



YEAR 9 KNOWLEDGE ORGANISER

MICHAELMAS 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
4-5	English	War
6-9	Mathematics	fractions, percentages, ratio and proportion, Algebra
10-20	Science	Biology, Chemistry, Physics
21-22	Geography	Hazardous Earth
23-25	History	Paper 1: Medieval, Early Modern and Industrial Age Crime and Punishment
26-27	Religious Education	Introduction to Christian teachings, Christian beliefs
28	GCSE Physical Education	Muscular System
29-30	Sports Studies	Table Tennis, Football
31-35	Computer Science	Programming, Problem solving
36-38	Drama	Theatre in Education, Physical Theatre
39-41	GCSE Music	Rock Music, Queen
42-43	Music Technology	Midi editing
44	Art	Painting and Pattern
45-46	Food and Nutrition	Foundation 1
47	Engineering	Engineering
48-49	French	Vocabulary
50-51	Spanish	Vocabulary
52-53	Statistics	Collection of Data
54-56	Citizenship	Community and identity
57-59	Business and Enterprise	Introduction to Business and Enterprise
60-61	PSHE	Diet and Fitness

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

HOMEWORK EXPECTATIONS

EACH NIGHT you should spend *at least 1 hour* per night on homework. 3 subjects per night x 20 minutes per subject= 1 hour. Use the homework timetable as a guide to what subjects to complete each night.

Complete all work in your exercise book and make sure you bring your knowledge organiser to school EVERYDAY (in your coloured folder).

Every FRIDAY morning the week's worth of KNOWLEDGE ORGANISER homework will be checked in Family Group time and detentions issued for work not complete, or not up to standard.

SUBJECT HOMEWORK

All students will also be assigned **ENGLISH** reading activities on www.CommonLit.org with each assignment taking 20-30 minutes to complete and **MATHS** activities with short explanatory videos on the online platform of <https://mathswatch.co.uk>.

It is also recommended to take advantage of FREE online revision tools such as www.senecalearning.com or the recently updated BBC BITESIZE.

It is also recommended that students regularly **READ** a variety of **fiction and non fiction books** of their choosing. This extra reading will develop and broaden general understanding and context in all subjects.



<u>HOMEWORK TIMETABLE</u>			
Year 9	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

EQUIPMENT CHECKLIST

Pencil case	Knowledge Organiser	2 Black or Blue pens
2 pencils and Eraser	Green Pen	Pencil Sharpener
Mini whiteboard and pen	Calculator	Ruler
Maths geometry set	Class book	

HOMEWORK CHECKLIST

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Half term						
Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7

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.

Copyright © 2018

4 Methods of Retrieval Practice

@ImpactWales

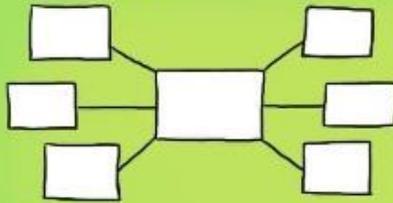
Before you start put away all your books & classroom materials.

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

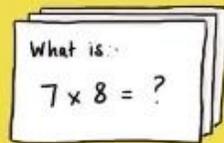
Create practice questions on a topic. Swap your questions with a partner & answer.

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

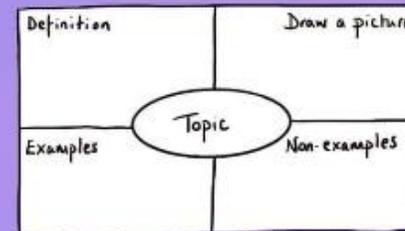
Create your own flashcards, question on one side answer on the other. Can you make links between the cards?



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

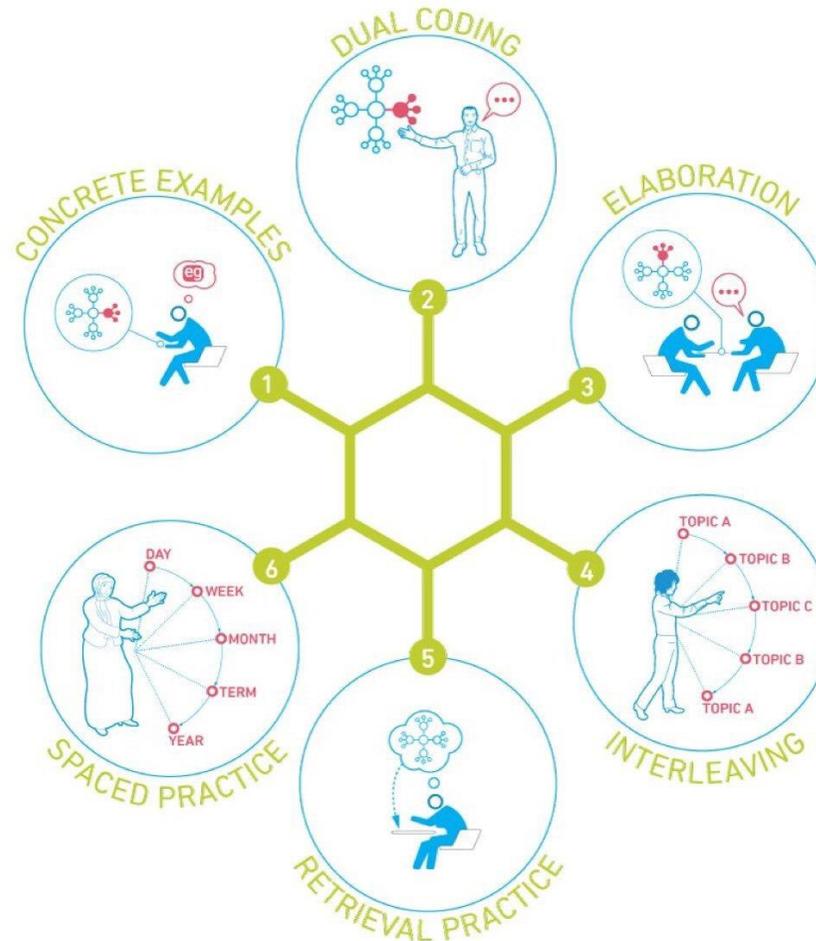
When you're studying, try to think about how you can turn ideas you're learning into concrete examples. Making a link between the idea you're studying and a real life example, concrete example, can help students understand abstract ideas and make it 'stick'.

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

	Term	Definition		Term	Definition
1	Sardonic (adj)	grimly mocking in tone	23	Scathing (adj)	severely critical and scornful
2	Personification (n) personify (v)	giving human qualities to something not human	24	Visceral (adj)	something you feel in your gut
3	Symbolise (v) Symbolic (adj)	when something represents something else	25	Abhorrent (adj) Abhorrent (n)	inspiring disgust or hatred
4	Incongruity (n) incongruous (adj)	when things don't fit or lack harmony	26	Despondent (adj) Despondence (n)	in low spirits, desperate
5	Jingoism (n) Jingoistic (adj)	Extreme or aggressive patriotism	27	Baleful (adj)	dangerous and threatening
6	Demotic (adj)	denoting or relating to the kind of language used by ordinary people; colloquial.	28	Disconcerting (adj)	causing one to feel unsettled
7	Epizeuxis (n)	repetition of a word in immediate succession	30	Sombre (adj)	having or conveying a feeling of deep seriousness and sadness.
8	1776-1783	American Revolution (American fights Britain)	31	Sanctimonious (adj)	thinking you are morally superior to others
9	1860	Abraham Lincoln elected President of USA	32	Mundane (adj)	boring and tedious
10	1863	Gettysburg Address	33	Elated (adj) Elation (n)	extremely happy
11	1861-1865	American Civil War	34	Macabre (adj)	disturbing because concerned with death or fear of death
12	1899-1902	Boer War (South Africa)	35	Inevitable (adj) inevitability (n)	certain to happen, unavoidable
13	1914-1918	World War One	36	Insurrection	a violent uprising against a government or King
14	1939-1940	World War Two	37	Denounce (v) denunciation (n)	to publicly criticise
15	Repugnant (adj) Repugnance (n)	Disgusting and offensive	38	Tenacious (adj) tenacity (n)	determined
16	Motif (n)	Common idea repeated across a text	39	Significant (adj) significance (n)	important or worthy of attention
17	Ubiquity (n) Ubiquitous (adj)	Found everywhere, commonplace	40	Resolute (adj)	determined
18	Parody (n)	Copying in a hyperbolic or mocking fashion for comic effect	41`	Ostracise (v) ostracisation (n)	Exclude from society or group
19	Frivolous (adj) frivolity (n)	not having any serious value or purpose	42	Ignominy (n) ignominious (adj)	Public shame and humiliation
20	Apathy (n) Apathetic (adj)	lack of interest, concern or care	43	Dehumanise (v) dehumanization (n)	Treat someone like an object
21	Profound (n) Profundity (n)	very great, intense or important	44	Grotesque (adj)	Repulsive and ugly, perhaps comically ugly

	Term	Definition		Term	Definition
45	Poignant (adj) Poignancy (n)	Evoking a keen sense of sadness or regret	62	Judicious (adj) Judiciously (adj)	Really carefully
46	Nihilistic (adj) Nihilism (n)	Thinking that life is meaningless and pointless	63	Shrewd (adj)	Having sharp powers of judgment
47	Deride (v) derision (n) derisive (adj)	Expressing contempt or ridicule	64	Paeon (n)	A song of praise or triumph
48	Indignance (n) Indignant (adj)	Angered or appalled by something unjust or cruel	65	Illicit (adj)	Against the law, illegal
49	Disconcert (v) disconcerting (adj)	Causing one to feel unsettled or on edge	66	Impediment (n) Impede (v)	To delay or prevent or obstruct something from happening
50	Inhumane (adj) Inhumanity (n)	Cruel or brutal behavior	67	Bathos (n)	An effect of anticlimax when the mood of a text changes from serious to silly or vice versa
51	Serene (adj) serenity (n)	Calm, peaceful, tranquil	68	Colloquialism (n) colloquial (adj)	Familiar or everyday language: slang
52	Emancipate (v) emancipation (n)	Set free, especially from legal, political or social restrictions	69	Forlorn (adj)	Pitifully sad or lonely
53	Benign (adj)	Gentle and kind	70	Dank (adj)	Unpleasantly damp and cold
54	Demagogue (n)	A political leader who appeals to popular desires and prejudices	71	Triviality (n) Trivial (adj)	Of little value or importance
55	Zeal (n) Zealous (adj)	Great enthusiasm and enjoyment and commitment to doing something	72	Condemn (v) condemnation (n)	Very strong disapproval
56	Magnitude (n)	The size and scale of something	73	Pay homage to (v)	To show respect to someone
57	Momentous (adj)	Of great importance or significance	74	Secular (adj)	Not religious
58	Sanguine (adj)	Optimistic and positive, especially in a bad situation	75	Apprehensive (adj) Apprehension (n)	anxious or fearful that something bad or unpleasant will happen.
59	Unequivocal (adj)	Leaving no doubt, unambiguous	76	Repress (v) Repression (n) repressive (adj)	Using force to control people in a cruel manner
60	Subjugate (v) Subjugation (n)	To bring under control or dominate someone in an unfair or cruel manner	77	Odious (adj)	Unpleasant
61	Scourge (n)	A person or thing that causes great suffering	78	Elaborate (adj)	Complicated in design and planning



Important Ideas	
Dividing by a fraction: multiply by the reciprocal of the divisor	$\frac{4}{7} \div \frac{2}{5}$ $2 \frac{4}{7} \times \frac{5}{2} = \frac{10}{7} = 1 \frac{3}{7}$
Percentage Multiplier	<p>Turn the percentage into a fraction or a decimal</p> <p>E.g. 5% = $\frac{5}{100} = 0.05$</p>

Compound Growth and Decay

This topic is simple if you [LEARN THIS FORMULA](#). If you don't, it's pretty well impossible:

Amount after n days/hours/years → $N = N_0 \times (\text{multiplier})^n$ ← Number of days/hours/years

Initial amount

Percentage change multiplier
E.g. 5% increase is 1.05 (= 1 + 0.05)
26% decrease is 0.74 (= 1 - 0.26)

Vocabulary	
Equivalent fractions	Fractions which are equal in value
Reciprocal of a number	1 divided by that number. In other words when you swap the numerator for the denominator.
Variable or unknown	A letter or symbol used to represent a number; it can take any value
Like terms	Separate parts of an expression which have exactly the same variable and same powers
Expression	Made up of numbers and/or letters but no equals sign
Equation	A mathematical statement showing that two expressions are equal. The expressions are linked with the symbol =

QUESTION	ANSWER
PERCENTAGE INCREASE Increase £400 by 12%	10% = £40 and 1% = £4 So 12 percent = £40 + £4 + £4 = £48 Total = £400 + £48 = £448
MIXED NUMBER ADDITION $1\frac{3}{5} + 2\frac{1}{3} =$	$\frac{8}{5} + \frac{7}{3} = \frac{24}{15} + \frac{35}{15} = \frac{59}{15} = 2\frac{14}{15}$
PERCENTAGE CHANGE There used to be 20 pencils in a pack, now there are only 15. Calculate the percentage change	$\frac{20 - 15}{20} \times 100 = \frac{5}{20} \times 100 = 25\%$ Answer 25% decrease
REVERSE PERCENTAGE A house increased in value by 20%. It is now worth £240,000. What was the original cost?	120% = £240 000 1% = £240 000 ÷ 120 = £2000 100% = £200 000

MathsWatch References	
70-74	The four operations with fractions
111, 164	Simple & compound interest
95	Substitution
135, 137	Forming and solving equations
94, 157	Factorising & Solving Quadratics

Key Facts & Formula	
Simple Interest versus Compound Interest	<p>An interest rate is usually specified, and this is applied at specified periods, for example annually.</p> <p>SI = Principal x interest rate (decimal) x time</p> <p>Compound interest (CI) interest is added over and over again: interest is calculated on the original amount and on already added interest.</p>
Expand & Simplify	$2(4m + 3) + 3(5m + 2)$ $8m + 6 + 15m + 6$ $23m + 12$
Factorise	<p>To express a number or an expression as the product of its factors.</p> <p>Factorise $6x^2 - 9x$</p> <p>The factorised expression is $3x(2x - 3)$.</p>
Substitute	<p>The velocity of a car is given by $v = u + at$, find value of v when $u=10$, $a=-2$ and $t=4$</p> $v = u + axt$ $v = 10 + -2 \times 4$ $v = 10 - 8$ $v = 2$
Solve	$5e - 1 = 3e + 6$ <p>STEP 1: Subtract $3e$ $-3e$ $-3e$</p> $2e - 1 = 6$ <p>STEP 2: Add 1 $+1$ $+1$</p> $2e = 7$ <p>STEP 3: Divide by 2 $\div 2$ $\div 2$</p> $e = 3.5$



Application of Methods	
Convert a mixed number into an improper fraction. Mixed Number	$4 \frac{3}{5} = \frac{4 \times 5 + 3}{5} = \frac{23}{5}$ $\frac{\text{Whole number} \times \text{denominator} + \text{numerator}}{\text{Original denominator}}$
Convert an improper fraction into a mixed number. Improper Fraction	$\frac{13}{3} \quad 13 \div 3 = 4 \text{ remainder } 1 \text{ over } 3 = 4 \frac{1}{3}$ <p>Step 1: Work out how many denominators fit into the numerator exactly Step 2: Leave the remainder over the original denominator.</p>
Reciprocal	<p>Step 1: Turn the number into a fraction Step 2: Turn the fraction upside down.</p> $0.5 = \frac{1}{2} \quad \text{Reciprocal} = \frac{2}{1}$ $4 \frac{2}{3} \times 1 \frac{1}{4} = \frac{16}{3} \times \frac{5}{4} = \frac{90}{12}$
To add/ subtract/ multiply/ or divide mixed numbers you...	<p>Step 1: Change both fractions into improper fractions Step 2: Calculate a normal.</p>
To change a recurring decimal to a fraction you...	<p>Step 1: Name the decimal X. Step 2: Eliminate the recurring element by subtraction. Step 3: Make X the subject of the remaining elements to find the fractional equivalent of the original decimal.</p> $\begin{array}{r} 10X = 3.\dot{3} \\ - \quad X = 0.\dot{3} \\ \hline 9X = 3 \end{array} \quad X = \frac{3}{9} = \frac{1}{3}$

Application of Methods									
To calculate a percentage of any amount you...	<p>Step 1: Turn the percentage into a decimal. Step 2: Multiply the decimal by the original amount.</p> $5.6\% \text{ of } \pounds 200 = 0.056 \times 200 = \pounds 11.20$								
To calculate compound interest you...	<p>Step 1: Turn the percentage increase into a decimal and add this to one. Step 2: The number of times you compound the interest becomes the power</p> $\text{Increase } \pounds 200 \text{ by } 6\% \text{ for } 4 \text{ years using compound interest.}$ 200×1.06^4								
To calculate compound decay you...	<p>Step 1: Turn the percentage decrease into a decimal and subtract this from one. Step 2: The number of times you compound the interest becomes the power.</p> $\text{Decrease } \pounds 300 \text{ by } 12\% \text{ for } 5 \text{ years using compound decay.}$ 300×0.88^5								
To find an original value given a percentage change you..	<p>Step 1: Write the new value with the percentage change taken into account. Step 2: Work backwards to 100% (the original value) using proportional reasoning.</p> <p>The price of a car is increased by 20% and now costs £2400. Calculate the original price</p> $\begin{array}{r} 120\% = 2400 \\ + 120 \downarrow \\ 100\% = 2000 \end{array}$								
To work out value for money...	<p>Step 1: Find out the value per unit in order to compare two deals directly using proportional reasoning.. Step 2: Write a conclusion in words using numbers as evidence to support your conclusion.</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Deal 1</td> <td style="text-align: center;">Deal 2</td> </tr> <tr> <td style="text-align: center;">£3 for 4kg</td> <td style="text-align: center;">£5 for 8kg</td> </tr> <tr> <td style="text-align: center;">+ 4 ↓</td> <td style="text-align: center;">+ 8 ↓</td> </tr> <tr> <td style="text-align: center;">£0.75 : 1kg ↓ + 4</td> <td style="text-align: center;">£0.625 : 1kg ↓ + 8</td> </tr> </table> <p>Deal 2 is better value for money as it is cheaper per kg since $0.625 < 0.75$</p>	Deal 1	Deal 2	£3 for 4kg	£5 for 8kg	+ 4 ↓	+ 8 ↓	£0.75 : 1kg ↓ + 4	£0.625 : 1kg ↓ + 8
Deal 1	Deal 2								
£3 for 4kg	£5 for 8kg								
+ 4 ↓	+ 8 ↓								
£0.75 : 1kg ↓ + 4	£0.625 : 1kg ↓ + 8								
To work out the speed of an object you...	<p>Step 1: Set up a ratio of distance versus time taken. Step 2: Use proportional reasoning in order to make the time equal to 60 minutes. Step 3: Remember speed is the distance travelled in one hour.</p> <p>Work out the speed if you travel 24km in 80 minutes</p> $\begin{array}{r} 24\text{km} : 80 \text{ minutes} \\ + 4 \downarrow \\ 6\text{km} : 20 \text{ mins} \\ \times 3 \downarrow \\ 18\text{km} : 60 \text{ mins} \end{array} \quad \text{Answer} = 18\text{kmph}$								

Vocabulary	
Speed kmph	The distance in km travelled in 60 minutes.
Density g/cm^3	The weight of an object in grams per cubic centimeter.
Pressure N/m^2	The force in Newton's per meter squared.
Proportional	There exists a multiplier between two linked values. E.g. as one triples so does the other so that they remain in proportion.

MathsWatch References	
25	Equivalent Fractions
26	Simplifying Fractions
38 – 42	Ratio and Proportion
70-74	+/-/x/= Fractions
86-89	Basic percentages
106-111	Percentage change
156	Mathematical reasoning
164	Compound interest

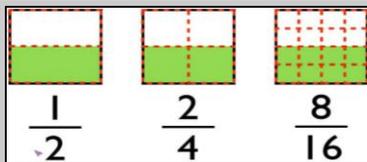


Important Ideas		QUESTION	ANSWER	KEY FACTS AND FORMULA	
BIDMAS	Brackets Indices (also known as orders or powers) Division Multiplication } equal priority Addition Subtraction } equal priority	BIDMAS $3 \times 5 + (1 + 3)^2$	$= 3 \times 5 + (4)^2$ $= 15 + 16$ $= 31$	Simplifying	Simplify the following 1) $x + x + x + x + x = 5x$ 2) $5e - 2e + e = 4e$ 3) $4x + 2y - x + 5y + 6 = 3x + 7y + 6$ 4) $3x^2 + 5x + 2x^2 - 4x = 5x^2 + x$ 5) $5 \times 4g = 20g$ 6) $3b \times 4c = 12bc$
Like Terms	Like terms contain the exact same variables, raised to the exact same powers E.g. $2a^2b$ and $5a^2b$; but $7ab^2$ would not be considered a like term	Substitution The velocity of a car is given by $v = u + at$, find value of v when $u=10$, $a=-2$ and $t=4$	$v = u + at$ $v = 10 + -2 \times 4$ $v = 10 - 8$ $v = 2$		
Simplify	you collect together all the terms that are alike. Remember, each term comes with the sign in front of it	Writing a formula Pencils cost 15p each and pens cost 25p each. Write a formula for the total cost, T pence, of x pencils and y pens.	Total cost = $15 \times x + 25 \times y$ $T = 15x + 25y$	Substitution	Evaluate $3a^2$ when $a = 5$ $3 \times 5^2 = 3 \times 25 = 75$ (Don't forget BIDMAS!)
Vocabulary					
Variable	(or an <u>unknown</u>) is a letter used to represent a number, these can take any values	Rearranging a formula Make r the subject of $C = 2\pi r$.	To isolate r , divide by 2π $\frac{C}{2\pi} = r$	Expanding Brackets – single brackets	
Terms	the separate parts of expressions. For example, in $5x + 3y - 4$, there are three terms $5x$, $+3y$ and -4	MathsWatch References			
Expressions	is made up numbers and/or letters representing unknown values where there is no equals symbol. For example, $4a + 6$ or $a + b$	30, 59	Number machines, BIDMAS		
		7,	Introduction to algebraic convention		
		66	Substitution		
Equations	A mathematical statement showing that two expressions are equal. The expressions are linked with the symbol =	34, 35	Simplifying expressions		
		102	Algebraic simplification		
Formula	An equation linking sets of physical variables.	136, 190	Rearranging Formulae		
				Expanding Two or More Brackets: multiply every term in each bracket by each term in every other bracket	Expand and Simplify:
				Rearranging Formula	Make x the subject of $y = \frac{x}{5} + 3$. To isolate x , start by subtracting 3 from both sides $y - 3 = \frac{x}{5}$ Then Multiply both sides of the equation by 5 $5(y - 3) = x$



Important Ideas

Equivalent Fractions



Dividing by a fraction:

multiply by the reciprocal of the divisor

$$\frac{4}{7} \div \frac{2}{5}$$

$$2\frac{4}{7} \times \frac{5}{2} = \frac{10}{7} = 1\frac{3}{7}$$

Vocabulary

Fraction

A **fraction** represents a part of a whole or, more generally, any number of equal parts.

Ratio

A **ratio** is a numerical comparison of 2 or more quantities.

Metrics Units of Measurement

The **metric system** is a **system** of measuring based on the metre, litre, kilogram and second.

Imperial Units of Measurement

In the past, **imperial units of measurement** were used in the UK. The imperial system has gradually been replaced by the metric system, which is easier to understand as it deals with tens, hundreds and thousands.

Q&A

Mixed number addition

$$1\frac{3}{5} + 2\frac{1}{3} =$$

Answer: $3\frac{14}{15}$

$$\frac{8}{5} + \frac{7}{3} = \frac{24}{15} + \frac{35}{15} = \frac{59}{15} = 3\frac{14}{15}$$

What is 50% of £84?

