	An example of a resistant strain of bacteria. It stands for methicillin resistant <i>Staphylococcus aureus</i> .
extinction	When NO individuals of a species remain alive.
evolutionary tree	A timeline that shows how closely related different species are to each other.

Resistant bacteria

The key factor that affects the rate of evolution is how fast an organism reproduces. Bacteria can reproduce as fast as doubling every 20 minutes, so they can evolve rapidly.

Thanks to a **mutation**, strains of bacteria that are **resistant** to an antibiotic can emerge. These are **NOT** killed by antibiotics used to try to kill them when the bacteria has infected someone. Consequently, they **survive** and **reproduce**, so the size of the resistant strain population **increases** generation to generation, while the non-resistant strain is wiped out. Furthermore, the resistant strain is likely to spread because if it infects other people and:

- They are not immune to it
- And there is no effective treatment.

Society benefits if we **reduce** the rate of development of antibiotic resistant strains of bacteria. Some methods to help save the day:

- Antibiotics should not be prescribed by doctors where they are not needed (especially for viral infections, since antibiotics don't work on viruses).
- Patients need to **finish the full course** of antibiotics they get prescribed, reducing the chance of any surviving and mutating to form resistant strains.
- **Restrict the use of antibiotics in agriculture**, as at present many animals receive antibiotics all the time to prevent infections and encourage growth.

We also badly need new antibiotics. However, it is slow and expensive to develop new antibiotic drugs, and at the moment we are not keeping up with the emergence of resistant strains of bacteria.

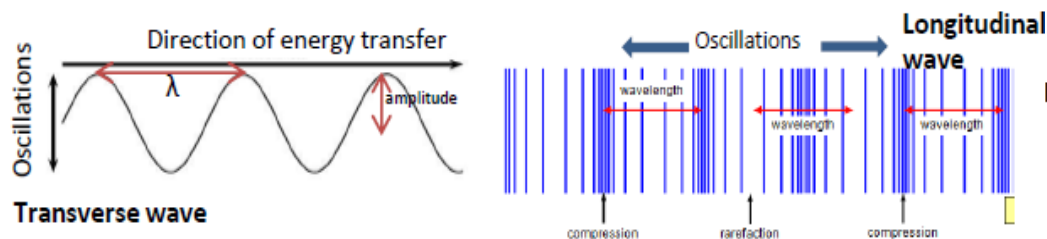
Types Of Wave

You can see waves easily in the sea, or if a tap is dripping into a sink of water. However, waves are far more common than just that. Waves can be **mechanical**, which means they involve particles moving, or **oscillating**, such as waves in the sea or sound waves in the air. Or, they can be **electromagnetic**, which don't involve any particles oscillating – instead, EM waves involve vibrations or oscillations of the electromagnetic field. All waves involve the transfer of energy.

The other way of defining types of wave is whether they are **longitudinal** or **transverse**. Which one they are depends on the direction of the oscillations compared to the direction of energy transfer by the wave.

- In **transverse waves**, the oscillations are **perpendicular** to the direction of energy transfer.
- In **longitudinal waves**, the oscillations are **parallel** to the direction of energy transfer. They show areas of **compression** and **rarefaction** – see diagram.

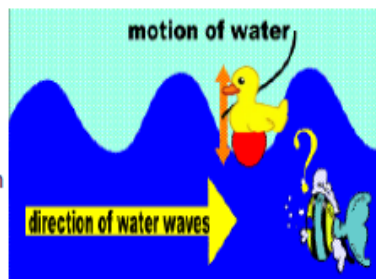
Examples: ALL electromagnetic waves are transverse. Mechanical waves can be either longitudinal or transverse. For instance: sound waves are mechanical and are longitudinal. Ripples in water are mechanical waves, and are transverse.



Particles Don't Travel, But The Wave Does. Particles Just Oscillate.

An easy way to see that the particles aren't travelling but the wave is (so energy is being transferred): put a rubber duck in a tank of water where waves are moving across. The duck goes up and down, just like the water particles (oscillations perpendicular to direction of energy transfer, remember), while the waves move across.

With longitudinal waves, you can tell the particles aren't flowing either – just oscillate. When you speak, you don't breathe into someone else's ear! Also, when a tuning fork is vibrating to produce a sound wave, it doesn't create a vacuum around it due to air particles travelling away.



Key Terms	Definitions
wave	A wave transfers energy from one place to another, and can also carry information. All waves involve movements or oscillations , allowing energy to be transferred without particles having to flow or travel from one place to another.
oscillations	Rhythmic back and forth movements from a rest position (e.g. vibrations). These movements are of particles in mechanical waves , or of the electromagnetic field when it comes to electromagnetic waves .
perpendicular	At right angles to.
amplitude	The amplitude of a wave is the maximum displacement of a point on the wave from the undisturbed position. <i>Translated:</i> the distance from a peak or trough to the 'midline' of the wave.
wavelength	The distance from a point on one wave to the equivalent point on the next wave along. This is easiest to measure at the distance from the centre of one area of compression to the next (longitudinal waves) or the distance from peak to peak (transverse waves). Symbol: λ
frequency	The frequency of a wave is the number of complete waves that pass a point per second. Symbol: f
period	The period, or time period, of a wave is the time it takes to complete a full wave. Symbol: T

Equation	Meanings of terms in equation
$T = \frac{1}{f}$	T = time period (seconds, s) f = frequency (hertz, Hz)
$v = f\lambda$	v = wave speed (m/s) f = frequency (Hz) λ = wavelength (metres, m)

The Wave Equation

The equation is directly above. You could measure the speed of sound in air, with a long distance between you and a friend. They make a loud noise (you start your clock when you see them do it) and you time how long it takes to get to you. Just use distance/time to calculate the speed.

Electromagnetic Waves (EM Waves)

EM waves are always **transverse waves**. They transfer energy from the source of the waves to an **absorber** – object that absorbs the wave. EM waves occur all over the universe naturally, and we can produce them ourselves for all sorts of uses.

EM waves all travel at the **same velocity** through empty space (a vacuum) – at what we call the **speed of light**. However, the wavelength of EM waves varies from a few kilometres to wavelengths even smaller than an atom. The EM waves form a **continuous spectrum**, but for convenience we've grouped the infinite types of waves into seven groups of wavelengths, based on their properties. Learn the order of EM waves in the EM spectrum. Notice that a **longer** wavelength equates to a **lower** frequency and vice versa – this is clear from the wave equation.

Long wavelength —————→ Short wavelength

Radio waves	Microwaves	Infrared	Visible light	Ultraviolet	X-rays	Gamma rays
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Low frequency —————→ High frequency

Visible light is the only kind of EM wave we can detect with our eyes (hence the name). Thus, we can only detect a limited range of EM waves without special equipment. However, it is easy to understand examples of how EM waves transfer energy. If you are standing in front of a fire, you feel the warmth thanks to infrared. Getting sunburn is due to the transfer of energy by ultraviolet waves from the Sun. Using Wi-Fi means a transfer of energy by microwaves.

Properties Of EM Waves

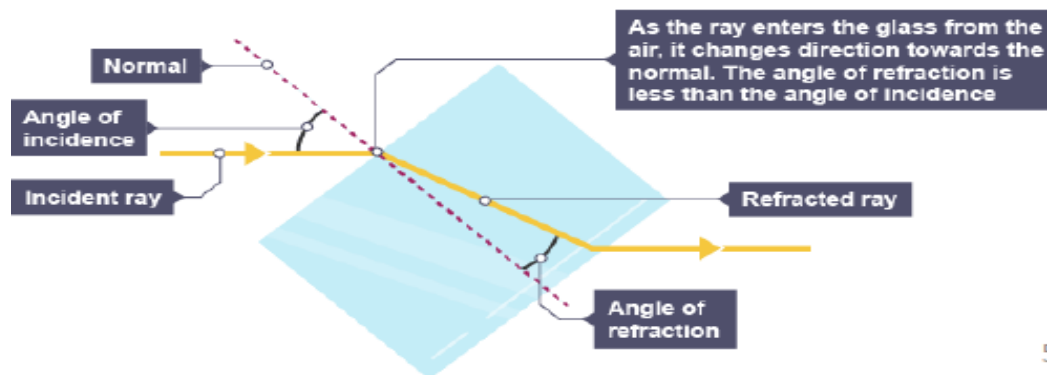
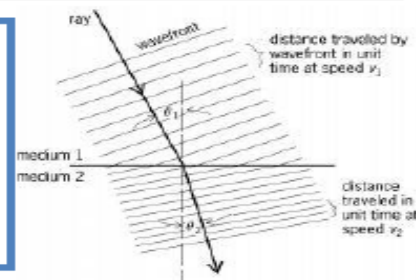
All EM waves can be **reflected**, **refracted**, **absorbed** or **transmitted** depending on the wavelength of the EM wave and the **medium** they are travelling through, or surface they are reaching.

Refraction occurs when a wave changes the medium it is travelling through. Refraction is a change in direction of the wave, and it happens at the boundary, or junction, between the media – for instance, the surface of a sheet of glass would be the boundary between the glass and the air. You need to be able to draw diagrams to show refraction, like the example opposite. Notice that the light ray refracts **towards** the normal as it enters the glass (this is because it slows down), and refracts **away** from the normal as it leaves the glass (it speeds back up), ending up parallel to the original ray in air.

Key Terms	Definitions
reflection	Rebounding of a wave from a surface. The angle between the incident (in-going) wave and the normal is the same as the angle between the reflected wave and the normal.
refraction	Changing direction of a wave due to a change in the medium it is travelling through.
absorption	'Taking in' energy from a wave and transferring it to another form, usually heat. For instance, you warming up if you lie in the sunshine (revising science, of course).
transmission	A wave travelling through a material. Right now, visible light waves are being transmitted through the air to your eyes.
media	<i>Singular 'medium'</i> . The medium is the material through which a wave travels.
normal	A 'construction line' (made up line to help with diagram drawing) at right angles to a surface at the point where the wave hits the surface.

HT: More On Refraction

Refraction is due to differences in the velocity of the waves in different media. The diagram shown here represents the **wave fronts**. The wave slows down as it enters medium 2, but the near edge slows first. The other end is faster, as it is still in medium 1. This is what causes the 'bending' of the wave towards the normal.



Electromagnetic Waves (EM Waves): Producing Them

EM waves can be generated by changes in atoms or the nuclei of atoms. For instance, gamma rays are produced due to changes in the nucleus of an atom (nuclear decay – more on this in a later topic).

HT: radio waves can be produced by oscillations in electrical circuits. This is how a TV/radio broadcast is produced. It is received (e.g. by your TV aerial) by another electrical circuit; the radio waves create an alternating current with the same frequency as the radio wave itself. More on alternating current in the electricity topic – but it is enough to say for now that it involves oscillations.

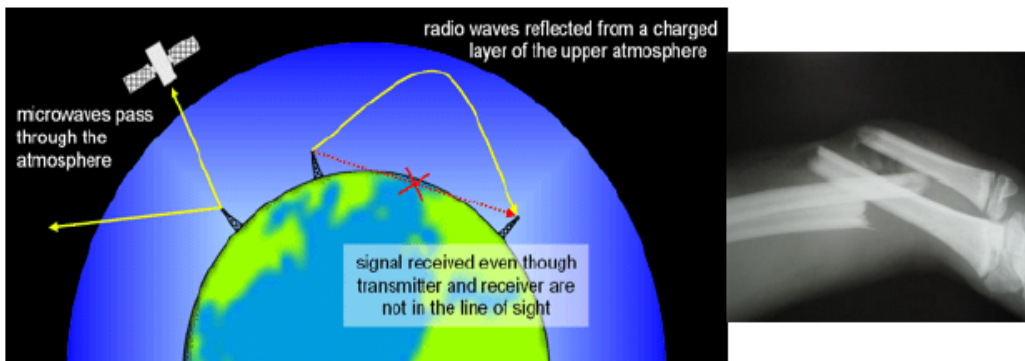
Dangers Of EM Waves

Ultraviolet waves, X-rays and gamma rays are potentially dangerous types of EM waves, since they can have hazardous effects on human tissues. How severe the effects are depends on the type of radiation and the size of the dose received.

Doses of radiation are measured according to how great the risk of harm to the body is. The radiation dose, or danger due to **exposure** to radiation, is measured in **sieverts (Sv)**.

A specific risk due to exposure to ultraviolet waves: they cause skin to prematurely age and increase the risk of skin cancer.

X-rays and gamma rays are **ionising** types of radiation. This means they can damage DNA, causing mutations and therefore increasing the risk of cancer.



Key Terms	Definitions
radiation dose	The risk of harm due to exposure to radiation.
exposure	Receiving and absorbing radiation (by the body).
sievert	The measure of radiation dose. As with the usual prefix: 1000 millisieverts (mSv) = 1 sievert (Sv)
ionising	Describes radiation that forms ions by 'knocking' electrons off atoms to make ions.
cancer	Type of disease caused by specific mutations to DNA, resulting in cells dividing out of control (making a tumour).

Applications Using EM Waves

It is not exaggerating to say that EM waves dominate our technology and our lives. Here are some examples to learn of the practical applications of EM waves:

- **Radio waves:** used for *television, radio* and Bluetooth. A signal carried by radio waves can get from a transmitting mast to a receiver by being reflected off a layer in the atmosphere.
- **Microwaves:** obviously, cooking food, but also communication with *satellites* and *mobile phones*; Wi-Fi internet. Unlike radio waves, microwaves can pass through the atmosphere (see diagram bottom left). In microwave ovens, the microwaves cause the water particles in the food to vibrate, heating it up.
- **Infrared:** electrical heaters, cooking food, infrared cameras. All objects emit infrared, but hotter objects emit more. An infrared camera detects infrared instead of visible light, so it can see hotter objects in the dark – night vision.
- **Visible light:** *fibre optic communication* (like the best broadband). Optical fibres reflect pulses of light all the way along their length. The pulses of light transmit the information.
- **Ultraviolet:** *sun tanning beds*... however, look at the dangers of UV in the other box.
- **X-rays:** both medical imaging for *diagnosis* (like broken bones) and medical *treatments*. X-rays can pass through soft tissue (like muscle), but not bone. That's why an X-ray image works to show up bones, and any breaks.
- **Gamma rays:** used in medical treatments such as radiotherapy.

Number	Key term	Definition
1	Fieldwork	The process of investigation to find an answer to a question.
2	Enquiry	The process of investigation to find an answer to a question.
3	Primary Data	Fieldwork data which you collected yourself (or as part of group) which are first hand information.
4	Secondary Data	Data that has been collected by someone else. They are important for giving background information and context to your enquiry.
5	Census	The census is a once-in-a-decade survey that gives us the most accurate estimate of all the people and households in England and Wales. It is produced by the Office for National Statistics
6	ONS	The office for national statistics
7	IMD	Index of multiple deprivation.
8	Sample size	This is how many measurements you will take.

Number	Key term	Definition
9	Survey locations/sites	Where the data will be collected.
10	Accuracy	How accurate your data is.
11	Quantitative data.	Numerical data
12	Random sampling	Where samples are chosen fairly randomly, and every person in the questionnaires, for example, has equal chance of being selected.
13	Systematic sampling.	A system is used to work out how to collect data. For example, every 20 meters or paces along a road to record land use.
14	Stratified.	Collecting a sample that is made up of different parts; for example, deliberately selecting samples of different people within the town/city so you include the whole range of people found there.
15	Qualitative	Data that includes techniques that don't involve numbers or counting.
16	Continuous Data	Shows change along a line of study.
17	Categories	Show classification of data.

Number	Key term	Definition
18	Aerial photos	Photos taken from above
19	GIS	Geographic Information System i.e. Google Maps
20	Cartographic	Maps
21	Annotated Photographs	Photographs with written descriptions on them,
22	Anomalies	Unusual data/ doesn't fit the trend.
23	Mean	The average value in the data
24	Median	To find the median you need to order the data and then find the middle value. This divides the data into two halves
25	Mode	The number that appears most frequently in a data set.
26	Range	The difference between the highest and lowest values
27	Quartiles	Dividing a list of numbers into four equal groups- two above and two below the median.

Number	Key term	Definition
28	Primary Methods	The techniques you/ your group used.
29	Secondary methods	How did you decide what secondary data to use and how did you decide what not to use.
30	Data representation	How you represent your data i.e. different types of graphs, annotated photographs, field sketches etc.
31	Analysis	What patterns can you identify from data and why might those patterns exist?
32	Evaluation	What went well with your fieldwork and what could have gone better/ you do better if you had more time and resources.
33	Transect	A transect is a line following a route along which a survey or observations are made
34	Social Media	Social media is an excellent source to use to find the opinions of people about your area- Blogs, Instagram, Twitter etc.
35	New Media	Newspapers and online news especially local newspapers like the News Shopper can give a good local perspectives on events/issues/peoples' opinions.

Context	
1	There was much religious change under the Tudors and Elizabeth had to find a way of dealing with these issues. Many people objected to Elizabeth's coronation in 1558 and she faced questions over her legitimacy, with many preferring Mary Queen of Scots, and whether a woman could rule effectively.
Key events	
2	1532 Start of the English Reformation.
3	1556-58 Dutch Revolt against Spanish.
4	1558 Elizabeth's accession.
5	1559 Mary Queen of Scots became Queen of France.
6	1559 Treaty of Cateau-Cambresis – England had to return Calais to France.
7	1559 Religious Settlement and visitations commenced.
8	1556 Pope issued an instruction that English Catholics should not attend Church of England services.
9	1560 Elizabeth helped Scottish Protestant lords defeat Mary of Guise. Treaty of Edinburgh.
10	1562 Religious war in France.
11	1563 Philip II banned import of English cloth into Netherlands.
12	1567 Elizabeth allows Dutch Sea Beggars to shelter in English harbours.
13	1568 Genoese Loan
14	1568 Mary Queen of Scots fled to Scotland and then arrives in England.
15	1569 Revolt of the Northern Earls,
Key Concepts	
16	Society and Government was very structured and hierarchical. The monarch had much power.
17	Elizabeth's accession caused controversy as her gender, legitimacy and religion were questioned.
18	Religion – Elizabeth imposed her Religious Settlement but this upset many English and foreign Catholics and some wanted Mary Queen of Scots to replace Elizabeth.
19	Financial problems – When Elizabeth took the throne the Crown was £300,000 in debt.
20	Foreign powers opposed to Protestantism remained an issue for Elizabeth, especially Scotland, France and Spain.

Key Words		
20	Nobility	Belonging to the aristocracy. Those who held a title
21	Gentry	People of a high social class.
22	Yeomen	Men who held a small amount of land or an estate.
23	Tenant farmers	Farmed rented land usually owned by yeomen or gentry.
24	Merchants	Traders.
25	Professionals	Lawyers and doctors.
26	Craftsmen	Skilled employees.
27	Extraordinary taxation	Occasional, additional taxation to pay for unexpected expenses, especially war.
28	Militia	A military force of ordinary people, rather than soldiers, raised in an emergency.
29	Privy council	Advisors to Elizabeth.
30	Justices of the Peace	Large landowners who kept law and order.
31	Patronage	To provide someone with an important job or position.
32	Secretary of State	Elizabeth's most important Privy Counsellor.
33	Crown	Refers to the monarch and their government.
34	Divine Right	Belief that the monarch's right to rule came from God.
35	Royal Prerogative	Elizabeth could insist that Parliament did not talk about certain issues.
36	Succession	The issue of who was going to succeed the throne after the existing monarch died.
37	Legitimate	Being born in wedlock when the existing king and queen were married.
38	Customs duties	Taxes from trade.
39	Auld Alliance	A Friendship between France and Scotland.
40	Puritans	Radical Protestants.

41	Ecclesiastical	An adjective used to describe things to do with the Church.
42	Act of Supremacy	Made Elizabeth supreme governor of the Church of England.
43	Act of Uniformity	Established the appearance of churches and the form of services they held.
44	Royal Injunctions	A set of instructions to reinforce the acts of Supremacy and Uniformity.
45	Recusants	Catholics who were unwilling to attend church services laid down by the Elizabethan religious settlement.
46	Visitations	Inspections of churches and clergy by bishops to ensure that the Act of Supremacy was being followed.
47	Papacy	The system of church government ruled by the Pope.
48	Heretics	People who refused to follow the religion of the monarch.
49	Martyr	Someone who dies for their religious beliefs.
50	Counter Reformation	The campaign against Protestantism.
51	Philip II	Catholic King of Spain.
52	Trade embargo	When governments ban trade with another country.
53	Excommunicated	Expulsion from the Catholic Church.
54	Sea Beggars	Dutch rebels who fled to the water.
55	Genoese Loan	When Elizabeth took gold loaned to Philip II by the bankers of Genoa.

Early Challenges	
56	Legitimacy- Her father Henry VIII divorced his first wife without permission of the Pope. This meant his marriage to Elizabeth's mother Anne Boleyn was invalid. This meant Elizabeth was illegitimate.
57	Marriage- Elizabeth was expected to marry quickly because women were thought not strong enough to rule alone, she would need a husband to help control the nobles and she needed to produce an heir to provide stability after she died.
58	Invasion- Danger of invasion from powerful foreign countries... • <i>France</i> —England was already at war with Catholic France. France had close ties with Mary, Queen of Scots. • <i>Scotland, *Spain</i> —Wealthy & powerful, strongly Catholic.



Challenges to Elizabeth at Home and Abroad 1569-88

1	Elizabeth faced many serious threats both within England and from abroad. Many still wanted Mary Queen of Scots on the throne. Philip II of Spain also wanted to remove Elizabeth from the throne. Spain and England were religious and political rivals. There was particular tension when Drake tried to challenge Spanish dominance in the New World.
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Key events

2	1492 Discovery of the New World
3	1567 Spanish travel to Netherlands to crush Protestant revolt.
4	1568 Mary Queen of Scots arrives in England
5	1569 Revolt of the Northern Earls
6	1570 Elizabeth excommunicated
7	1571 The Ridolfi Plot
8	1572 Elizabeth hired Drake as a privateer
9	1576 Spanish Fury and Pacification of Ghent
10	1577-80 Drake circumnavigated the globe.
11	1583 Throckmorton Plot
12	1584 Treaty of Joinville
13	1585 Act of Preservation of the Queen's Safety/Treaty of Nonsuch
14	1586 Babington Plot
15	1587 Mary Queen of Scots executed
16	1587 Attack on Cadiz

Key Words 1588 Spanish Armada

21	New World	North and South America.
22	Revolt of the Northern Earls	When northern earls encouraged Catholics to rebel.
23	Ann Percy	Wife of Thomas Percy.
24	Jane Neville	Wife of James Neville and Duke of Norfolk's sister.
25	Mary Queen of Scots	Supported the plan to marry the Duke of Norfolk.
26	Thomas Howard, Duke of Norfolk	One of England's most senior nobles and a Protestant.
27	Charles Neville, Earl of Westmorland	Duke of Norfolk's brother in law and from an important Catholic family.
28	Thomas Percy, Earl of Northumberland	Had been important under previous monarchs, but as a Catholic he had been side-lined.
29	James Pilkington	Appointed Archbishop of Durham.
30	Civil War	A war between people in the same country.

31	Conspiracy	A secret plan with the aim of doing something illegal.
32	Papal Bull	A written order by the Pope.
33	Council of the North	Used to implement Elizabeth's laws and authority in the North of England.
34	Ridolfi Plot	Plan to murder Elizabeth, launch a Spanish attack and put Mary Queen of Scots on the throne.
35	Priest holes	Secret hiding places for Catholic priests.
36	Hanged, drawn and quartered	A type of punishment used when the accused was found guilty of high treason. The accused would be hanged until near dead, cut open, have their intestines removed and were finally chopped into four pieces.
37	Throckmorton Plot	Plan for the French Duke of Guise to invade England, free Mary, overthrow Elizabeth and restore Catholicism in England.

38	Sir Francis Walsingham	Elizabeth's Secretary of State.
39	Babington Plot	The Duke of Guise would invade England and put Mary on the throne.
40	Act of Preservation of the Queen's Safety	In the event of Elizabeth's assassination, Mary would be banned from the succession.
41	Agents provocateurs	Agents who become part of groups suspected of wrongdoing and encourage other members to break the law so that potential threats can be identified and arrested.
42	Foreign Policy	The aims or objectives that guide a nation's relations with other states.
43	Privateer	Individuals with their own armed ships that capture other ships for their cargo, often with the support and authorisation of the government.
44	Francis Drake	Elizabeth hired him as a privateer.
45	Circumnavigate	To travel all the way around the world.
46	Autonomy	The right to self government, so people of one country can manage its own affairs.
47	Spanish Fury	The Spanish rampaged through Dutch provinces as they left.
48	Pacification of Ghent	Spanish troops expelled from Netherlands, political autonomy to be returned and end of religious persecution.
49	Mercenary	A soldier who fights for money rather than a nation or a cause.
50	Treaty of Joinville	The King of France and the King of Spain became allies against Protestantism.
51	Treaty of Nonsuch	Effectively put England and Spain at war.
52	Singeing of the King of Spain's beard	Drake sailed into Cadiz harbour, Spain's most important Atlantic port, and over 3 days destroyed 30 ships.
53	Tilbury Speech	Elizabeth's famous speech to her troops before the Armada.








Elizabethan Society in the Age of Exploration 1558-88	
1	Elizabeth's reign was a time of expansion with growth in many different areas of society and life.
Key events	
2	1563 Statute of Artificers
3	1570 Norwich Survey
4	1572 Vagabonds Act
5	1576 Poor Relief Act
6	1580 Drake returns from circumnavigating the globe with spices, treasure and tales of Nova Albion.
7	1584 Raleigh begins planning new colonisation attempt by sending a fact finding mission to Virginia.
8	1585 Colonists set sail for North America and begin the English colonisation of Virginia.
9	1586 Surviving colonists abandon Virginia and return to England
10	1587 New group of colonists arrive in Virginia and establish colony at Roanoke
11	1590 English sailors arrive at Roanoke only to find it abandoned
Key Concepts	
12	Education – Expanded during Elizabeth's reign but it was expensive and mostly for boys. The large majority of people were illiterate.
13	Pastimes – Theatre thrived. Elizabethan leisure was similar to modern day but sport was much more violent.
14	Population Growth – During the reign of Elizabeth, population grew by as much as 35%. Food prices rose, wages fell and enclosure brought problems. The urban poor grew and poverty was a real problem.
15	Exploration by Drake led to conflict with Spain over the New World.
16	Attitudes – Unemployment was recognised as a genuine issue.
17	Poverty was an issue that Elizabeth wanted to address.

Key Words		
18	Social mobility	Being able to change your position in society.
19	Humanists	Believed that learning was important in its own right and not for just practical reasons.
20	Grammar schools	Private schools set up for boys considered bright who largely came from well off families in towns.
21	Corporal punishment	Punishment which causes physical pain.

22	Apprentice	Someone learning a trade or a skill.
23	Petty schools	Set up in a teacher's home. For boys.
24	Dame schools	Set up in a teacher's home. For girls.
25	Pastimes	Activities for leisure.
26	Mystery plays	Plays based on the Bible and saints' stories.
27	Globe	Shakespeare's theatre.
28	Alms	Charity
29	Poor relief	Financial help.
30	Itinerants	People who had moved from their home parishes looking for work.
31	Enclosure	The process of replacing large, open fields that were farmed by villages with individual fields belonging to one person.
32	Rural depopulation	When the population of the countryside falls as people move away in search of a better life.
33	Subsistence farming	Growing just enough to feed the family but not to sell.
34	Vagabonds	Homeless people without jobs who roamed the countryside begging for money or perhaps committing crimes in order to survive.
35	Economic recession	When a fall in demand leads to falling prices and businesses losing money.

36	Deserving poor	People unable to work because of illness or old age.
37	Idle poor	People who were fit to work but didn't.
38	Triangular trade	Route from Europe to Africa to the Americas.
39	Quadrant/ Astrolabe	Used by sailors to help with navigation at sea.
40	Cartographer	Map maker.
41	Galleons	Ships that were much larger than traditional trading ships.
42	Colonies	Land under the control or influence of another country.
43	Monopoly	When one person or company controls the supply of something.
44	Nova Albion	Region named by Drake, probably north of modern day San Francisco.
45	Walter Raleigh	Explorer who encouraged colonists to Virginia.
46	Barter	To exchange goods for other goods.
47	Manteo and Wanchese	Two native American Indians who came back to England.
48	Native Americans	People who lived in the New World before the colonists.

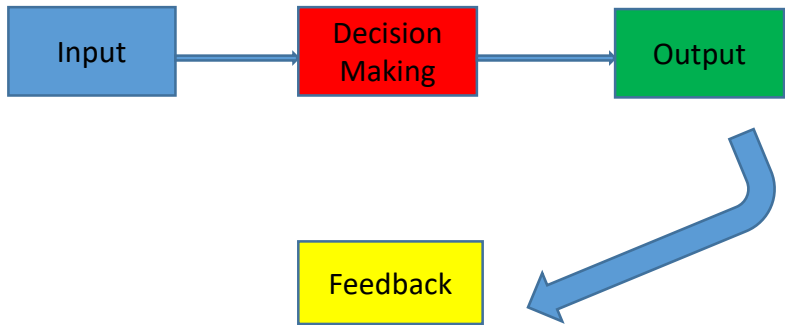
Key Ideas

<p>Religious Views on Sexuality</p> 	<p>Sexual Orientation</p> <ul style="list-style-type: none"> - The Roman Catholic church teaches that sex between people of the same gender is 'disordered' - They argue that homosexual relationships are banned by the Bible - Liberal Christians teach that Jesus wanted people to love each other and show mercy and that we should be accepting of homosexuals - Gay marriage is banned in the Catholic Church and Church of England - <i>"Do not have sexual relations with a man as one does with a woman"</i> – Leviticus 18:22 	<p>Adultery and Sex Outside Marriage</p> <ul style="list-style-type: none"> - Roman Catholics argue that all sex before marriage and after a divorce is unacceptable. Sex should only take place inside a marriage which is a lifelong, loving relationship. - Adultery means the act of having sex with someone who is not your husband or wife. - It is prohibited by the Bible and Christians argue it is wrong as it undermines marriage involves lies and secrecy. - <i>"You shall not commit adultery"</i> – Exodus 20:14
<p>Artificial Contraception</p> 	<ul style="list-style-type: none"> - Artificial contraception means using something to stop yourself from getting pregnant. This could be a condom, the pill or a device like the coil. - Family planning means using the natural cycle of fertility which women go through to predict when a woman would be least fertile. It is much less effective than artificial contraception. - God tells Adam and Eve (the first couple) to <i>"be fruitful and multiply"</i> (Genesis 1:2) which encourages them to have children. ☑ The Catholic Church argues that all sexual acts inside marriage must be open to procreation (having babies) and that a baby is a gift from God. They may use family planning as it is a natural method. ☑ The Church of England argues that contraception should be allowed so that couples can take time and consider if they want to have children. 	
<p>Marriage and Divorce</p> 	<ul style="list-style-type: none"> - Marriage is a religious and legal ceremony in which two people make vows (promises) in front of their friends and family and (if in a church) in front of God - During the ceremony you agree to be together for life saying <i>"till death do us part"</i> (Marriage Ceremony) - Divorce is the legal break-up of a marriage. It is legal in the UK and many marriages currently end in divorce. - Many Christians do not like it as it is seen to break the promises made in a marriage. ☑ The Catholic Church do not support divorce. They believe that sex after divorce is a form of adultery and you cannot get remarried in a Catholic Church once you have been divorced. Jesus says <i>"if a man divorces his wife [...] he involves her in adultery"</i> (Matthew 5:32) ☑ The Church of England accepts divorce, especially if it is for reasons of abuse but you have to receive special permission to get remarried in a church. They might see it as a merciful option. 	
<p>Family</p> 	<p>Types of Family</p> <ul style="list-style-type: none"> - Nuclear Family is a family with a mother, father and children – some Christians argue this is the ideal - Extended Family is a family where grandparents and other relatives are involved - Single Parent Family this is a family where one parent brings up the child 	<p>Purpose of the Family</p> <ul style="list-style-type: none"> - Procreation – the family should be for the purpose of having and bringing up children - Stability – the family should be for providing a secure, stable environment for children - Faith – the family should be a way of bringing children up as good Christians
<p>Gender</p> 	<ul style="list-style-type: none"> - Gender equality means that men and women should be equal and given the same rights and opportunities as each other - In the UK women can face gender prejudice and discrimination where they are not treated equality - The Catholic Church argues that women have a special role as mothers and they do not allow women to be priests - The Church of England has allowed women priests since 1994 	

Key Words

Adultery	Having sex with someone who is not your husband or wife, outside of marriage
Artificial Contraception	Methods of preventing pregnancy e.g. condoms, the pill, the coil
Cohabitation	Living and starting a family with someone who you are not married to
Divorce	The legal ending of a marriage
Family Planning	Using a woman's natural cycle of fertility to try and avoid pregnancy
Gender Discrimination	Acting against people based on their gender
Gender Prejudice	Holding biased opinions about people based on their gender
Heterosexual	Sexual attraction to the opposite gender
Homosexual	Sexual attraction to the same gender
Marriage	A legal and religious ceremony joining two people together in love
Procreation	Bringing babies into the world
Remarriage	Marrying someone else after divorce

The Information Processing Model



✓ You will need to be able to draw this model giving an example from sport

SMART Targets

What targets could you set yourself?

SPECIFIC – Specific to the demands of the sport/muscles used/movements involved.

MEASUREABLE– It must be possible to measure whether it has been achieved.

ACCEPTED – It must be accepted or agreed by the performer and the performer’s coach.

REALISTIC – It must be actually possible to complete the goal, that the person is physically and mentally capable.

TIME-BOUND– It must be set over a fixed amount of time

Types of Aggression

Types of aggression – Think about situations in sport that would be either direct or indirect?

Direct aggression – where there is **physical** contact between performers. They **deliberately** inflict **harm** upon the opponent.

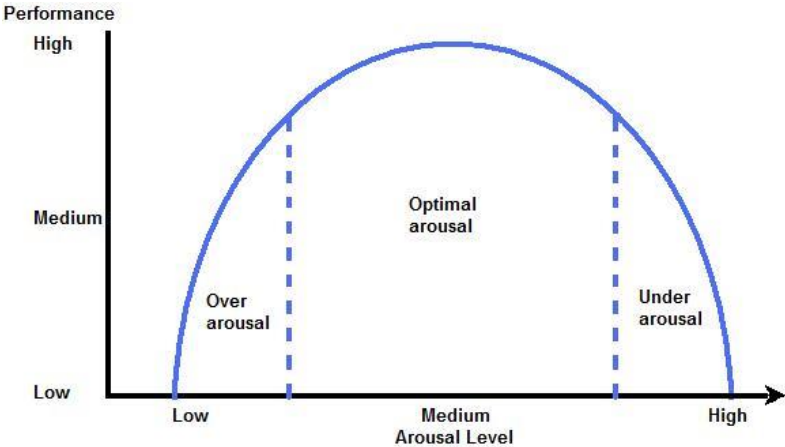
E.g. a high tackle in rugby, a boxer punching opponent below the belt.

Indirect aggression – does not involve physical contact. The aggressive act is taken out on **an object** to gain an advantage over an opponent. They act **WITHIN** the rules of the game.

E.g. smashing a badminton shuttle very hard, Serving a fast forehand return in tennis.

Activity	Direct or Indirect?
A tennis player smashes a return	
A sailor cuts across an opponent’s sailing line	
A netball player deliberately sticks her elbows out to catch an opponent’s face	
A hockey player tackles an opponent, swiping legs with their stick	
A football player tackles a player makes contact with the ball and wins possession.	
A rugby player tackles another player off the pitch at knee height.	

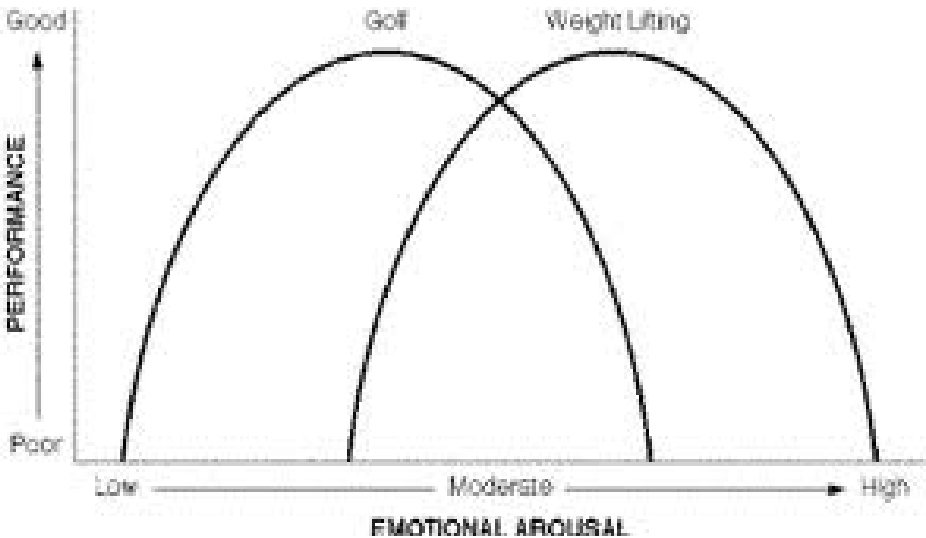
THE INVERTED U THEORY



Can you describe the relationship between arousal and performance?