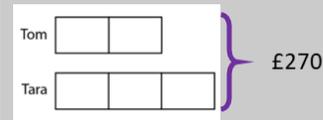
Answer: £42

$$\frac{50}{100} \times \frac{84}{1} =$$

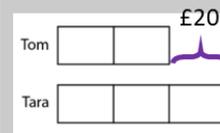
$$\frac{1}{2} \times \frac{84}{1} = \frac{84}{2} = £42$$

Ratio

Tom and Tara share £270 between them in the ratio 2:3. What else can you find out?



Tom and Tara share some money between them in the ratio 2:3. Tara gets £20 more than Tom. What else can you find out?



Key Facts

Units of Measurement

	Metric	Imperial
Length	millimetre, centimetre, metre, kilometre	inch, foot, yard, mile
Mass	milligram, gram, kilogram	ounce, pound, stone
Capacity	millilitre, centilitre, litre	pint, gallon

Converting Fractions, Decimals, and Percents

Decimal Fraction Percent

1. Divide the numerator by the denominator.

$$\frac{.25}{1.00}$$

convert to $\frac{1}{4}$

1. Divide the numerator by the denominator.

$$4 \overline{) 1.00}$$

2. Multiply by 100 or move the decimal point two places to the right.
 $0.25 \times 100 = 25.00$ or $.25 = 25$

3. Add the percent symbol. 25%

Percent Decimal Fraction

1. Multiply by 100 or move the decimal point two places to the right.

$$0.75 \times 100 = 75.00$$

1. Use the place value of the last digit to the right of the decimal point as the denominator.

$$0.75 = \frac{75}{100}$$

$0.75 = 75$

2. Add the percent symbol.
 $0.75 = 75\%$

2. Remove the decimal point and make that number the numerator.

$$0.75 = \frac{75}{100}$$

3. Reduce the fraction to lowest terms.
 $\frac{75}{100} = \frac{3}{4}$

Fraction Percent Decimal

1. Remove the percent symbol and make that number the numerator.

$$\frac{40}{100}$$

1. Remove the percent symbol.

$$40$$

2. Use 100 as the denominator.

$$\frac{40}{100}$$

2. Divide by 100 or move the decimal point two places to the left.

$$\frac{40}{100} = 0.40$$

3. Reduce the fraction to lowest terms.

$$\frac{40}{100} = \frac{2}{5}$$

$$40.0 = 0.40$$

Fractions 24, 25, 26, 70, 71a, 71b, 72, 73, 74, 84, 85

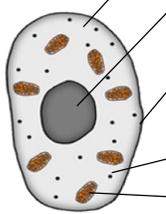
Percentage 85, 86, 87, 88, 89

Decimal 3, 17, 18, 66, 67, 84, 85

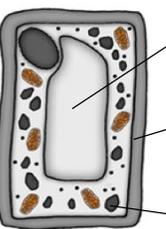
Conversion of Units 112

1. Eukaryote and prokaryote cells

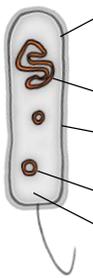
Animal cells

	cytoplasm	<i>site of chemical reactions in the cell</i>	gel like substance containing enzymes to catalyse the reactions
	nucleus	<i>contains genetic material</i>	controls the activities of the cell and codes for proteins
	cell membrane	<i>semi permeable</i>	controls the movement of substances in and out of the cell
	ribosome	<i>site of protein synthesis</i>	mRNA is translated to an amino acid chain
	mitochondrion	<i>site of respiration</i>	where energy is released for the cell to function

Plant cells contains all the parts of animal cells plus extras

	permanent vacuole	<i>contains cell sap</i>	keeps cell turgid, contains sugars and salts in solution
	cell wall	<i>made of cellulose</i>	supports and strengthens the cell
	chloroplast	<i>site of photosynthesis</i>	contains chlorophyll, absorbs light energy

Bacterial cells are much smaller than plant and animal cells

	cell membrane	<i>site of chemical reactions in the cell</i>	gel like substance containing enzymes to catalyse the reactions
	bacterial DNA	<i>not in nucleus floats in the cytoplasm</i>	controls the function of the cell
	cell wall	NOT made of cellulose	supports and strengthens the cell
	plasmid	<i>small rings of DNA</i>	contain additional genes
	cytoplasm	<i>semi permeable</i>	controls the movement of substances in and out of the cell

2. Microscopes

Feature	Light (optical) microscope	Electron microscope
Radiation used	Light rays	Electron beams
Max magnification	~ 1500 times	~ 2 000 000 times
Resolution	200nm	0.2nm
Size of microscope	Small and portable	Very large and not portable
Cost	~£100 for a school one	Several £100,000 to £1 million plus

PREFIXES

Prefix	Multiple	Standard form
centi (cm)	1 cm = 0.01 m	$\times 10^{-2}$
milli (mm)	1 mm = 0.001 m	$\times 10^{-3}$
micro (μm)	1 μ m = 0.000 001 m	$\times 10^{-6}$
nano (nm)	1nm = 0.000 000 001 m	$\times 10^{-9}$

$$\text{magnification } M = \frac{\text{size of image}}{\text{real size of the object}}$$

3. Cell cycle

Stage	Process	Description
Stage 1	Growth	Increase the number of sub-cellular structures e.g. ribosomes and mitochondria.
Stage 2	DNA Synthesis	DNA replicates to form two copies of each chromosome.
Stage 3	Mitosis	One set of chromosomes is pulled to each end of the cell and the nucleus divides. Then the cytoplasm and cell membranes divide to form two cells that are identical to the parent cell.

4. Cell differentiation			
nerve		carry electrical signals	long branched connections and insulating sheath
sperm		fertilise an egg	streamlined with a long tail acrosome containing enzymes large number of mitochondria
muscle		contract to allow movement	contains a large number of mitochondria long
root hair		absorb water and minerals from soil	hair like projections to increase the surface area
xylem		carry water and minerals	TRANSPIRATION - dead cells cell walls toughened by lignin flows in one direction
phloem		carry glucose	TRANSLOCATION - living cells have end plates with holes flows in both directions

5. Cancer	
Benign tumour	Contained in one area of the body (usually by a membrane) – not cancer.
Malignant tumour	Invade tissues and spread to different parts of the body to form secondary tumours.
Carcinogens and ionising radiation increase the risk of cancer by changing/ damaging DNA	

6. Stem cells		
Divides to form more cells of the same type, and can differentiate to form many other cell types.		
Human Embryonic stem cells	Can be cloned and made to differentiate into most cell types	Therapeutic cloning uses same genes so the body does not reject the tissue. Can be a risk of infection
Adult bone marrow stem cells	Can form many types of human cells e.g. blood cells	Tissue is matched to avoid rejection, risk of infection. Only a few types of cells can be formed.
Meristems (plants)	Can differentiate into any plant cell type throughout the life of the plant.	Used to produce clones quickly and economically, e.g. rare species, crop plants with pest /disease resistance
Treatment with stem cells may be able to help conditions such as diabetes and paralysis. Some people object to the use of stem cells on ethical or religious grounds		

7. Respiration for energy		
Cellular respiration is an exothermic reaction which is continuously occurring in all living cells		
An organism will receive all the energy it needs for living processes as a result of the energy transferred from respiration	For movement	To enable muscles to contract in animals.
	For keeping warm	To keep a steady body temperature in a cold environment.
	For chemical reactions	To build larger molecules from smaller one.

8. Aerobic respiration

Respiration with oxygen. Occurs inside the mitochondria continuously

glucose + oxygen → carbon dioxide + water



Aerobic respiration releases a large amount of energy from each glucose molecule

9. Anaerobic respiration

Respiration when oxygen is in short supply. Occurs during intensive exercise

During hard exercise, muscle cells are respiring so fast that blood cannot transport enough oxygen to meet their needs.

Glucose is partially oxidised to produce lactic acid which builds up in muscle tissue causing them to become painful and fatigued.

glucose → lactic acid

Anaerobic respiration releases a much smaller amount of energy than aerobic respiration.

Anaerobic respiration in plant and yeast cells

The end products are ethanol and carbon dioxide. Anaerobic respiration in yeast cells is called fermentation

glucose → ethanol + carbon dioxide

7. The periodic table		
Mass number	<i>The sum of the protons and neutrons in the nucleus</i>	
Atomic number	<i>The number of protons in the atom</i>	Number of electrons = number of protons
Elements arranged in order of atomic number	<i>Elements with similar properties are in columns called groups</i>	Elements in the same group have the same number of outer shell electrons and elements in the same period (row) have the same number of electron shells.

8. Development of the periodic table		
Before discovery of protons, neutrons and electrons	<i>Elements arranged in order of atomic weight</i>	Early periodic tables were incomplete, some elements were placed in inappropriate groups if the strict order atomic weights was followed.
Mendeleev	<i>Left gaps for elements that hadn't been discovered yet</i>	Elements with properties predicted by Mendeleev were discovered and filled in the gaps. Knowledge of isotopes explained why order based on atomic weights was not always correct.

9. Group 1 – Alkali metals		
Alkali metals	<i>Very reactive with oxygen, water and chlorine</i>	Only have one electron in their outer shell. Form +1 ions.
	<i>Reactivity increases down the group</i>	Negative outer electron is further away from the positive nucleus so is more easily lost.

10. Group 7 – Halogens		
Halogens	<i>Consist of molecules made of a pair of atoms</i>	Have seven electrons in their outer shell. Form -1 ions.
	<i>Melting and boiling points increase down the group (gas → liquid → solid)</i>	Increasing atomic mass number.
	<i>Reactivity decreases down the group</i>	Increasing proton number means an electron is more easily gained

11. Group 0 – Noble gases		
Noble gases	<i>Unreactive, do not form molecules</i>	This is due to having full outer shells of electrons.
	<i>Boiling points increase down the group</i>	Increasing atomic number.

12. Transition metals (CHEMISTRY ONLY)	
Compared to group 1	<ul style="list-style-type: none"> • <i>Less reactive</i> • <i>Harder</i> • <i>Denser</i> • <i>Higher melting points</i>
Typical properties	<ul style="list-style-type: none"> • <i>Many have different ion possibilities with different charges</i> • <i>Used as catalysts</i> • <i>Form coloured compounds</i>

1. Atoms, elements and compounds

Atom	<i>The smallest part of an element that can exist</i>
Element	<i>Contains only one type of atom</i>
Compound	<i>Two or more elements chemically combined</i>

3. Separating mixtures

Mixtures	<i>Two or more elements or compounds not chemically combined together</i>	
Method	Description	
Filtration	<i>Separating an insoluble solid from a liquid</i>	
Crystallisation	<i>To separate a solid from a solution</i>	
Simple distillation	<i>To separate a solvent from a solution</i>	
Fractional distillation	<i>Separating a mixture of liquids each with different boiling points</i>	
Chromatography	<i>Separating substances that move at different rates through a medium</i>	

2. Chemical equations

Chemical equations	<i>Show chemical reactions - need reactant(s) and product(s) energy always involves and energy change</i>	
Word equations	<i>Uses words to show reaction</i> reactants → products <i>magnesium + oxygen → magnesium oxide</i>	
Symbol equations	<i>Uses symbols to show reaction</i> reactants → products <i>2Mg + O₂ → 2MgO</i>	

4. Atomic structure

Nucleus	<i>Contains protons and neutrons</i>	
Electron shells	<i>Contains electrons</i>	
Name of Particle	Relative Charge	Relative Mass
Proton	+1	1
Neutron	0	1
Electron	-1	Very small

5. Electronic structure

Electronic shell	Max number of electrons
1	2
2	8
3	8
4	2

6. History of the atomic model

Rutherford's scattering experiment	<p><i>A beam of alpha particles are directed at a very thin gold foil</i></p>	<p>Most of the alpha particles passed right through. A few (+) alpha particles were deflected by the positive nucleus. A tiny number of particles reflected back from the nucleus.</p>
------------------------------------	---	--

Pre 1900	<i>Tiny solid spheres that could not be divided</i>	Before the discovery of the electron, John Dalton said the solid sphere made up the different elements.
1897 'plum pudding'	<i>A ball of positive charge with negative electrons embedded in it</i>	JJ Thompson 's experiments showed that showed that an atom must contain small negative charges (discovery of electrons).
1909 nuclear model	<i>Positively charge nucleus at the centre surrounded negative electrons</i>	Ernest Rutherford's alpha particle scattering experiment showed that the mass was concentrated at the centre of the atom.
1913 Bohr model	<i>Electrons orbit the nucleus at specific distances</i>	Niels Bohr proposed that electrons orbited in fixed shells; this was supported by experimental observations.



1. Chemical bonds		
Ionic	<i>Particles are oppositely charged ions</i>	Occurs in compounds formed from metals combined with non metals.
Covalent	<i>Particles are atoms that share pairs of electrons</i>	Occurs in most non metallic elements and in compounds of non metals.
Metallic	<i>Particles are atoms which share delocalised electrons</i>	Occurs in metallic elements and alloys.

2. Ionic bonding	
Electrons are transferred so that all atoms have a noble gas configuration (full outer shells).	<i>Metal atoms lose electrons and become positively charged ions</i>
	<i>Non metals atoms gain electrons to become negatively charged ions</i>

4. Covalent bonding	
Atoms share pairs of electrons	<i>Can be small molecules e.g. ammonia</i>
	<i>Can be giant covalent structures e.g. polymers</i>

3. Ionic compounds	
Structure	<ul style="list-style-type: none"> <i>Held together by strong electrostatic forces of attraction between oppositely charged ions</i> <i>Forces act in all directions in the lattice</i>
<i>High melting and boiling points</i>	Large amounts of energy needed to break the bonds.
<i>Do not conduct electricity when solid</i>	Ions are held in a fixed position in the lattice and cannot move.
<i>Do conduct electricity when molten or dissolved</i>	Lattice breaks apart and the ions are free to move.

5. Metallic bonding	
Giant structure of atoms arranged in a regular pattern	Electrons in the outer shell of metal atoms are delocalised and free to move through the whole structure. This sharing of electrons leads to strong metallic bonds.
Good conductors of electricity	Delocalised electrons carry electrical charge through the metal.
Good conductors of thermal energy	Energy is transferred by the delocalised electrons.
High melting and boiling points	This is due to the strong metallic bonds.
Pure metals can be bent and shaped	Atoms are arranged in layers that can slide over each other.

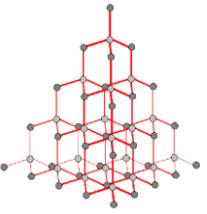
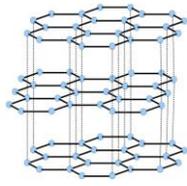
6. Alloys		
Alloys	<i>Mixture of two or more elements at least one of which is a metal</i>	Harder than pure metals because atoms of different sizes disrupt the layers so they cannot slide over each other.

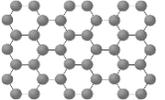
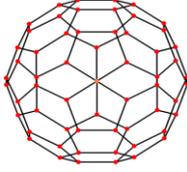
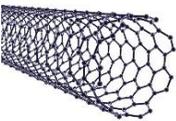
7. States of matter			
Solid, liquid, gas	<i>Melting and freezing happen at melting point, boiling and condensing happen at boiling point.</i>	The amount of energy needed for a state change depends on the strength of forces between particles in the substance.	(HT only) Limitations of simple model: <ul style="list-style-type: none"> • There are no forces in the model • All particles are shown as spheres • Spheres are solid

8. Properties of small molecules			
Usually gases or liquids	<i>Covalent bonds in the molecule are strong but forces between molecules (intermolecular) are weak</i>	Low melting and boiling points.	Due to having weak intermolecular forces that easily broken.
		Do not conduct electricity.	Due to them molecules not having an overall electrical charge.
		Larger molecules have higher melting and boiling points.	Intermolecular forces increase with the size of the molecules.

9. Polymers		
Very large molecules	<i>Solids at room temperature</i>	Atoms are linked by strong covalent bonds.

10. Giant covalent structures		
Diamond, graphite, silicon dioxide	<i>Very high melting points</i>	Lots of energy needed to break strong, covalent bonds.

11. Diamond & Graphite			
Diamond: Each carbon atom is bonded to four others		Very hard.	Rigid structure.
		Very high melting point.	Strong covalent bonds.
		Does not conduct electricity.	No delocalised electrons.
Graphite: Each carbon atom is bonded to three others forming layers of hexagonal rings with no covalent bonds between the layers		Slippery.	Layers can slide over each other.
		Very high melting point.	Strong covalent bonds.
		Does conduct electricity.	Delocalised electrons between layers.

12. Graphene & Fullerenes			
Graphene	 <i>Single layer of graphite one atom thick</i>	Excellent conductor.	Contains delocalised electrons.
		Very strong.	Contains strong covalent bonds.
Fullerenes		Buckminsterfullerene, C ₆₀ First fullerene to be discovered.	Hexagonal rings of carbon atoms with hollow shapes. Can also have rings of five (pentagonal) or seven (heptagonal) carbon atoms.
Carbon nanotubes	 <i>Very thin and long cylindrical fullerenes</i>	Very conductive.	Used in electronics industry.
		High tensile strength.	Reinforcing composite materials.
		Large surface area to volume ratio.	Catalysts and lubricants.

13. Nanoparticles (CHEMISTRY ONLY)	
Between 1 and 100 nanometres (nm) in size	1 nanometre (1 nm) = 1×10^{-9} metres (0.000 000 001m or a billionth of a metre).
Healthcare, cosmetics, sun cream, catalysts, deodorants, electronics.	Nanoparticles may be toxic to people. They may be able to enter the brain from the bloodstream and cause harm.



1. Energy stores and energy pathways		
Energy stores	<i>Kinetic, chemical, internal (thermal), gravitational potential, elastic potential, magnetic, electrostatic, nuclear</i>	Energy is gained or lost from the object or device.
Unit	<i>Joules (J)</i>	
Kinetic energy	<i>Energy stored by a moving object</i>	$\frac{1}{2} \times \text{mass} \times (\text{speed})^2$ $\frac{1}{2} mv^2$
Elastic Potential energy	<i>Energy stored in a stretched spring, elastic band</i>	$\frac{1}{2} \times \text{spring constant} \times (\text{extension})^2$ $\frac{1}{2} ke^2$ (Assuming the limit of proportionality has not been exceeded)
Gravitational Potential energy	<i>Energy gained by an object raised above the ground</i>	Mass X gravitational field strength X height mgh
Mechanical	<i>Force acts upon an object</i>	
Electrical	<i>Electric current flow</i>	
Heat	<i>Temperature difference between objects</i>	
Radiation	<i>Electromagnetic waves or sound</i>	

4. Specific heat capacity		
Specific Heat Capacity	<i>Energy needed to raise 1kg of substance by 1°C</i>	Depends on: mass of substance, what the substance is and energy put into the system.
Change in thermal energy = mass × specific heat capacity × temperature change		
$\Delta E = m \times c \times \Delta \theta$		

2. Systems		
System	<i>An object or group of objects that interact together</i>	EG: Kettle boiling water.
Ways to transfer energy	<i>Light, sound, electricity, thermal, kinetic are ways to transfer from one store to another store of energy.</i>	EG: electrical energy transfers chemical energy into thermal energy to heat water up.
Closed system	<i>No change in total energy in system</i>	
Open system	<i>Energy can dissipate</i>	

3. Work done and power			
Work	<i>Doing work transfers energy from one store to another</i>	By applying a force to move an object the energy store is changed.	Work done = Force X distance moved $W = Fs$
Power	<i>The rate of energy transfer</i>	1 Joule of energy per second = 1 watt of power	Power = energy transfer ÷ time $P = E \div t$ Power = work done ÷ time, $P = W \div t$

5. Dissipation of energy		
Principle of conservation of energy	<i>The amount of energy always stays the same.</i>	Energy cannot be created or destroyed, only changed from one store to another.
Dissipate	<i>To scatter in all directions or to use wastefully</i>	When energy is 'wasted', it dissipates into the surroundings as internal (thermal) energy.
Ways to reduce 'wasted' energy	<i>Energy transferred usefully</i>	Insulation, streamline design, lubrication of moving parts.

6. Units and numbers

Energy (KE, EPE, GPE, thermal)	Joules (J)	Specific Heat Capacity	Joules per Kilogram degree Celsius (J/Kg°C)	Prefix	Multiple	Standard form
Velocity	Metres per second (m/s)	Temperature change	Degrees Celsius (°C)			
Spring constant	Newton per metre (N/m)	Work done	Joules (J)	Kilo	1000	10 ³
Extension	Metres (m)	Force	Newton (N)			
Mass	Kilogram (Kg)	Distance moved	Metre (m)	Mega	1000 000	10 ⁶
Gravitational field strength	Newton per kilogram (N/Kg)	Power	Watts (W)			
Height	Metres (m)	Time	Seconds (s)	Giga	100 000 000	10 ⁹

7. Energy efficiency

Efficiency	How much energy is usefully transferred
Useful energy	Energy transferred and used
Wasted energy	Dissipated energy, stored less usefully
$\text{Efficiency} = \frac{\text{Useful power output}}{\text{Total power input}}$	
$\text{Efficiency} = \frac{\text{Useful output energy transfer}}{\text{Total input energy transfer}}$	

8. Renewable and non-renewable

Non-renewable energy resource	These will run out. It is a finite reserve. It cannot be replenished.	e.g. Fossil fuels (coal, oil and gas) and nuclear fuels.
Renewable energy resource	These will never run out. It is an infinite reserve. It can be replenished.	e.g. Solar, Tides, Waves, Wind, Geothermal, Biomass, Hydroelectric

9. Energy resources

Energy resource	<i>How it works</i>	Advantages	Disadvantages
Fossil Fuels (coal, oil and gas)	<i>Burnt to release thermal energy used to turn water into steam to turn turbines</i>	Provides most of the UK energy. Large reserves. Cheap to extract. Used in transport, heating and making electricity. Easy to transport.	Non-renewable. Burning coal and oil releases sulfur dioxide. When mixed with rain makes acid rain. Acid rain damages building and kills plants. Burning fossil fuels releases carbon dioxide which contributes to global warming. Serious environmental damage if oil spilt.
Nuclear	<i>Nuclear fission process</i>	No greenhouse gases produced. Lots of energy produced from small amounts of fuel.	Non-renewable. Dangers of radioactive materials being released into air or water. Nuclear sites need high levels of security. Start up costs and decommission costs very expensive. Toxic waste needs careful storing.
Biofuel	<i>Plant matter burnt to release thermal energy</i>	Renewable. As plants grow, they remove carbon dioxide. They are 'carbon neutral'.	Large areas of land needed to grow fuel crops. Habitats destroyed and food not grown. Emits carbon dioxide when burnt thus adding to greenhouse gases and global warming.
Tides	<i>Every day tides rise and fall. Movement turns a turbine.</i>	Renewable. Predictable due to consistency of tides. No greenhouse gases produced.	Expensive to set up. A dam like structure is built across an estuary, altering habitats and causing problems for ships and boats.
Waves	<i>Up and down motion turns turbines</i>	Renewable. No waste products.	Can be unreliable depends on wave output as large waves can stop the pistons working.
Hydroelectric	<i>Falling water spins a turbine</i>	Renewable. No waste products.	Habitats destroyed when dam is built.
Wind	<i>Movement causes turbine to spin which turns a generator</i>	Renewable. No waste products.	Unreliable – wind varies. Visual and noise pollution. Dangerous to migrating birds.
Solar	<i>Directly heats objects in solar panels or sunlight captured in photovoltaic cells</i>	Renewable. No waste products.	Making and installing solar panels expensive. Unreliable due to light intensity.
Geothermal	<i>Hot rocks under the ground heats water to produce steam to turn turbine</i>	Renewable. Clean. No greenhouse gases produced.	Limited to a small number of countries. Geothermal power stations can cause earthquake tremors.

10. National grid

Power station: You need to understand the principle behind generating electricity. An energy resource is burnt to make steam to drive a turbine which drives the generator.

National Grid	<i>Transports electricity across UK</i>	Power station → Step-up transformer → Pylons → Step-down transformer → House, factory
---------------	---	---

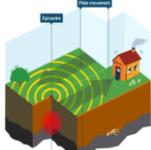
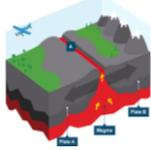


Volcanic Hazards	
Ash cloud	Small pieces of pulverised rock and glass which are thrown into the atmosphere.
Gas	Sulphur dioxide, water vapour and carbon dioxide come out of the volcano.
Lahar	A volcanic mudflow which usually runs down a valley side on the volcano.
Pyroclastic flow	A fast moving current of super-heated gas and ash (1000°C). They travel at 450mph.
Volcanic bomb	A thick (viscous) lava fragment that is ejected from the volcano.