Key Words for Paper 2 – Can you define these words?

- Arousal Complex skill Performance goals SMART targets
- Visual guidance Verbal guidance Knowledge of results
- Mental Rehearsal Visualisation, Aggression Positive self-talk
- Extrinsic motivation Feedback Information processing model



Fine and gross skills determine the level of arousal needed to perform that skill well.
Q) List as many sports as you can on the scale of arousal.

Activity

Direct or Indirect?

- A tennis player smashes a return
- A sailor cuts across an opponent's sailing line
- A netball player deliberately sticks her elbows out to catch an opponent's face
- A hockey player tackles an opponent, swiping legs with their stick
- A football player tackles a player makes contact with the ball and wins possession.
- A rugby player tackles another player off the pitch at knee height.

LO1: Know the personal qualities, styles, roles and responsibilities associated with effective sports leadership	
<p>1. What is leadership? It can be defined as the action of leading a group of people. However, being a leader has distinctive requirements. Leaders hold responsibility and respect and have followers who they can influence.</p>	<p>4. Personal qualities that relate to leadership roles: Sports Leaders must be punctual for training and reliable in attendance. They must be able to communicate with the people they are leading and be fair to everyone. They must have the confidence to instruct and the charisma or charm to persuade and motivate. Sports leaders must be creative when designing sessions for their group and knowledgeable about the activity, its skills, techniques and specific requirements</p>
<p>2. Different leadership roles:</p> <ul style="list-style-type: none"> • Captains: Help to make decisions for their team and influence and motivate those around them. • Managers: Help to manage the processes and procedures, tactics and strategies that a team or sports performer uses. • Teachers: Are in apposition of authority and subsequently have the opportunity to lead and guide those they are teaching. • Coaches: Influence those who they coach. Their leadership role is to guide and help performers in order to eradicate weaknesses and maximize strengths. • Expedition leaders: Influence those in the expedition and often need to help others to lead and to take on responsibilities. • Role models: They can be positive or negative. However, there is a general belief that sportspeople should act as positive role models to the general public, leading and guiding other sports performers in how to conduct themselves. 	<p>5. Leadership Styles:</p> <p>Democratic - Leaders consult the group when they make decisions.</p> <p>Autocratic - Leaders do not value opinions of others. They do not ask for opinions or welcome suggestions. They are the sole leader and therefore make all decisions.</p> <p>Leiszez-faire - It is a leadership style which the leader does not intervene and allows the activity to follow its own, natural course.</p>
	LO2: Be able to plan sports activity session
<p>3. Role-related responsibilities:</p> <ul style="list-style-type: none"> • Knowledge of activity - Any sporting leader must fully understand the activity and know the rules so that can enforce the rules during play. • Enthusiasm for activity - A sports leader has to show an appropriate amount of motivation and enthusiasm for the activity they are leading. • Knowledge of safety - The prime concern of anyone in a position of responsibility should be the safety of those involved • Knowledge of child protection issues - Safeguarding, or protecting children from harm, is a major consideration for any sporting leader. • Knowledge of basic first aid - Sports Leaders have often attended first aid awareness training to enable them to use basic first aid in the event someone getting injured. 	<p>1. Things to consider when planning your session:</p> <ul style="list-style-type: none"> • Who are you going to teach? (year 4, year 5, year 6, year 7) • What are you going to teach them? (Sport, skill, what game?) • When are you planning to teach your session? (Date, time) • Where are you going to teach? (i.e. sports hall, field, gym) • Why are you planning? (To help you when put your leadership skills into practice and to make sure the session goes well) • How are you going to break up the session? (Warm up, main activity x2, cool down) <p>2. Safety considerations when planning sports activities:</p> <ul style="list-style-type: none"> • Risk assessments (e.g. facilities, equipment/clothing checks, activity-specific risks) • Corrective action (e.g. wiping up puddles, removing litter, reporting faulty equipment) • Emergency procedures (e.g. procedures in the event of an accident, procedures in the event of other emergencies, summoning qualified help, completion of relevant documents).

1	Algorithms	understand what an algorithm is, what algorithms are used for and be able to interpret algorithms (flowcharts, pseudo code, written descriptions, program code)	Python -> English	
2	Flowcharts	understand how to create an algorithm to solve a particular problem, making use of programming constructs (sequence, selection, iteration) and using appropriate conventions (flowchart, pseudo code, written description, draft program code)	<code>print("hello!")</code>	Prints a value on screen (in this case, hello!)
			<code>input("x")</code>	Inputs a value into the computer.
			<code>x = input("x")</code>	Inputs a value and stores it into the variable x.
			<code>x = int(input("x"))</code>	Inputs a value into x, whilst also making it into an integer.
			<code>answer = x + y</code>	Saves the result of x and y added together in a variable named answer.
3	Pseudo code	understand the purpose of a given algorithm and how an algorithm works	<code>print(str(x))</code>	Prints the variable x, but converts it into a string first.
			<code>print("Hello", "World")</code>	Prints the two strings concatenated with a space between. This code would output "Hello World".
4	Interpreting Algorithms	understand how to determine the correct output of an algorithm for a given set of data	<code>age = 12</code> <code>print("Age: " + str(age))</code>	The + joins together two variables when printing. Str has to be used to cast age to be a string. This code will output "Age: 12".
			<code>if name == "Fred":</code>	Decides whether the variable 'name' has a value which is equal to 'Fred'.
5	Errors in algorithms	understand how to code an algorithm in a high-level language	<code>else:</code>	The other option if the conditions for an if statement are not met (eg. name = 'Bob' when it should be Fred)
			<code>elif name == "Tim":</code>	elif (short for else if) is for when the first if condition is not met, but you want to specify another option.
6		understand how the choice of algorithm is influenced by the data structures and data values that need to be manipulated	<code># COMMENT</code>	# is used to make comments in code – any line which starts with a # will be ignored when the program runs. They are used to describe the code to a programmer.
7	Programming	be able to write programs in a high-level programming language	<code>for i in range(0,10):</code> <code># WRITE CODE HERE</code>	Repeats any code indented after this line a set number of times, in this case, 10.
			<code>while x < 10:</code> <code># WRITE CODE HERE</code>	Repeats any code indented after this line until a condition is met, in this case x becoming equal to or greater than 10.
8	Python	understand the benefit of producing programs that are easy to read and be able to use techniques (comments, descriptive names (variables, constants, subprograms), indentation) to improve readability and to explain how the code works	<code>list = ["x", "y"]</code>	Creates a variable and makes it an array – a list which can store many values.
9	Errors in code	be able to differentiate between types of error in programs (logic, syntax, runtime)	<pre>def hello(name): print("Hello " + name + " nice to meet you") hello("Alice") hello("Bob") hello("Sue")</pre>	
10	Trace Table	be able to determine what value a variable will hold at a given point in a program (trace table)		

Variables and arrays		
Syntax	Explanation of syntax	Example
SET Variable TO <value>	Assigns a value to a variable.	SET Counter TO 0 SET MyString TO 'Hello world'
SET Variable TO <expression>	Computes the value of an expression and assigns to a variable.	SET Sum TO Score + 10 SET Size TO LENGTH(Word)
SET Array[index] TO <value>	Assigns a value to an element of a one-dimensional array.	SET ArrayClass[1] TO 'Ann' SET ArrayMarks[3] TO 56
SET Array TO [<value>, ...]	Initialises a one-dimensional array with a set of values.	SET ArrayValues TO [1, 2, 3, 4, 5]
SET Array [RowIndex, ColumnIndex] TO <value>	Assigns a value to an element of a two dimensional array.	SET ArrayClassMarks[2,4] TO 92

Selection		
Syntax	Explanation of syntax	Example
IF <expression> THEN <command> END IF	If <expression> is true then command is executed.	IF Answer = 10 THEN SET Score TO Score + 1 END IF
IF <expression> THEN <command> ELSE <command> END IF	If <expression> is true then first <command> is executed, otherwise second <command> is executed.	IF Answer = 'correct' THEN SEND 'Well done' TO DISPLAY ELSE SEND 'Try again' TO DISPLAY END IF

Subprograms		
Syntax	Explanation of syntax	Example
PROCEDURE <id> (<parameter>, ...) BEGIN PROCEDURE <command> END PROCEDURE	Defines a procedure.	PROCEDURE CalculateAverage (Mark1, Mark2, Mark3) BEGIN PROCEDURE SET Avg to (Mark1 + Mark2 + Mark3)/3 END PROCEDURE
FUNCTION <id> (<parameter>, ...) BEGIN FUNCTION <command> RETURN <expression> END FUNCTION	Defines a function.	FUNCTION AddMarks (Mark1, Mark2, Mark3) BEGIN FUNCTION SET Total to (Mark1 + Mark2 + Mark3)/3 RETURN Total END FUNCTION
<id> (<parameter>, ...)	Calls a procedure or a function.	Add (FirstMark, SecondMark)

Arithmetic operators	
Symbol	Description
+	Add
-	Subtract
/	Divide
*	Multiply
^	Exponent
MOD	Modulo
DIV	Integer division

Relational operators	
Symbol	Description
=	equal to
<>	not equal to
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to

Repetition		
Syntax	Explanation of syntax	Example
WHILE <condition> DO <command> END WHILE	Pre-conditioned loop. Executes <command> whilst <condition> is true.	WHILE Flag = 0 DO SEND 'All well' TO DISPLAY END WHILE
REPEAT <command> UNTIL <expression>	Post-conditioned loop. Executes <command> until <condition> is true. The loop must execute at least once.	REPEAT SET Go TO Go + 1 UNTIL Go = 10
REPEAT <expression> TIMES <command> END REPEAT	Count controlled loop. The number of times <command> is executed is determined by the expression.	REPEAT 100-Number TIMES SEND '*' TO DISPLAY END REPEAT
FOR <id> FROM <expression> TO <expression> DO <command> END FOR	Count controlled loop. Executes <command> a fixed number of times.	FOR Index FROM 1 TO 10 DO SEND ArrayNumbers[Index] TO DISPLAY END FOR
FOR <id> FROM <expression> TO <expression> STEP <expression> DO <command> END FOR	Count controlled loop using a step.	FOR Index FROM 1 TO 500 STEP 25 DO SEND Index TO DISPLAY END FOR
FOR EACH <id> FROM <expression> DO <command> END FOREACH	Count controlled loop. Executes for each element of an array.	SET WordsArray TO ['The', 'Sky', 'is', 'grey'] SET Sentence to '' FOR EACH Word FROM WordsUArray DO SET Sentence TO Sentence & Word & ' ' END FOREACH

Syntax	Explanation of syntax	Example
SEND <expression> TO DISPLAY	Sends output to the screen.	SEND 'Have a good day.' TO DISPLAY
RECEIVE <identifier> FROM (type) <device>	Reads input of specified type.	RECEIVE Name FROM (STRING) KEYBOARD RECEIVE LengthOfJourney FROM (INTEGER) CARD_READER RECEIVE YesNo FROM (CHARACTER) CARD_READER

File handling		
Syntax	Explanation of syntax	Example
READ <File> <record>	Reads in a record from a <file> and assigns to a <variable>. Each READ statement reads a record from the file.	READ MyFile.doc Record
WRITE <File> <record>	Writes a record to a file. Each WRITE statement writes a record to the file.	WRITE MyFile.doc Answer1, Answer2, 'xyz 01'

Memory: Find out the purpose

Effect on Performance of

Random Access Memory (RAM) (Volatile)

Faster **RAM** can improve communication speed with the processor and decrease load times.

Read Only Memory (ROM)(Non-volatile)

Increasing the amount of **ROM** in a system could reduce the amount of a program that is installed on a slower disk or other external memory device. It could also be used to store lookup tables that might otherwise be created in RAM which can slow down a program's execution.

Virtual memory: The operating system makes part of the storage drive available to use as **RAM**.

... It copies the data back into **RAM** when the process is needed again. Using **virtual memory** slows the **computer** down because copying to a hard disk takes much longer than reading and writing **RAM**.

Flash memory: Flash memory, also known as flash storage, is a type of **nonvolatile memory** that erases data in units called **blocks** and rewrites data at the byte level. Flash memory is widely used for storage and data transfer in consumer devices, enterprise systems and industrial applications. Flash memory retains data for an extended period of time, regardless of whether a flash-equipped device is powered on or off.

Read/Write operations: **Write** caching lets your **computer** store data in a cache before it is written to the hard drive. Because a **computer** can **write** data to a cache much more quickly than to a hard drive, the overall **read/write performance** of the hard drive is improved. Remember, however, that data in a cache is only temporary.

Features affecting performance:: Clock speed (MHz, GHz)

A PC **clock speed** is normally in the gigahertz region. That is a billion cycles per second. Typical **speeds** are two to four gigahertz. The faster the **clock speed**, the faster the instructions can be processed by the **processor**.

Cache Memory




Cache plays the greatest part in improving the **performance** of the processors. The larger the **cache** size, the faster the data transfer and the better the CPU **performance**.

Multiple cores

This means that a **processor** can be up to **two** or four times faster than a normal **processor**. However the actual speed of the **processor** is dependent on the software that's being run. Not **all** software will take advantage of the quad and dual **cores**.

Binary logic

- Why binary? (transistors) Computers use **binary** - the digits 0 and 1 - to store data. ... The circuits in a computer's processor are made up of billions of **transistors**. A **transistor** is a tiny switch that is activated by the electronic signals it receives. The digits 1 and 0 used in **binary** reflect the on and off states of a **transistor**.

Name	Graphic Symbol	Algebraic Function	Truth Table															
AND		$F = A \cdot B$ or $F = AB$	<table><tr><th>A</th><th>B</th><th>F</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	A	B	F	0	0	0	0	1	0	1	0	0	1	1	1
A	B	F																
0	0	0																
0	1	0																
1	0	0																
1	1	1																
OR		$F = A + B$	<table><tr><th>A</th><th>B</th><th>F</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	A	B	F	0	0	0	0	1	1	1	0	1	1	1	1
A	B	F																
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NOT		$F = \bar{A}$ or $F = A'$	<table><tr><th>A</th><th>F</th></tr><tr><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td></tr></table>	A	F	0	1	1	0									
A	F																	
0	1																	
1	0																	

Central processing unit (CPU) – what are the following?

Arithmetic & logic unit: An arithmetic-logic unit (ALU) is the part of a computer **processor (CPU)** that carries out arithmetic and logic operations on the **operands** in computer **instruction words**. In some processors, the ALU is divided into two units, an arithmetic unit (AU) and a logic unit (LU).

Control Unit (CU): A control unit (CU) handles all **processor** control signals. It directs all input and output flow, fetches code for instructions from microprograms and directs other units and models by providing control and timing signals. A CU component is considered the processor brain because it issues orders to just about everything and ensures correct instruction execution.

Registers (Memory Unit): A register may hold an **instruction**, a storage address, or any kind of data (such as a bit sequence or individual characters). Some instructions specify registers as part of the instruction. For example, an instruction may specify that the contents of two defined registers be added together and then placed in a specified register.

Fetch-Decode-Execute: The **fetch execute cycle** is the basic operation (instruction) cycle of a computer (also known as the fetch decode execute cycle). During the fetch execute cycle, the computer retrieves a program instruction from its memory. It then establishes and carries out the actions that are required for that instruction.

The cycle of fetching, decoding, and executing an instruction is continually repeated by the **CPU** whilst the computer is turned on.

Buses and their Purposes: The **CPU** sits on the motherboard (also called the logic board). **Buses** are circuits on the motherboard that connect the **CPU** to other components. There are many **buses** on the motherboard. A **bus** moves instructions and data around the system.

The Boot Sequence: **Boot sequence** is the **order** in which a computer searches for nonvolatile data storage devices containing program code to load the operating system (OS).

Hardware: research and list examples of the following;

Input devices (moves data in)

Keyboard, Mouse, Touch screen
Microphone, Camera, Sensor

Bar code scanner, Foot mouse, Accelerometer, GPS, Braille keyboard

Process devices

Storage devices List them for primary and secondary storage devices:

Output devices (moves data out) Monitor, Printer, Plotter, Speakers, Actuators, LEDs

PRIMARY STORAGE VERSUS SECONDARY STORAGE

It refers to the main memory such as the random access memory (RAM).

It refers to auxiliary memory, external memory or secondary memory.

It holds data or instructions that are currently in use.

It is used to store and retrieve data or information on a long-term basis.

It is a volatile memory.

It is a non-volatile memory.

Data is directly accessed by the CPU.

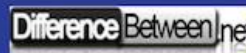
Data is not directly accessed by the CPU.

Data is lost when the device loses power.

Data is intact even when the device loses power.

Common examples of primary storage include RAM, ROM, and cache memory.

Common examples of secondary storage include HDD, CD, DVD, floppy disks, flash drives, etc.



Programming Software

Editors / IDEs

Text **editors** and integrated development environments (**IDEs**) are applications for writing code.

Translators

Computers only understand machine code (binary), this is an issue because programmers prefer to use a variety of high and low-level programming languages instead. To get around the issue, the high-level and low-level program code (source code) needs to pass through a translator. A translator will convert the source code into machine code (object code).

There are several types of translator programs, each able to perform different tasks.

Compiler

Compilers are used to translate a program written in a high-level language into machine code (object code). Once compiled (all in one go), the translated program file can then be directly used by the computer and is independently executable.

Interpreter

Interpreters read, translate and execute one statement at a time from high-level language source code.

An interpreter stops when a line of code is reached that contains an error.

Assembler

An assembler is a type of computer program that interprets software programs written in assembly language into machine language, code and instructions that can be executed by a computer.

Pros and Cons of different Translators

Here are some **advantages** of the Compiler: The whole **program** is validated so there are no system errors. The executable file is enhanced by the compiler, so it runs faster. User do not have to run the **program** on the same machine it was created.

Security

Malware (malicious software (viruses) **malicious Software** refers to any **malicious** program that causes harm to a computer system or network. **Malicious Malware Software** attacks a computer or network in the form of viruses, worms, Trojans, spyware, adware or rootkits.

Patching: **Patch (computing)** ... A **patch** is a set of changes to a **computer** program or its supporting data designed to update, fix, or improve it. This includes fixing security vulnerabilities and other bugs, with such **patches** usually being called bug fixes or bug fixes, and improving the functionality, usability or performance.