The structure of the Earth	
The Crust	Varies in thickness (5-10km) beneath the ocean. Made up of several large plates.
The Mantle	Widest layer (2900km thick). The heat and pressure means the rock is in a liquid state that is in a state of convection.
The Inner and outer Core	Hottest section (5000 degrees). Mostly made of iron and nickel and is 4x denser than the crust. Inner section is solid whereas outer layer is liquid.

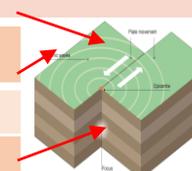
Convection Currents	
The crust is divided into tectonic plates which are moving due to convection currents in the mantle.	
1	Radioactive decay of some of the elements in the core and mantle generate a lot of heat.
2	When lower parts of the mantle molten rock (Magma) heat up they become less dense and slowly rise .
3	As they move towards the top they cool down, become more dense and slowly sink .
4	These circular movements of semi-molten rock are convection currents
5	Convection currents create drag on the base of the tectonic plates and this causes them to move.

LIC -CS: Haiti Earthquake 2010	
Causes On a conservative plate margin , involving the Caribbean & North American plates. The magnitude 7.0 earthquake was only 15 miles from the capital Port au Prince . With a very shallow focus of 13km deep .	
Effects 230,000 people died and 3 million affected. Many emotionally affected . 250,000 homes collapsed or were damaged. Millions homeless . Rubble blocked roads and shut down ports.	Management Individuals tried to recover people. Many countries responded with appeals or rescue teams . Heavily relied on international aid , e.g. \$330 million from the EU. 98% of rubble remained after 6 months .

Types of Plate Margins	
Destructive Plate Margin	
When the denser plate subducts beneath the other, friction causes it to melt and become molten magma . The magma forces its way up to the surface to form a volcano. This margin is also responsible for devastating earthquakes .	
Constructive Plate Margin	
Here two plates are moving apart causing new magma to reach the surface through the gap. Volcanoes formed along this crack cause a submarine mountain range such as those in the Mid Atlantic Ridge .	
Conservative Plate Margin	
A conservative plate boundary occurs where plates slide past each other in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes such as the ones happening along the San Andreas Fault, USA.	

What is a Natural Hazard	
A natural hazard is a natural process which could cause death, injury or disruption to humans, property and possessions.	
Geological Hazard	Meteorological Hazard
These are hazards caused by land and tectonic processes.	These are hazards caused by weather and climate.

Causes of Earthquakes	
Earthquakes are caused when two plates become locked causing friction to build up. From this stress , the pressure will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of seismic waves , to travel from the focus towards the epicentre . As a result, the crust vibrates triggering an earthquake.	
The point directly above the focus, where the seismic waves reach first, is called the EPICENTRE .	
SEISMIC WAVES (energy waves) travel out from the focus.	
The point at which pressure is released is called the FOCUS .	



Managing Volcanic Eruptions	
Warning signs	Monitoring techniques
Small earthquakes are caused as magma rises up.	Seismometers are used to detect earthquakes.
Temperatures around the volcano rise as activity increases.	Thermal imaging and satellite cameras can be used to detect heat around a volcano.
When a volcano is close to erupting it starts to release gases.	Gas samples may be taken and chemical sensors used to measure sulphur levels.
Preparation	
Creating an exclusion zone around the volcano.	Being ready and able to evacuate residents.
Having an emergency supply of basic provisions, such as food	Trained emergency services and a good communication system.

Earthquake Management	
PREDICTING	
Methods include:	
<ul style="list-style-type: none"> • Satellite surveying (tracks changes in the earth's surface) • Laser reflector (surveys movement across fault lines) • Radon gas sensor (radon gas is released when plates move so this finds that) • Seismometer • Water table level (water levels fluctuate before an earthquake). • Scientists also use seismic records to predict when the next event will occur. 	
PROTECTION	
You can't stop earthquakes, so earthquake-prone regions follow these three methods to reduce potential damage:	
<ul style="list-style-type: none"> • Building earthquake-resistant buildings • Raising public awareness • Improving earthquake prediction 	

HIC - CS: Eyjafjallajökull (E15) Eruption, Iceland 2010	
Causes The North-American and Eurasian plates move apart on a constructive plates. The disruption caused by Eyjafjallajökull was the result of a series of small volcanic eruptions from March to October.	
Effects The thick ice cap melted which caused major flooding. No reported deaths . Airspace closed across Europe, with at least 17,000 flights cancelled. Costed insurers £65m to cancelled flights.	Management Iceland had a good warning system with texts being sent to residents within 30 minutes . Large sections of European airspace were closed down due ash spread over the continent. Airlines developed ash monitoring equipment .

Global pattern of air circulation

Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

Hadley cell	Largest cell which extends from the Equator to between 30° to 40° north & south .
Ferrel cell	Middle cell where air flows poleward between 60° & 70° latitude .
Polar cell	Smallest & weakness cell that occurs from the poles to the Ferrel cell.

Distribution of Tropical Storms.

They are known by many names, including **hurricanes** (North America), **cyclones** (India) and **typhoons** (Japan and East Asia). They all occur in a band that lies roughly **5-15°** either side of the Equator.

Low Pressure	High Pressure
Caused by hot air rising . Causes stormy, cloudy weather.	Caused by cold air sinking . Causes clear and calm weather.

Formation of Tropical Storms

- The sun's rays heats large areas of ocean in the summer and autumn. This causes **warm, moist air** to rise over the particular spots
- Once the **temperature is 27°**, the rising warm moist air leads to a **low pressure**. This eventually turns into a thunderstorm. This causes air to be sucked in from the **trade winds**.
- With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to **spin**.
- When the storm begins to **spin faster than 74mph**, a tropical storm (such as a hurricane) is officially born.
- With the tropical storm growing in power, **more cool air sinks** in the centre of the storm, creating calm, clear condition called the **eye of the storm**.
- When the tropical storm hits land, it **loses its energy source** (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.

Changing pattern of Tropical Storms

Scientists believe that global warming is having an impact on the frequency and strength of tropical storms. This may be due to an increase in ocean temperatures.

Management of Tropical Storms

Protection Preparing for a tropical storm may involve construction projects that will improve protection.	Aid Aid involves assisting after the storm, commonly in LIDs.
Development The scale of the impacts depends on the whether the country has the resources cope with the storm.	Planning Involves getting people and the emergency services ready to deal with the impacts.
Prediction Constant monitoring can help to give advanced warning of a tropical storm	Education Teaching people about what to do in a tropical storm.

Primary Effects of Tropical Storms

- The intense winds of tropical storms can destroy whole **communities, buildings and communication networks**.
- As well as their own destructive energy, the winds can generate abnormally high waves called **storm surges**.
- Sometimes the most destructive elements of a storm are these subsequent **high seas and flooding** they cause to coastal areas.

Secondary Effects of Tropical Storms

- People are **left homeless**, which can cause distress, poverty and ill health due to lack of shelter.
- Shortage of clean water and lack of proper sanitation** makes it easier for diseases to spread.
- Businesses are damaged** or destroyed causing employment.
- Shortage of food as **crops are damaged**.

Case Study: Typhoon Haiyan 2013

Causes
Started as a tropical depression on **2nd November 2013** and gained strength. Became a Category 5 "**super typhoon**" and made landfall on the Pacific islands of the Philippines.

Effects	Management
<ul style="list-style-type: none"> Almost 6,500 deaths. 130,000 homes destroyed. Water and sewage systems destroyed had caused diseases. Emotional grief for dead. 	<ul style="list-style-type: none"> The UN raised £190m in aid. USA & UK sent helicopter carrier ships deliver aid remote areas. Education on typhoon preparedness.

Case Study: UK Heat Wave 2003

Causes
The heat wave was caused by an anticyclone (areas of high pressure) that stayed in the area for most of August. This blocked any low pressure systems that normally brings cooler and rainier conditions.

Effect	Management
<ul style="list-style-type: none"> People suffered from heat strokes and dehydration. 2000 people died from causes linked to heatwave. Rail network disrupted and crop yields were low. 	<ul style="list-style-type: none"> The NHS and media gave guidance to the public. Limitations placed on water use (hose pipe ban). Speed limits imposed on trains and government created 'heatwave plan'.

What is Climate Change?

Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years.

Recent Evidence for climate change.

Global temperature	Average global temperatures have increased by more than 0.6°C since 1950 .
Ice sheets & glaciers	Many of the world's glaciers and ice sheets are melting. E.g. the Arctic sea ice has declined by 10% in 30 years .
Sea Level Change	Average global sea level has risen by 10-20cms in the past 100 years. This is due to the additional water from ice and thermal expansion.

Enhanced Greenhouse Effect

Recently there has been an increase in **humans burning fossil fuels** for energy. These fuels (gas, coal and oil) emit **greenhouse gases**. This is making the Earth's atmosphere thicker, therefore trapping more solar radiation and causing **less to be reflected**. As a result, the Earth is becoming warmer.

Evidence of natural change

Orbital Changes	Some argue that climate change is linked to how the Earth orbits the Sun, and the way it wobbles and tilts as it does it.
Sun Spots	Dark spots on the Sun are called Sun spots. They increase the amount of energy Earth receives from the Sun.
Volcanic Eruptions	Volcanoes release large amounts of dust containing gases . These can block sunlight and results in cooler temperatures.

Managing Climate Change

Carbon Capture This involves new technology designed to reduce climate change.	Planting Trees Planting trees increase the amount of carbon is absorbed from atmosphere.
International Agreements Countries aim to cut emissions by signing international deals and by setting targets.	Renewable Energy Replacing fossil fuels based energy with clean/natural sources of energy.



Anglo Saxon Crime and Punishment	
1	Crime and Punishment were dealt with by local communities with some involvement of the King and the Church. In 1066 a dramatic change occurred in England when William of Normandy invaded. The new regime sparked challenges to government authority. As the medieval period continued, the growth of towns led to a rise in crime rates in some areas. This prompted new ideas about law enforcement. Throughout this period, the church played an important part in defining and enforcing the law.
Key events	
2	954 – English kingdoms unite under one king.
3	1066 – William I is crowned King of England.
4	1066-1087 – Resistance to William’s rule was put down brutally.
5	1072 – Forest Laws are introduced.
6	1086 – Domesday Book.
7	1154 – Henry II became King.
6	1164 – Constitutions of Clarendon. Henry II reorganised the courts and set up prisons for those awaiting trial.
8	1194 – Coroners are introduced.
9	1215 – Trial by ordeal ends.
10	1348 – Black Death reaches England.
11	1485 – Henry Tudor becomes King Henry V11.
Key Concepts	
12	Rural population – 90% of people lived in the countryside.
13	During the Anglo-Saxon period, the power and influence of the King over crime and punishment grew . The role of the Catholic Church grew too and they wanted to give criminals opportunities to save their souls. The use of punishments, including capital punishment, grew.
15	Under the Normans, systems were centralised . This was a way of boosting the visible power of the King.
16	In the later Middle Ages, there was a shift away from local communities dealing with crime in their area towards a system where crime was dealt with by government appointed officials .
17	The church was an extremely powerful institution which controlled people’s thought and actions.

Key Words		
18	King’s Peace	Anglo-Saxons believed that it was the King’s duty to take care of law and order, so people could go about their everyday lives knowing that the law would be upheld.
19	Anglo-Saxon social structure	King, nobles, freemen and serfs.
20	Treason	Betraying the King – for example, by helping his enemies, or plotting to kill or replace him.
21	Crimes against the person	Crimes like assault or murder that cause physical harm to another person.
22	Crimes against property	Crimes like theft, robbery and arson, that involve taking or damaging something that belongs to another person.
23	Collective responsibility	Being responsible for the actions of other members of your group. In a village community if someone broke the law, it was up to everyone in the village to take action.
24	Reeve	A local official, appointed from the community.
25	Abbeys	Communities of monks or nuns.
26	Moral crimes	Actions that didn’t physically harm anyone, or their property, but didn’t match up to society’s views on decent behaviour: for example, having sex outside of marriage, or not sticking to the rules and customs of the church.
27	King’s shire reeve	A man who was appointed locally to bring criminals to justice. The term ‘shire reeve’ later turned into the word ‘sheriff’.
28	Tithing	Made up of 10 men over the age of 12. All were responsible for the behaviour of each other. One man from each tithing had to meet regularly with the shire reeve.
29	Hue and cry	Shouting for help if a crime had been committed. Everyone who heard it was expected to bring chase and capture the suspects.
30	Petty theft	Stealing small, low value items.
31	Maiming	Causing physical harm. A criminal could be punished by having a hand or ear cut off, or their tongue cut out.
32	Oath	A formal declaration of the facts, calling on God to witness that what is said is true.
33	Trial by ordeal	A way of testing whether the accused was innocent or guilty in the eyes of God.
34	Trial by hot iron/ hot water	Heat was used to burn one of the accused’s hands which was then bandaged. If the burn healed well, the accused was innocent.
35	Trial by cold water	The accused was thrown into cold water with their arms tied. Anyone who floated was judged guilty.
36	Wergild	Fines paid to the victim’s family. For murder. How much was determined by social status.
37	Capital punishment	The death penalty
38	Corporal Punishment	A range of punishments that caused harm or pain to the body – including being beaten or having body parts removed.
39	Retribution	A severe punishment, meant to match the severity of the crime.
40	Deterrent	A punishment that is frightening or painful and designed to put other people off committing the same crime.
41	Stocks and pillory	The pillory secured the arms and neck. The stocks secured the ankles. In full view, in bad weather for days on end, rubbish would be thrown at the accused and verbal abuse.
42	Castles	Built by the Normans to keep a careful watch on communities and to look intimidating.
43	Feudal system	Everybody owed money or service to the class above them.
44	Murdrum	If the murderer was not found, then a large sum of money had to be paid by the hundred where the body was found.
45	Forest Law	All common land was now strictly controlled by the King.
46	Poaching	Illegal hunting on land that belongs to someone else.
47	Outlaw	Any man aged 14 and over who tried to avoid trial and punishment by running away from his community. They could be killed without any legal consequences for the person responsible.
48	Folville gang	A group of upto 50 outlaws who operated in England in the C14th.
49	King’s mund	All men under the Normans should expect to live safe from crime under the authority of the King.
50	Brand	Make a mark on a criminal by burning their flesh with hot iron. They would now permanently stand out as a criminal.
51	Trial by combat	The two combatants fought to the death or until one gave in. It was usually used to settle disputes over money or land.
52	Statute of Labourers	Made it a crime to ask for higher wages.
53	Heresy	Made disagreeing with the teachings of the church a crime.
54	Secular	Non religious
55	Clergy	People who work for the church including priests.
56	High treason	Plotting to kill or betray the King.
57	Hanged, drawn and quartered	Semi strangled, then revived, abdomen cut open, intestines drawn out and limbs severed and displayed.
58	Banished	Ordered to leave the country.
59	Trial of consecrated bread	The priest had to pray and ask that when he ate a piece of consecrated bread, the bread would choke him if he lied about the crime of which he was accused.



Early Modern England Crime and Punishment	
1	Between c.1500-c.1700, there were wide ranging social, religious and political changes in England. Religion became more volatile after Henry VIII's divorce. Many religious activities were now viewed as religious crimes. The Gunpowder Plot increased fears around religious conflict in England. The English Civil Wars also led to great instability. The C17th saw persecution for witchcraft and during this period, the ruling elite continued to use the law to protect their own position in society. Punishment became harsher and more varied.
Key events	
2	1509-47 – Reign of Henry VIII.
3	1547-53 – Reign of Edward VI.
4	1547 – Vagrancy Act – An able bodied vagabond who was without work for more than 3 days was to be branded with the letter V and sold as a slave for 2 years.
5	1553-58 – Reign of Mary I.
6	1558-1603 – Reign of Elizabeth I.
7	1597 – Act for the Relief of the Poor – included harsh punishments to act as a deterrent to vagrants.
8	1601 - Poor Laws aimed to make all local parishes provide poor relief for anybody who was not physically fit to work.
9	1603-25 – Reign of James I.
10	1605 – Gunpowder Plot.
11	1606 – Popish Recusants Act – forced Catholics to take an oath of allegiance to the English Crown.
12	1653-1658 – Rule of Oliver Cromwell as Lord Protector.
13	1671 - Game Act – poaching was illegal.
14	1688 – 50 capital crimes.
Key Concepts	
15	Religious changes in the C16th led to new and changing definitions of criminal activity.
16	Economic changes led to an increase in unemployment and vagrants and a suspicion of the poor by the upper classes.
17	Poaching and smuggling were seen to be ' social crimes '.
18	The population grew dramatically , from 2.5 million in 1500 to 5 or 6 million by 1700. Urban areas grew too.
19	Between 1500 and 1700, law enforcement was similar to how it had been in the Middle Ages . The community were still expected to take a leading role in stopping and finding suspects.
20	Growth of towns and rising crime rates meant that a new co-ordinated approach to enforcing law was needed .
21	Catholic persecution increased after the Gunpowder Plot of 1605.

Key Words		
22	Martin Luther	German monk who protested against the Catholic Church.
23	Reformation	The change from Catholicism to Protestantism.
24	Heretics	People who had a different religion to the monarch.
25	Treason	To challenge the authority of the monarch and their authority as Head of the Church of England.
26	Burned at the stake	Tied to a wooden post and a fire lit beneath the victim.
27	Middle Way	The attempt of Elizabeth I to create a Protestant Church that was not too challenging to Catholic traditions.
28	Act of Uniformity	Everyone had to go to church on Sundays and holy days or pay a fine.
29	Recant	Make a public statement that you have changed your religious beliefs.
30	Excommunicate	Eject from the Catholic Church.
31	Fox's Book of Martyrs	Published 1563, it describes the persecution of Protestants by Catholics under the reign of Bloody Mary (Mary I).
32	Vagabonds/Vagrants	Unemployed and homeless people who left their village or town in search of work.
33	Deserving Poor	Elderly and disabled.
34	Undeserving Poor	Those fit to work but did not.
35	Poor Relief	Financial assistance for the poorest members of society.
36	Enclosed	Fenced off for the exclusive use of the landowner.
37	Import Duties	Taxes payable on goods imported into the country.
38	Smuggling	Sneaking good into the country to avoid import duties.
39	Decriminalise	Make an activity legal, or no longer a crime.
40	Puritan	A radical Protestant.
41	Protectorate	The period that Oliver Cromwell was in charge.
42	Night watchman	Early form of policing. Worked for the town constable who was employed by the town authorities.
43	Thief takers	Paid a reward for catching a criminal and delivering them to the law.
44	Jonathan Wild	An infamous thief taker in London who secretly led a gang of thieves who claimed rewards when they handled stolen goods.
45	Bridewell Prison	Built in 1556 and used to punish poor people who had broken the law.
46	Capital Crime	A crime that is punished by the death penalty.
47	Pardon	When a person is let off punishment for a crime of which they have been convicted.
48	Bloody Code	Harsh attitude to law making. Many crimes were punishable by death.
49	Transportation	Being sent away from England to serve a period of punishment in a colony abroad.
50	Colonies	New settlements in foreign lands – often taken by force from the original inhabitants.
51	Plead for belly	Pregnant women condemned to death asked to be allowed to live until the baby was born.
52	Rehabilitation	Help someone return to normal life and society after they have committed a crime.
53	Conspirator	Someone who is involved in a conspiracy – a secret plan to do something illegal.
54	Pact	A formal agreement.
55	Demonologie	Book published in 1597 by James I about the nature of Hell and witches.
56	Superstition	Belief based on old ideas about magic rather than reason or science.
57	Matthew Hopkins	A self proclaimed Witchfinder General who hunted down witches in the East of England.
58	Familiars	Animals who worked for the devil and witches.
59	Swimming Test	Involved drowning the accused. The guilty would float and the innocent would sink.
60	Enlightenment	Philosophical movement of the C17th and C18th that focused on the use of reason to question and analyse ideas that were previously taken for granted.
61	Royal Society	Established in London in 1660 and brought together thinkers and scientists from a wide range of academic fields.



C18th and C19th Crime and Punishment	
1	This period saw rapid population growth and increased urbanisation meant more opportunities for crime. There was significant poverty in the cities and enforcing crime became more problematic. There was a change in attitudes too – prisons were for reforming criminals and not just punishing them. Important individuals in this time included John Howard, a prison reformer, and Robert Peel, the founder of the Metropolitan Police.
Key events	
2	1690 – Excise duty extended to salt, leather and soap and mounted customs officers introduced.
3	1716 – Last known execution for witchcraft.
4	1723 – Black Act makes poaching game or damaging forest a capital crime.
5	1735 – Witchcraft Act decriminalised witchcraft.
6	1748 – Fielding brothers set up the Bow Street Runners.
7	1778 – Transportation to Australia introduced.
8	1789 – French Revolution.
9	1810 - 222 crimes are capital offences.
10	1816 - The first national prison opens at Milbank, London to hold convicts awaiting transportation.
11	1823 – Black Act repealed.
12	1829 - Metropolitan Police Act
13	1832 – 60 crimes are capital offences.
14	1835 – Gaols Act introduces inspection of prisons.
15	1842 – Pentonville prison set up on the site of old Milbank prison.
16	1850 – Import taxes cut and large scale smuggling reduced.
17	1856 – Police Act makes it compulsory for all towns and counties to set up a police force.
18	1868 – Public execution ended.
19	1869 – National Crime Records established.
20	1877 – All prisons are brought under government authority.
21	1878 – Criminal Investigations Department set up.
22	1898 – Prison Act emphasises rehabilitation and reform of prisoners.
23	1902 – Holloway Prison for women opens/ first conviction in court using fingerprint evidence.
Key Concepts	
24	Smuggling and highway robbery became less common in the C19th.
25	There were increasingly harsh and unpopular laws against poaching but they were repealed in the 1820's.
26	The growth of the prison system meant that an alternative punishment to transportation was available.
27	Early C18th law enforcement continued to use similar methods to the early modern period but the establishment of the Bow Street Runners was a very important development in policing that laid the foundations for the Metropolitan Police Act.
28	The government was concerned with punishing wrongdoing and deterring others from crime by ensuring conditions were sufficiently harsh.

Key Words		
29	Smugglers	People who brought goods into the country and sold them on, without paying duties.
30	Hawkhurst Gang	A large smuggler gang which operated in the South East of England from 1735 to 1749.
31	William Pitt	Prime Minister who lowered import duties and who helped to reduce smuggling.
32	Highway Robbery	Threatening and attacking travellers and forcing them to hand over valuable possessions.
33	Turnpikes	Roads with a toll gate.
34	Jack Shepherd/ Dick Turpin	Famous highwaymen.
35	Tolpuddle Martyrs	Men from the village of Tolpuddle in Dorset who formed an early trade union.
36	Martyr	A person who suffers for their beliefs, and often is admired for it.
37	George Loveless	Leader of the Tolpuddle Martyrs.
38	Trade Union	An organisation that represents workers to protect their rights.
39	Transportation	Criminals were sent to America and later Australia as punishment for their crimes.
40	Home Secretary	The government minister with responsibility for law and order.
41	Hulk	Disused ships used as floating prisons just offshore.
42	Inhumane	Cruel, without compassion.
43	The Tyburn Tree	The most famous place for public executions. The tree could hang 24 people at once.
44	Treadwheel	A common form of hard labour where the prisoner walked up the wheel for 10 minutes at a time with a 5 minute break before the next stint.
45	John Howard	Campaigner for prison reformer.
46	Elizabeth Fry	Campaigner for prison reformer.
47	Humanitarianism	A school of thinking based on the principle that all humans are equal and inhumane treatment of other human beings should be challenged.
48	Bow Street Runners	A crime fighting team, established in London, in 1748, by the Chief Magistrate, Henry Fielding. By 1785, they were officially paid by the government.
49	Metropolitan Police Act	Gave London a uniformed police force. Set up by Home Secretary, Robert Peel.
50	Prototype	A new idea or design that is tried out before more versions are made.
51	Separate system	Prisoners were kept apart as much as possible.
52	Pentonville Prison	Designed as a model prison by Joshua Jebb.
53	Psychosis	A confused state where sufferers have hallucinations and delusions – seeing and imagining things that are not really there.
54	Hard labour, hard fare and hard board	Physically demanding work, boring and bland diet and wooden board beds.
55	Robert Peel	Home Secretary responsible for bringing in a wide range of changes to criminal law and for reforming prisons. Some historians call him the 'father of modern policing'.
56	Penal	Involving punishments.