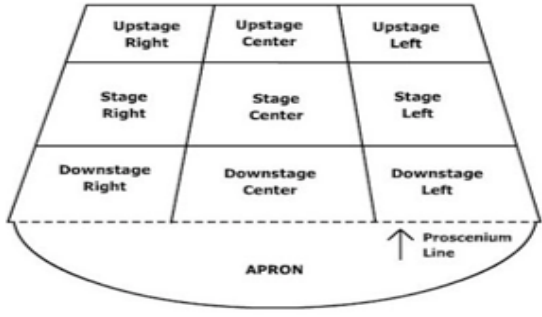
Authentication: **Authentication**. In **computing**, **authentication** is the process of verifying the identity of a person or device. A common example is entering a username and password when you log in to a website.

Access Levels: In **computer** science and **computer** programming, **access level** denotes the set of permissions or restrictions provided to a data type. ... The two most common **access levels** are public and private, which denote, respectively; **permission** across the entire program scope, or **permission** only within the corresponding class.

Encryption: Encryption is used to scramble information so that it can be sent safely without anyone else being able to read it. The information is encrypted with a password or key that is needed to read the information again. If you visit a website on the internet that starts with 'https://' then this means that all of the information you are looking at or sending is being securely encrypted. Sign of encryption is Secure socket layer. It is important when transmitting data over a network that it is kept secure. Encryption encodes data so that only those who have the encryption key or **password** can decrypt it.

Caesar cipher: The Caesar **cipher** is one of the earliest known and simplest ciphers. It is a type of **substitution** cipher in which each letter in the text is 'shifted' a certain number of places down the alphabet. For example, with a shift of 1, A would be replaced by B, B would become C, and so on. The method is named after Julius Caesar, who apparently used it to communicate with his generals.

Section 1: Response to Stimulus	Section 2: Development and Collaboration	Section 3: Analysis and Evaluation
<p>In your devising log, you will be asked to write about the stimuli that your teacher presented to you and the stimulus you chose. You will need to explain the following:</p> <ul style="list-style-type: none"> Your first response to the stimuli. The different ideas, themes and settings you considered and how and why you reached your final decision. What you discovered from your research What your own dramatic aims and intentions are (for example, if you are a performer what you want to achieve in your portrayal of your character). What the dramatic aims and intentions of the piece were (for example what theme might your piece explore or what message would you deliver?). 	<p>Working with others and developing ideas are a part of the pleasure of drama, but these can also be difficult. Make sure that throughout the process you are contributing and meeting your responsibilities. For your devising log, you need to explain:</p> <ul style="list-style-type: none"> How you developed and refined your ideas and those of others with whom you worked. How you developed the piece in rehearsals. How you developed AND refined your own theatrical skills (performance or design) during the devising process. How you responded to feedback. How you used your refined theatrical skills in the final piece. 	<p>Section 3 of your devising log provides you with the opportunity to show your skills at analysing and evaluating your devised work.</p> <div data-bbox="1336 249 1937 449"> <p>Key Words</p> <p>To 'analyse' is to identify and investigate.</p> <p>To 'evaluate' is to assess the different approaches used and formulate judgments. For example "This was successful because... or this could be improved by"</p> </div> <ul style="list-style-type: none"> You need to include: How far you developed your theatrical skills. The benefits you brought to the pair/group and the way in which you helped to shape the final piece. The overall impact you personally had on the devising, rehearsal and performance. <p>You could also, if appropriate, consider the areas of the devising that didn't go as well as you had hoped or could have been further developed. In order to write concisely about how well you succeeded, you need to be very clear about what you hoped to achieve.</p>
<p>Assessment Criteria – Response to Stimulus</p> <ul style="list-style-type: none"> The explanations given in the Devising log evidence excellent skills in creating and developing ideas to communicate meaning. There is evidence of a highly developed and highly creative response to the stimulus. The explanation is very clear and points are comprehensively explored. Precise details are provided throughout. 	<p>Assessment Criteria – Development and Collaboration</p> <ul style="list-style-type: none"> The explanations given in the Devising log evidence excellent skills in creating and developing ideas to communicate meaning. There is evidence of extensive and highly effective development and refinement of skills and the piece. The explanation is very clear and points are comprehensively explored. Precise details are provided throughout. 	<p>Assessment Criteria – Evaluation</p> <ul style="list-style-type: none"> Response demonstrates highly developed skills in identifying and investigating how far they developed their theatrical skills and how successfully they contributed to the devising process and to the final devised piece (analysis). Response demonstrates highly developed skills in assessing the merit of different approaches and formulating judgements about the overall impact they had as an individual (evaluation). Response is critical and insightful. Points are comprehensively explored and supported in depth with thorough exemplification.





Theatrical Terminology	Devising Log Checklist																																																				
<p>Have you been using the key words? Check as this will increase your grades.</p> <table border="0"> <tr> <td>General</td><td>Genre</td></tr> <tr> <td>Antagonist</td><td>Documentary Theatre</td></tr> <tr> <td>Anti-climax</td><td>Naturalism</td></tr> <tr> <td>Aside</td><td>(Stanislavski)</td></tr> <tr> <td>Blackout</td><td>Non Naturalism</td></tr> <tr> <td>Character</td><td>(Brecht)</td></tr> <tr> <td>Character Interaction</td><td>Physical Theatre</td></tr> <tr> <td>Character Motivation</td><td>Theatre in Education</td></tr> <tr> <td>Chorus</td><td></td></tr> <tr> <td>Climax</td><td>Rehearsal Techniques</td></tr> <tr> <td>Communal Voice</td><td>Bigger Bigger Bigger</td></tr> <tr> <td>Costume</td><td>Conscience Corridor</td></tr> <tr> <td>Mood and Atmosphere</td><td>Hot-Seating</td></tr> <tr> <td>Cross Cutting</td><td>Inner Thoughts</td></tr> <tr> <td>Flashbacks</td><td>Role on the Wall</td></tr> <tr> <td>Forth Wall</td><td></td></tr> <tr> <td>Forum Theatre</td><td>Stage Types</td></tr> <tr> <td>Freeze Frame</td><td>End on</td></tr> <tr> <td>Genre</td><td>In the round</td></tr> <tr> <td>Improvisation</td><td>Arena</td></tr> <tr> <td>Narration</td><td>Thrust</td></tr> <tr> <td>Props</td><td>Traverse</td></tr> <tr> <td>Protagonist</td><td>Promenade</td></tr> <tr> <td>Split Screen</td><td>Proscenium Arch</td></tr> <tr> <td>Structure</td><td></td></tr> <tr> <td>Sub-Text</td><td></td></tr> </table> 	General	Genre	Antagonist	Documentary Theatre	Anti-climax	Naturalism	Aside	(Stanislavski)	Blackout	Non Naturalism	Character	(Brecht)	Character Interaction	Physical Theatre	Character Motivation	Theatre in Education	Chorus		Climax	Rehearsal Techniques	Communal Voice	Bigger Bigger Bigger	Costume	Conscience Corridor	Mood and Atmosphere	Hot-Seating	Cross Cutting	Inner Thoughts	Flashbacks	Role on the Wall	Forth Wall		Forum Theatre	Stage Types	Freeze Frame	End on	Genre	In the round	Improvisation	Arena	Narration	Thrust	Props	Traverse	Protagonist	Promenade	Split Screen	Proscenium Arch	Structure		Sub-Text		<p>As you are preparing your devising log, keep checking it against the following checklist:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Have I written three sections with appropriate headings? <input type="checkbox"/> Are the sections roughly the same length? <input type="checkbox"/> Have I stayed within the final word count? <input type="checkbox"/> Have I provided evidence of research? <input type="checkbox"/> Have I stated my dramatic aims AND intentions? <input type="checkbox"/> Have I shown how I developed and refined my ideas? <input type="checkbox"/> Have I explained how I helped the group? <input type="checkbox"/> Have I shown how I responded to feedback? <input type="checkbox"/> Have I demonstrated that I have developed my theatrical skills? <input type="checkbox"/> Have I explained how I positively shaped the final piece? <input type="checkbox"/> Have I used correct theatrical terms to explain my thoughts? <input type="checkbox"/> Have I given specific examples to back up my points? <input type="checkbox"/> Have I analysed and evaluated my work?
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Musicals		Exploring Songs and Music from the Stage		
<p>A. What makes up a Musical?</p> <p>Every Musical has a:</p> <ul style="list-style-type: none">• LIBRETTO – the overall text including the spoken and sung parts• LYRICS – the words to the song <p>There are different types of song within a Musical including:</p> <ul style="list-style-type: none">• ACTION SONGS – which move the plot forward• CHARACTER SONGS – which enable a character to express their feelings and often have LYRICAL MELODIES and are designed enable the singer to “show off” their vocal skills. <p>Within these two types of songs, different song types can be found including:</p> <ul style="list-style-type: none">• BALLADS – which are usually slow, romantic and reflective• COMEDY SONGS – which are funny, to the lyrics are very important• PRODUCTION NUMBERS – which involve the full company and are used to show major changes in location or plot, and often open and close ACTS.• RHYTHM SONGS – are driven by energetic rhythmic patterns <p>The singers in Musicals are normally accompanied by a live BAND or ORCHESTRA (which are often ‘hidden from view’ of the audience in the orchestra pit) which are made up of a range of traditional orchestral instruments combined with modern electronic instruments (e.g. electric guitars, synthesisers and keyboards and drum kits) to give a wide variety of sounds and effects to accompany the on-stage action.</p> <p>Sometimes, a particular song from a Musical becomes more famous than others and is often performed “out of context” as a stand-alone number.</p>	<p>B. What is Musical Theatre?</p> <p>Musical theatre combines music, songs, spoken dialogue and dance; also called ‘MUSICALS’, they are usually performed in theatres. Musicals set out to entertain through a combination of:</p> <ul style="list-style-type: none">• Catchy music in a popular style• SOLO SONGS, DUETS, CHORUSES and ENSEMBLES.• ORCHESTRA or BAND ACCOMPANIMENT• Spoken dialogue• Dance sequences, stage spectacles and magnificent costumes <p>These are held together by the PLOT or STORYLINE which is divided into ACTS and SCENES. A summary or outline of the plot of a Musical is called a SYNOPSIS. Musicals are usually performed in theatres, most famously on Broadway and in the West End of London. “Broadway” is also used as a general term to refer to American Musicals</p>	<p>C. Voices and Voice Types</p> <p>Various different types of male and female voice are used in both Musicals (and Opera) and are given to different characters.</p> <p>SOPRANO – the highest female voice type and normally plays the most sympathetic roles (sometimes the heroine who is being cheated on!)</p> <p>MEZZO SOPRANO – a lower female voice type (often given the spiciest and juiciest roles – often witches!)</p> <p>ALTO – the lowest female voice type but can also be sang by men (often maids, mothers or grandmothers)</p> <p>TENOR – the highest male voice type (often given to vulnerable men who love too much!)</p> <p>BARITONE – a medium-range male voice type (often given to the hero of the plot)</p> <p>BASS – the lowest male voice type (often given to characters that portray fathers or priests)</p>	<p>D. Origins of Musical Theatre</p> <p>Music Theatre originated from OPERA which was entirely sung with no dialogue. Operas contained main/lead characters, minor characters and the CHORUS. Operas are made up of RECITATIVE (a type of sung dialogue), SOLO SONGS (ARIAS), DUETS, ENSEMBLES and CHORUS NUMBERS and often begin with an instrumental introduction called the OVERTURE. An ORATORIO was like an opera but based on a religious or sacred theme and performed without staging or costumes, often in a church. In the late 1800’s, a duo called Gilbert and Sullivan began writing short, COMIC OPERAS designed for everyone – not just the upper classes (<i>Mikado 1885, HMS Pinafore 1878</i>). The 1920’s and 1930’s saw a huge boom in musicals and theatre productions. Theatre, at this time, was one of the main forms of entertainment. This pre-war era was when musicals were beginning to look and sound like the musicals we still have today, but the songs and dance weren’t usually related to the plot or storyline (if there was one!) The “Golden Age” of Musicals lay between 1943-1968 in Britain and America (<i>Annie Get Your Gun – Irving Berlin – 1946; Kiss Me Kate – Cole Porter – 1948</i>). Richard Rodgers and Oscar Hammerstein II wrote <i>Oklahoma!</i> In 1943 and this was the first musical to combine a PLOT with music and dance which ‘moved the story forward’. From 1970, audiences have seen musicals split into genres and subcategories. Musicals now often address very serious issues and are not just for entertainment (<i>Les Misérables 1980, Miss Saigon 1989</i>) and ROCK MUSICALS (<i>Hair 1967, Grease 1971</i>) contain rock music and were very influenced by popular culture. Andrew Lloyd-Weber has had huge success in Musical Theatre (<i>Phantom of the Opera 1986, Joseph 1968 and many others!</i>). Many Disney films are done in the style of musicals and there are adaptations of films into musicals (<i>The Lion King 1997</i>) as well as musicals based on the career of a group or artist (<i>We Will Rock You, 2002; Mamma Mia 1999</i>). A strong musical tradition still exists in Britain and America and not just on Broadway or in London by everywhere. Film has been greatly influenced by musicals.</p>	
<p>E. The Structure of Songs in Musicals</p> <p>Although most musicals use dialogue, there are some Musicals which are THROUGH-COMPOSED which use little or no dialogue and everything is sung. STROPHIC FORM is when the same melody is repeated but with different words e.g. <i>hymns and carols</i>. The opposite of strophic form is THROUGH-COMPOSED where each section of words has a new music or melody and nothing is repeated (no repeated choruses or refrains).</p> <p>Many songs from Musicals use VERSE & CHORUS form. The CHORUS:</p> <ul style="list-style-type: none">• Sets the refrain of the lyrics and often contains the title words• Usually returns several times, always with the same words• Is normally the “catchiest” part of the song and has a MEMORABLE MELODY <p>The VERSE usually has different words, sung to the same music, with each repetition.</p>				
<p>F. The Structure of a Musical</p>				
<p>OVERTURE</p> <p>Musicals often begin with an OVERTURE – an INSTRUMENTAL piece played by the BAND or ORCHESTRA which “sets the scene” and often contains parts from songs which will occur later in the musical (e.g. a MEDLEY)</p>	<p>CHARACTERS</p> <p>Characters are then introduced, and the storyline develops. Musicals contain some spoken dialogue and sometimes dance sequences. INCIDENTAL MUSIC (music played by the band/orchestra alone) is often used for scene or set changes.</p>	<p>SONGS</p> <p>Musicals contain a number of different songs – solo songs (CHARACTER SONGS), DUETS, TRIOS, COMPANY/CHORUS or PRODUCTION NUMBERS, ACTION SONGS, BALLADS and COMEDY SONGS.</p>	<p>CLIMAX</p> <p>The high point of the musical often towards the end of the second ACT – which has some sort of dramatic build up and tension often reflected in the music.</p>	<p>FINALE</p> <p>A big ending with music, dance and drama. Often the final song of a musical is a CHORUS/COMPANY/PRODUCTION NUMBER which is fast, loud and dramatic. Following the finale, performers take their bows accompanied by the band/orchestra.</p>



The Purpose of Music in Film

Film Music is a type of Descriptive Music that represents a mood, story, scene or character through music; it is designed to support the action and emotions of the film on screen.

To create or enhance a mood	To function as a Leitmotif	To emphasise a gesture	To provide unexpected juxtaposition/irony
<p>Frequent effects used by Film Music composers to create or enhance a mood include:</p> <ul style="list-style-type: none"> A repeated OSTINATO pattern Sustained notes of LONG DURATION TREMOLO strings A CRESCENDO with the DYNAMICS gradually getting louder Increasing TEMPO (<i>Accelerando</i>) PITCH getting higher The use of SILENCE before something dramatic (to make you jump!) Unusual harmonies such as the use of minor and DISSONANT or CHROMATIC CHORDS, DISCHORDS and DIMINISHED CHORDS IRREGULAR TIME SIGNATURES (5/4, 7/8) Rapid Scale Patterns help create a frantic mood and a feeling of unrest and urgency INTERRUPTED CADENCES create a sense of tension and suspense The use of the TRITONE (<i>Augmented 4th</i>) The use of low pitch brass and strings to provide a “dark sound” The use of percussive metallic sounds The use of SUSPENSIONS that don’t resolve to build tension and make you think danger is near Frequent changes in DYNAMICS to hint an imminent danger The use of electronic sounds and synthesisers The use of SAMPLED SOUNDS The use of effects such as REVERB or DISTORTION applied to electronic, synthesised or sampled sounds to change and manipulate the sound The use of unusual (often electronic) instruments <i>e.g. Rózsa’s use of the Theremin</i> in his soundtrack to Alfred Hitchcock’s thriller ‘Spellbound’ (1945) 	<p>A frequently recurring short melodic or harmonic idea which is associated with a character, event, concept, idea, object or situation which be used directly or indirectly to remind us of one not actually present on screen. Leitmotifs can be changed (<i>sequencing, repetition, modulation</i>) giving a hint as to what will happen later in the film or may be heard in the background giving a “subtle hint” to the viewer/listener.</p> 	<p>This is known as MICKEY-MOUSING and is used especially in animated films, cartoons and comedy films and is where the music mimics every small movement reinforcing or illustrating the action <i>e.g. sliding trombones as characters journey up and down in a lift, a descending chromatic scale as a character goes down a set of stairs</i>. Timing is crucial when using Mickey-Mousing and Film Music composers often use CLICK TRACKS to help them time their music exactly.</p> 	<p>Using music which the listener/viewer wouldn’t normally expect to hear creating a sense of uneasiness, comparison or even humour <i>e.g. Tchaikovsky’s “Swan Lake” is heard in the ‘Dracula’ (1931) film.</i></p> 
	<p>To link one scene to another and smooth over visual cuts, providing continuity</p> <p>Repeated sections of music can be used to link different parts of the film together – it can remind you of something that happened earlier in the film. The style of music can also change within a film with different sections of the film having different moods – love, humour, battle/war. Film scores may be MONOTHEMATIC where the entire film score is based upon a single melody <i>e.g. David Raksin’s “Laura” (1944)</i> which is heard so often and in many different circumstances, that it comes to “haunt the listener”.</p>	<p>To give added commercial impetus</p> <p>The independent commercial ‘afterlife’ of the film score has become an increasingly important aspect of Film Music. “Hit” songs will help sell the film and are often used in the opening or closing credits. Songs may be used as title tracks but can return ‘in the background’ of the film soundtrack later. All of the James Bond films feature ‘big songs’ often released as popular music singles independently to help advertise the film and add commercial impetus.</p> 	<p>To influence the pacing of a scene making it appear faster/slower/more comprehensive</p> <p>Film Music composers often use fast, dramatic music in action sequences to “drive the action and pace forward”. In love or romantic scenes, a slow, sweeping theme on the Strings can be used to “slow the pace down”.</p>
			<p>To illustrate geographic location or historical period</p> <p>Westerns often use music “from the time” to set the scene using ‘traditional’ instruments. Films set in a different country often combine traditional instruments “associated with a particular country” in their soundtracks to help the audience imagine the film’s setting and give a sense of “place” <i>e.g. the Sitar can help “place a film” in India or the Bagpipes help “place a film” in Scotland</i>. Films set in a particular historical period <i>e.g. the 1970’s or 1980’s</i>, may use pop songs from the time to set the scene with the audience recognising the songs and reminding them of that particular decade.</p>

	Features	KEYWORDS
elody	<ul style="list-style-type: none"> Syllabic throughout with rhythms moving in a speech-like manner. Vocalisation at the end in bar 175 to the word 'aah'. Conjunct/stepwise start; verse & chorus combine conjunct & wide angular leaps. Leaps often feature rising perfect fifth. Some exceptionally large leaps such as a compound perfect fourth and a compound perfect fifth. Ascending sequence in b.6&7. Leitmotif developed to form much melodic & accompanying material. 	<p>1- Syllabic - when one note is sung per syllable.</p> <p>2- Vocalisation - wordless singing using a vowel syllable such as 'ah'.</p> <p>3- Conjunct - movement by step.</p> <p>4- Angular/disjunct - movement by leap.</p>
hythm (incl. tempo & metre)	<p>Tempo changes through this song and they are important to the overall structure.</p> <p>Rallentandos used particularly at end of sections to go from Allegro to Andante.</p> <p>Time signature changes: 3/2 to 2/2 in opening, changes to 4/4 at b.88, returning to 2/2 at b.115.</p> <ul style="list-style-type: none"> Syncopation and dotted rhythms are used throughout. Triplets are used, both quaver & crotchet triplets. Rhythms are predominantly crotchet and quaver based, with some longer durations at ends of phrases. Rests are often used to break up phrases. Pause marks or fermatas are used to lengthen and give freedom to longer rhythms. Off-beat entry after a crotchet rest at each start of phrase. 	<p>5- Sequence - the repetition of a musical phrase at a higher or lower pitch than the original.</p> <p>6- Leitmotif - a recurring musical idea, associated with a particular theme, character of place.</p> <p>7- Rallentando - gradually slower.</p> <p>8-Allegro - fast & lively.</p> <p>9- Andante - slow, moderately paced.</p>
exture	<ul style="list-style-type: none"> Sparse texture at opening: punctuating instrumental chord stabs with some monophonic unaccompanied bars. Melody-dominated homophony in verses. Homophonic chordal moments. Ostinato accompaniment at b.88 with repeated semiquavers. Unison & harmony singing though Elphaba & Glinda usually sing separately. Contrapuntal ending: 3 different musical ideas with different lyrics. 	<p>10- Maestoso - majestically.</p> <p>11- Syncopation - a temporary displacement of the regular metrical accent in music caused typically by stressing the weak beat.</p>
nstrument (sonority)	<p>'Defying Gravity' is a duet for the characters Elphaba and Glinda with some spoken dialogue in addition to the singing. The two characters either deliver their text spoken, half sung/spoken with music notated on the stave with crosses instead of note heads or entirely sung. These two singers require extremely versatile voices with a large range of just under two octaves, from G below middle C to F.</p> <p>Large orchestra: woodwind section (including additional instruments such as piccolo, bass clarinet and cor anglais), brass and string sections with a harp and three keyboards. It includes a wide variety of percussion instruments: drum kit, tubular bells and timpani. Electric guitars create a modern sound and in this song they are required with over-drive, a distortion effect.</p> <p>The score in the anthology is a short score or orchestral reduction and the main instruments with solos are labelled. The orchestra is used to good dramatic effect.</p>	<p>12- Triplet - three notes should be played in the space of two, highlighted by a square bracket with a '3'.</p> <p>13- Homophonic - a melody & accompaniment.</p> <p>14- Ostinato - a persistent phrase or motif repeated over several bars or more.</p> <p>15- Unison - more than one part playing the same melody at the same pitch.</p>
enre	<p>Stephen Schwartz is an American music theatre composer and lyricist. Born in 1948 in New York, he studied piano and composition at the Juilliard School of Music while still at high school, and later graduated in drama from Carnegie Mellon University.</p> <p>Musicals: <i>Godspell</i>; <i>Pocahontas</i>; <i>The Hunchback of Notre Dame</i>; <i>The Prince of Egypt</i> and <i>Enchanted</i>.</p> <p>2003: composer and lyricist for <i>Wicked: The Untold Story of the Witches of Oz</i>, a musical based on the novel <i>Wicked: The Life and Times of the Wicked Witch of the West</i>. This is an alternative version of the <i>Wizard of Oz</i> and tells the story from the point of view of the witches, Elphaba (the Wicked Witch of the West) and Glinda, the Good Witch.</p> <p>'Defying Gravity' is the finale song for the first act, when Elphaba discovers that the Wizard of Oz is not the heroic figure she had originally believed him to be. Realising this, Elphaba vows to do everything in her power to fight the Wizard and his sinister plans. She sings of how she wants to live without limits, going against the rules that others have set for her. It was originally written in the key of D^b major but has been transposed to D major in the Anthology.</p> <p>Music theatre integrates songs, spoken dialogue, acting and dance within a popular idiom. Musicals are an extended piece of music theatre.</p>	<p>16- Contrapuntal - when two melodies are played 'against' each other and interweave - almost the same as 'polyphonic'; written in counterpoint.</p> <p>17- Dialogue - instrument in dialogue, playing on after another, swapping ideas.</p> <p>18- Overdrive - a type of distortion, altering the sound by increasing the gain, to produce a 'fuzzy', 'growling' or 'gritty' sound.</p> <p>19- parallel semitonal movement - moving</p>
armony	<ul style="list-style-type: none"> Root position chords. Unrelated chord progressions; parallel semitonal movement in opening (chromatic movement). Dissonance sometimes. Pedal at end. 	<p>20- Dissonant - clashing intervals. the intervals that are dissonant (clashing) are the minor and major second, the minor and major seventh and the tritone (augmented fourth or diminished fifth).</p>
onality	<ul style="list-style-type: none"> Ambiguous tonality at start. D major. Modulations: b.20: B major; b.22: F major; b.32: D major. B.88: G major; b.103: D major. B.115: chromatic melody of the opening. B.132: D major; B.168: B minor; finish on a chord of D major. 	<p>20- Dissonant - clashing intervals. the intervals that are dissonant (clashing) are the minor and major second, the minor and major seventh and the tritone (augmented fourth or diminished fifth).</p>
tructure	<p>Verse-chorus form. (Verse: bar 34, bar 63, bar 135. Chorus: bar 50, bar 79, bar 103, bar 151.)</p> <p>Within that structure this piece has multiple sections, which are defined by tempo, contrasting moods and melodic material.</p>	<p>21- Pedal - a sustained or repeated note in the bass.</p> <p>22- Ambiguous - unclear in tonality.</p>

KEYWORDS

- 1- Programmed drum track:** Information inputted to a DAW.
- 2- Synth Patch:** A saved user or pre-set setting on a musical device - a patch that sets the functions of a synthesiser.
- 3- Sampler:** A device for recording and/or playing back audio.
- 4- Internal Routing:** Activities required or undertaken to conserve the original condition of an item.
- 5- sends:** An auxiliary output from a physical or software mixer.
- 5- inserts:** A direct break in a channel strip to insert a device or processor.
- 5- automation:** The recording or programming data for the use in playback.
- 5- plug-in:** A software processor that can affect the audio
- 5- mixer:** A physical or software device for the combining of signals

Planning your EXAM project (1000 words)

Personal Aims

You will need to think about your contribution to the recording. Your statement should describe your personal aims in relation to the recording.

You may want to think about the following questions:

What do I want to achieve with my contribution?

What skills do I have that I can use?

How will I know if I have achieved it?

Project Timeline

You must produce a project timeline that will map out the DAW project you are undertaking. This can be presented as a flow chart, Gantt chart, or any other way that adequately displays the time taken on different aspects of the brief. The content of this chart should be led by the assessment criteria.

Audience Expectation

You must address the briefs scenario.

What do you think the audience will be looking for? How will you meet or exceed their expectations?

Resources

You will need to consider the resources that will be used during this project. List and describe the resources that you will need to complete your work.

?

EXAM – Creating your Project (1200 words)

3-5 Minute composition with at least 8 TRACKS

A programmed DRUM TRACK

Simple/effective & creative/more complex drum patterns

Create & Saved SYNTH PATCH

Some creativity/creative/very creative in synth & sample patches

Create & save patch within a SAMPLER – min. 3 audio files

Internal Routing: two alternative signal paths

Some basic/good/greater insight into architecture (incl. internal routing), using some/range/more complex operations

Use Sequencer to edit note data & velocity

Simple quantisation/correct usage using basic/beyond basic snap parameters

Some/clear/efficient use editing

AUTOMATION: mixer, plug-in, instrument

Simple/creative & developed automation

Save all work in one folder & create mp3 mixdown

Evaluation (800 words)

Review the project in light of feedback:

- Look back at your aims and review the success of your project as a whole
- Make use of feedback from tutors and peers.

SCREENSHOTS:

Annotated screenshots of the project...

...that are basic but outline the essentials

...that are relevant and clear

...that are detailed, relevant and clear.

Highlight Strengths & areas of development:

- How successful was your DAW project in regard to the brief?
 - What areas of the project were you happy with and why?
 - What areas of the project could be improved in the future, why?
- How?

?

?

?

?



KEYWORDS

- 1- Compose:** an original musical creation.
- 2- Style:** The style or genre of music (Blues, Hip-Hop, Rock are 3 different musical styles).
- 3- Rhythm Track:** a regular repeated pattern, often heard on drums.
- 4- Bassline:** the lowest frequency notes in the composition.
- 5- Harmonic Progression:** the chord changes that move to form the harmonic characteristic of the composition.
- 6- Melody:** short riffs and musical ideas combined to create a tune
- 7- Lyrics:** written words that are sung, spoken or otherwise performed with the composition.
- 8- Chord:** 2 or more notes played simultaneously.
- 9- Conjunct:** moving by step.
- 10- Phrase:** a musical sentence, usually in 2, 4 or 8 bars.
- 11- Structure:** how a piece is organized (Verse-chorus, ABA, strophic are 3 different types of song structure).

KEY QUESTIONS

- What musical style are you composing?
- What are the key music features of your chosen style?
- What makes a successful composition in this style?

When composing a piece, all the parts should match and fit together harmoniously.

In order to do this, all the parts should relate to set of chords arranged together in a strong progression.

Different songs use different amounts of chords and chord progressions:

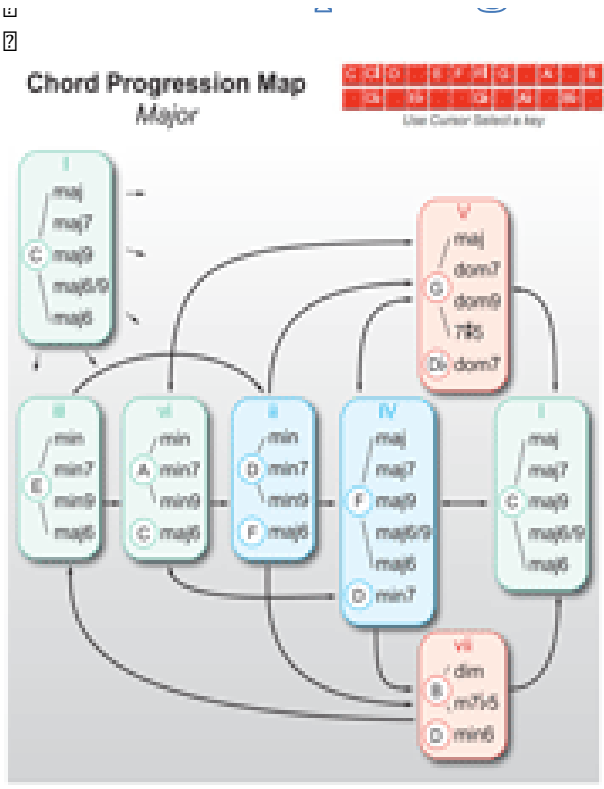
- Two-chord songs
- Three chords across 2-bars
- 4-bar patterns
- 8-bar patterns

The strongest chord progressions focus around the **tonic (I)**, **subdominant (IV)** and **dominant (V)** chords.

You should avoid using the median (iii) and leading note (vii).

Listen to as many songs in your style and try to answer the analysis questions.

The more you listen to and identify the different features of all the parts, the better your composition will be!



- CHECKLIST (3+)**
- 1. Rhythm Track? Drums? or Percussion?
 - 2. Bassline? Repetitive? Or melodic riff?
 - 3. Harmonic Progression? how many chords? Will they change for different sections? Use the progression map for good progressions.
 - 4. Melody? Short motifs/riffs in phrases? structure?
 - 5. Lyrics? Sung? Or Bars?

COMPOSING BASS LINES

ROOTS AND 5THS CAN MAKE THE BASS LINE MORE INTERESTING

A. Key Terms

Keyword	Description
1. Medium	Refers to the materials that used to create a work of
2. Inspiration	The process of being stimulated to do creative.
3. Iconic	Highly original, influential, unique, works of art, artists.
4. Distorted	Pulled or twisted out of contorted.
5. Portraiture	The art of painting or portraits.
6. Figurative	Representing forms that recognisably derived from

Command Words

Show, Refine, Present, Investigate.

B. Key concepts



Top Tips for creating an Artist Page

1. Include a colour copy of each image being discussed
2. Make sure the copies are big enough to see clearly and talk about
3. Use specialist art terminology and key words (see Art Keyword pages)
4. Break your writing down into small sections and separate each topic
5. Do not copy and paste directly from the internet—this will earn you NO marks as it does not show your own understanding!
6. Your own opinion and YOUR ideas about the work are most important!
7. Keep ALL WORK NEAT. Plan your page carefully.
8. If you get stuck discuss your thoughts and ideas with another student or teacher.

C. Artists Analysis

Do portraits need to be realistic to be considered skilful?

Model Response

Francis Bacon creates works using his own distinctive painting style mainly focusing on the human form. Experts would consider Bacon's style as an example of Expressionism. This movement was seen to be partly a reaction against academic art. In spite of this Francis Bacon clearly was an admirer of the old masters and his attitudes were profoundly traditional. In my opinion portraits do not need to be realistic to demonstrate skill. I prefer the realist style but can appreciate the skills used to produce distorted, fluid and emotional self portraits. In response to this question I looked into the BP portrait awards and found a variety of successful painting styles all using varied techniques. All the paintings had been well thought out and appropriate methods had been selected to convey particular emotions. The majority of artists able to create accomplished works usually follow certain rules and have been classically trained. These included proportion, shadow and light, and shape and scale. Although photography has almost replaced traditional portrait painting, critics would say the medium does not have the ability to convey emotion in such an extensive way. Through the motion and means paint is applied it can create a certain impression of a person and their personality that could not be achieved through the medium of photography.

Furthermore	Subsequently	In Spite of	Although
However	In Addition	To Summarise	In Contrast

D. Key Techniques

1) Use the internet, books & Visits



2) Your own opinion



3) Your own practical response



Temperature control	
Keyword	Definition
1. Food spoilage	When food deteriorates so that its quality is reduced or it can no longer be eaten.
2. Food poisoning	An illness caused by eating contaminated food
3. high-risk foods	Food that contains a lot of moisture and nutrient (e.g. milk, cream, eggs, meat and fish), and easily support the growth of pathogenic microorganisms particularly bacteria.
4. bacteria	Microscopic living organisms, which are single-celled and can be found everywhere
5. reproduce	When animals and plants make more of their own kind
6. Binary fission	How each bacterium reproduces by splitting in two
7. Temperature danger zone	Temperatures between 5°C and 63°C where most bacteria can multiply
8. dormant	When bacteria are inactive and cannot grow at all
9. Temperature probe	A device with a metal spike that takes the temperature of food

Key Points

1. Bacteria are found everywhere and need the right temperature, warmth, time, nutrients, pH level and oxygen to grow and multiply.
2. Microorganisms (bacteria) are used to make a wide range of food products.
3. Bacteria are used to make cheese, yogurt and bread.
4. Lactobacillus are the most important in food manufacturing.
5. Bacterial contamination is the presence of harmful bacteria in our food, which can lead to food poisoning and illness.
6. As a food handler you must do everything possible to prevent this contamination.
7. What are the main symptoms of food poisoning and the bacteria that cause them?

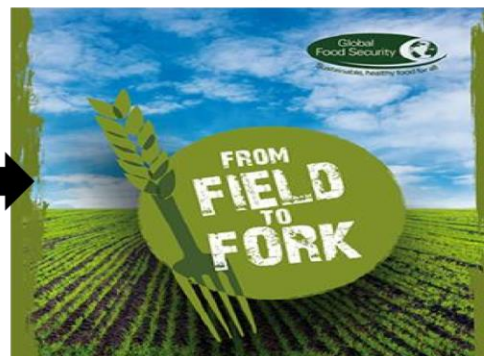
Where do bacteria come from?	
Keyword	Definition
1. Micro organisms	Tiny forms of life, both plant and animal. They can only be seen under a microscope. Bacteria are just one type of microorganism.
2. pathogenic	Something that is capable of causing illness
3. contaminate	To make a food unsafe to eat by allowing it to come into contact with microorganisms that will grow and multiply in it.
4. mould	A micro-organism related to mushrooms. Some types of mould contaminate food by growing in it and spoiling the appearance, taste, smell and texture of the food.
5. Enzymes	Natural substances (mostly proteins) that speed up chemical reactions. They cause fruit and vegetables that have been harvested to ripen and the flesh of animals to break down once they have been killed
6. moisture	Needed for bacterial growth. Micro-organisms need water for all their biological processes.
7. time	It takes micro organisms time to grow and multiply. Most micro organisms multiply every 10-20 minutes
8. nutrients	Micro-organisms need nutrients and energy from food to enable them to grow and multiply
9. Ph level	If foods are too acidic or too alkaline, this will affect whether microorganisms can grow and multiply
10. oxidation	When substances combine with oxygen
Food poisoning (pathogenic) bacteria	
Salmonella	Found in raw and undercooked poultry, eggs and meat, raw milk. Incubation 12-36 hours
Staphylococcus aureus	Found in People! Especially hands, nose, mouth and on the skin, in cuts and skin infections, cold cooked meats, raw milk, dairy products. Incubation 1-6 hours
Bacillus Cereus	Found in soil and plants that grow in the soil such as rice. Incubation 6-15 hours
Campylobacter	Found in raw meat and poultry, milk and untreated dirty water. Incubations 48-60 hours
Listeria	Found in chilled ready-to-eat foods that do not require further cooking or reheating, such as: cooked sliced meats, cured meats, smoked fish, pre-prepared sandwiches and salads. Incubation 5-14 days
E. coli	Found in beef (especially minced beef) and other meat, raw milk, untreated dirty water. Incubation 12-24 hours

Raising agents	
Keyword	Definition
1. Raising agent	An ingredient or process that introduces a gas into a mixture so that it rises when cooked
2. Physical raising agent	Processes such as whisking, beating, folding, lamination, These incorporate air or steam to make mixtures rise.
3. Chemical raising agent	Raising agents that produce carbon dioxide when they are heated with a liquid. E.g. baking powder, and bicarbonate of soda. Self raising flour has baking powder added to it.
4. Biological raising agent	A micro-organism used as a raising agent: yeast
5. aeration	The adding of air during the combining of different ingredients.
6. whisking	Eggs or egg whites are whisked to trap air bubbles
7. steam	Moisture/water in the product produces steam when heated causing it to act as a raising agent
9. Baking powder	A chemical raising agent consisting of bicarbonate of soda and cream of tartar. This raising agent does not produce an after taste. It is used in cakes.
10. Bicarbonate of soda	A chemical raising agent used in making cakes with a strong flavour (e.g. gingerbread) due to the after taste produced.
11. Carbon dioxide	The gas produced by chemical and biological raising agents
12. Yeast	Yeast A microscopic fungus consisting of single oval cells that reproduce by budding, and capable of converting sugar into alcohol and CO2 gas. Also ferments in the correct conditions to make bread rise.
13. fermentation	The process in which yeast produces the gas carbon dioxide.