Key teachings	
Sermon on the mount	<p>When Jesus first started preaching, he spoke from a mountainside in front of a large crowd. This speech is known as the <u>Sermon</u> on the Mount. In this sermon, Jesus taught his followers the <u>Lord's Prayer</u> and told them the <u>Parable</u> of the Good Samaritan. The sermon also contained the <u>Beatitudes</u> and Jesus' teachings about God's laws, which he expected his followers to uphold.</p> <p>In the Sermon on the Mount, Jesus summed up almost all of his teachings. Christians find the following important lessons in this sermon:</p> <ul style="list-style-type: none"> • Possessions on Earth are not important. Meaningful spiritual 'treasures' will be found by good people in Heaven. • People should not worry because God will take care of them. • People should not judge each other. It is <u>hypocritical</u> to do so, and only God can sit in <u>judgment</u>. • God will help people who seek his help. • The way to <u>Heaven</u> is difficult to pass through – like a narrow gate – but getting to <u>Hell</u> is easy, like a wide gateway.
The Beatitudes	<p>In the Sermon on the Mount, Jesus explains to his followers what kinds of human lives are blessed by God. The statements he made are known as the Beatitudes. According to Jesus, God gives his blessing to:</p> <ul style="list-style-type: none"> • the meek – meaning humble people • those who make peace • those who show mercy to others <p>Jesus also mentioned that people who are persecuted because of their faith will be blessed and find reward in Heaven (Matthew 5:3–11).</p>
Jesus' teachings about agape	<p>Christians believe that God has unconditional and enduring love for all human beings, known as agape. They believe that he showed this love by sacrificing his son, <u>Jesus</u>, to <u>atone</u> for human sin. In this sense, agape is also a self-sacrificing kind of love. Jesus' mission was based on agape. The <u>gospels</u> tell how Jesus encouraged people to love others unconditionally, even when it was difficult to do so. Examples of agape in the Bible - the greatest commandment (Matthew 22:36–9)</p>

Key Words	
Catholic	The tradition within the Christian Church which is led by the Pope; also called the Roman Catholic Church.
Denominations	A distinct group within the Christian faith, with its own organization and traditions
Christ	Literally means 'Anointed One' in Greek; the Hebrew equivalent is Messiah. The leader promised by God to the Jews; Christians believe Jesus to be the Christ.
Trinity	The belief that there are three persons in One God; the Father, the Son and the Holy Spirit are separate, but are also one being
Grace	The unconditional and generous love that God shows to people who do not deserve it.
Holy Spirit	The third Person of the Trinity; believed to be present with believers since Pentecost and active on earth.
Incarnation	Literally 'in flesh', belief that God took on human form in the person of Jesus
Jesus	Believed by Christians to be the Son of God, he was a first century Jewish teacher living and travelling in Palestine/Israel.
Protestant	Christian denominations in which authority is generally based on the Bible, rather than Church tradition/teaching. (eg Anglican, Methodist, Baptist).

Key quotes	
	"Do for others what you would want them to do for you" Golden Rule Matthew 7:12
	"It doesn't matter if you are a Jew or a Greek, a slave or a free, male or female. You are all the same in Christ Jesus" Galatians 3:28
	"So God created mankind in his own image, in the image of God he created them; male and female he created them" – Genesis 1:27
	"For God so loved the world that he gave his one and only Son, that whoever believes in him shall not perish but have eternal life" – John 3:16
	"For I was hungry and you gave me something to eat, I was thirsty and you gave me something to drink, I was a stranger and you invited me in, I needed clothes and you clothed me, I was sick and you looked after me, I was in prison and you came to visit me" – Matthew 25: 35-36



Key Ideas			
<p>Nature of God</p>	<ul style="list-style-type: none"> - Christians believe in one God who is the creator and the sustainer of all that exists - God is omnipotent which means they are almighty and have unlimited power - God is benevolent which means they are all-loving and all-good - God is just which means they are a perfect and fair judge - The Problem of Suffering asks: if God is all these things why do they allow bad things to happen to good and innocent people? 		
<p>The Trinity</p>	<ul style="list-style-type: none"> - Christians believe God is three persons in one. This idea is called the Trinity. - Each person of the Trinity is fully God but the three persons of the Trinity are not the same. - The Father is the creator of all life - The Son is Jesus Christ who is both fully human and fully God - The Holy Spirit is the unseen power of God at work in the world, especially answering prayers - <i>"We believe in one God, Father, Son and Holy Spirit"</i> – The Nicene Creed 		
<p>Incarnation and Crucifixion</p>	<table border="0"> <tr> <td style="vertical-align: top;"> <p>Crucifixion</p> <ul style="list-style-type: none"> - Jesus travelled to Jerusalem to preach and he was sentenced to death by Pontius Pilate - Jesus was then nailed to a cross where he died. - In his last moments Jesus was able to forgive those who were killing him showing Christians how important forgiveness is - This event is remembered on Good Friday - <i>"Forgive them father, they know not what they do"</i> - Luke 23:34 </td> <td style="vertical-align: top;"> <p>Incarnation</p> <ul style="list-style-type: none"> - Christians believe that God was incarnated (born) in human form as Jesus Christ - Mary was impregnated by the Holy Spirit and gave birth as a virgin – for Christians this is proof of Jesus' status as the son of God - Christmas is the festival that celebrates the incarnation - <i>"The word became flesh"</i> – John 1:14 </td> </tr> </table>	<p>Crucifixion</p> <ul style="list-style-type: none"> - Jesus travelled to Jerusalem to preach and he was sentenced to death by Pontius Pilate - Jesus was then nailed to a cross where he died. - In his last moments Jesus was able to forgive those who were killing him showing Christians how important forgiveness is - This event is remembered on Good Friday - <i>"Forgive them father, they know not what they do"</i> - Luke 23:34 	<p>Incarnation</p> <ul style="list-style-type: none"> - Christians believe that God was incarnated (born) in human form as Jesus Christ - Mary was impregnated by the Holy Spirit and gave birth as a virgin – for Christians this is proof of Jesus' status as the son of God - Christmas is the festival that celebrates the incarnation - <i>"The word became flesh"</i> – John 1:14
<p>Crucifixion</p> <ul style="list-style-type: none"> - Jesus travelled to Jerusalem to preach and he was sentenced to death by Pontius Pilate - Jesus was then nailed to a cross where he died. - In his last moments Jesus was able to forgive those who were killing him showing Christians how important forgiveness is - This event is remembered on Good Friday - <i>"Forgive them father, they know not what they do"</i> - Luke 23:34 	<p>Incarnation</p> <ul style="list-style-type: none"> - Christians believe that God was incarnated (born) in human form as Jesus Christ - Mary was impregnated by the Holy Spirit and gave birth as a virgin – for Christians this is proof of Jesus' status as the son of God - Christmas is the festival that celebrates the incarnation - <i>"The word became flesh"</i> – John 1:14 		
<p>Resurrection and Ascension</p>	<table border="0"> <tr> <td style="vertical-align: top;"> <p>Resurrection</p> <ul style="list-style-type: none"> - After Jesus was dead and buried Christians believe he rose from the dead – this is the resurrection - Early on the Sunday three women visited his tomb expecting to find his body but it was not there - After his resurrection Jesus appeared to his disciples and told them to spread the word of him - This event is celebrated on Easter Sunday - <i>"He is risen"</i> – Christians say this to each other on Easter Sunday </td> <td style="vertical-align: top;"> <p>Ascension</p> <ul style="list-style-type: none"> - Forty days after he rose from the dead Jesus ascended (went up) into heaven <p>A belief in resurrection and ascension ...</p> <ul style="list-style-type: none"> - Shows life after death is real - Assures Christians they will rise again after death and live on in the afterlife - Leads Christians to try and lead a good life </td> </tr> </table>	<p>Resurrection</p> <ul style="list-style-type: none"> - After Jesus was dead and buried Christians believe he rose from the dead – this is the resurrection - Early on the Sunday three women visited his tomb expecting to find his body but it was not there - After his resurrection Jesus appeared to his disciples and told them to spread the word of him - This event is celebrated on Easter Sunday - <i>"He is risen"</i> – Christians say this to each other on Easter Sunday 	<p>Ascension</p> <ul style="list-style-type: none"> - Forty days after he rose from the dead Jesus ascended (went up) into heaven <p>A belief in resurrection and ascension ...</p> <ul style="list-style-type: none"> - Shows life after death is real - Assures Christians they will rise again after death and live on in the afterlife - Leads Christians to try and lead a good life
<p>Resurrection</p> <ul style="list-style-type: none"> - After Jesus was dead and buried Christians believe he rose from the dead – this is the resurrection - Early on the Sunday three women visited his tomb expecting to find his body but it was not there - After his resurrection Jesus appeared to his disciples and told them to spread the word of him - This event is celebrated on Easter Sunday - <i>"He is risen"</i> – Christians say this to each other on Easter Sunday 	<p>Ascension</p> <ul style="list-style-type: none"> - Forty days after he rose from the dead Jesus ascended (went up) into heaven <p>A belief in resurrection and ascension ...</p> <ul style="list-style-type: none"> - Shows life after death is real - Assures Christians they will rise again after death and live on in the afterlife - Leads Christians to try and lead a good life 		
<p>Sin and Salvation</p>	<ul style="list-style-type: none"> - Christians believe you are judged after you die (see Religion and Life) and how well or badly you have lived and treated others decides if you go to heaven or hell - Sin is any action or thought that goes against God's will, Christians can look in the Bible for advice on what is a sin e.g. murder (you shall not kill) and adultery (cheating, you shall not commit adultery) - God gave humans free will but they should use that freedom to make good choices and not sin - Salvation is the idea that Jesus's crucifixion saves human beings from eternal damnation - The death of Jesus made up for original sin – the idea that we were all damned by Eve's choice to disobey God – it allows us to atone for sins and reach eternal life in heaven 		

Key Words	
Ascension	Jesus returning to be with God in heaven after the crucifixion
Atonement	Making things better after sinning, asking for forgiveness from God
Benevolent	God's nature as all-loving
Crucifixion	Jesus' execution by the Romans on the cross
Incarnation	God becoming flesh in the form of Jesus Christ
Just	God's nature as fair
Omnipotent	God's nature as all-powerful
Original Sin	The built-in tendency to do wrong which comes from Eve's disobedience
Resurrection	Jesus returning from the dead after he was crucified
Salvation	Being saved from sin and given eternal life in heaven by God
Sin	Any thought or action which goes against God's will
Trinity	God's nature as three-parts-in-one, the Father, Son and Holy Spirit

Muscular system

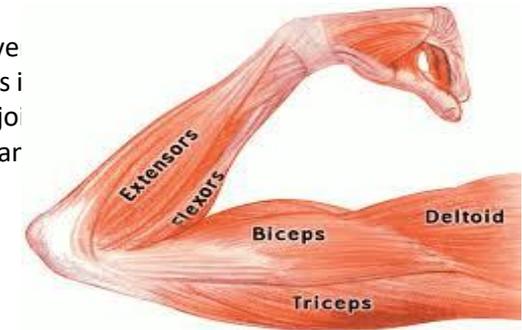
Name of muscle	Function	Example in sport
Triceps	Extend the arm at the elbow	Press-up, throwing a javelin
Biceps	Flex the arm at the elbow	Pull-up, drawing a bow in archery
Deltoids	Move the arm in all directions at the shoulder	Bowling a cricket ball
Pectorals	Adduct the arm at the shoulder	Forehand drive in tennis
Trapezius	Hold the shoulders in place, move head back and sideways	Holding head up in rugby scrum
Gluteals	Adduct and extend leg at the hips	Pulling back leg before kicking a ball
Quadriceps	Extend the leg at the knee	Kicking a ball jumping upwards
Hamstrings	Flex the leg at the knee	Bending knee before kicking a ball
Gastrocnemius	Pointing the toes, help to flex the knee	Running
Latissimus dorsi	Adduct and extend the arm at the shoulder	Butterfly stroke in swimming
Abdominals	Flex the trunk across the stomach	Pulling the body down when hurdling

1. To cause movement muscles and bones must work together. Explain this process, using an example. (4 marks)

2. Adduction is one of the range of movements that occurs at joints in the body. Which of the following describes adduction at the shoulder joint?

- A. The movement of a limb away from the midline of the body
- B. The movement of a limb towards the midline of the body
- C. The movement of a limb in a complete circle
- D. The movement of a limb which increases the angle of a joint

3. There are a range of movements that occur at different joints in the body. The elbow is a hinge joint. What types of movement can occur here? [2 marks]



Muscle Contractions

Muscles contract when they work. If a muscle contracts to create movement, it is called an **isotonic contraction**.

An **isotonic** contraction can be **concentric**, which is where the muscle shortens as the fibres contract or **eccentric**, where the fibres contract as the muscle lengthens.

When a muscle contracts with no resulting movement, it is an **isometric** contraction.

Movement	Description
Abduction	Movement away from the mid-line of the body
Adduction	Movement towards the mid-line of the body
Extension	Straightening limbs at a joint
Flexion	Bending the limbs at a joint.
Rotation	A circular movement around a fixed point

Muscles and Movement:

Muscles only provide one type of movement as they can only pull and not push. All muscles work in pairs, with one muscle pulling while the other relaxes, and then vice versa. These are called an **'Antagonistic Pair'**.

The **Prime mover** muscle contracts to start a movement. It is also known as the **'agonist'**.

The **Antagonist** muscle relaxes to allow movement to take place.

Origin: the end of the muscle attached to the fixed bone.

Insertion: the end of the muscle attached to the bone that moves.

<p>Y9 AIM: Develop skills and tactics in competitive situations.</p>
<p>Reference: https://tabletennisengland.co.uk/</p>
<p>Key skills:</p>
<p>1. What is the aim of table tennis? The aim of table tennis is to score more points than your opponent by volleying the ball across the net and landing on the table.</p>
<p>2. When is a point won? A point is won by you if your opponent is unable to return the ball to your side of the table (e.g. they miss the ball, they hit the ball but it misses your side of the table, or the ball hits the net), or if they hit the ball before it bounces on their side of the table.</p>
<p>3. How is table tennis scored? The winner of a game is the first to 11 points. There must be a gap of at least two points between opponents at the end of the game though, so if the score is 10-10, the game goes in to extra play until one of the players has gained a lead of 2 points. The point goes to the player who successfully ends a rally, regardless of who has served. A match can consist of the number of games you like, just make sure you agree this in advance!</p>
<p>4. How big is the ball? The ball has a diameter of 40mm and weighs only 2.7g.</p>
<p>5. What is a rally? The period where the ball is in play.</p>
<p>6. What is a let? A rally of which the point is not scored.</p>
<p>7. What is a point? A rally of which the result is scored.</p>
<p>8. Who is the server and who is the receiver? The server is the player due to strike the ball first in the rally while the receiver is the player due to strike the ball second.</p>
<p>9. How many players are on the table during a game? A game of table tennis is played in either singles or doubles.</p>
<p>10. How is the serve made? The serve is made from the end of the table with the server tossing the ball upward from the palm of the free hand and striking it as it descends so that it first bounces on the servers own court and then passing over the net bounces on the opponents court. There are no second serves.</p>

<p>Extension skills:</p>
<p>11. Do you have to serve diagonally in table tennis? The ball must bounce once on your side of the table and once on your opponents side of the table. In doubles the ball must be played diagonally for example within the right half of the court only however in singles you can serve to and from any part of the table.</p>
<p>12. How high do you have to throw the ball when you are serving? 6 inches</p>
<p>13. What happens if the ball hits the net? The ball must pass ‘cleanly’ over the net. If the ball ‘clips’ the net and goes over it is a ‘let’ and the point is retaken. If the ball hits the net and doesn’t go over the point goes to the other player / team. There are no second serves.</p>
<p>14. How do you get spin on the ball? One of the biggest differences between recreational and competitive table tennis players is the ability to execute a spin shot. The advantage of executing a spin is that it makes it more difficult for your opponent to return. To generate a spin: 1. Start your stroke below and behind the ball. 2. Wait for the ball to bounce off your table upwards. 3. Move your arm forward and upwards, brushing the ball at a “/” angle from a high position. 4. The ball’s trajectory will arch downwards, picking up speed after it bounces off the table. If returned incorrectly, the resulting return by your opponent will fly off the table, earning you a point!</p>
<p>15. Where is table tennis most popular? Many Asian countries are crazy about table tennis particularly China and South Korea. China are currently number one in the world but South Korea provide fierce competition and are currently second.</p>
<p>16. When did table tennis start in England? Table tennis as we know it today started in England in the late 1880’s. Game makers were trying to emulate the popularity of lawn tennis by developing indoor versions of it. As we can see it is still played in England both competitively and recreationally.</p>

How to get top spin on the ball.

Where to position yourself for the serves.

BASIC RULES

- 1. How do you start a football match?** The football game is started by a kick off in the centre of the pitch.
- 2. What's the number of players on each side during a professional match?** In a full sided game each team consists of 11 players.
- 3. What happen when the ball goes off at the side of the pitch?** If the ball goes off the side of the pitch it is a throw in to the team that didn't touch the ball last.
- 4. What happen if the ball goes off at the end of the pitch?** If the ball goes off the end of the pitch it is a corner or a goal kick depending who the ball touched last.

KEY TERMINOLOGY

- 4. What is meant by the term offside?**
If a player is past the opponent's last defender and in the opposition half when the ball is passed they are offside and an indirect free kick is awarded to the opposition team.
- 5. What is meant by the term corner kick?**
A free kick taken from the corner of the field by an attacker. The corner kick is awarded when the ball has passed over the goal line after last touching a defensive player. The shot is taken from the corner nearest to where the ball went out.
- 6. Description of the term individual defence:**
 - Man to man marking – to be beside to the attacking player
 - try to slow attacking player down
 - show attacker to their weaker foot
 - time tackle effectively to increase chances of winning the ball back.
- 7. What is meant by the term VAR?**
The video assistant referee (VAR) is a match official in association football who reviews decisions made by the head referee with the use of video footage and a headset for communication.

TEACHING POINTS & STRATEGIES

- 8. What are the teaching points for the SHORT PASS?**
 - Non kicking foot next to the ball
 - Use the side of the kicking foot to contact the ball following a short back swing
 - Keep head over the ball to improve accuracy and ensure ball stays on the ground
 - Follow foot through to generate more power
- 9. What is POSSESSION FOOTBALL?**
Possession football is when teams attempt to hold onto the ball for as long as possible, at all times choosing the easiest possible pass (hence the many times you see defenders passing the ball along the defensive line).
- 10. What is TEAM FORMATION?**
The team formation describes how the players in a team generally position themselves on the pitch. It is a fluid and fast-moving game, and (with the exception of the goalkeeper) a player's position in a formation does not define their role as rigidly.
Formations are typically described by three or four numbers, which denote how many players are in each row of the formation from the most defensive to the most forward. For example, the popular "4–5–1" formation has four defenders, five midfielders, and a single forward. Different formations can be used depending on whether a team wishes to play more attacking or defensive football, and a team may switch formations between or during games for tactical reasons..

FULL FOOTBALL POSITIONS

Goalkeeper	Winger
Wing-back	Central-midfielder
Full-back	Striker
Sweeper	Attacking midfielder
Centre-back	Forward
Defensive midfielder	



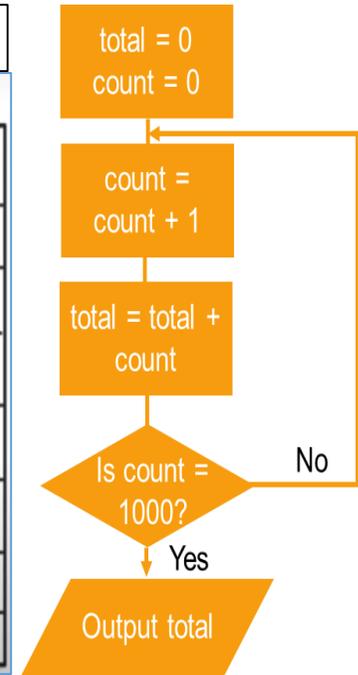
1	Algorithms	Understand what an algorithm is, what algorithms are used for and be able to interpret algorithms (flowcharts, Pseudo-code, written descriptions, program code)
2	Flowcharts	Understand how to create an algorithm to solve a particular problem, making use of programming constructs (sequence, selection, iteration) and using appropriate conventions (flowchart, pseudo-code, written description, draft program code)
3	Pseudo code	Understand the purpose of a given algorithm and how an algorithm works
4	Interpreting Algorithms	Understand how to determine the correct output of an algorithm for a given set of data
5	Errors in algorithms	Understand how to identify and correct errors in algorithms
6	Python	Understand how to code an algorithm in a high-level language

Interpreting Algorithms

```

turns = 0
X = 3
while turns < 22
    X = X * 3
    turns = turns + 3
endwhile
print (X)
print (turns)
    
```

Turns	X	Output
0	—	—
0	3	—
0	9	—
3	9	—
3	27	—
6	27	—
6	81	—



Algorithms (Structures)

Sequencing: This means that the computer will run your code in order, one line at a time from the top to the bottom of your program. It will start at line 1, then execute line 2 then line 3 and so on till it reaches the last line of your program

Selection: Sometimes you only want some lines of code to be run only if a condition is met, otherwise you want the computer to ignore these lines and jump over them. This is achieved using IF statements. e.g. If a condition is met then lines 4, 5, 6 are executed otherwise the computer jumps to line 7 without even looking at line 4,5 and 6.

Iteration: Sometimes you want the computer to execute the same lines of code several times. This is done using a loop. There are three types of loops: For loops, while loops and repeat until loops. That's handy as it enables you not to have to copy the same lines of code many times.

	Process or action May perform a calculation
	Decision, a condition has to be met, may use ==< etc Has a yes and no coming out of it on an arrow
	Terminator: Start always used, end maybe used
	Represent = Data to be input or output
	Denotes a sub-process that may be defined in a separate flowchart. A chunk of code that does a separate job



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

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> DO 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

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

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

Python Functions – see next page for example
 A function is a subroutine that returns a value. This means that it outputs a value from the instructions it carries out. Like a procedure, a function groups together a number of instructions under one name.