	Nutrient	Source	Function	Effects of deficiency and excess
MACRONUTRIENTS	1. Carbohydrates	<p>1. Starches – found in cereal grains such as rice, wheat, oats, plus starchy tubers (potatoes and sweet potatoes) and vegetables (carrots, beets, corn)</p> <p>2. Sugars – lactose found in milk and dairy, fructose found in honey, fruits and some vegetables (peppers, tomatoes etc.)</p> <p>3. <u>Glycaemic Index</u> – how quickly carbs convert to blood sugars. High GI convert quickly e.g. white bread, cornflakes, white rice, pineapple</p> <p>Medium – brown rice and oats</p> <p>Low GI – convert slowly – most fruits, carrots, whole-wheat bread, beans, peas, lentils</p>	<p>1. Starches (polysaccharides) provide energy when broken down – slow release energy to the body (wholegrain provide slower release carbohydrates). provide fibre</p> <p>2. Sugars (Disaccharides and Monosaccharides) provide quick release energy to the body's' cells. Known as empty calories</p> <p>1g carbs = 3.75Kcal</p> <p>3. Intrinsic sugars – found in naturally in food eg fruit, vegetables</p> <p>4. Extrinsic sugars – added to foods eg white sugar, honey, artificial sweeteners</p>	<p>1. Deficiency of carbohydrates is extremely rare in the UK. Short term – weak, hungry and tired. Long term lack of carbohydrates in the diet can cause 2. Ketosis – a condition where the body switches to using protein as an energy source.</p> <p>3. Excess – converts to fat – obesity, type 2 diabetes, heart disease, some cancers. Excess sugars – tooth decay</p> <p>4. No more than 5% of daily calories should come from sugar</p>
	2. Proteins	<p>1. Protein is digested by the body into its component parts – called amino acids. There are 8 which are essential for adults and 12 for children. HBV protein foods contain all the essential amino acids. LBV have one or more missing.</p> <p>2. High Biological Value (HBV) protein: Meat, fish, poultry, eggs, Quorn, milk, soya, Quinoa</p> <p>3. Low Biological Value (LBV) protein: Tofu, beans, nuts, seeds, grains eg wheat</p>	<p>1. Protein is needed for growth and repair, the production of body chemicals eg enzymes and hormones</p> <p>2. Is also a source of secondary energy</p> <p>1g protein = 4Kcal</p> <p>3. Complementary proteins – eating a mixture of LBV proteins in order to get all the essential amino acids eg Beans on toast</p>	<p>1. Protein deficiency can cause:</p> <ul style="list-style-type: none"> Wasting of muscle & muscle loss Oedema – build up of fluids in the body Slow growth in children <p>2. Severe deficiency leads to kwashiorkor →</p> <p>3. Excess – some is removed as waste. Rest is stored as fat.</p> <p>4. Adults need 55g of protein a day</p>
	3. Fats	<p>1. Saturated fats - Butter, cheese, meat, lard. Contain low density lipoproteins LDL (bad) which raise blood cholesterol levels and clog artery walls.</p> <p>2. Unsaturated fats – olive oil, avocado oil, fish oils. These contain high density lipoproteins HDL (good) which help to remove cholesterol by taking it to the liver where it is processed and removed..</p> <p>3. Visible fats – fat on meat, bacon rind</p> <p>Invisible fats – cheese, avocados, nuts.</p> <p>4. Oils are turned into solid fats by hydrogenation. These fats are unhealthy.</p>	<p>1. Fat is a term used to describe lipids – this can refer to solid fats and oils. Fat is broken down by the body and used for energy. 1 g fat = 9Kcal</p> <p>2. Fat provides warmth when stored under the skin. Protects organs eg heart, liver.</p> <p>3. Fat Carries fat soluble vitamins A, D, E & K.</p> <p>4. Fat is important for hormone production</p> <p>5. Contains essential fatty acids that the body is unable to make itself</p> <p>6. Omega 3 and 6 are essential fatty acids which promote heart and brain development and prevent depression.</p>	<p>1. Lack of fat in the diet can lead to deficiencies of fat soluble vitamins A, D, E & K.</p> <p>2. Excess fat (either type) – obesity and all diseases linked to it.</p> <p>3. Excess unsaturated fat - build up of cholesterol on artery walls which can lead to a heart attack.</p> <p>5. Adults men need 95g fat and women 70g. No more than 30g or 20g saturated fat</p>

Key Points

- Food and packaging waste contributes to greenhouse gases (GHG's)
- Seasonal and sustainable foods address many environmental issues.
- MSC – Marine Stewardship Council = Seafood can be traced back to a certified sustainable fishery.
- Food miles are the distance food travels from its point of origin to your table. Recycling and producing waste can help reduce carbon emissions.
- Nearly a third of all food produced ends up in landfill sites where it gives off methane gas as it decomposes.
- Cheaper foods are ones that are GM/intensively farmed
- Best quality protein foods are ones where the welfare of the animals has been considered.
- Hydroponic farming is the production of food using specially developed nutrient rich liquids rather than soil.
- Free range farming allows animals to access outdoor areas as part of their life. Increased demand for fish stocks has seen stocks diminishing in the wild due to over fishing.
- Barn reared animals live in an environment similar to intensive farming
- Under EU law, all foods need to be traceable from field to fork.
- Carbon emissions and global climate change affect food and water supplies. Sustainable food production ensures less negative impact on the environment and the farmers.



Transportation
Food Miles
Food Origin
Climate Change
Carbon Footprint
Recycling
Packaging
Landfill

Sustainability
Free Range
Genetically modified
Organic
Traceability
Sustainable food
Composting
Food waste

Food Choice

Cultural

Different to other people.
Behaviour patterns
Habits/ inherited
Different beliefs/morals/way of life.

Economical

Cheaper cuts of meat
Collect vouchers
Supermarket own brand
Make your own food
Seasonal produce

Social

Reward
Gifts
Demonstrating wealth
A way of socialising
Celebrations

Religion

Jews not eating pork
Halal- Muslim
Jews- no shellfish/dairy
Islam – fasting etc.
Hindus – no beef

Materials – Ferrous metals - containing IRON

Cast iron	High carbon steel	Low carbon steel	Stainless steel
Good compressive strength, good for casting.	Strong and hard but difficult to form.	Tough and low cost.	Strong and hard, good corrosion resistance.

Materials – NON Ferrous metals / alloys — containing NO iron

Aluminium	Copper (pure metal)	Brass (alloy of 65% copper 35% zinc)	Bronze (alloy of 90% copper 10% tin)	Lead (pure metal)	Zinc (pure metal)
Light, strong, ductile, good conductor, corrosion resistant.	Malleable, ductile, tough, good conductor, easily joined, corrosion resistant.	corrosion resistant, good conductor, easily joined, casts well.	Tough and hardwearing, corrosion resistant.	Very soft and malleable, heaviest common metal, corrosion resistant.	Low melting point, extremely corrosion resistant, easily worked.

Materials – Polymers – Thermoplastics — shaped when hot – can be reheated

ABS	Acrylic	Polycarbonate	Polystyrene
Strong and ridged, hard and tough, expensive.	Good optical properties, transparent, good colour, hard wearing, shatter proof.	High strength and impact strength, heat resistant, good colour stability.	Good toughness and impact strength, good for vacuum forming and injection moulding.

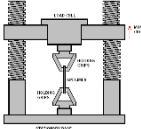
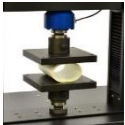

Materials – Polymers – Thermosetting plastic — can be moulded – non recyclable

Polyester resin	Melamine resin	Polyurethane	Vulcanised rubber
Good strength but brittle	Stiff hard and strong	Hard with high strength, flexible and tough	Highest tensile strength, elastic, resistant to abrasion

Properties and characteristics of materials

	Absorbency	To be able to soak up liquid easily.
	Strength	The capacity of an object or substance to withstand great force or pressure.
	Elasticity	The ability of an object or material to resume its normal shape after being stretched or compressed; stretchiness.
	Plasticity	The quality of being easily shaped or moulded.
	Malleability	To be able to be hammered or pressed into shape without breaking or cracking.
	Density	The quantity of mass per unit volume of a substance
	Effectiveness	The degree to which something is successful in producing a desired result; success.
	Durability	The ability to withstand wear, pressure, or damage.

Testing materials

Materials testing is used to check the suitability of a material.	Testing can be non-destructive or destructive.	Most Non destructive testing will be visual.	Tensile testing, compressive strength tests and hardness testing are destructive.
Tensile test	Compressive test	Hardness test	
			
<ul style="list-style-type: none">- Used to find the strength under tension.- The maximum pulling or stretching force before failure.- Used by applying a load and observing the changes.	<ul style="list-style-type: none">- The resistance of a material under a compressive force.- A material is placed under compression to see its resistance.- concrete is a good example of material with compressive strength.	<ul style="list-style-type: none">- Used to find out how hard a material is.- In a work shop a hammer and dot punch is used to create an indentation in the material.	

SI Base Units

unit	abb	physical quantity	Smallest - - - - - Largest
metre	m	length	Micrometer, millimeter, centimeter, meter
second	s	time	Microsecond, millisecond, seconds
kilogram	kg	mass	Milligram, gram, kilogram
ampere	A	electric current	Micro amp, milliamp, amp, kiloamp
kelvin	K	thermodynamic temperature	Kelvin, degrees Celsius
candela	cd	luminous intensity	Microcandela, millicandela, candela
mole	mol	amount of substance	Nanomole, micromole, millimole, mole

Engineering Disciplines

Mechanical	Hydraulics, gears, pulleys.
Electrical	Power station, household appliances, integrated circuits
Aerospace	Aircraft, space vehicles, missiles
Communications	Telephone, radio, fibre optic
Chemical	Pharmaceuticals, fossil fuels, food and drink
Civil	Bridges, roads, rail
Automotive	Cars, motorcycles, trains
Biomedical	Prosthetics, medical devices, radiotherapy
Software	Applications, systems, programming

Understand the making Process

1 Preparation	Drawing, CAD, sketches, plans.
2 Marking Out	Pencil, scribe, steel rule, tri square, marking gauge, calipers, centre punch.
3 Modification	Saw, jigsaw, scroll saw, laser cutter, pliers, hammer, drill, file, glass paper.
4 Joining	Riveting gun, spanner, screwdriver, hot glue, gun, soldering iron, nail gun.
5 Finishing	Hand sander, glass paper, disc sander, buffing wheel, polish, spray paint, varnish.

Health & Safety Legislation

Health and Safety at work Act – an agreement to keep us safe.	Personal Protective Equipment – to protect your body.	Manual Handling Operations – lifting and carrying.	Control of Substances Hazardous to Health – chemicals.	Reporting of Injuries RIDDOR – keeping a log of accidents.
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Module 3

Theme: Identity and culture
(daily life; cultural life)

- 1 Qu'est-ce que tu manges le soir?
- 2 Qu'est-ce que tu portes normalement le week-end?
- 3 Quelle est ta routine les jours d'école?
- 4 Tu préfères acheter tes vêtements en ligne ou dans un magasin?
- 5 Est-ce que tu fêles Noël chez toi?
- 6 Quelle est ta fête préférée? Pourquoi?
- 7 Comment est-ce que tu vas fêter le Nouvel An cette année?
- 8 Comment as-tu fêté ton dernier anniversaire?

1. **Généralement, le soir, après avoir pris ma douche**, je **prépare** le repas avec ma famille dans la cuisine. **Souvent**, on **se régale** en mangeant des frites avec un bon steak. En dessert, je **prends** toujours un petit filou et une pomme, je **trouve** que **c'est** vraiment délicieux!

2. **Tous les weekend, je sors** avec ma copine Grace qui **adore** la mode. **Du coup**, je **dois être** sur mon trente-et-un. **Vu qu'elle ne supporte pas que je sois mal habillée**, alors je **mets** mes **plus beaux** ensembles, par exemple, mes **tailleurs** ou mes **plus belles** combinaisons.

3. **Tous les jours**, quand j'ai école, je **me réveille** à sept heures. **Après avoir pris** mon petit déj, je **me prépare** puis je **quitte** la maison vers huit heures. **Souvent**, je **retrouve** mon copain sur la route de l'école car on y va à pieds, **c'est** plus écolo!

A la fin de la journée, je **rentre** à la maison à cinq heures car je **dois** aller chercher ma petite sœur à la crèche.

4. **Personnellement**, je **pense** vraiment que je **préfère** acheter mes vêtements dans un magasin car j'aime **essayer** avant de choisir. **Cependant**, j'aime **acheter** des vêtements en ligne car je **trouve** que **c'est** absolument pratique.

5. **Tous les ans**, je **fête** Noël avec ma famille à la montagne en France. **A mon avis**, **c'est** fantastique car on **prépare** le sapin, on **mange** plein de bonnes choses et on **joue** dans la neige. **Cependant, l'année dernière, on a célébré** Noël à Dubaï et **c'était nul** parce que **je suis tombé** malade.

6. **Pour moi**, ma **fête préférée** est assurément Pâques parce qu'on peut **manger** des tonnes de chocolat. **En plus, chaque année**, on **fait** la chasse au œufs dans le jardin, **c'est** génial car **ça réunit** la famille.

7. **Au printemps prochain**, ma famille va **célébrer** Pâques à New-York. Nous **allons** y **aller** en avion avec mes grands-parents parce qu'ils **adorent** les Etats-Unis. Le top **c'est** qu'on **va aussi** aller à DisneyWorld. **Ça va être** fantastique.

8. **Pour mes treize ans**, ma famille et moi **sommes** allés au restaurant dans le centre-ville en bus. **Après avoir mangé**, nous **avons** **visité** le Tate Modern et on a **fait** une promenade en bateau sur la Tamise. **C'était** un peu long mais mes parents ont **adoré** donc **ça a été**!

Semana 1

Vocabulario Vale Higher



<p>La paga Mis padres me dan... Mi madre / padre me da... ...euros a la semana / al mes Gasto mi paga en... También compro...</p>	<p>Pocket money My parents give me... My mum / dad gives me... ...euros a week / a month I spend my pocket money on... I also buy...</p>	<p>saldo para el móvil ropa / joyas / maquillaje zapatillas de marca videojuegos / revistas</p>	<p>credit for my phone clothes / jewellery / make-up designer trainers computer games / magazines</p>
<p>Mis ratos libres las actividades de ocio Tengo muchos pasatiempos. A la hora de comer... Cuando tengo tiempo... Después del insti... Los fines de semana... Mientras desayuno / como... juego al billar / fútbol monto en bici / monopatin quedo con mis amigos voy de compras mi pasión es la música / la lectura Sueño...</p>	<p>My free time leisure activities I have lots of hobbies. At lunchtime... When I have time... After school... At weekends... Whilst I have breakfast / lunch... I play billiards / table football I ride my bike / I skateboard I meet up with friends I go shopping my passion is music / reading I tend to / I usually ... rest</p>	<p>hacer deporte ir al cine leer libros / revistas / periódicos salir con amigos usar el ordenador ver la tele Es divertido / relajante / sano Soy creativo/a / perezoso/a / sociable Soy adicto/a a... me ayuda a relajarme me ayuda a olvidarme de todo me hace reír necesito comunicarme / relacionarme con otra gente</p>	<p>do sport go to the cinema read books / magazines / newspapers go out with friends use the computer watch TV It's fun / relaxing / healthy I'm creative / lazy / sociable I'm addicted to... it helps me to relax it helps me to forget everything it makes me laugh I need to have contact with other people</p>
<p>mi pasión es la música / la lectura Sueño... descansar escuchar música / la radio</p>	<p>my passion is music / I tend to / I usually ... rest listen to music / the radio</p>	<p>me ayuda a olvidarme de todo me hace reír necesito comunicarme / relacionarme con otra gente</p>	<p>it helps me to forget everything it makes me laugh I need to have contact with other people</p>

Semana 2

<p>El deporte Soy / Era... (bastante / muy) deportista miembro de un club / un equipo aficionado/a / hinchas de... un(a) fanático/a de... juego al... jugué al... jugaba al... badminton / baloncesto beisbol / balonmano críquet / fútbol hockey / ping-pong rugby / tenis / voleibol</p>	<p>Sport I am / I used to be... (quite / very) sporty a member of a club / a team a fan of... a ... fanatic I play... I played... I used to play... badminton / basketball baseball / handball cricket / football hockey / table tennis rugby / tennis / volleyball</p>	<p>submarinismo tiro con arco voy... fui... iba... a clases de... de pesca ya no (juego)... todavía (hago)... batir un récord correr entrenar jugar un partido contra...</p>	<p>diving archery I go... I went... I used to go... to ... classes fishing (I) no longer (play)... (I) still (do)... to break a record to run to train to play a match against...</p>
<p>hago... hice... baile / boxeo / ciclismo deportes acuáticos equitación / escalada gimnasia / judo karate / natación patinaje sobre hielo piragüismo / remo</p>	<p>I do... I did... I used to do... dancing / boxing / cycling water sports horseriding / climbing gymnastics / judo karate / swimming ice skating canoeing / rowing</p>	<p>marcar un gol montar a caballo participar en un torneo patinar mi jugador(a) preferido/a es... su punto culminante fue cuando... el campeón / la campeona la temporada</p>	<p>to score a goal to go horseriding to participate in a tournament to skate my favourite player is... the highlight (of his/her career) was when... the champion the season</p>

Semana 3

<p>La música Me gusta el soul / el rap / el dance / el hip-hop / el pop / el rock / el jazz / la música clásica / electrónica asistir a un concierto cantar (una canción) tocar el teclado / el piano /</p>	<p>Music I like soul / rap / dance / hip-hop / pop / rock / jazz / classical / electronic music to attend a concert to sing (a song) to play the keyboard / the piano /</p>	<p>la batería / la flauta / la guitarra / la trompeta mi cantante preferido/a es... un espectáculo una gira (mundial)</p>	<p>the drums / the flute / the guitar / the trumpet my favourite singer is... a show a (world) tour</p>
<p>Las películas un misterio una película de amor una película de terror una película de acción una película de aventuras</p>	<p>Films a mystery a love film a horror film an action film an adventure film</p>	<p>una película de animación una película de ciencia ficción una película de fantasía una película extranjera</p>	<p>an animated film a sci-fi film a fantasy film a foreign film</p>

Semana 4

<p>La tele (No) Soy teleadicto/a. Mi programa favorito es... un concurso un programa de deportes un reality un documental un culebrón / una telenovela una comedia una serie policíaca el telediario / las noticias Me gustan las comedias.</p>	<p>TV I'm (not) a TV addict. My favourite programme is... a game / quiz show a sports programme a reality TV show a documentary a soap a comedy a crime series the news I like comedies.</p>	<p>Es / Son... aburrido/a/os/as adictivo/a/os/as divertido/a/os/as entretenido/a/os/as tonto/a/os/as informativo/a/os/as malo/a/os/as emocionante(s) interesante(s)</p>	<p>It is / They are... boring addictive fun entertaining silly informative bad exciting interesting</p>
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Semana 4 Parte B



Nacionalidades	Nationalities
americano/a	American
argentino/a	Argentinian
británico/a	British
chino/a	Chinese
griego/a	Greek
italiano/a	Italian
mexicano/a	Mexican
sueco/a	Swedish
	alemán/alemana
	danés/danesa
	español(a)
	francés/francesa
	holandés/holandesa
	inglés/inglesa
	irlandés/irlandesa
	japonés/japonesa
	German
	Danish
	Spanish
	French
	Dutch
	English
	Irish
	Japanese

Semana 5

Ir al cine, al teatro, etc.	Going to the cinema, theatre, etc.
¿Qué vamos a hacer... esta tarde?	What are we going to do... this afternoon / evening?
esta noche?	tonight?
mañana / el viernes?	tomorrow / on Friday?
¿Tienes ganas de ir...?	Do you fancy going...?
a un concierto / un festival?	to a concert / a festival?
a un espectáculo de baile?	to a dance show?
al cine / al teatro / al circo?	to the cinema / theatre / circus?
¿Qué ponen?	What's on?
	Es una película / obra de...
	¿A qué hora empieza / termina?
	Empezar / Termina a las...
	Dos entradas para... por favor.
	para la sesión de las...
	No quedan entradas.
	¿Hay un descuento para estudiantes?
	Aquí tiene mi carne de estudiante.
	It's a ... film / play
	What time does it start / finish?
	It starts / finishes at...
	Two tickets for ... please
	for the ... showing / performance
	There are no tickets left.
	Is there a discount for students?
	Here is my student card.

Temas del momento

he compartido...	I have shared...	cuenta la historia de...	it tells the story of...
he comprado...	I have bought...	trata de...	it's about...
he jugado...	I have played...	combina el misterio con la acción	it combines mystery with action
he leído...	I have read...	el argumento es fuerte / débil	the plot is strong / weak

Semana 6

he oído...	I have heard...	la banda sonora es buena / mala	the soundtrack is good / bad
he roto...	I have broken...	los actores...	the actors...
he subido...	I have uploaded...	los efectos especiales...	the special effects...
¿Has probado...?	Have you tried...?	los gráficos...	the graphics...
mi hermano ha descargado...	my brother has downloaded...	los personajes...	the characters...
se ha estrenado...	...has been released.	las animaciones...	the animations...
la nueva canción	the new song	las canciones...	the songs...
el último libro	the latest book	son guapos/as / guay	are good looking / cool
Ya lo/la/los/las he visto.	I have already seen it/them.	son estúpidos/as / impresionantes	are great / impressive
No lo/la/los/las he visto todavía.	I haven't seen it/them yet.	son originales / repetitivos/as	are original / repetitive
acabo de ver / jugar a...	I have just seen / played...		

¿En el cine o en casa?

At the cinema or at home?

Prefiero ver las pelis en casa porque...	I prefer watching films at home because...	las palomitas están ricas	the popcorn is tasty
el ambiente es mejor	the atmosphere is better	los asientos no son cómodos	the seats aren't comfortable
hay demasiadas personas	there are too many people	los otros espectadores me molestan	the other spectators annoy me
la imagen es mejor en la gran pantalla	the picture is better on the big screen	ponen trailers para las nuevas pelis	they show trailers for new films
las entradas son muy caras	the tickets are very expensive	si vas al baño te pierdes una parte	if you go to the toilet you miss part of it
		tiemes que hacer cola	you have to queue
		una corrida de toros	a bull fight
		en directo	live

Semana 7

Los modelos a seguir

Role models

Admiro a...	I admire...	la pobreza / la homofobia	poverty / homophobia
MI inspiración / ídolo es...	My inspiration / idol is...	los derechos de la mujer	women's rights
...es un buen / mal modelo a seguir	...is a good / bad role model	los derechos de los refugiados	the rights of refugees
Un buen modelo a seguir es	A good role model is someone who...	los niños desfavorecidos	underprivileged children
alguien que...	supports charities	la justicia social	social justice
apoya a organizaciones benéficas	raises money for...	a pesar de sus problemas...	despite his/her problems...
recauda fondos para...	is very talented / successful	ha batido varios récords	he/she has broken several records
tiene mucho talento / éxito	works in defence of animals	ha creado...	he/she has created...
trabaja en defensa de los animales	uses his / her fame to help others	ha ganado ... medallas / premios	he/she has won ... medals / awards
usa su fama para ayudar a los demás	they get drunk	ha sufrido varias enfermedades	he/she has suffered several illnesses
se emborrachan	they behave badly	ha superado sus problemas	he/she has overcome his/her problems
se comportan mal	they get into trouble with the police	ha tenido mucho éxito como...	he/she has had lots of success as...
se meten en problemas con la policía	he/she is nice / affectionate / strong	siempre sonríe	he/she always smiles
es amable / cariñoso/a / fuerte	he/she fights for / against...	solo piensa en los demás	he/she only thinks of other people
lucha por / contra...			

Important Ideas

Time series graphs are useful for studying the trend and seasonal variation

Trend lines can be used to predict future values.

You can find estimates of a probability by repeating an experiment many times

You can use a variety of diagrams to represent all the different outcomes possible of events

Vocabulary

Time series	Graphs which show variation over time
Trend	The overall behaviour over time
Trend line	Shows the tend of data over time ignoring any seasonal variation
Moving average	A sequence of averages that smooths out variations in data. Used to show trends.
Expected (relative) frequency	How often we expect something to happen based on trials.
Risk	The probability of loss
Two-way table	A way of presenting data with two variables
Sample space diagram	A table showing all possible outcomes of two combined events
Tree diagram	A diagram with branches used to work out probabilities of combined events
Venn diagram	A diagram using circles to represent sets. The position and overlap of the circles indicates the relationships between the sets.

Question

Time series

	2011		
Rainfall (cm)	102	156	142
3-point moving average		133	135
	2012		
Rainfall (cm)	106	157	135
3-point moving average	135	133	134
	2013		
Rainfall (cm)	110	169	
3-point moving average	138		

Plot the time series
Plot the moving averages
Draw the trend line
Describe the trend

Experimental probability

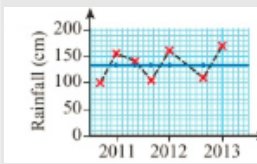
Sami spins a coin 250 times.
He gets 110 heads
(a) Work out the experimental probability of getting a head
(b) Write down the experimental probability of getting a tail

Risk

	Football	Hockey	Rugby
Injuries	8	5	13
Games	50	60	40

Work out the risk of a knee injury in each sport
Estimate the number of knee injuries next season, which has 35 games

Answer



The trend is flat

(a) 110/250
(b) 140/250

Football 0.16
Hockey 0.083
Rugby 0.325

3 (rounded from 2.9)

Key Facts & Formula

Moving averages

Year	Population (thousands)	3-point moving average (thousands)	
2008	4.5		
2009	5.2		
2010	6.8		
2011	4.7		
2012	5.5		
		5.50	The first 3-point moving average is the mean of the first three consecutive values: $4.5 + 5.2 + 6.8 = 5.50$
		5.57	The next 3-point moving average is the mean of the 2nd, 3rd and 4th values: $5.2 + 6.8 + 4.7 = 5.57$
		5.67	

Expected (relative) frequency

Uses trials to estimate the probability of something happening next.

Equation of a trend line

$Y = ax + b$
where **b** is the intercept on the y-axis and **a** is the gradient of the line.

Experimental probability

Number of times the event happens ÷ total number of trials

Estimate

Total number of trials x probability

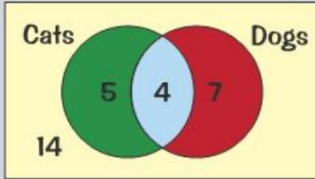
The more times an experiment is repeated the more accurate the estimate will be.

Increasing sample size leads to better estimates

Risk

Risk of a fault x number of items sold

Important Ideas	
Index numbers are often used to compare price changes over time.	
The probability of one event may affect the probability of another.	
Vocabulary	
Independent events	Events are independent if the outcome of one does not affects the probability of another occurring.
Conditional probability	When the probability of a second event depends on the first.
Index numbers	A way of tracking changes in value through time.
Weighted index numbers	A measure of how a set of items changes in value.
Retail price index (RPI)	Shows changes in the cost of living. Used to set interest rates for student loans.
Consumer price index (CPI)	Shows changes in the cost of living (not including mortgage payments). Used to index benefits, tax credits and pensions in the UK
Gross domestic product (GDP)	The main measure of economic output based on the value of goods and services produced by a country or region.
Crude rates	A simple way to compare population statistics such as births, deaths and employment levels
Standardised rates	Enables valid comparisons between distributions

Question	Answer								
Conditional probability									
	$P(\text{no dog} \mid \text{cat})$ $= \frac{\text{Number of households with cats but no dog}}{\text{Number of households with cats}}$ $= \frac{5}{9}$ <p>Using the Venn diagram above, find the probability that a randomly chosen household does not own a dog, given the household owns a cat.</p>								
Index numbers									
<table><tr><td>Year</td><td>2013</td><td>2014</td><td>2015</td></tr><tr><td>Index Number</td><td>100</td><td>85</td><td>109</td></tr></table> <p>The index numbers in the table show the average monthly rent for a flat, using 2013 as the base year.</p> <p>a) In which year did the average monthly rent decrease?</p> <p>b) The average monthly rent in 2013 was £530. Calculate the average monthly rent for the years 2014 and 2015.</p>	Year	2013	2014	2015	Index Number	100	85	109	<p>(a) Average monthly rate decreased in 2014 ($85 < 100$)</p> <p>(b) 2014:</p> $85 = \frac{\text{price in 2014}}{\pounds 530} \times 100$ $\Rightarrow \text{price in 2014} = \pounds 450.50$ <p>2015:</p> $109 = \frac{\text{price in 2015}}{\pounds 530} \times 100$ $\Rightarrow \text{price in 2015} = \pounds 577.70$
Year	2013	2014	2015						
Index Number	100	85	109						

Key Facts & Formula	
Independent events	$P(A \text{ and } B) = P(A) \times P(B)$
Conditional probability	$P(A \text{ and } B) = P(A) \times P(B \mid A)$
Index number	$\frac{\text{value}}{\text{value in base year}} \times 100$
Weighted index numbers	$\frac{\sum (\text{index number} \times \text{weight})}{\sum \text{weights}}$
Chain base index number	$\frac{\text{value this year}}{\text{value last year}} \times 100$

Number	Key term	Explained
1	Democratic	Relating to or supporting democracy or its principles.
2	Democratic deficit	Less democratic
3	direct democracy	purest form of democracy. A form of democracy in which all laws and policies imposed by governments are determined by the people themselves, rather than by representatives who are elected by the people.
4	indirect democracy	is a type of democracy founded on the principle of elected officials representing a group of people
5	legitimacy	the degree to which the government has the right to exercise power
6	political participation	opportunities to become involved in the political process
7	referendum	a popular vote on a specific question
8	Absolute majority	where an MP gains over 50% of the vote

Number	Key term	Explained
9	AMS	Additional Member System. a hybrid system with 2/3 FPTP and 1/3 regional list. Used in Scotland and Wales
10	Alternative vote	An electoral system whereby voters rank candidates in order of preference.
11	British Constitution	This sets out how we are governed. The UK does not have one single document instead our constitution comes from many sources and has been shaped over hundreds of years by different laws and events e.g. Magna Carta, Human Rights Act.
12	Parliamentary Sovereignty	This means that Parliament is the only body that can make laws. It is hugely powerful. It also means that UK law and policy can be changed when new Parliaments are formed, its adaptable. However, once law and policy are created by Parliament, all individuals and public bodies must follow it.
13	European Parliament	The European Union has a parliament, which represents all member countries of the EU. This group have a say in plans that are developed for Europe, often involving trade and employment. The UK has now started the process of leaving the EU.
14	National Parliament	This is what most people think of when they imagine politics. Our national Parliament is based in Westminster. The elected body (MPs) sit in the House of Commons and have the power (along side the rest of Parliament) to make laws and shape national policy.
15	Local council	Councillors are elected by citizens who live in their ward. They cannot make laws, but they can make decisions about your local area, they aim to improve your local area.

Number	Key term	Explained
16	Misters whips	Whips are MPs or members of the House of Lords appointed by each party to inform and organise their own members in Parliament. One of their responsibilities is to make sure that their members vote in divisions, and vote in line with party policy. It is the party whips, along with the Leader and Shadow Leaders of each House, that negotiate behind the scenes to arrange the day to day business in Parliament - a process often referred to as 'the usual channels'.
17	Cabinet	The Cabinet is the team of 20 or so most senior ministers in the Government who are chosen by the Prime Minister to lead on specific policy areas such as Health, Transport, Foreign Affairs or Defence.
18	Shadow Cabinet	The Shadow Cabinet is the team of senior spokespeople chosen by the Leader of the Opposition to mirror the Cabinet in Government. Each member of the shadow cabinet is appointed to lead on a specific policy area for their party and to question and challenge their counterpart in the Cabinet. In this way the Official Opposition seeks to present itself as an alternative government-in-waiting.
19	Backbenchers	Backbenchers are MPs or members of the House of Lords that are neither government ministers nor opposition Shadow spokespeople . They are so called because, in the Chamber, they sit in the rows of benches behind their parties' spokespeople who are known as frontbenchers.

Number	Key term	Explained
20	Manifesto	A manifesto is a publication issued by a political party before a General Election. It contains the set of policies that the party stands for and would wish to implement if elected to govern.
21	Legislation	Legislation is a law or a set of laws that have been passed by Parliament. The word is also used to describe the act of making a new law.
22	Bishops	As senior members of the Church of England, which is the established church, some bishops are entitled to sit in the House of Lords. The Archbishop of Canterbury, the Archbishop of York, the Bishops of London, Durham and Winchester and 21 other bishops in order of seniority together form the Lords Spiritual.
23	Crossing the floor	To cross the floor in Parliament means to change sides: to leave one political party and join another.
24	Dissolution	Dissolution is the official term for the end of a Parliament before a general election. When Parliament is dissolved every seat in the House of Commons becomes vacant. MPs immediately revert to being members of the general public and those who wish to become MPs again must stand for election as candidates.
25	Frontbench (frontbenchers)	A frontbencher is either a Government minister or an Opposition shadow spokesperson. They are so-called because they occupy the front benches on either side of the Chamber when the House is in session, with other party members - backbenchers - sitting behind them.



Borrowing

Annual borrowing has fallen steeply since the Treasury reclaimed interest payments it made to the Bank of England in 2012. The central bank has become the Treasury's biggest lender following the purchase of almost a third of UK debt via its quantitative easing (QE) policy. Excluding QE, the Office for Budget Responsibility forecasts the deficit will fall only marginally this year compared with 2012/13, but more quickly in relation to GDP - from 6.6% to 5.5%.

National insurance

With a rise in employment beyond 30m, national insurance contributions receipts are expected to rise by a third over the next five years.

Business rates

Business rate rises were limited to 2% in 2013/14 and the small business rate relief scheme for one year beyond 2014. Rates had been due to go up in line with September's retail price index of 3.2%, but a rise will be a third of that and cost businesses £300m. A revaluation planned for 2015 that could exclude 300,000 businesses has been delayed to 2017.

VAT

Vying with national insurance as the second biggest tax in terms of receipts after income tax, VAT is projected to lag GDP growth over the next few years following cuts in government spending on VATable goods and services and a shift in consumer spending from luxuries (vatable) to food (VAT exempt).

Corporation tax
Only worth about 9% of total tax receipts, corporation tax came down from 28% in 2010 to 21% from April 2014. This year's cut will bring in £300m a year less in 2013/14 than the previous year.

Income tax

The biggest element of government tax receipts, income tax was expected to benefit from a rise in employment. But successive rises in the personal allowance threshold are expected to cost an extra £3.9bn by 2014/15.