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'

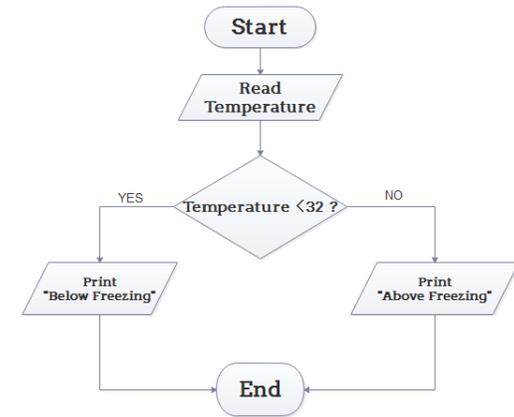
Arithmetic operators	
Symbol	Description
+	Add
-	Subtract
/	Divide
*	Multiply
^	Exponent
MOD	Modulo
DIV	Integer division

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

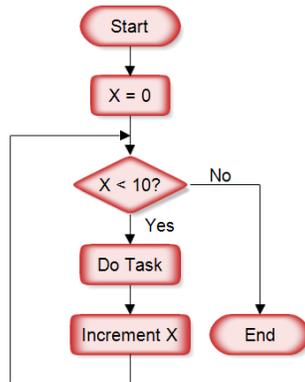
<p>Function example</p> <pre>def userName(fname, sname, year): uname = str(fname[0] + sname + year[-2:]) return uname forename = "Joe" surname = "Bloggs" yearOfBirth = "2001"</pre>	<pre>def hello(name): print("Hello " + name + " nice to meet you") hello("Alice") hello("Bob") hello("Sue")</pre>																																
<p>A procedure is a way of giving a sequence of instructions a named identifier which can then be called from anywhere in the program. Procedures can also take inputs – these are known as arguments.</p>	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="913 392 1933 421">Python -> English</th> </tr> </thead> <tbody> <tr> <td data-bbox="913 421 1295 464"><code>print("hello!")</code></td> <td data-bbox="1295 421 1933 464">Prints a value on screen (in this case, hello!)</td> </tr> <tr> <td data-bbox="913 464 1295 492"><code>input(" ")</code></td> <td data-bbox="1295 464 1933 492">Inputs a value into the computer.</td> </tr> <tr> <td data-bbox="913 492 1295 535"><code>x = input(" ")</code></td> <td data-bbox="1295 492 1933 535">Inputs a value and stores it into the variable x.</td> </tr> <tr> <td data-bbox="913 535 1295 578"><code>x = int(input(" "))</code></td> <td data-bbox="1295 535 1933 578">Inputs a value into x, whilst also making it into an integer.</td> </tr> <tr> <td data-bbox="913 578 1295 649"><code>answer = x + y</code></td> <td data-bbox="1295 578 1933 649">Saves the result of x and y added together in a variable named answer.</td> </tr> <tr> <td data-bbox="913 649 1295 692"><code>print(str(x))</code></td> <td data-bbox="1295 649 1933 692">Prints the variable x, but converts it into a string first.</td> </tr> <tr> <td data-bbox="913 692 1295 749"><code>print("Hello", "World")</code></td> <td data-bbox="1295 692 1933 749">Prints the two strings concatenated with a space between. This code would output "Hello World".</td> </tr> <tr> <td data-bbox="913 749 1295 835"><code>age = 12</code> <code>print("Age: " + str(age))</code></td> <td data-bbox="1295 749 1933 835">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".</td> </tr> <tr> <td data-bbox="913 835 1295 906"><code>if name == "Fred":</code></td> <td data-bbox="1295 835 1933 906">Decides whether the variable 'name' has a value which is equal to 'Fred'.</td> </tr> <tr> <td data-bbox="913 906 1295 963"><code>else:</code></td> <td data-bbox="1295 906 1933 963">The other option if the conditions for an if statement are not met (eg. name = 'Bob' when it should be Fred)</td> </tr> <tr> <td data-bbox="913 963 1295 1021"><code>elif name == "Tim":</code></td> <td data-bbox="1295 963 1933 1021">elif (short for else if) is for when the first if condition is not met, but you want to specify another option.</td> </tr> <tr> <td data-bbox="913 1021 1295 1120"><code># COMMENT</code></td> <td data-bbox="1295 1021 1933 1120"># 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.</td> </tr> <tr> <td data-bbox="913 1120 1295 1178"><code>for i in range(0,10):</code> <code> # WRITE CODE HERE</code></td> <td data-bbox="1295 1120 1933 1178">Repeats any code indented after this line a set number of times, in this case, 10.</td> </tr> <tr> <td data-bbox="913 1178 1295 1249"><code>while x < 10:</code> <code> # WRITE CODE HERE</code></td> <td data-bbox="1295 1178 1933 1249">Repeats any code indented after this line until a condition is met, in this case x becoming equal to or greater than 10.</td> </tr> <tr> <td data-bbox="913 1249 1295 1298"><code>list = [" ", " "]</code></td> <td data-bbox="1295 1249 1933 1298">Creates a variable and makes it an array – a list which can store many values.</td> </tr> </tbody> </table>	Python -> English		<code>print("hello!")</code>	Prints a value on screen (in this case, hello!)	<code>input(" ")</code>	Inputs a value into the computer.	<code>x = input(" ")</code>	Inputs a value and stores it into the variable x.	<code>x = int(input(" "))</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.	<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".	<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'.	<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.	<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.	<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.	<code>list = [" ", " "]</code>	Creates a variable and makes it an array – a list which can store many values.
Python -> English																																	
<code>print("hello!")</code>	Prints a value on screen (in this case, hello!)																																
<code>input(" ")</code>	Inputs a value into the computer.																																
<code>x = input(" ")</code>	Inputs a value and stores it into the variable x.																																
<code>x = int(input(" "))</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.																																
<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".																																
<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'.																																
<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.																																
<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.																																
<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.																																
<code>list = [" ", " "]</code>	Creates a variable and makes it an array – a list which can store many values.																																
<p>ERRORS IN CODE</p> <p>Bugs, which can prevent computer programs from working in the way they should.</p> <p>Run-Time Errors: Runtime errors are errors which will cause the program or computer to crash even if there appears to be nothing wrong with the program code. Running out of memory will often cause a runtime error. This could be because instructions have been written in the wrong order.</p> <p>Syntax errors include spelling mistakes, incorrect use of punctuation and the use of capital letters.</p> <p>Semantic errors, or logical errors, are those where the program works but produces different results from what you designed or expected. A program with semantic errors will execute without any errors being reported.</p>																																	

1	Algorithm interpretation	Understand what an algorithm is, what algorithms are used for and be able to interpret algorithms (flowcharts, pseudo-code, written descriptions, program code)
2	Sequence, Selection and Iteration	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)
3	Algorithm Purpose	Understand the purpose of a given algorithm and how an algorithm works
4	Algorithm Outputs	Understand how to determine the correct output of an algorithm for a given set of data
5	Errors in Algorithms	Understand how to identify and correct errors in algorithms
6	Algorithm to Code	Understand how to code an algorithm in a high-level language

Flowchart Showing Selection



Flowchart Showing Sequence



When designing algorithms, there are many steps where decisions must be made.
 draw a 3 cm line
 turn left 90 degrees
 draw a 3 cm line
 turn left 90 degrees
 draw a 3 cm line
 turn left 90 degrees
 draw a 3 cm line

Flowchart Showing Iteration



Iteration Pseudo-code

When designing algorithms, there may be some steps that need repeating.
INPUT – indicates a user will be inputting something
OUTPUT – indicates that an output will appear on the screen
WHILE – a loop (iteration that has a condition at the beginning)
FOR – a counting loop (iteration)
REPEAT – UNTIL – a loop (iteration) that has a condition at the end

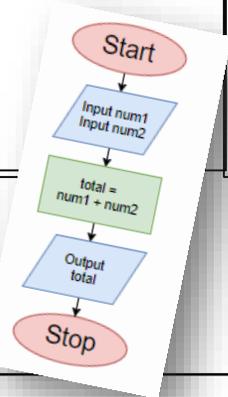
Selection Pseudo-code

When designing algorithms, it is important to make sure that all the steps are presented in the correct order.
IF represents the question
THEN points to what to do if the answer to the question is true
ELSE points to what to do if the answer to the question is false

https://www.youtube.com/watch?v=e_WfC8HwVB8

Algorithms

- Sequence, Selection, Iteration →
- Flowcharts
 - Interpreting
 - Creating your own
 - Using symbols correctly



Evaluating Algorithms

- Importance of data structure
- Fitness for purpose
- Efficiency (Big "O" Notation)

<https://www.programiz.com/python-programming/examples>

Interpreting Algorithms

- Purpose of a given algorithm
- Explain how it works
- Determine output for given inputs
- Write a Trace Table
- Identify Logic Errors
- Discuss efficiency

```

for passes in range(count-1):
    for num in range(count-1):
        if a[num+1] < a[num]:
            temp = a[num]
            a[num] = a[num + 1]
            a[num+1] = temp
    
```

Pseudo-code

- Written Description
- Write an Algorithm
- Complete an unfinished Algorithm
- Code in a HLL (e.g. Python)

Designing Solutions

- Analyse a Problem
- Decompose it
- Abstract the Data Structure
- Identify inputs, process, outputs
- Design an Algorithm

SET <var> TO <expression>
 SEND <expression> TO DISPLAY
 RECEIVE <var> FROM (<type>)
 KEYBOARD

FOR <counter> FROM <a> TO
 code that repeats
 END FOR

IF <expression> THEN
 code to run if true
 ELSE
 code to run if false
 END IF

WHILE <condition> DO
 code that repeats
 END WHILE
 or
 REPEAT code UNTIL ...

```

a="Alan "
b="Devonshire"

c=a+b

print c
    
```

Example string

```

count = 0
while (count < 9):
    print 'The count is:', count
    count = count + 1

print "Good bye!"
    
```

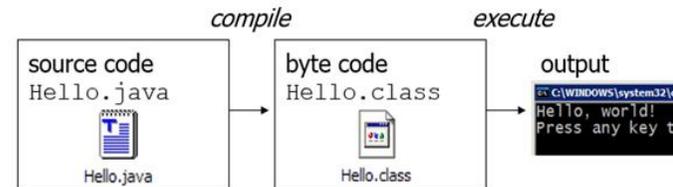
```

a=raw_input("enter the first number")
b=raw_input("enter the last number")
c=a+b

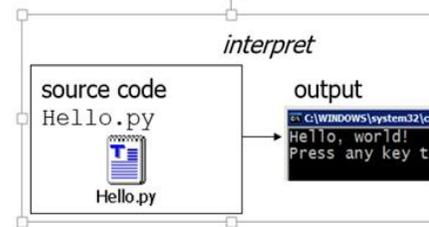
print c
    
```

Example loop

Many languages require you to *compile* (translate) your program into a form that the machine understands.



Python is instead directly *interpreted* into machine instructions.



Devised: Explanation	Devised: How Assessed
<p>Devising is a way of creating a drama without starting with a script. It usually begins with an idea and a stimulus. Actors and designers research, improvise, develop and shape scenes until they have a drama ready for an audience. The play you create will use either the techniques from a theatre practitioner (e.g. Brecht or Stanislavski) or in the style of a theatre genre (e.g. Physical Theatre or Theatre in Education). You will research your chosen topic, create a performance and document the development in a devising log portfolio. You will then write an evaluation of the final performance. This knowledge organiser will focus on Theatre in Education.</p> <p>Higher Level Challenge In order to gain the most marks in your performance exam and your portfolio remember to consider and refer to the following contexts:</p> <ul style="list-style-type: none"> ▪ Social Context: A social setting or environment which people live. ▪ Historical Context: A part of history which has happened (this could be when the play was set) ▪ Political Context: The political party in power at the time and how this impacted on society. ▪ Cultural Context: How culture can effect behaviour, choices and decisions for characters. 	<p>Performance A performance live on stage which is designed to realise your original intentions.</p> <p>Devising Log : Portfolio A record of the creation and development of your ideas to communicate meaning through and the development of your play.</p> <p>Devising Log: Evaluation An analysis and evaluation of your individual contribution to the devising process and the final devised piece.</p>

Theatre in Education: A Brief History	Theatre in Education: Definition	The main elements
<p>After the Second World War, people became aware that drama or theatre techniques might be useful as a way of fostering effective learning in schools. This is known as Theatre in education or 'TIE' for short. Brian Way, who founded the Theatre Centre in 1953, was an early practitioner, and influenced the team, including Gordon Vallins, who established TIE at the Belgrade Theatre, Coventry in 1965. Their work was so influential that it spread nationwide.</p> <p>The idea of a high impact performance for a specifically targeted school audience became hugely popular. Because the audiences are small, they can be encouraged to participate through work in role and through debate. Projects can be supported with resource materials and training or support for the students' teachers.</p> <p>Originally, a Theatre in education project would probably be centrally funded. These days, companies have to seek their funding from individual schools so they have to provide the product the schools want.</p>	<p>Theatre in Education (also called T.I.E.) is a play with an educational focus designed to teach school audiences (or other groups) about a certain issue or topic.</p> <p>You may have seen a Theatre in Education play in your school. They cover topics such like the following:</p> <ul style="list-style-type: none"> ▪ Stranger Danger ▪ Road Safety ▪ Internet Safety ▪ How to tackle bullying 	<p>It's important for you to remember the following characteristics that typify T.I.E.:</p> <ul style="list-style-type: none"> ▪ There is a clear aim and educational objective running throughout. ▪ A small cast so actors must be versatile and often have to multi-role. ▪ A low budget so actors often play instruments too. ▪ The production must be portable so the design is simple and representational. ▪ They explore issues from various viewpoints, so we can see the effect of an action upon a range of people. ▪ There is some level of audience involvement. ▪ They are rarely wholly naturalistic because direct address or narration is used to engage the audience. ▪ The costumes are simple and representational, especially if actors have to multi-role. ▪ They may include facts and figures to educate the audience. ▪ They may have a strong message or moral running throughout.



Have you got an important message to teach an audience? Turn over to find out how to make your own Theatre in Education Play.

Planning a T.I.E. Performance

When planning a Theatre in education piece companies must take into account:

The **age** and **size** of the **audience**. The performance needs to suit the audience.

The **venue**, its **size** and **facilities** such as lighting and whether there are any particular restrictions, eg they might not be allowed to tap dance as taps would damage the floor.

Health and Safety issues. They'll probably have to complete paperwork for this. It could cover anything from risk assessment for the journey to the venue, to checking there are no asthmatics in the audience if they plan to use dry ice.

Teaching and Learning Objectives. What they have been asked to do and how they can deliver what's required.



Ideas for Engaging a Young Audience

A Quest

A quest is a concept all will recognise and is familiar from superhero stories and fairy tales. Somebody needs to be rescued, evil must be defeated or there is treasure to discover. If you're going to involve a large group of children it's probably best to have a number of mini missions that they can be a part of, leading up to the final triumph. You could set a challenge involving number tasks for five-year-olds to solve. It's a good idea to include a little art work with this age group, if the size of the group and the time available allow this. Art work would sustain engagement and help them see where their imagination is taking them.

A modern fairy story for 7 to 11-year-olds

Children in this age range will be familiar with most of the well-known fairy tales and many of them will have come across the idea of adaptation. Your task will be to take them a little further with the story so that they see its structure and the ideas it contains. Cinderella is a story about bullying being punished. That's readily transferable, as is the ball or party idea. Maybe the prince took a photo of Cinderella on his mobile phone and is trying to find her on social media networks. The ugly sisters could go online and pretend that they are Cinderella which could serve as a warning to children that online interaction can be dangerous.

Theatre in Education Skills

Target Audience

It is important that the creators and performers in a T.I.E. play know exactly who their audience are so that the materials they produce are appropriate and beneficial for the specific audience.

Specific Message

T.I.E. plays must have a specific message that they are teaching the audience.

Facts

T.I.E. plays are designed to educate the audience about a specific topic. It is therefore essential that the information given out is accurate. Facts can be used to help devise the play and they should also be included within the performance

Communal Voice/Chorus

Chorus is when the performer use the same movement and say the same lines. Communal voice is a variation of Chorus used in T.I.E. The performers speak with 'one voice' and usually reinforce the message of the play.

Where to get help.

At the end of watching a T.I.E. play, the audience should know what to do if they face a similar situation to the characters in the play. Where do they go for help/support?

Directly Engaging the Audience:

1. **Direct Address** – The actor or character breaks the forth wall and speaks directly to the audience.
2. **Forum Theatre** – The audience are given tasks to do which involve them within the performance.

Episodes

A series of scenes which can be related or unrelated.

Placards/PowerPoints

A placard is a sign presented onstage. Using placards might be as simple as holding up a card or banner. Multimedia or a PowerPoint slideshow can also be used for this effect. For example Scene One – The Bad News

Narration

Narration is used in T.I.E. to guide the audience through the plot. There are two types of narration as follows:

1. In role

The character narrates in first person For example "My name is Little Red Riding Hood. I live in the forest".

2. Third Person/Out of role/All Knowing

Commenting upon a character as an actor is a clear way of reminding the audience of theatricality. The narrator speaks in third person. For example "This is Little Red Riding Hood.. She lives in the forest".

Stereotypical characters

These are easily recognisable stock characters. They are often exaggerated and represent a type of character rather than a specific individual. For example, the mum, the teenager, the teacher.

Multi-roling

Multi-roling is when an actor plays more than one character onstage. The differences in character are marked by changing voice, movement, gesture and body language but the audience can clearly see that the same actor has taken on more than one role. This means the audience are more aware of the fact that they are watching a presentation of events. Cross-sex casting is also possible in Epic theatre as we don't need to suspend our disbelief.

Split-role

This is where more than one actor plays the same character. For instance, the actor playing the main character might rotate from scene to scene. This keeps that character representational and inhibits emotional involvement and attachment on the part of the audience.

Basic Set, Props, Lighting and sound

T.I.E. has to travel to a variety of performance venues. Therefore actors use minimal set and props. They usually carry their own sound equipment with them and rarely use stage lighting.

Song /Dance/Movement

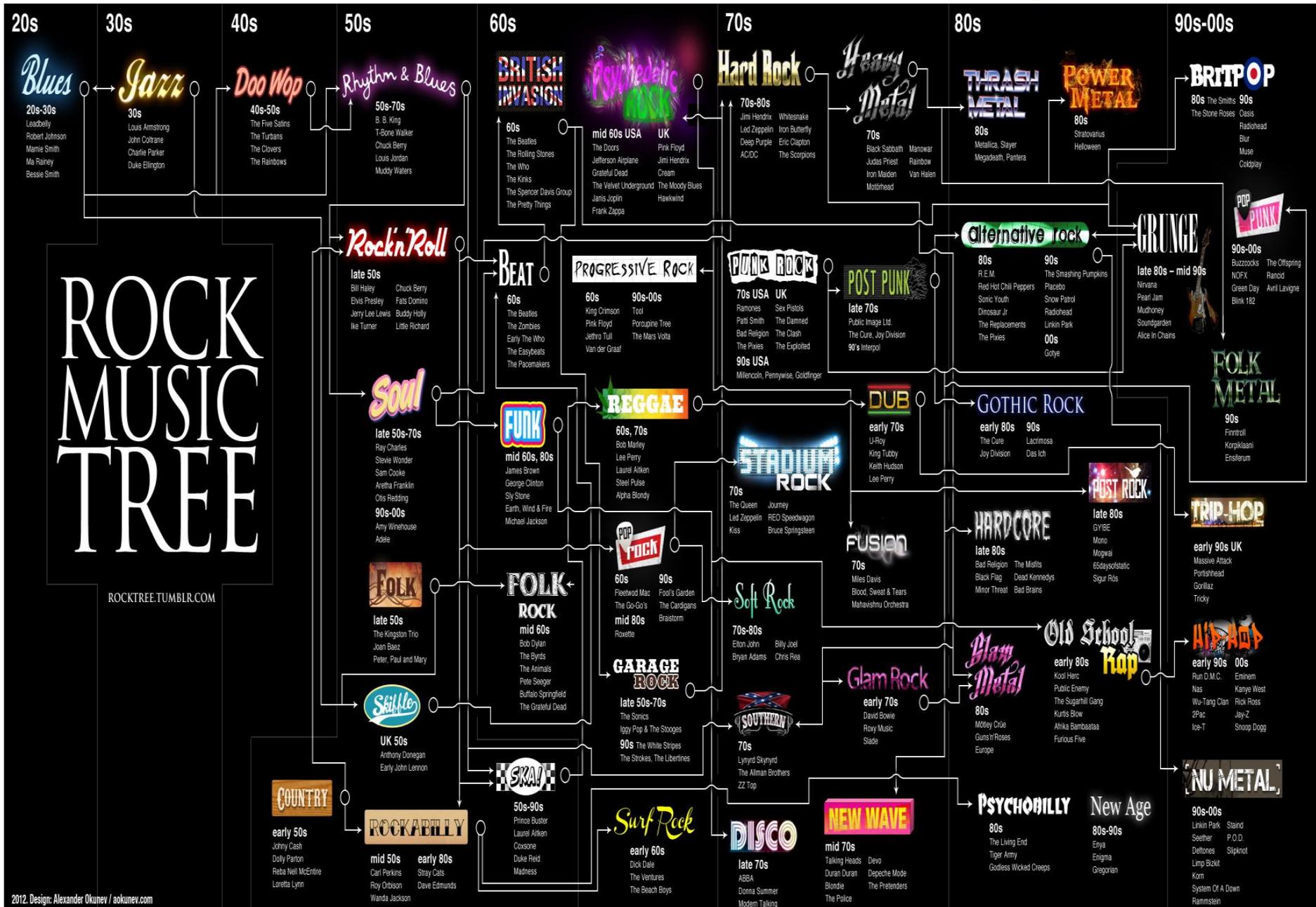
Song, dance and movement are often used in T.I.E. plays to engage the audience and make the performances more visually/orally interesting.

Devised: Explanation	Devised: How Assessed
<p>Devising is a way of creating a drama without starting with a script. It usually begins with an idea and a stimulus. Actors and designers research, improvise, develop and shape scenes until they have a drama ready for an audience. The play you create will use either the techniques from a theatre practitioner (e.g. Brecht or Stanislavski) or in the style of a theatre genre (e.g. Physical Theatre or Theatre in Education). You will research your chosen topic, create a performance and document the development in a devising log portfolio. You will then write an evaluation of the final performance. This knowledge organiser will focus on Physical Theatre.</p> <p>Higher Level Challenge In order to gain the most marks in your performance exam and your portfolio remember to consider and refer to the following contexts:</p> <ul style="list-style-type: none"> ▪ Social Context: A social setting or environment which people live. ▪ Historical Context: A part of history which has happened (this could be when the play was set) ▪ Political Context: The political party in power at the time and how this impacted on society. ▪ Cultural Context: How culture can effect behaviour, choices and decisions for characters. 	<p>Performance A performance live on stage which is designed to realise your original intentions.</p> <p>Devising Log : Portfolio A record of the creation and development of your ideas to communicate meaning through and the development of your play.</p> <p>Devising Log: Evaluation An analysis and evaluation of your individual contribution to the devising process and the final devised piece.</p>

Physical Theatre: Explanation	Physical Theatre: Famous Companies	Physical Theatre: Performance Skills
<p>The Nature of Physical Theatre At its simplest, you could define Physical Theatre as a form of theatre that puts emphasis on movement rather than dialogue. But remember there are a huge number of variations as the genre covers a broad range of work. But essentially Physical theatre is anything that puts the human body at the centre of the storytelling process. As a result it's often abstract in style, using movement in a stylised and representational way. With the expression of ideas choreographed through movement, such performers use very little or no dialogue at all.</p> <p>Combining Art Forms Physical theatre has a focus on movement but can be separate from the spoken word or united with it to expand and explore its meaning. It may well be devised or contain substantial elements of work beyond the printed script. These elements could be other art forms such as music, dance, the use of media or visual images. So you could use a combination of elements that may also be combined with script, for instance. You could reach out to the audience in a way that challenges the so-called fourth wall, making the audience a collaborator in the action.</p> <div data-bbox="31 1163 683 1349" style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #e0f0ff;"> <p style="text-align: center;">Explore Physical Theatre</p> <p style="text-align: center;">The easiest way to understand Physical Theatre is to see it. Watch performances by the following companies on YouTube</p> <p style="text-align: center;"> DV8 Frantic Assembly Complicite </p> </div>	<p>DV8</p>  <p>DV8 are arguably among the main practitioners of Physical theatre as a 'full' art form. They focus on looking at the dramatic potential that can be unlocked from movement. Their work is often described as existing at a crossroads where dance, sound and drama meet. DV8 are well known for using Physical theatre to explore complex aspects of human relationships and social or cultural issues.</p> <p>In DV8's production, <i>Can We Talk About This?</i> the director and performers used Physical theatre to express extremely complicated and delicate political and social issues. The main theme of the production looked at multiculturalism, separatism and militant Islam. Words and bodywork were combined to express what's sometimes difficult to put into words alone.</p> <p>Frantic Assembly Another major company in Physical theatre is Frantic Assembly. The company's production of <i>Lovesong</i> by well-known playwright and author, <u>Abi Morgan</u>, illustrates another level of Physical theatre. There's a substantial dialogue script for the play but much of its impact in production comes from the movement work representing the relationship of a couple over the years. This clip shows a group of actors from Frantic Assembly working with director, Scott Graham on the play.</p> 	<p>Physical Theatre: Performance Skills</p> <p>General Skills</p> <p>Motif: Short phrase of movement Canon: Motif A performed then Motif B one after the other Unison: Moving together in time Mirroring: Copying someone (don't have to face each other) Opposition: Mirroring but the other side moves Formations: Shapes line, triangle, square etc Proxemics: Distance between characters suggests meaning Character: Physicality and actions to create person Contact work: Holding or making physical contact with others Counter balances: Holding each other's weight Lifts: Picking up partners in a controlled way (not in studio) Dynamics: Speed and energy of the movement Focus: Where your eyes should be focused during play Power of the Hand: Symbolic fight</p> <div data-bbox="1388 1092 2040 1349" style="border: 1px solid black; background-color: #e0ffe0; padding: 10px;"> <p>Frantic Assembly Techniques</p> <ul style="list-style-type: none"> ▪ Push hands ▪ Round by through ▪ Chairs ▪ Hymns Hands ▪ Jet Pack ▪ Connect, Effect, Disconnect </div>



1950s – Rock 'n' Roll	Late 1960s - Rock	1970s – Rock's Diversification
<p>Artists: Elvis Presley; Bill Haley & The Comets; Buddy Holly</p> <p>Musical features: 12-bar Blues; walking bassline; guitar-driven; fast pace; swung rhythms.</p> <p>R&B/Blues combined with Country Music appealing to the newly-developed 'teenage' audience.</p>	<p>Artists: Rolling Stones; Jimi Hendrix; The Who</p> <p>Musical features: slide guitar, harmonica, solos for guitar and drums, barre chords, distortion.</p> <p>Rock that was heavily influenced by black R&B/Blues music set the scene for many heavy metal bands in the futures.</p> <p>Music then went in 2 opposing directions – optimistic utopian hippy-influenced or disillusioned cynicism full of life & destruction.</p>	<p>Heavy Rock – Progressive Rock – Latin Rock – Glam Rock – Soft Rock – Country Rock – Punk Rock – New Wave</p> <p>Artists: Led Zeppelin; Deep Purple; Pink Floyd; T-Rex; Queen; Sex Pistols</p> <p>Musical features: effects added; world influences; electric guitar; wailing vocals; modal; intricate melodies/solos; theatrical.</p> <p>Music became increasingly diverse, with bands building on experiments of the 60s into long studio-conceived albums, whereas the introduction of stadium rock concerts focused songs into live versions.</p>
Early 1960s – Beat Music		2000s – Indie/Alternative
<p>Artists: The Beatles; Rolling Stones; Bob Dylan;</p> <p>Musical features: Strong rhythms of un-swung quavers; catchy tunes; guitar-dominated; close harmonies.</p> <p>British Beat Music/Mersey Beat combined rock 'n' roll, R&B and soul, appealing to the rock 'n' roll teenagers and developing into a British dominance of the charts.</p>	<p>1990s – Grunge/Alternative/Britpop</p> <p>Artists: Nirvana; Red Hot Chilli Peppers; Oasis; Blur; Radiohead</p> <p>Musical features: Fast tempos; scruffy sound & visuals; guitar-based; non-conventional harmonies; easy chords; nasal vocals.</p> <p>Back-to-basics post punk reaction to the commercialization of music spawned the grunge movement in the USA.</p> <p>In the UK grew a cleaner, less distorted version from the working class viewpoint with an amateur musician feel.</p> <p>This later developed into the more progressive alternative rock.</p>	<p>Artists: Arctic Monkeys; Kaiser Chiefs; The Killers; Coldplay</p> <p>Musical features: Medium tempo; high bass melodic phrases; short melodic licks; sing along choruses; orchestral influences.</p> <p>Technology and the internet meant that styles popped up and fused overnight and artists could be heard and known far quicker, before even playing a gig.</p>
1980s – Heavy Metal		
<p>Artists: Motorhead; Iron Maiden; Guns 'n' Roses; The Smiths</p> <p>Musical features: fast tempi; driven by powerful bass lines & large drum kits; power chords; extended solos; minor modes; mythological themes.</p> <p>As political moods settled, so music calmed, reflecting this change in direction, becoming more focused on image and commercial acceptance.</p> <p>A combination of psychedelic & blues rock, starting from Punk, but getting progressively darker.</p>		
KEYWORDS		
1-12-bar blues - A chord structure of 12-bars using chords I, IV and V.		7-Distortion – altering the tone of electric instruments to make them sound gritty, growly or fuzzy.
2-Walking bassline – a bassline that moves by step.		8-Modal – system of scales from medieval period, pre major/minor system.
3-Swung rhythm – a rhythm that emphasizes the first pair of quavers.		9-Power chords – a chord using just the 1 st & 5 th notes (omitting the 3 rd).
4-Close harmonies – harmony where notes of the chords are close together, typically in vocal music.		10-Riff – short repeated phrase in popular music.
5-Slide guitar – a sliding effect across the strings of a guitar, often used in blues.		11-Lick – stock pattern or phrase, usually played on the guitar, similar to a riff.
6-Barre chords – a type of chord on a guitar played by using one or more fingers to press down multiple strings across a single fret of the fingerboard.		12-Chord – 2 or more notes played simultaneously.





MR TIGHTS	Features	KEYWORDS														
Melody	<ul style="list-style-type: none"> Syllabic – throughout, mainly. Vocalisation - backing vocals mix words and vocalisation (e.g. bars 8–9) to the sound 'ooh' and bar 18 to the sound 'ba'. Conjunct - starts mostly stepwise with small leaps of a third or fourth. Sequence – descending & slightly altered in bars 7 and 8. Angular leaps - combine conjunct and wide leaps in the melodic line. B.6-7: Leap of rising major sixth; b.62 – an octave. 	<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- Sequence - the repetition of a musical phrase at a higher or lower pitch than the original.</p> <p>4- Conjunct - movement by step.</p> <p>5- Moderato – tempo marking, at a moderate pace.</p> <p>6- Swung - music that has a triplet feel, even when notated with straight quavers.</p> <p>7- Anacrusis - one or more unstressed notes before the first bar line of a piece or passage.</p> <p>8- Compound time signature - when the bar feels like it needs to be split into groups of three (having a group of three 'mini' beats in a 'big' beat).</p> <p>9- Triplets - a horizontal square bracket that lets the performer know that the three notes should be played in the time it normally takes to play two.</p> <p>10- Homophonic - a texture comprising a melody part and an accompaniment.</p> <p>11- Imitation - the repetition of a phrase or melody in another part or voice, usually at a different pitch.</p> <p>12- Panning - giving sounds different levels in the left and right speakers so that it sounds as if they are coming from a new direction.</p> <p>13- Antiphonal - music performed alternately by two groups, which are often physically separated.</p> <p>14- Overdubbing - recording an instrumental or vocal part over previously recorded music.</p> <p>15- Pull-off - when a note is sounded on the guitar by plucking the string with the fretting hand.</p> <p>16- Bend - push a string across or over the fingerboard with your left hand fingers so that the string gets tighter and the pitch goes up.</p> <p>17- Vibrato - a technique used to cause rapid variations in pitch. The term 'vibrato' is Italian and is the past participle of the verb 'vibrare', which means to vibrate.</p> <p>18- Multi-track - a recording of a performance (or performances) on separate tracks in which each track can be edited individually to change levels, add effects, etc.</p> <p>19- EQ - the levels of frequency response of an audio signal, or controls, which allow their adjustment.</p> <p>20- Flanger - an effect creating a swirling or swooshing sound.</p> <p>21- Distortion - an effect that increases the volume and sustain on an electric guitar as well as making the timbre more gritty or smooth depending on the settings.</p> <p>22- Reverb - an effect, which creates the impression of being in a physical space.</p> <p>23- Wah-wah - a filter effect in which the peak of the filter is swept up and down the frequency range in response to the player's foot movement on a rocker pedal.</p> <p>24- Circle of fifths - a series of chords in which the root note of each chord is a fifth lower or a fourth higher than that of the previous one.</p> <p>25- Extended Chord - a chord with at least one added note, such as the ninth.</p> <p>26- Perfect cadence - a cadence comprising two chords. A perfect cadence is chord V followed by chord I.</p> <p>27- Inversions - major or minor triads with either the third (first inversion) or the fifth (second inversion) in the bass.</p> <p>28- Altered Chord - notes in a chord that have been sharpened or flattened by a semitone, such as a flattened fifth.</p> <p>29- Pedal - a sustained or repeated note in the bass. Pedals are usually on the tonic or dominant notes, so would be called either a tonic or a dominant pedal.</p>														
		Rhythm (incl. tempo & metre)	<ul style="list-style-type: none"> Moderato tempo - with a dotted crotchet pulse of 112 beats per minute. 12/8 - compound quadruple time signature; occasional 6/8 bar - has the effect of extending the phrase length. Swung feel. Anacrusis (upbeat) – starts every verse and chorus. Syncopation - frequent throughout (e.g. bars 44–46). Triplets - bar 18. 													
				Texture	<ul style="list-style-type: none"> Homophonic – predominant texture. Imitation. Layering - Three-part texture during guitar solo. Panning - (e.g. bars 42-43 backing vocals). Antiphonal - (e.g. bars 67-68). 											
						Instrument (sonority)	<ul style="list-style-type: none"> Tenor – high male voice, performed by Freddie Mercury. Instruments - lead and backing vocals, piano, overdubbed with a honky-tonk (jangle) piano, four electric guitars, bass guitar and drum kit. Overdubbing - Guitars and vocals, creating a richer colour. Guitar techniques - slides, bends, pull-offs and vibrato. Recording techniques & effects - multi-tracking, EQ, flanger, distortion, reverb, wah-wah, panning and overdubbing. 									
								Genre	<ul style="list-style-type: none"> Sheer Heart Attack - Queen's third studio album released in November 1974. 'Killer Queen' was written by Freddie Mercury and featured on Queen - formed in London in 1970: singer Freddie Mercury, guitarist Brian May, drummer Roger Taylor and bassist John Deacon. ' First single from the album - one of the few songs where Freddie Mercury wrote the lyrics first, which are about an upper-class prostitute. 							
										Harmony	<ul style="list-style-type: none"> Mainly root position chords. Inversions - Some chords in first or second inversion. Dissonance - some used (e.g. bar 30). Seventh chords - (e.g. bar 4). Circle of fifths - (e.g. bars 20–21). Altered and extended chords - (e.g. F¹¹ bar 47). Pedal - bars 27–30. 					
												Tonality	<ul style="list-style-type: none"> Eb Major Ambiguity - Opening in C minor and closing on an Eb major chord, not always clear. Passing modulations - many are used, strengthened by perfect cadences but often followed by parallel shifts, moving to a new key. 			
														Structure	<ul style="list-style-type: none"> Verse-chorus form: Intro-Verse 1-Chorus 1-Instrumental-Verse 2-Chorus 2-Guitar solo-Verse 3-Chorus 3-Outro. 	

Relating Notation durations to MIDI sequencer note lengths				
Note	Name	Duration	Piano roll	Snap/Quantise
	Semibreve	4		1/1
	Dotted Minim	3		-
	Minim	2		1/2
	Dotted Crotchet	1 1/2		-
	Crotchet	1		1/4
	Dotted Quaver	3/4		-
	Quaver	1/2		1/8
	Triplet quavers	1/3 each		1/8 triplet (1/12)
	Semiquaver	1/4		1/16

Relating stave pitches to DAW Piano & Drum rolls for inputting notes

The diagram illustrates the relationship between piano keys, musical notes, and drum machine sounds. A piano keyboard at the top shows keys C2, C3, and C4. Below it, a treble clef staff shows notes C, D, E, F, G, A, B, C, with blue arrows pointing to C2, C3, and C4. A bass clef staff shows notes C, D, E, F, G, A, B, C. At the bottom, a drum roll lists sounds: Crash Right, Crash Left, Snare Right, Snare Left, Hi-Hat, Kick, Snare Center, Snare Slidestick, Snare Rimshot, Hand Claps, Snare Closed, Low Tom, Hi-Hat Foot, Mid Tom, Hi-Hat Open, Mid Tom, Hi Tom, Crash Left, C2 Hi Tom, Crash Right, Cowbell, Tambourine, Ride Bell, Ride Edge, Ride Out, Hi Tom, C1 Kick, and C2 Hi Tom.

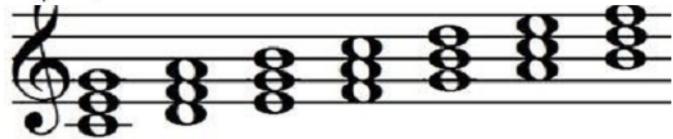
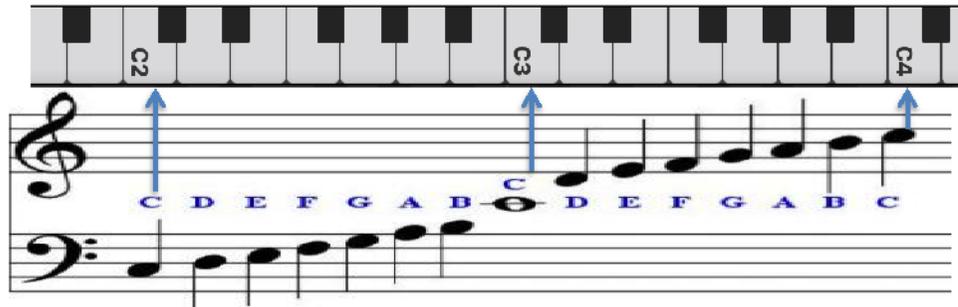
KEYWORDS

- 1-DAW (Digital Audio Workstation):** a digital system designed for recording and editing digital audio. It may refer to audio hardware, audio software, or both.
- 2-MIDI (Musical Instrument Digital Interface):** the interchange of musical information between musical instruments, synthesizers and computers.
- 3-MIDI controller:** any hardware or software that generates and transmits MIDI data to electronic or digital MIDI-enabled devices, typically to trigger sounds and control parameters of an electronic music performance.
- 4-Sequencer:** a software application or a digital electronic device that can record, save, play and edit audio files.
- 5-Arrange Window:** the main window of Logic Pro. It incorporates other Logic Pro editors and it's where you do most of your work.
- 6-Drum Machine:** An electronic device containing a sequencer that can be programmed to arrange and alter digitally stored drum sounds.
- 7-Tempo:** the pace or speed at which a section of music is played.
- 8-BPM (beats per minute):** how many beats in some song appear in a minute, and it describes the tempo of the song.
- 9-Rhythm:** the arrangement of sounds as they move through time.
- 11-Snap:** A function that causes audio, MIDI, or other events in a DAW to automatically "snap" or jump to the nearest division in a time "grid" in the DAW.
- 12-Quantise/Quantisation:** the rhythmic correction of audio or MIDI regions to a specific time grid.
- 13-Velocity:** the force with which a note is played, and it is vitally important in making MIDI performances sound human - or if you use a fixed velocity, making them sound mechanical.
- 14-Pitch:** how high or low a note is.
- 15-Pitch Bend:** an electronic device that enables a player to bend the pitch of a note being sounded on a synthesizer, usually with a pitch wheel, strip, or lever.
- 16-Scale:** any set of musical notes ordered by fundamental frequency or pitch. A scale ordered by increasing pitch is an ascending scale, and a scale ordered by decreasing pitch is a descending scale.
- 17-Fader:** a device for gradually increasing or decreasing the level of an audio signal.
- 18-Master fader:** The fader, which controls the main output(s) of the console during mixdown.

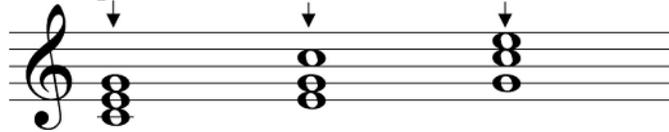
KEY QUESTIONS

- Q1:** Each box in the editing window is worth what note & duration length? Semiquaver (1/4 beat)
- Q2:** On the Piano roll, which C is the same pitch as 'Middle C'? C3
- Q3:** What is the name of the DAW that we use? Logic Pro X
- Q4:** If I want to edit a note to be perfectly in time to the beat, I would use what function? Quantisation
- Q5:** The Kick on a drum machine/drum kit is on which key of the drum roll? C1 and/or B1

Relating stave pitches to DAW Piano & Drum rolls for inputting notes

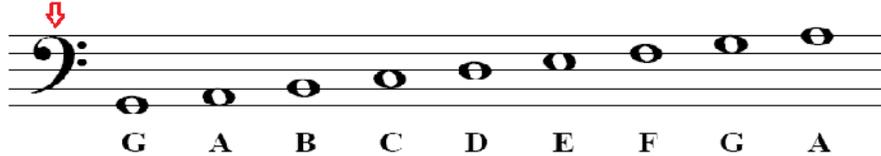


C maj D min E min F maj G maj A min B dim
 Root position first inversion second inversion

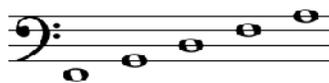


Bass Clef

Bass Clef Notes



Line Notes:



G B D F A

Good Boys Do Fine Always

Space Notes:



A C E G

All Cows Eat Grass

Bass Clef Mnemonic

KEYWORDS

- 1- **Sequencer:** a software application or a digital electronic device that can record, save, play and edit audio files.
- 2- **Snap:** A function that causes audio, MIDI, or other events in a DAW to automatically “snap” or jump to the nearest division in a time “grid” in the DAW.
- 3- **Quantise/Quantisation (pitch):** the correction of audio or MIDI regions to a specific scale/key.
- 4- **Velocity:** the force with which a note is played, and it is vitally important in making MIDI performances sound human - or if you use a fixed velocity, making them sound mechanical.
- 5- **Pitch:** how high or low a note is.
- 6- **Pitch Bend:** an electronic device that enables a player to bend the pitch of a note being sounded on a synthesizer, usually with a pitch wheel, strip, or lever.
- 7- **Scale:** any set of musical notes ordered by fundamental frequency or pitch. A scale ordered by increasing pitch is an ascending scale, and a scale ordered by decreasing pitch is a descending scale.
- 8- **Treble Clef:** Used to signal the high-pitched notes in music.
- 9- **Bass Clef:** Used to signal the low-pitched notes in music.
- 11- **Chord:** 2+ notes played together, typically notes 1, 3, 5 of a scale.
- 12- **Inversion:** putting the 3rd (1st inversion) or 5th (2nd inversion) in the bass of a chord.
- 13- **Key:** the group of notes or scale that forms the basis of the piece.
- 14- **Modulate:** Changing the key of a piece.
- 16- **Fader:** a device for gradually increasing or decreasing the level of an audio signal.
- 17- **Master fader:** The fader, which controls the main output(s) of the console during mixdown.

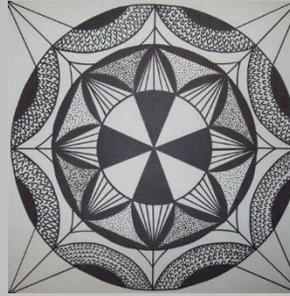
KEY QUESTIONS

- Q1: On the Piano roll, which C is the same pitch as 'Middle C'? C3
- Q2: What is the mnemonic to remember the LINES on the bass clef? Good Boys Do Fine Always
- Q3: What is the mnemonic to remember the SPACES on the bass clef? All Cows Eat Grass
- Q4: If I want to edit notes to make sure they are in the right scale, I would use which function? Quantisation (pitch/scale)
- Q5: A 1st inversion chord has which note in the bass? (e.g: in a C chors?) 3rd (E)
- Q5: A 2nd inversion chord has which note in the bass? (e.g: in a C chors?) 5th (G)

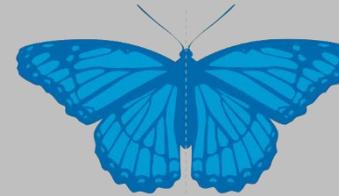
A. Key Terms

Keyword	Description
7. Pattern	A design that is created by repeating lines, shapes, tones or colours. The design used to create a pattern is often referred to as a motif. Motifs can be simple shapes or complex arrangements
2. Weight	The thickness of a mark or brushstroke
3. To Block in	to BLOCK IN: to fill in an empty area in an image with a certain colour before adding fine details such as shadows and highlights.
4. Composition	how objects or figures are arranged in the frame of an image
5. Contemporary	Living or occurring at the same time.
6. Negative Space	When drawing shapes, you must consider the size and position as well as the shape of the area around it. The shapes created in the spaces between shapes are referred to as negative space .
7. Geometric	characterized by or decorated with regular lines and shapes. "a geometric pattern"

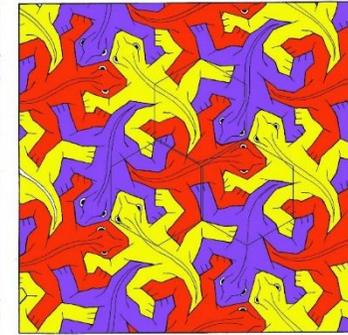
B. Pattern



B1: Radial Symmetry
A pattern that rotates around a central axis.



B2: Symmetry
the quality of being made up of exactly similar parts facing each other or around an axis.



B3: Tessellation
A tessellation of a flat surface is the tiling of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps.

C. Painting techniques

Key Words: Painting Techniques and Equipment	
C1	Flat painting The use of flat colours (no tints or tones blended in) to give each shape a clear bold finish.
C2	Layers Additional layers of paint are added to make the painted shapes flatter in colour (no brush marks showing)
C3	Palette A flat container with wells to mix different coloured paint in.
C4	Paint brush A hand held painting tool to apply paint to any surface.
C5	Water pot A plastic container to hold water for cleaning brushes.





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, 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. The most important bacteria in food manufacturing are Lactobacillus species.
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?
8. Name three bacteria responsible for food poisoning?
9. Which groups of people are more at risk of food poisoning?
10. When handling food at any stage care must be taken to prevent contamination.
11. Everything possible must be done to control the conditions that allow bacteria to multiply causing food poisoning.

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 re 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
8. lamination	
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.

Quick Test

1. What are microorganisms?
2. What is the ideal temperature for bacterial growth?
3. What is the most important bacteria used in food manufacturing?
4. What are the two date marks you need to check when buying food?
5. What is the recommended temperature for chilled food?
6. What is the temperature range of the danger zone?
7. Explain the term cross contamination.
8. List four occasions during food preparation when you must wash your hands.

Food preparation skills (cake and pastry)	
Keyword	Definition
1. Creaming method	<ul style="list-style-type: none"> Fat and sugar are creamed together. Eggs added slowly Flour folded in <i>Aeration: SR flour, sieving, creaming fat and sugar</i>
2. rubbing in method	<ul style="list-style-type: none"> Fat rubbed into flour Additional ingredients added Liquid added Knead, then shape <i>Aeration: SR flour, sieving, rubbing in</i>
3. whisking method	<ul style="list-style-type: none"> Eggs and sugar whisked together Flour gently folded in <i>Aeration: steam from the eggs, sieving, whisking</i>
4. melting method	<ul style="list-style-type: none"> Fat is melted with treacle, syrup or sugar Dry ingredients stirred in Eggs and milk added <i>Aeration: bicarbonate of soda</i>
5. shortening	The ability of a fat to produce a characteristic crumbly texture to baked products (when flour is coated with fat to prevent gluten formation e.g. in short crust pastry)
6. Gluten formation	Formed from the two wheat proteins gliadin and glutenin, in presence of water. Gluten is developed by kneading
7. Shortcrust pastry	<p>A short crumb, light, crisply textured pastry used to make pies and tarts</p> <ul style="list-style-type: none"> Fat rubbed into flour to fine breadcrumbs Water added gradually Knead, chill Roll out
8. Choux pastry	<p>A light, crisp, hollow pastry used to make profiteroles, éclairs and gougères</p> <ul style="list-style-type: none"> Fat and water melted in saucepan, c Flour added, cooled Eggs added shaped
9. Puff pastry	<p>A light and layered pastry</p> <ul style="list-style-type: none"> Fat rubbed into flour Water added to form a dough Roll the dough, fold into three Repeat four times chill
10. Sweet pastry	As short crust pastry with the addition of egg or egg yolk and sugar
11. Filo pastry	<p>A thin crispy pastry usually baked in many layers to make baked dishes</p> <ul style="list-style-type: none"> Oil and warm water added to flour Kneaded until smooth Rested for 2 hours Rolled out until paper thin

Sensory evaluation	
Keyword	Definition
1. senses	The ability of the body to react to things through sight, taste, hearing, smell,(aroma) and touch
2. Taste buds	Special cells on the tongue that pick up flavours
3. Olfactory receptors	Special cells in the nose that pick up aromas(smells)
4. Sensory descriptors	Words used to describe that characteristics of food
5. Sensory analysis	Identifying the sensory characteristics of products, i.e. taste, texture, appearance , mouth feel, colour. A way of measuring sensory characteristics.
Sensory testing methods	
1. Rating test	People are asked to rate a food sample for a specific characteristic.
2. Ranking test	People are asked to rank order samples of food according to a criteria.
3. Star profile	People are asked to rate the intensity of a food product from 1–5 against a set of sensory descriptors.
4. Triangle test	People are given three samples of a food product to try. Two samples are identical, the third something is different; they need to discriminate between the samples.
5. Paired preference test	People are given two similar samples of food and they have to say which one they prefer.