Excise duties

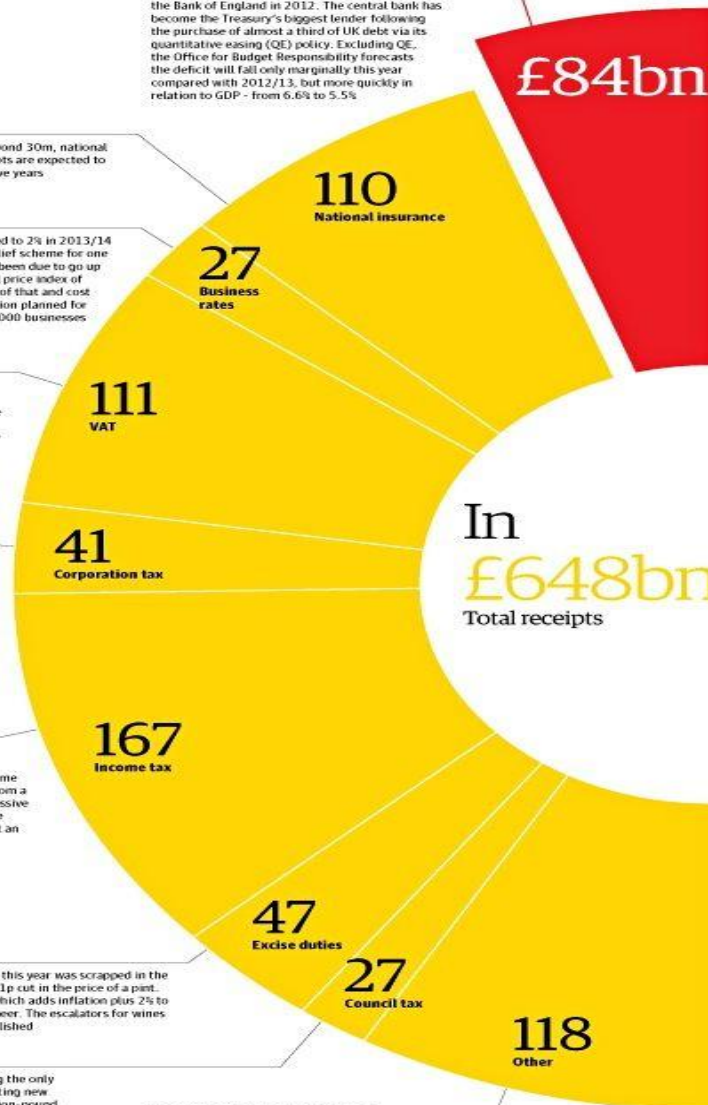
A planned 3p rise in beer duty this year was scrapped in the last budget and replaced by a 1p cut in the price of a pint. The alcohol duty escalator - which adds inflation plus 2% to the price - was abolished for beer. The escalators for wines and spirits have also been abolished.

Council tax

There is much talk of changing the only tax on property, possibly creating new top-tier bands to capture million-pound homes. A two-year freeze has limited receipts to £2.7bn.

Other - including stamp duty, vehicle excise duty

An expected rise in stamp duty receipts from share trades and house buying will more than pay for another freeze in fuel duty in 2014. A recent fall in oil prices could ease pressure for further freezes.



Defence

According to the latest figures, the UK has slipped one place to be the fifth highest spender in cash terms on defence in the world behind the United States, China, Russia and Saudi Arabia. But protection from cuts in the last two budgets prevented the UK copying France's precipitous slide from third to sixth largest spender.

Education

The departmental expenditure limit will increase in 2015/16 after a slight rise this year and small dip as the new capital budget of £7.2bn in 2010-11 that was due to bottom out at £3.3bn in 2013-14 was partially restored in last year's budget. But overall spending will fall behind inflation as further education and other areas suffer steep cuts.

Transport

The Treasury will funnel a smidgen more cash into major transport projects, and it will also use a new, souped-up version of the private finance initiative to try to attract private sector cash. But we can still expect drastic fare rises over the coming years, as the coalition shifts the burden for funding the transport network from the taxpayer to the passenger.

Public order & safety

The Home Office and Ministry of Justice are struggling to implement some of the steepest cuts in Whitehall. Redundancies in the police force combined with privatisations are key areas for savings. Both departments will need to make cuts for the next three years. However, the police budget will be protected and the counter-terrorism budget frozen.

Health

A backstairs privatisation of the health service has eaten into hospital and GP budgets, which will make a small, below-inflation rise in spending this year difficult to manage. Below-inflation rises are expected to continue as the NHS gets by on £104bn in 2012-13, rising to £114bn in 2014/15.

Industry, agriculture & employment

The Department for Business, Innovation and Skills is expected to cut 15% from its spending over four years to 2015/16.

Housing & environment

Private house building has picked up from a record low. Public housing remains in the doldrums. Nevertheless, it is an area targeted for cuts and environmental policy is likely to suffer most as green subsidies are rolled back.

Debt interest

Although the national debt has ballooned to more than £1 trillion, the UK is considered a safe haven by foreign lenders, which has kept interest rates low. That said, the UK must raise billions of pounds of new debt just to maintain spending.

Personal social services

A Cinderella area of spending, it covers home helps to social work and is a chief target for cuts. An ageing population is expected to put extra strain on budgets.

Social protection including tax credits

The welfare bill is one of the chief targets for cuts to protect spending in other areas. Higher rate taxpayers have already lost their child benefit. A switch to up-rating benefits in line with the lower consumer prices measure of inflation will have a cumulative savings effect and reap £5.8bn of the expected £11bn of savings in 2014-15. In addition, a new welfare cap from April 2015 will be set each year at the budget for four years ahead, including housing benefit, tax credits, disability benefits and pensioner benefits but not the state pension.

Other - including culture, sport, international development

Despite attacks from backbench Tory MPs, overseas aid spending is protected by the coalition government's commitment to raise overall expenditure in this area to the internationally agreed target of 0.7% of GDP.

TEXT: PHILLIP INMAN ECONOMICS CORRESPONDENT
GRAPHIC: GUARDIAN GRAPHICS. SOURCE: THE TREASURY
Figures rounded.

Box 1. What do I need to know?

- What are the different types of contracts?
- Why is the Equality Act 2010 so important?
- What are the redundancy and disciplinary procedures?

Box 2. Equality in Recruitment

Businesses must ensure they treat all workers fairly. They must offer equal pay and promotion opportunities for women and ethnic minorities.

This also applies to recruitment. Employers must not discriminate against applicants based on race, sex, age or disability.

Equality Act 2010

This act legally protects people from discrimination in the workplace and in wider society.

Box 3. Redundancy Procedures

Redundancy :- when a business eliminates a certain job role.

- ☐ Staff can lose their job through **redundancy** if the business suffers a fall in profit or they no longer offer the services of products the employee provides.
- ☐ Redundancy procedures must be fair .
- ☐ Can receive compensation for being made redundant.

Voluntary redundancy

Employees can volunteer for redundancy.

Box 4. Key Words	Explanation
Contract of employment	A contract is an agreement that sets out an employee's: employment conditions, rights & responsibilities and duties. The legal parts of a contract are known as ' terms '. An employer should make clear which parts of a contract are legally binding.
Permanent contract	This employment contract does not have an end date. This can offer better job security as it is ongoing.
Temporary contract	This employment contract is flexible and both sides have a notice period . This is often used in seasonal work, for example, shop staff at Christmas, or fruit pickers in summer.
Fixed term contract	This employment contract has a fixed end date. This can be used when the employer knows exactly when the contract needs to end. For example if someone is covering maternity leave the employer will know when the person is returning to work.
Part-time contract	A contract of less than a full time worker. There is not a set number of hours and can range from 1-34 hours per week.
Full time contract	A contract of full time employment. Full time is usually considered a contract of over 35 hours per week.
Zero hour contract	This contract means that the employer is not required to provide a minimum number of hours and the worker is not required to accept any work offered.

Box 5.

Disciplinary Procedures

Disciplinary procedures

Employers' disciplinary rules set the expected standards of employees and make it clear what conduct is and is not acceptable in the workplace. If this is not followed then staff can be disciplined.
Verbal warning, written warnings, final warnings or instant dismissals can be used.

Staff Development

Box 6.

What do I need to know?

- What is a staff induction?
- What is a staff appraisal?
- Why is staff training important?

Box 7.

Staff Appraisals

Appraisals are annual meetings to:

- review a staff member's performance over the previous year
- set targets for the next year
- support staff and motivate them to improve
- discuss any training needs or Continuous Professional Development (CPD).

Appraisal should be based on **the job description**.

They should be based on evidence of the employee's performance such as sickness record, disciplinary records, any previous targets.

Once the performance has been reviewed targets should be set for the following year.

Box 8.

Training

1. **On the job training:** where employees train within the business. Train whilst they work. Also called in house training.
2. **Off the job training:** where employees go off site to be trained by an external provider.

Box 9.

Staff Induction

All staff should be given an induction into their new job role and work place.
The purpose of the induction is to introduce the new member of staff to the job and workplace as quickly as possible, so they can contribute as quickly as possible.

Training can include:

1. Introduction to their new team
2. Introduction to building including health and safety guidelines (including first aid and fire exits)
3. Business policies and procedures
4. How to carry out their role, usually carried out by their line manager and can include job shadowing and training

Box 10.

Training

Why is training needed?

- New skills required by employees. This could be because of new equipment or updated products
- Changes to the business sector e.g. new legal requirements to driving qualification for lorry drivers.
- Expansion of a business into new areas which the staff do not have the required skills for.
- Promotion of staff to a new role they have not experienced before.
- Staff maybe required to gain a recognised qualification to carry out their job.
- Employers may want to help staff develop their functional skills to support their life chances.

Internal Training

Carried out by staff members of the business often in their own premises. This training is usually part of continuous staff development. Can include mentoring, job rotation and coaching.

External training

Carried out by others who are not part of the business. They could be consultants/ trainers from another organisation or training provider who have the skills and knowledge the business lacks

Box 11.**What I need to know?**

- What are the different ways an employee can be paid?
- What is performance related pay?

Performance Related Pay

Based on an employee reaching clearly set targets that can be measured. This can include commission, bonuses and profit sharing.

People who receive performance rated pay are usually paid a lower salary and are set pre-agreed targets. If they achieve the targets they will be paid a higher rate of pay.

Commission	Where staff are paid a basic wage and then a target based commission. For example, the more they sell, the higher their commission payment will be. Or if they meet a target then they receive the payment. If targets are not met then no commission will be paid.
Bonuses	Staff are given an extra payment. This is usually linked to the profitability of the company and the performance of the employee.
Profit sharing	Profit sharing is an incentive plan by a business to encourage their staff to perform better. The company allocates a percentage of the pre-tax profits to share amongst staff.



Useful Links: - <https://youtu.be/gfYdjFcrqkQ>
- <https://youtu.be/26dgiehTnnA>

Box 12.**Payment**

Wage	<p>A wage is a fixed regular payment earned for work or services, typically paid on a daily or weekly basis.</p> <ul style="list-style-type: none"> • Payment may be calculated at an hourly or daily rate. • Waged employees may also receive tips paid directly by customers. • Someone working in a shop, bar or restaurant is likely to receive a wage as opposed to a salary.
Salary	<p>The employer pays an arranged amount at regular intervals (such as a week or month) regardless of hours worked.</p> <p>Employees who receive an annual salary would also receive pay for holidays and sickness.</p>
Piece work	<p>You are paid for each thing you make or do and not for the amount of time you work.</p> <ul style="list-style-type: none"> • Many piece workers work from home. This is classed as 'output' work. • Many piece workers are self employed. This means they are responsible for their own tax and national insurance. • Piece work can be very low paid. It should be paid at minimum rate but this would depend on the employer estimate of how long it should take to complete the tasks! <p>For example, 50p for every scarf you make.</p>
Performance related pay	<p>Based on an employee reaching clearly set targets that can be measured. This can include commission, bonuses and profit sharing</p>

Define: <i>Stimulant</i>
A drug which cause a person to feel like they have more energy or more awake.
Define: <i>Depressant</i>
A drug which cause a person to feel calmer or lethargic.
Define: <i>Hallucinogen</i>
A drug which cause a person to experience sensations that are not really there. This could be visual, auditory or physical.
Define: <i>Analgesic</i>
A drug which reduces the feeling of pain.
Define: <i>Withdrawal</i>
a predictable group of signs and symptoms that result from either the sudden removal of, or abrupt decrease in the regular dosage of a drug.
Define: <i>Addiction</i>
The feeling of needing a drug in order to get through the day.

Drug	Analgesic	Hallucinogen	Stimulant	Depressant
Caffeine			✓	
Cocaine			✓	✓
Heroin	✓			✓
Cannabis		✓		✓
Crack Cocaine			✓	
Amphetamines		✓	✓	
Ecstasy			✓	
Alcohol				✓
Inhalants		✓	✓	
Tobacco				✓
LSD		✓		
Magic Mushrooms		✓		
Steroids	✓			

Mental and Emotional Withdrawal Symptoms
<ul style="list-style-type: none"> Anxiety: Anxiety, panic attacks, restlessness, irritability Depression: Social isolation, lack of enjoyment, fatigue, poor appetite Sleep: Insomnia, difficulty falling asleep or staying asleep Cognitive: Poor concentration, poor memory
Physical Withdrawal Symptoms
<ul style="list-style-type: none"> Head: Headaches, dizziness Chest: Chest tightness, difficulty breathing Heart: Racing heart, skipped beats, palpitations GI: Nausea, vomiting, diarrhoea, stomach aches Muscles: Muscle tension, twitches, tremors, shakes, muscle aches Skin: Sweating, tingling
Dangerous Withdrawal Symptoms
<ul style="list-style-type: none"> Grand mal seizures Heart attacks Strokes Hallucinations Delirium tremens (DTs)

Who Can you turn to for help and Support	
Parents and Family members	School Staff and Safeguarding Team
Your GP or Practice Nurse	
NSPCC	Helpline: 0808 800 5000 nspcc.org.uk
Childline	Helpline: 0800 1111 (https://www.childline.org.uk)
NHS Live Well Website	www.NHS.UK/Livewell
The Mix	Helpline: 0808 808 4994
Talk to Frank	Helpline: 0300 123 6600 talktofrank.com
Action on Addiction	Helpline: 0300 330 0659 actiononaddiction.org.uk
DrugFAM	Helpline: 0300 888 3853 drugfam.co.uk

Define: Rehabilitation

Drug users are sent to specialist clinics to help them break their addiction and often the causes of it as well.

Define: Possession

Being caught with a small amount of drugs that could reasonably be used by one person.

Define: intent to Supply

Being stopped whilst holding drugs and the police have reasonable suspicions that you will share with others or sell.

Define: Supply

Being caught selling drugs or medicines to other people.

Define: Trafficking

Taking illegal substances from one country to another.

Class	Examples	Sentence for Possession	Sentence for Dealing
Class A	Ecstasy, LSD, heroin, cocaine, crack, magic mushrooms, amphetamines (if prepared for injection).	Up to seven years in prison or an unlimited fine or both.	Up to life in prison or an unlimited fine or both.
Class B	Amphetamines, Methylphenidate (Ritalin),	Up to five years in prison or an unlimited fine or both.	Up to 14 years in prison or an unlimited fine or both.
Class C	Tranquilizers, Cannabis, some painkillers, Gamma hydroxybutyrate (GHB), Ketamine.	Up to two years in prison or an unlimited fine or both.	Up to 14 years in prison or an unlimited fine or both.
Temporary Class	The government can ban new drugs for 1 year under a 'temporary banning order' while they decide how the drugs should be classified.	None, but police can take away a suspected temporary class drug	Up to 14 years in prison, an unlimited fine or both
<p>These are the maximum sentences that could be imposed but there are a number of factors which will determine the sentence given if someone is charged and convicted of a drug offence. In most cases a first-time possession offence will lead to a caution and confiscation. A caution is not a criminal conviction, but it could be used as evidence of bad character if you go to court for another crime.</p>			

Prescription Medications

The law surrounding the selling of or sharing of prescription medications is ambiguous and is often linked to the type of drug/medicine that is being sold.

If the medicine is on the controlled substance list (e.g. morphine, amphetamines and benzodiazepines) then the person supplying can be subject to the punishments which are for that class of drugs.

It is extremely dangerous to share prescription drugs because of the possible side effects and impacts of other medications that are being taken.

Consequences of having a drug conviction

Employment	Having a criminal record for a drug conviction can prevent you from getting jobs in certain fields such as education, working with vulnerable adults, Health professions and legal professions.
Travel	A conviction for a drug offence can prevent travel to certain countries such as the USA and Australia
Education	A criminal record may stop you from enrolling on a course at the university of your choice, as many universities will ask you to declare any criminal convictions on your application and consider this separately from your academic achievements. The nature of the offence, the time that has elapsed since the offence was committed and the potential impact on fellow students and staff will all be considered. Some universities and educational facilities will refuse applications on the grounds of the crime committed.

Define: Sexual Consent
The giving of permission by a person to engage in any form of sexual activity including penetrative and oral sex.

Define: Affirmative Consent
Consent is only given when a person agrees verbally to engage in sexual activities including penetrative and oral sex.

Define: Coercion
The action or practice of persuading someone to do something they wouldn't normally do or something they don't want to do by using force or threats.

Define: A person who is a minor
A person who is under the age of 18 and legally considered a child.

Consent is:	
1	Freely given. It's not okay to pressure, trick, or threaten someone into saying yes.
2	Reversible. It's okay to say yes and then change your mind — at any time!
3	Informed. You can only consent to something if you have all the facts.
4	Enthusiastic. You should do stuff you WANT to do, not things people expect you to do. If someone doesn't seem enthusiastic stop and check in.
5	Specific. Saying yes to one thing (like going to the bedroom to make out) doesn't mean you're saying yes to other things (like having sex).

When can consent not be given?	
1	When a person is drunk or high, to the point that they are unable to speak or look after themselves.
2	Asleep or Passed Out – if they are not conscious they are unable to agree to any sexual activity. If someone passes out whilst engaging in sexual activity – STOP!
3	They are Underage – Legally a person under the age of 16 cannot give consent to any sexual activity.
4	Mental disability or learning difficulties which mean they are unable to fully understand what they are consenting to.

What does the Law say?		
Act	Definition	Consequence
Rape	A rape is when a person uses their penis without consent to penetrate the vagina, mouth, or anus of another person.	Rape is punished by a maximum of fifteen years' in prison. Aggravated Rape is punished by a maximum of twenty years' in prison Both offences would result in placement on the sex offenders register.
Sexual Assault	Sexual assault is when a person is coerced or physically forced to engage against their will, or when a person, touches another person sexually without their consent. Touching can be done with any part of the body or with an object.	Up to 10 years in prison and placement on the sex offenders register
Sex Between Minors	When both parties involved the sexual activity are under 16 but have consented to the activity.	Technically the law is that if two 13 – 15 year old's engage in consensual sexual activity and each knows that the other is under 16, they will both be guilty of an offence carrying a maximum penalty of five years' imprisonment, however it is unlikely the CPS will prosecute. If one party is under 13 and the other under 18 it is statutory Rape which is punishable by Life imprisonment, but the average is 6-7 years when prosecuted.

Who Can you turn to for help and Support	
Parents or trusted family members	The Police / Community support officers
School Safe Guarding Team or any member of staff.	
NSPCC	Helpline: 0808 800 5000 (24 hours, every day) nspcc.org.uk
Childline	Helpline: 0800 1111 (24 hours, every day) https://www.childline.org.uk
Rape Crisis	Helpline: 0808 802 9999 (12-2:30 and 7-9:30) rapecrisis.org.uk
Survivors UK – Male Rape and Sexual Abuse Support	survivorsuk.org
RASAC (Rape and Sexual Abuse Support Centre)	National Helpline: 0808 802 9999 (12-2.30 & 7-9.30) rasac.org.uk