Quick test

- Name two methods of holding food when cutting it
- What glaze would you use on enriched dough?
- What type of flour is used to make most cakes?
- What gas does yeast produce?
- Why is it important to use codes when tasting food?
- List the stages used to carry out a controlled sensory analysis
- What term describes how fat makes a short texture product?
- Which basic cake making process traps air into the mixture by beating fat with sugar?
- How does egg white trap air?
- How does fat trap air?
- Which type of pastry uses steam to help it to rise?

Key points – knife skills

- Specific types of knives are designed for specific cutting and shaping tasks.
- Knives are dangerous and if not handled correctly and care should be taken at all times.
- A flat and stable cutting surface is essential to avoid injury when cutting food
- There are specific terms used for vegetable cuts relating to the size and shape of the outcome

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 toughness, 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	
- Used to find the strength under tension. - The maximum pulling or stretching force before failure. - Used by applying a load and observing the changes.	- 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.	- 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.

M1 Semaine 1

La famille

le beau-père	stepfather/father-in-law	la fille
la belle-mère	stepmother/mother-in-law	le fils
le beau-frère	brother-in-law	l'enfant/le petit-enfant
la belle-sœur	sister-in-law	le mari/l'ex-mari (m)
le demi-frère	half-brother/stepbrother	la femme/l'ex-femme (f)
la demi-sœur	half-sister/step sister	

daughter

son

(grand)child

(ex)husband

(ex)wife

M1 Semaine 2

Les adjectifs de personnalité

Il/Elle est ...	He/She is ...
agaçant(e)	annoying
aimable	likeable
amusant(e)	amusing/funny
arrogant(e)	arrogant
bavard(e)	talkative/chaty
charmant(e)	charming
drôle	funny
égoïste	selfish
fidèle	loyal
fort(e)	strong
généreux/-euse	generous
gentil(le)	kind

impatient(e)

jalous/-ouse

méchant(e)

parasseux/-euse

polite)

sage

sensible

sérieux/-euse

sympa(thique)

têtue)

travailleur/-euse

triste

impatient

jealous

nosy/mean

lazy

polite

well-behaved, wise

sensitive

serious

stubborn/pig-headed

hard-working

sad

M1 Semaine 3

Ma description physique

J'ai les cheveux ...	short/longs/mid-length
courts/longs/mi-longs	straight/curly
raides/bouclés/frisés	black/brown/chestnut
noirs/bruns/châtain	blond/red/grey/white
blonds/roux/gris/blancs	I have ... eyes
J'ai les yeux ...	blue/green
bleus/verts	grey/brown
gris/marron	I have ...
J'ai ...	spots
des boutons	

My physical description

I have ... hair	une barbe/une moustache
short/long/mid-length	Je suis ...
straight/curly	petit(e)/grand(e)
black/brown/chestnut	de taille moyenne
blond/red/grey/white	mince/gros(se)
I have ... eyes	beau/belle
blue/green	joli(e)
grey/brown	moche
I have ...	Je porte des lunettes.
spots	

une barbe/une moustache

Je suis ...

petit(e)/grand(e)

de taille moyenne

mince/gros(se)

beau/belle

joli(e)

moche

Je porte des lunettes.

a beard/a moustache

I am ...

short/tall

of average height

slim/fat

beautiful

pretty

ugly

I wear glasses.

M1 Semaine 4

En ville

la boîte de nuit	le théâtre
le bowling	dans
le café	derrière
le centre commercial	devant
le cinéma	entre
les magasins (m)	en face de
la patinoire	à côté de
la piscine	près de
la plage	

In town

night club	le théâtre
bowling alley	dans
cafe	derrière
shopping centre	devant
cinema	entre
shops	en face de
ice rink	à côté de
swimming pool	près de
beach	

le théâtre

dans

derrière

devant

entre

en face de

à côté de

près de

theatre

in

behind

in front of

between

opposite

next to

near

M1 Semaine 5

Quand?

aujourd'hui	today
demain	tomorrow
après-demain	the day after tomorrow

When?

today	today
tomorrow	tomorrow
the day after tomorrow	the day after tomorrow

M1 Semaine 6

L'amitié

Un(e) bon(ne) ami(e) est ...	A good friend is ...
de bonne humeur	In a good mood
compréhensif/-ive	understanding
équilibré(e)	balanced/level-headed
honnête	honest
indépendant(e)	independent
modeste	modest
patient(e)	self-confident
sur(e) de lui/d'elle	

Friendship

A good friend is ...	
In a good mood	
understanding	
balanced/level-headed	
honest	
independent	
modest	
self-confident	

Un(e) bon(ne) ami(e) n'est pas ...

de mauvaise humeur

déprimé(e)

pessimiste

prétentieux/-euse

vaniteux/-euse

Il/Elle ...

croit en moi

dit toujours la vérité

me fait rire

prend soin de moi

voit le bon côté des choses

A good friend is/is not ...

In a bad mood

depressed

pessimistic

pretentious

conceited

He/She ...

believes in me

always tells the truth

makes me laugh

takes care of me

sees the positive side of things

this morning

this afternoon

tonight

Les traits de personnalité
 le sens de l'humour
 la patience
 la générosité
 la gentillesse

Qualities

a sense of humour
 patience
 generosity
 kindness

la fidélité
 la modestie
 l'honnêteté (f)
 l'optimisme (m)

M1 Semaine 7

loyalty
 modesty
 honesty
 optimism

Les rapports en famille

se confier à
 se disputer avec
 se entendre bien avec
 se fâcher contre
 s'intéresser à

Family relationships

to confide in
 to argue with
 to get on well with
 to get angry with
 to be interested in

s'occuper de
 s'aimer
 se chamailler
 mort(e)/décédé(e)
 divorcé(e)(s)
 séparé(e)(s)

M2 Semaine 1

to look after
 to love each other
 to bicker with each other
 dead
 divorced
 separated

On décrit sa famille

adorable
 débrouillard(e)
 dynamique
 énergique/plein(e) d'énergie

Describing family members

adorable
 resourceful
 lively
 energetic

extravert(e)
 fragile
 instable
 introvert(e)

M2 Semaine 2

outgoing
 fragile
 unstable
 introverted

On va sortir

Je vais/Tu vas/On va...
 aller au match
 faire les magasins
 faire du patin à glace/du patinage
 manger au fast-food
 aller au cinéma
 faire du skate
 voir un spectacle
 jouer à des jeux vidéo
 venir chez moi

Going out

I'm going/You're going/We're going...
 to go to the match
 to go shopping
 to go ice-skating
 to eat in a fast-food restaurant
 to go to the cinema
 to go skateboarding
 to see a show
 to play video games
 to come to my house

Tu veux venir?
 Tu peux venir?
 On se retrouve quand?
 ... où?
 ... à quelle heure?
 Tu y vas avec qui?
 ... comment?
 D'accord.
 A plus!/A plus tard!

Do you want to come?
 Can you come?
 When will we meet?
 Where...?
 At what time...?
 Who are you going there with?
 How...?
 OK.
 See you later!

M2 Semaine 3

Do you want to come?
 Can you come?
 When will we meet?
 Where...?
 At what time...?
 Who are you going there with?
 How...?
 OK.
 See you later!

On décrit une sortie

hier soir
 à 20 heures
 débord
 après
 puis/ensuite
 J'ai.../Il/Elle a.../Nous avons...
 visité la musée
 vu un match/une exposition
 mangé dans un restaurant
 refusé de manger
 bu un coca

Describing a night out

last night
 at 8 p.m.
 first of all
 afterwards
 then
 I.../He/She.../We...
 visited the museum
 saw a match/an exhibition
 ate in a restaurant
 refused to eat
 drank a coca

dit «au revoir»
 embrassé...
 Je suis.../Il/Elle est.../Nous sommes...
 allé(e)(s) à un pub
 resté(e)(s) dehors sur la terrasse
 entré(e)(s) dans un restaurant
 sorti(e)(s)
 parti(e)(s)
 monté(e)(s) dans le bus
 rentré(e)(s) à la maison
 tombé(e)(s) amoureux/-euse(s)

said good-bye
 kissed...
 I.../He/She.../We...
 went to a pub
 stayed outside on the terrace
 went into a restaurant
 went out
 left
 got on the bus
 went home
 fell in love

M2 Semaine 4

said good-bye
 kissed...
 I.../He/She.../We...
 went to a pub
 stayed outside on the terrace
 went into a restaurant
 went out
 left
 got on the bus
 went home
 fell in love

Parler de son enfance

Quand j'étais plus jeune...
 j'habitais avec (mon papa et ma maman)
 j'allais à l'école primaire
 j'avais (les cheveux blonds)
 j'étais (mignon(ne))

Talking about your childhood

When I was younger...
 I lived with (my mum and dad)
 I went to primary school
 I had (blond hair)
 I was (cute)

je jouais (à «cache-cache»)
 j'aimais (les bonbons)
 je détestais (les épinards)
 je portais (un maillot du PSG)
 je rêvais d'être...

I played (hide and seek)
 I liked (sweets)
 I hated (spinach)
 I wore (a PSG shirt)
 my dream was to be a...

M2 Semaine 5

I played (hide and seek)
 I liked (sweets)
 I hated (spinach)
 I wore (a PSG shirt)
 my dream was to be a...

Qui est-ce que tu admires?

Mon modèle s'appelle...
 Moi, j'admire...
 Mon héros/mon héroïne, c'est...
 J'aimerais bien être comme lui/elle.
 J'admire sa créativité.
 Il/Elle...
 m'impressionne énormément
 a travaillé très dur pour devenir...
 est devenu(e)...

Who do you admire?

My role model is called...
 Personally I admire...
 My hero/heroine is...
 I would like to be like him/her
 I admire his/her creativity.
 He/She...
 impresses me a lot
 worked very hard to become...
 became...

aider/a aidé...
 a/avait du courage/dé la détermination
 est/était courageux/-euse face à
 des dangers terribles
 lutte/a lutté pour...
 a obtenu...
 a sauvé la vie de...
 C'est un enfant adopté, comme moi.

helps/helped...
 has/had courage/determination
 is/was brave when faced with terrible
 danger
 fights/fought for...
 obtained/got...
 saved the life of...
 He/She is adopted, like me.

M2 Semaine 6

helps/helped...
 has/had courage/determination
 is/was brave when faced with terrible
 danger
 fights/fought for...
 obtained/got...
 saved the life of...
 He/She is adopted, like me.

Each test is made of 20 questions.
 Previous week vocabulary can be used.



Desconéctate

Vale Higher



Semana 1

¿Dónde vives? Vivo en el... norte/noreste/noroeste... sur/sureste/suroeste...	Where do you live? I live in the... north/northeast/northwest... south/southeast/southwest...	este/oeste/centro... de Inglaterra/Escocia de Gales/Irlanda (del Norte)	east/west/centre... of England/Scotland of Wales/(Northern) Ireland
¿Qué haces en verano? En verano/invierno... chateo en la red cocino para mi familia descargo canciones escribo correos hago natación/esquí/windsurf hago una barbacoa juego al baloncesto/fútbol	What do you do in summer? In summer/winter... I chat online I cook for my family I download songs I write emails I go swimming/skiing/windsurfing I have a barbecue I play basketball/football	montó a caballo/en bici nado en el mar salgo con mis amigos/as toco la guitarra trabajo como voluntario/a veo la tele voy al polideportivo/al parque/ a un centro comercial voy de paseo	I go horseriding/cycling I swim in the sea I go out with my friends I play the guitar I work as a volunteer I watch TV I go to the sports centre/to the park/ to a shopping centre I go for a walk

Semana 2

¿Con qué frecuencia? siempre a menudo todos los días a veces	How often? always often every day sometimes	de vez en cuando una vez a la semana dos o tres veces al año (casi) nunca	from time to time once a week two or three times a year (almost) never
¿Qué tiempo hace? Hace buen/mal tiempo. Hace calor/frío/sol/viento. Llueve/Nieva. El tiempo es variable.	What's the weather like? It's good/bad weather. It's hot/cold/sunny/windy. It's raining/snowing. The weather is changeable.	El clima es caluroso/soleado. Hay niebla/tormenta. Hay chubascos. Está nublado.	The climate is hot/sunny. It's foggy/stormy. There are showers. It's cloudy.
¿Qué te gusta hacer? Soy adicto/a a... Soy un(a) fanático/a de... ya que/dado que/puesto que Prefiero... Me gusta... Me encanta/Me mola/Me chifla/ Me flipa/Me apasiona... No me gusta (nada)... Odio... A (mi padre) le gusta... Nos encanta... bucar estar al aire libre	What do you like doing? I'm addicted to... I'm a... fan/fanatic. given that/since I prefer... I like... I love... I don't like... (at all) I hate... (My dad) likes... We love... diving being outdoors	estar en contacto con los amigos hacer artes marciales hacer deportes acuáticos ir al cine/a la pista de hielo ir de compras leer (un montón de revistas) usar el ordenador ver películas Prefiero veranear... en el extranjero/en España en la costa/en el campo en la montaña/en la ciudad	being in touch with friends doing martial arts doing water sports going to the cinema/ice rink going shopping reading (loads of magazines) using the computer watching films I prefer to spend the summer... abroad/in Spain on the coast/in the country in the mountains/in the city

Semana 3

¿Adónde fuiste de vacaciones? hace una semana/un mes/un año hace dos semanas/meses/años fui de vacaciones a... Francia/Italia/Turquía ¿Con quién fuiste? Fui... con mi familia/insti	Where did you go on holiday? a week/month/year ago two weeks/months/years ago I went on holiday to... France/Italy/Turkey Who did you go with? I went... with my family/school	con mi mejor amigo/a solo/a ¿Cómo viajaste? Viaje... en autocar/avión en barco/coche/tren	with my best friend alone How did you travel? I travelled... by coach/plane by boat/car/train
¿Qué hiciste? primero luego más tarde después finalmente Lo mejor fue cuando... Lo peor fue cuando... aprendí a hacer vela comí muchos helados compre recuerdos descargué fui al acuario hice turismo	What did you do? first then later after finally The best thing was when... The worst thing was when... I learned to sail I ate lots of ice creams I bought souvenirs I rested I went to the aquarium I went sightseeing	llegué tarde al aeropuerto perdí mi móvil saqué fotos tomé el sol tuve un accidente en la playa vi un partido visité el Park Güell vomedí en una montaña rusa Puedes... descubrir el Museo Picasso disfrutar del Barrio Gótico pasear por Las Ramblas subir al Monumento a Colón por los barcos en el puerto	I arrived at the airport late I lost my mobile I took photos I sunbathed I had an accident on the beach I saw/watched a match I visited Park Güell I was sick on a roller coaster You can... discover the Picasso Museum enjoy the gothic quarter walk along Las Ramblas go up the Columbus Monument see the boats in the port

Semana 4

¿Qué tal lo pasaste? Me gusto/Me encanta. Lo pasé bomba/fenomenal. Lo pasé bien/mal/fatal. Fue... Inolvidable/increíble impresionante/flipante horroroso	How was it? I liked it/I loved it. I had a great time. I had a good/bad/awful time. It was... unforgettable/incredible impressive/awesome awful	un desastre ¿Qué tiempo hizo? Hizo buen/mal tiempo. Hizo calor/frío/sol/viento. Hubo niebla/tormenta. Llovió/Nevó.	a disaster What was the weather like? It was good/bad weather. It was hot/cold/sunny/windy. It was foggy/stormy. It rained/snowed.
--	---	---	---

Semana 4 Parte 2



¿Cómo era el hotel?
 Me alojé/Me quedé...
 Nos alojamos/Nos quedamos...
 en un albergue juvenil
 en un apartamento
 en un camping
 en un hotel de cinco estrellas
 en un parador
 en una casa rural
 en una pensión
 Fuí de crucero.
 Estaba...
 cerca de la playa
 en el centro de la ciudad
 en las afueras
 Era...
 acogedor(a)
 antiguo/a
 barato/a
 caro/a

What was the hotel like?
 I stayed...
 We stayed...
 in a youth hostel
 in an apartment
 on a campsite
 in a five-star hotel
 in a state-run luxury hotel
 in a house in the country
 I went on a cruise.
 It was...
 near the beach
 in the city centre
 on the outskirts
 It was...
 welcoming
 old
 cheap
 expensive

Semana 5

grande
 lujoso/a
 moderno/a
 pequeño/a
 tranquilo/a
 Tenía/Había...
 No tenía ni... ni...
 No había ni... ni...
 Tampoco tenía...
 (un) apartamento
 (un) bar
 (un) gimnasio
 (un) restaurante
 (una) cafetería
 (una) lavandería
 (una) piscina cubierta
 mucho espacio para mi tienda

big
 luxurious
 modern
 small
 quiet
 It had/There was/were...
 It had neither... nor...
 There was neither... nor...
 Nor did it have...
 a car park
 a bar
 a gym
 a restaurant
 a café
 a laundrette
 an indoor pool
 lots of space for my tent

¿Cómo era el pueblo?
 Lo bueno/Lo malo...
 del pueblo...
 de la ciudad...
 era que era...
 demasiado/muy/bastante...
 animado/a
 bonito/a
 histórico/a
 pintoresco/a

What was the town/village like?
 The good thing/The bad thing...
 about the town/village...
 about the city...
 was that it was...
 too/very/quite...
 lively
 pretty
 historic
 picturesque

Semana 6

turístico/a
 Tenía...
 mucho ambiente/tráfico
 mucho que hacer
 mucha contaminación/gente
 muchos espacios verdes
 muchos lugares de interés
 muchas discotecas

It had...
 It had...
 lots of atmosphere/traffic
 lots to do
 lots of pollution/people
 lots of green spaces
 lots of places of interest
 lots of discos

¿Quisiera reservar...?
 ¿Hay...
 wifi gratis...
 aire acondicionado...
 en el hotel/las habitaciones?
 ¿Cuánto cuesta una habitación...?
 ¿A qué hora se sirve el desayuno?
 ¿Cuándo está abierto/a el/la...?
 ¿Cuánto es el suplemento por...?
 ¿Se admiten perros?
 ¿Quisiera reservar...
 una habitación individual/doble
 con/sin balcón

I would like to book...
 Is/Are there...
 free wifi...
 air conditioning...
 in the hotel/the rooms?
 How much does a... room cost?
 What time is breakfast served?
 When is the... open?
 How much is the supplement for...?
 Are dogs allowed?
 I would like to book...
 a single/double room
 with/without balcony

con bañera/ducha
 con cama de matrimonio
 con desayuno incluido
 con media pensión
 con pensión completa
 con vistas al mar
 ¿Para cuántas noches?
 Para... noches
 del... al... de...
 ¿Puede repetir, por favor?
 ¿Puede hablar más despacio?

with a bath/shower
 with double bed
 with breakfast included
 with half board
 with full board
 with sea view
 For how many nights?
 For... nights
 from the... to the... of...
 Can you repeat, please?
 Can you speak more slowly?

Quiero quejarme
 Quiero hablar con el director.
 Quiero cambiar de habitación.
 El aire acondicionado...
 El ascensor...
 La ducha...
 La habitación...
 está sucio/a
 La luz...
 no funciona
 Hay ratas en la cama.

I want to complain
 I want to speak to the manager.
 I want to change rooms.
 The air conditioning...
 The lift...
 The shower...
 The room...
 is dirty
 The light...
 doesn't work
 There are rats in the bed

Semana 7

No hay...
 Necesito...
 papel higiénico
 jabón/champú
 toallas/(un) secador
 ¡Socorro!
 Es inaceptable.
 Lo siento/Perdone.
 El hotel está completo.

There is no...
 I need...
 toilet paper
 soap/shampoo
 towels/a hairdryer
 Help!
 It's unacceptable.
 I'm sorry.
 The hotel is full.

Mis vacaciones desastrosas
 Por desgracia
 Por un lado... por otro lado...
 El primer/último día
 Al día siguiente
 Tuve/Tuvimos...
 un accidente/un pinchazo
 un retraso/una avería
 Tuve/Tuvimos que...
 esperar mucho tiempo
 ir al hospital/a la comisaría
 llamar a un mecánico
 Perdí/Perdimos...
 el equipaje/la cartera
 la maleta/las llaves

My disastrous holiday
 Unfortunately
 On the one hand... on the other hand...
 (On) the first/last day
 On the following day
 I had/We had...
 an accident/a puncture
 a delay/a breakdown
 I had to/We had to...
 wait a long time
 go to the hospital/to the police station
 call a mechanic
 I lost/We lost...
 the luggage/the wallet
 the suitcase/the keys

Cuando llegamos...
 era muy tarde
 estaba cansado/a
 la recepción ya estaba cerrada
 acampar
 decidir
 alquilar bicicletas
 coger el teleférico
 chocar con
 hacer alpinismo
 volver
 el paisaje
 la autopista
 precioso/a

When we arrived...
 it was very late
 I was tired
 the reception was already closed
 to camp
 to decide (to)
 to hire bicycles
 to catch/take the cable car
 to crash into
 to go mountain climbing
 to return
 the landscape
 the motorway
 beautiful



Vocabulary	
Primary data	Data you have collected yourself
Secondary data	Data that comes from published sources
Qualitative data	Data that uses words
Quantitative data	Data that uses numbers
Discrete data	Quantitative data that which is counted
Continuous data	Quantitative data which is measured
Bivariate data	Data sets that uses two variables
Ranked data	Discrete data that is put in order
Hypothesis	A hypothesis is a statement of belief about some aspect of a population
Control	A control in an experiment is designed to check the hypothesis, and is compared to the standard.
Population	All the data that you are interested in
Sample frame	A list that includes every population from which a sample is to be taken
Sample	A sample can be taken and used to make predictions about a population.
Pilot study	Using a small sample of data to see if meaningful results can be obtained

Important Ideas
Categorical data can be sorted in to groups of data types.
You can carry out experiments or make observations to see if your hypothesis is supported by the data you collect.

Question	Answer
Data types	
What type of data is the following: 1) Number of seagulls on a beach 2) The weight of a bag of sugar 3) The name of a town 4) The score you got on your last test 5) The time taken to run a marathon	1) Quantitative – discrete 2) Quantitative – continuous 3) 3) Qualitative 4) Quantitative – discrete 5) Quantitative - continuous
Sampling	
Sarah wants to find out how many of the 250 students in his year bring a mobile phone to school. She decides to ask 10 of his friends (a) Write down two reasons why this is not a good sample (b) Explain how Sarah could take a better sample	(a) It's too biased - her friends are likely to do similar things - the sample is too small. (b) She should take a random sample of 30 or more using a list of all the students in her year.
Experimental design	
Malique wants to know whether drinking a certain tea will help with weight loss. Design an experiment for Malique.	1) Select two groups of people at random 2) Weigh each person 3) One group drink the tea. 4) Re-weigh all the people after a certain amount of time.

Key Facts & Formula	
Samples	<p>GOOD samples:</p> <ul style="list-style-type: none"> • Are as large as possible • Are unbiased • Have a suitable time frame <p>BAD samples:</p> <ul style="list-style-type: none"> • Are too small • Are biased • Are out of date, have people missing or counted twice, incorrect names on the list
Designing investigations	<p>The DATA HANDLING CYCLE:</p> <ul style="list-style-type: none"> • Specify the problem and plan • Collect data from a variety of sources • Process and represent the data • Interpret and discuss data
Estimation	<p>You can infer characteristics of a population using estimation and sampling:</p> <p>Proportion of sample with that characteristic x population size</p>



Important Ideas	
Samples don't give you information about every member of the population so the data can be less accurate and may be biased	
You can use summary statistics to make estimates of population characteristics	

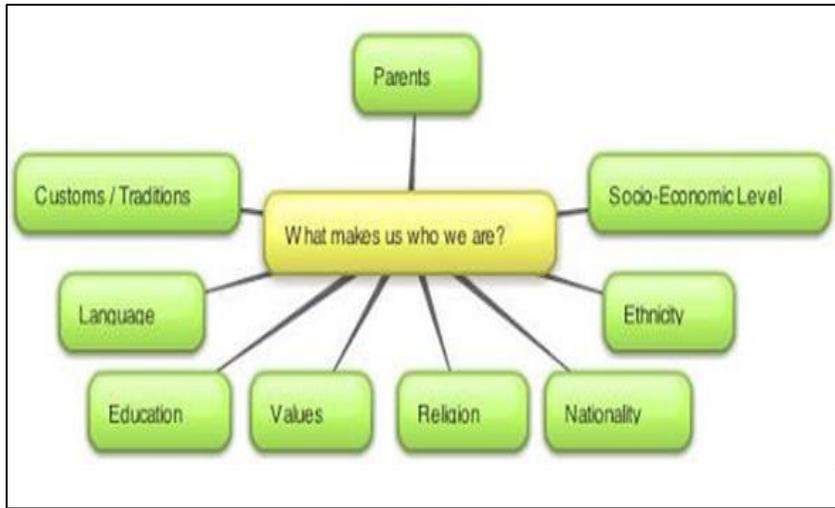
Vocabulary	
Random sampling	Every member of the population has an equal chance of being selected.
Stratified sampling	Stratified sampling gives the different groups in the same sample an amount of representation that's proportional to how big they are in the population.
Judgement sampling	Uses judgement to select a sample that is representative of the population
Opportunity sampling	Uses the people or objects that are available at the time.
Cluster sampling	Used when the population is in groups. A random sample of these groups is selected and all items in the selected groups are include in the sample.
Quota sampling	Splitting the population into groups with certain characteristics and selecting a given number from each group.
Systematic sampling	Items are selected from the population at regular intervals either in time or in space.
Explanatory variable	The "cause" variable
Response variable	The "effect" variable
Extraneous variable	A variable you are not interested in which could affect your results

Question	Answer
Population and sampling	
You want to find out the average amount of pocket money received by students in your school. Describe how you would get a random sample of 40 from a population of 748 students.	Get a list of all 748 students (a sample frame) and number them 1 to 748. Generate 40 random numbers (using a random number table or computer) between 1 and 748. Match the 40 random numbers to the students to create the sample.
Estimation	
Evelyn captures 30 frogs from her garden pond and carefully marks each before returning them to the water. The next day she captures 20 frogs and finds that 10 are marked. Estimate the number of frogs in her pond.	$\frac{30}{N} = \frac{10}{20}$ $\Rightarrow N = 60 \text{ frogs}$
Collection of data	
Rajan plans to distribute his questionnaire about public transport by handing out copies in his town centre	a) Advantage – it should be quick and cheap to carry out. Disadvantage – the results may be biased depending on who takes a questionnaire and who responds.
a) Give one advantage and one disadvantage of Rajan's plan for collecting data	b) He could enter people who respond in a prize draw
b) B) Suggest one way Rajan could reduce the number of non-responses	

Key Facts & Formula		
	Advantage	Disadvantage
Questionnaire	<ul style="list-style-type: none"> Much cheaper to do Each person answering the question is treated the same way 	<ul style="list-style-type: none"> Non-response People may misunderstand some questions
Interview	<ul style="list-style-type: none"> Interviewer can explain complex questions Interviewer can follow up on unclear responses 	<ul style="list-style-type: none"> Interviewer may be biased Can be costly

$\frac{n}{N} = \frac{m}{M}$ <p>Assumptions: No significant change to population All members of the population are equally likely to be captured. Capture and marking does not affect recapture & markings are not lost Sample is big enough to be representative</p>	
Petersen Capture-recapture	
Stratified sampling	<p>Number in sample for each stratum:</p> $\frac{\text{stratum size}}{\text{population size}} \times \text{number in sample}$

Key words	Definition
1. Multicultural Society	A society that is made up of people from a range of cultural and religious backgrounds.
2. National identity	An identity associated with being a citizen of a particular country.
3. Identity	Characteristics/qualities that make a person who they are e.g. age, gender, religion, regional location, job etc.
4. Multiple Identities	An individual assumes a range of identities i.e. part of a family, the area they come from' linked to a school or a supporter of a football team etc.
5. Britishness	The state of being British, or qualities that are considered typical of British people.
6. National Identity	Identity associated with being a citizen of a specific country e.g. English identity or Scottish identity.
7. Discrimination	Unfair treatment of others based on their race, gender, sexuality, age, disability, religion etc.
8. Prejudice	To pre-judge, have an unreasonable dislike for a person or group of people, view not based on experience.
9. Stereotyping	A generalized view about a group of people linked to a personal characteristic e.g. hair colour, where they live, their way of life etc.
10. Equality Act (2010)	Law which legally protects people from discrimination in the workplace and in wider society.
11. Immigration	The act of someone moving into another country.
12. Immigrant	A person who moves into another country to live, with the intention of staying there permanently.
13. Migration	The movement of people from one country to another – some moving in and others moving out.
14. Net Migration	The difference between the total number of people in and out of an area over a given period of time. If more people in the figure is a plus and if more people leave the figure is a minus.
15. Community Cohesion	Working towards a society where everyone shares a sense of belonging and common values – people live together peacefully and everyone feels valued.



Islam – minority religion in the UK brought here by migrants from Pakistan and Bangladesh in the 1970s and other countries since then (e.g. Syrian refugees)
3% of the UK 2001
4.8% of the UK 2011

Hinduism – minority religion in the UK brought by migrants from India in the 1970s
1% of the UK 2001
1.3 % of the UK 2011

Sikhism – minority religion in the UK brought by migrants from the Punjab region of India in the 1970s
0.6% of the UK 2001
0.7 % of the UK 2011

Christianity – majority religion in the UK
71.6% of the UK 2001
59.5% of the UK 2011

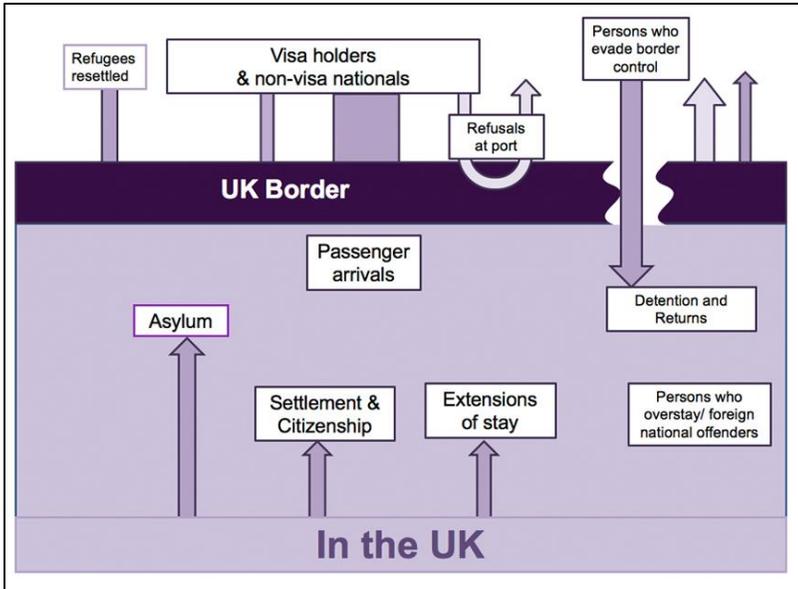
Buddhism – minority religion in the UK brought by migrants from Nepal and other Buddhist countries
0.3% of the UK 2001
0.4 % of the UK 2011

Judaism – minority religion in the UK brought here by Jewish refugees from Europe in the 1600s & 1700s, and from Nazi Germany in the 1930s & 1940s
0.5% of the UK 2001
0.4% of the UK 2011

What other group is significant in size but not mentioned here? **Why is that?**

Changing patterns in the UK: Ethnic groups 2001 and 2011 in England & Wales.

Ethnicity	% of UK population			
	2001	2011	% change + or -	
White	91.3	86.0		
Asian / Asian British	Indian	2.0	2.5	
	Pakistani	1.4	2.0	
	Bangladeshi	0.5	0.8	
	Chinese	0.4	0.7	
	Other Asian	0.5	1.5	
Black / African / Caribbean / Black British	African	0.9	1.8	
	Caribbean	1.1	1.1	
	Other Black	0.2	0.5	
Mixed ethnic groups	1.4	2.2		
Other Ethnic groups	Arab		0.4	
	Any other Ethnic group	0.4	0.6	



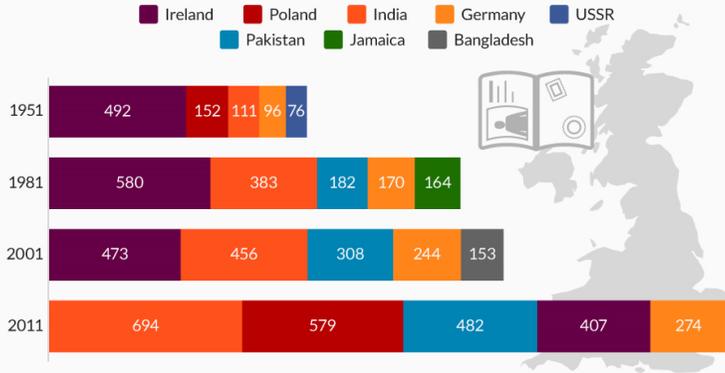
OVER 6 DECADES, WHERE MIGRANTS CAME FROM

Top ten non-UK countries of origin

1951	1981	2001	2011
Ireland 492,000	Ireland 580,000	Ireland 473,000	India 694,000
Poland 152,000	India 383,000	India 456,000	Poland 579,000
India 111,000	Pakistan 182,000	Pakistan 308,000	Pakistan 482,000
Germany 96,000	Germany 170,000	Germany 244,000	Ireland 407,000
Russia 76,000	Jamaica 164,000	Bangladesh 153,000	Germany 274,000
USA 59,000	USA 106,000	Jamaica 146,000	Bangladesh 212,000
Canada 46,000	Kenya 100,000	USA 144,000	Nigeria 191,000
Italy 33,000	Italy 93,000	S Africa 132,000	S Africa 191,000
Australia 31,000	Poland 88,000	Kenya 127,000	USA 177,000
France 30,000	Cyprus 83,000	Italy 102,000	Jamaica 160,000
Top ten total 1,126,000	Top ten total 1,949,000	Top ten total 2,285,000	Top ten total 3,367,000
Others 774,000	Others 1,251,000	Others 2,315,000	Others 4,133,000
Total 1.9m	Total 3.2m	Total 4.6m	Total 7.5m

Where Britain's immigrants historically come from

Top five origin countries of British immigrants from 1951 to 2011 (in thousands)



© StatistaCharts Source: ONS

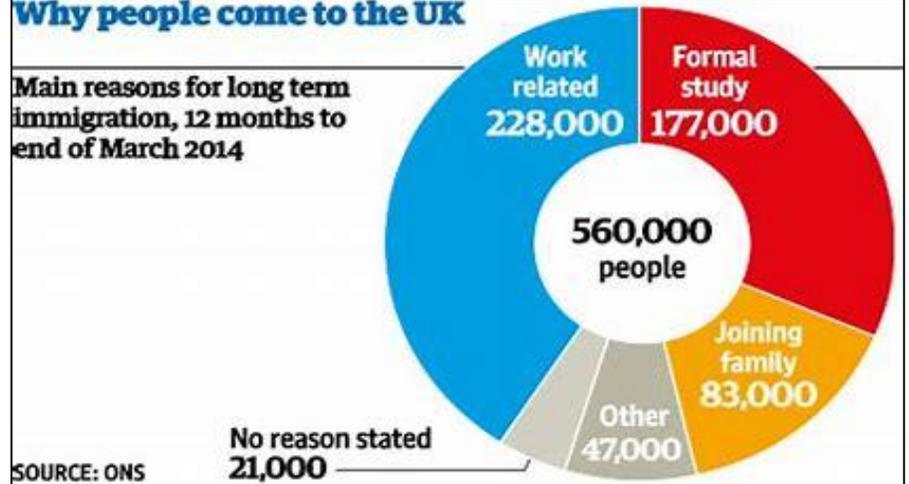
i100

from THE INDEPENDENT

statista

Why people come to the UK

Main reasons for long term immigration, 12 months to end of March 2014



SOURCE: ONS



No.	Key word	Meaning
1.	Microsoft Word	A word processor developed by Microsoft, also referred to as simply Word. It was first released on October 25, 1983 under the name Multi-Tool Word for Xenix systems.
2.	Word Processing	Using a computer to produce text. Word processing programs are incredibly useful. Not only can they be used to produce text - for example to write letters or stories - they can also include images.
3.	Folder computing	A folder is a storage space where many files can be placed into groups and organise the computer. A folder can also contain other folders.
4.	Universal System Bus (USB)	A way of connecting devices to a computer that provides FAST access.
5.	Download	To copy from one computer system to another.
6.	Flash Drive	A small electrical device used for storing data also known as a Memory Stick or pen drive.
7.	Encryption	A way of scrambling information for security purposes.
8.	Email	To communicate electronically on the computer.
9.	Email Attachment	This is the name given to a file that is sent along with an email. An email attachment can be any type of file, including images (photos), videos, mp3s, documents, zipped files/folders, and more.
10.	Portfolio	A collection of evidence that represents achievement and learning within a module/course or programme of study
11.	Desktop Publisher (DTP)	A program that combines text and graphics to produce documents such as newsletters, brochures, books etc.
12.	Uniform Resource Locator (URL)	The address of a web page on the World Wide Web.
13.	Web Browser	A piece of software that allows you to access websites on the internet.
14.	Home page	The first page that opens when you open a web-browser.
15.	Spreadsheet	A computer program used for working with numbers and accounts



Box 1. Being an Entrepreneur

What is an entrepreneur? - It doesn't mean you have to be setting up new business ventures every day; an entrepreneur is someone with the foresight, drive and ambition to take a risk and solve business or consumer problems.

Entrepreneurs are motivated by one or more factors, these are **financial, personal and social**.

Examples of entrepreneurs are:

- Sir Alan Sugar
- Jamie Oliver
- Nadiya Hussain
- Victoria Beckham
- Joe Wicks

Characteristics and skills:

Characteristic - a feature or quality belonging typically to a person to identify them. For example, someone is hard working.

Skills – an ability to do an activity or job well, especially because you have practised it.

For example, a chef will practice knife skills

Most entrepreneurs have some characteristics and skills in common:

- Confident
- Motivated
- Determined
- Results focused
- Initiative
- Decision making
- Analytical ability
- Communication

Business Aims and Objectives

Financial Aims and Objectives are;

- **Break even** – This is the point when the total revenue exactly matches the total costs and the business is not making a **profit or a loss**.
- **Profitability** - The ability of a company to use its resources to generate revenues in excess of its expenses. In other words, this is a company's capability of generating profits from its operations.

Box 2. Business Aims and Objectives

Non-Financial Aims And Objectives are:

- Customer satisfaction
- Expansion
- Employee engagement/satisfaction

Diversification:

Diversification is a corporate strategy to enter into a new market or industry in which the business doesn't currently operate, while also creating a new product for that new market.

Ethical and corporate responsibility:

Some businesses believe that they have a responsibility to behave in an ethical manner. To do this they consider two questions

Impact: who/what does my decision affect or harm?

Fairness: will my decision be considered fair by those affected?

Using cheap labour in countries with poor health and safety legislation may mean goods are cheaper but many consumers would prefer to buy more expensive items knowing the workers are paid properly and work in safe environments

Companies can use ethical and corporate responsibility to enhance their image, gain good publicity and increase their profits.

Many companies feel that they have a duty to act in an ethical manner and protect the environment they work in and the people they employ.

Structures

Legal structures - There are a range of legal structures for businesses:

- **Sole Trader** – A sole trader is the only owner of a business, meaning that they are responsible for the entire operation, entitled to keep all profits after tax has been paid but liable for all losses. They are considered self-employed.
- **Partnership** - A form of business where two or more people share ownership, as well as the responsibility for managing the company and the income or losses the business generates. That income is paid to partners, who then claim it on their personal tax returns – the business is not taxed separately, as corporations are, on its profits or losses.

Box 3. Legal structures continue

- **Franchise** - A franchise is a type of license that a party (franchisee) acquires to allow them to have access to a business's (the franchiser) proprietary knowledge, processes, and trademarks in order to allow the party to sell a product or provide a service under the business's name.
- **Private Limited Company (Ltd)** – A form of business organisation in the UK that can limit the number of shareholders, restrict their share transactions, while providing them with limited liability. Shareholders are not allowed to sell or transfer shares of the company without first offering them other shareholders, and shares may not be traded through a public exchange. Shareholder liability extends only to their interests in the company and not to their personal assets.
- **Public Limited Company (PLC)** – A public limited company is a type of public company under United Kingdom company law, some Commonwealth jurisdictions, and the Republic of Ireland. It is a limited liability company whose shares may be freely sold and traded to the public, with a minimum share capital of £50,000 and usually with the letters PLC after its name.
- **Co-operatives** – A co-operative is a member-owned business structure with at least five members, all of whom have equal voting rights regardless of their level of involvement or investment. All members are expected to help run the cooperative. A co-operative is a separate legal entity and members, directors, managers and employees are not liable for any debts incurred unless they are the result of recklessness, negligence or fraud.

Organisational Structures

Flat Organisational structures - An organizational structure in which most middle-management levels and their functions have been eliminated, thus bringing the top management in direct contact with the frontline salespeople, shop floor employees, and customers.

Despite their breadth, flat organizations can benefit from most of the advantages enjoyed by small companies, such as faster response time to changing conditions and customer preferences.

Tall Organisational structures - Tall structures are vertical, which means a top-down management style in which a CEO or company leader establishes the work culture, goals, and strategies, and communicates these concepts to middle management and supervisors that are responsible for implementing these processes through lower level employees. This type of structure is most often effective in larger companies that require a rigid hierarchy to maintain workplace efficiency. In a tall structure, there are often multiple departments that are headed by managers, with team supervisors as the next level below management, and the rank-and-file workers at the bottom.

Box 4. Structures

Restructuring:

A business may restructure its organisation, including:

- **Delayering** - to reduce the size of a business hierarchy, especially in terms of a reduction in management. This creates a flatter (less layered) organisational structure.
- **Redundancies** - elimination of a job role.

Stakeholder Engagement

All businesses and enterprises have stakeholders. A stakeholder is an individual, group or organisation who has an interest in the business or enterprise, and may be affected by the business.

Stakeholders can be... **internal** - within a business.

Internal stakeholders of a business including:

- **Employees**
- **Managers**
- **Owners**
- **Workers**

Stakeholders can be... **external** - outside a business.

External stakeholders of a business including:

- **Customers**
- **Suppliers**
- **Shareholders**
- **Local community**
- **Government**
- **Finance providers**

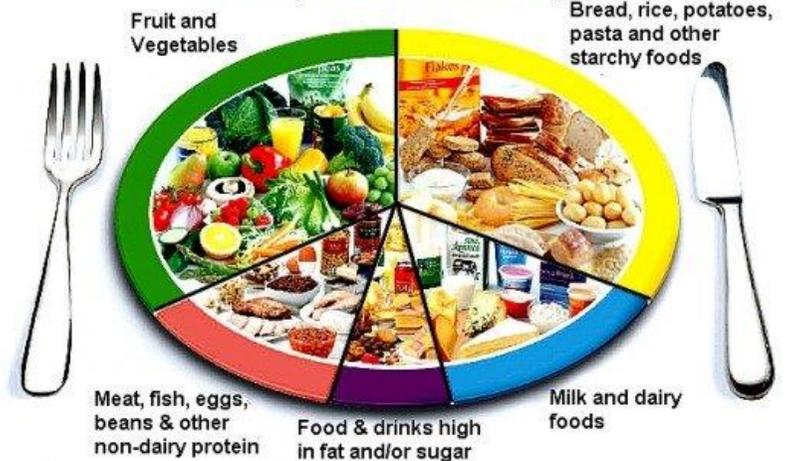
Key term	Definition
1. body mass index (or BMI)	a weight-to-height ratio that shows if you're overweight, underweight or at a healthy weight
2. calorie	a unit for measuring the amount of energy we get from food
3. carbohydrate	a substance in foods such as bread and potatoes that is a major source of energy or calories
4. cholesterol	a substance in body cells that can cause heart disease if levels in the blood are too high
5. diabetes	a serious illness in which your body cannot regulate the amount of sugar in the blood
6. malnutrition	a condition of weakness or illness caused by eating too much food, not enough food or unhealthy food
7. nutrient	a substance in food that is necessary for good health
8. obesity	the state of being very overweight, or the medical condition related to this
9. pescetarian	(of a diet) including vegetarian food and fish, but no other meat
10. vegan	(of a diet) with plant foods only; without animal products, including meat, fish, seafood, eggs, milk, cheese, etc
11. vegetarian	(of a diet) with plant foods and sometimes dairy products, but without meat, fish, or seafood
12. preservative	a chemical substance used for preventing food from spoiling or wood from decaying
13. process	to add chemicals or other substances to food to make it last longer or look or taste better
14. saturated fat	a type of fat that's found in butter, cheese, red meat, etc.

8 Tips For Healthy Eating

- 1. Base your meals on higher fibre starchy carbohydrates**
- 2. Eat lots of fruit and veg**
- 3. Eat more fish, including a portion of oily fish**
- 4. Cut down on saturated fat and sugar**
- 5. Eat less salt: no more than 6g a day for children 11+**
- 6. Get active and be a healthy weight**
- 7. Do not get thirsty**
- 8. Do not skip breakfast**

The eatwell plate

Use the eatwell plate to help you get the balance right. It shows how much of what you eat should come from each food group.



15. trans fat (or trans fatty acid)

an artificial fat that makes food last longer and taste better but is very bad for health

Fitness Key term	Definition
1. Aerobic fitness	A measure of how well your blood transports oxygen around the body, and how well your muscles utilize the oxygen.
2. Aerobic	Meaning with oxygen. Aerobic training is at a lower intensity, with the purpose of stimulating aerobic metabolism to improve.
3. Anaerobic	Anaerobic processes occur in the cells of the body without the presence of oxygen. Anaerobic training is of high intensity and short duration, with the aim of the efficiency of the body's anaerobic energy-producing systems.
4. Body composition	Body composition refers to the components of the body. It is usually divided into two components: the amount of fat mass (weight) and the amount of fat-free mass (muscle, bone, skin and organs) in the body.
5. Cardiovascular	Concerning the heart and blood vessels.
6. Endurance	The body's ability to exercise with minimal fatigue. Often used with other terms such as; endurance training, muscular endurance and cardiorespiratory endurance.
7. Glycogen	The form in which carbohydrates are stored in the body. Primary sites for storage are the muscles and the liver.
8. obesity	the state of being very overweight, or the medical condition related to this
9. Interval training	A training session that involves repeated bouts of exercise, separated by rest intervals. Depending of the length of exercise and rest periods, it may be anaerobic or aerobic training.
10. Lactic acid	Anaerobic exercise produces lactic acid, which quickly forms lactate in the muscles. because of this, the terms "lactate" and "lactic acid" are often used interchangeably.
11. Resistance training	Training designed to increase the body's strength, power, and muscular endurance through resistance exercise. The most common form of which is weight training.



How much physical activity should children and young people aged 5 to 18 do to keep healthy?

Children and young people need to do **2 types of physical activity** each week:

- aerobic exercise
- exercises to strengthen their muscles and bones

Children and young people aged 5 to 18 should:

1. aim for an average of at least 60 minutes of moderate intensity physical activity a day across the week
2. take part in a variety of types and intensities of physical activity across the week to develop movement skills, muscles and bones
3. reduce the time spent sitting or lying down and break up long periods of not moving with some activity. Aim to spread activity throughout the day. All activities should make you breathe faster and feel warmer