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Important Exam Information
- Paper 1 Section B
- Extract question
-No choice of question
-45 minutes

GCSE English Literature: Paper 1 - A Christmas Carol

A Christmas Carol – Context

Dickens' Life

Charles Dickens was born in 1812 in Kent and moved to London at the age of 9. When he was 12 years of age, his father was arrested and sent to a debtors' prison. Dickens' mother moved seven f their children into prison with their father but took Charles out of school and arranged for him to live alone outside the prison, working with other child labourers in a terrible job which involved pasting labels on bottles in a blacking (shoe polish) warehouse; he was poorly paid and the conditions were extremely bad. Much of Dickens' writing is influenced by his early experiences.

Social and Historical Context

Dickens was born into a time of great change in the way people lived. The Industrial Revolution was taking place and there was a sudden growth in the cities – the economy shifted from agriculture to industry and trade. As a result, many people who had once lived in rural communities moved to the city in huge numbers, causing overcrowding. Money from industry made the rich richer and the rich/poor gap widened. Workers had to toil for long hours for little money and, out of necessity, children of all ages often did not go to school and worked long hours for little money. Compulsory education was introduced by Queen Victoria so many children were taught to read and write in Victorian times where they would not have been early. However, despite this, most poor children still ended up in low-paid jobs and working in appalling conditions. The housing was dreadful for working class families who often lived in squalor and deprivation where disease spread rapidly. There was no NHS and so poor people rarely had access to any form of medical help if they fell ill. Child mortality was very high. In the poorer quarters of the big cities, almost 1 in 5 children born had died by the age of five. The main cause of death was polluted drinking water, damp, and tuberculosis, which claimed between 60,000 and 70,000 lives in each decade of Queen Victoria's reign. Disease spread rapidly due to over-crowding and due to the very unhygienic way that the poor had to live as they had little access to clean water. For those who were unable to work and support themselves, there were workhouses. These were not intended to be pleasant places to stay. Men, women, and families were separated and those who were physically able were expected to work for their keep. Like the workhouses there were debtors' prisons (those who were unable to pay a debt went here) such as a Marshlea, where Charles Dickens' father spent time. If you could not look after your family the workhouse was the only option that you had, or your family would be left to the starve. There was no system to support those who could not work and so people found themselves with little choice. The wealthy few, on the other hand, lived in luxury with large houses, plenty of money and food. Their children did not work, were educated, and often had expensive toys and nice clothes. The rich had to be seen to be civilised and adhere to a strict set of morals that were considered very important for high society in the Victorian age. Victorians are well known for being prudish and overly polite in their interactions for this reason. However, this was often criticised for being hypocritical, because the rich lived such different lives to the poor and often did little to help them.

A Christmas Carol

During this time of unrelenting social change, Dickens wrote A Christmas Carol. Firstly, he wanted to write a good 'ghost' story - these were extremely popular at the time and he had hoped that this would be a good story for families to enjoy sitting around the fire on a cold winters night. Victorians were extremely interested in the supernatural and many of them firmly believed in ghosts and the idea of spirits visiting them from the dead and so the story would not have seemed at all far-fetched or unrealistic to them. However, he also had the intention of drawing readers' attention to the plight of England's poorest, a recurring theme in many of his novels. As such, the novella can be read a social criticism, an allegory.

Malthusian Theory

Thomas Malthus was an English demographer and political economist best known for his pessimistic but highly influential views on population growth.

Malthus famously argued that in a world in which economies grew arithmetically and population grew geometrically, mass want would be inevitable. His *Essay on Population* created a school of thought which continues to this day under the banners of Zero Population Growth and Sustainability. The threat of a "population bomb" under which my generation lived was Paul Ehrlich's modern rehashing of the Malthusian argument about the inability of productivity to keep pace with, let alone exceed, population growth.

Characters:

1.Ebenezer Scrooge: Miserly, mean, bitter, materialistic, unsympathetic, indifferent, cold, selfish, isolated, cynical, charitable, value driven, generous, happy, sociable, transformed.

2. Marley's Ghost: Materialistic, self-centred, terrifying, haunting, exhausted, direct, reformed, regretful, hopeful, selfless, wise

3. Bob Cratchit: Uncomplaining, tolerant, courteous, deferential, patient, civil, eager, pleasurable, good-humoured, playful, caring, tender, cheerful, loving, forgiving.

4. Fred: Warm-hearted, empathetic, cheerful, optimistic, even-tempered, insightful, determined, generous, forgiving, jovial, enthusiastic, caring

5. Ghost of Christmas Past: Contradictory, strong, gentle, quiet, forceful, questioning, mysterious

6. Ghost of Christmas Present: Compassionate, abundant, generous, cheerful, jolly, friendly, severe, sympathetic

7. Ghost of Christmas Future: Mysterious, silent, ominous, intimidating, frightening, resolute

8. Tiny Tim: Frail, ill, good, religious

The Plot

Stave One

1. Introduced to Ebenezer Scrooge on Christmas Eve. He is a lonely miser obsessed with money. He has a clerk called Bob Cratchit who is not treated well. We learn Jacob Marley, Scrooge's business partner, died exactly 7 years earlier. Scrooge is irritated that Christmas Day seems to be interrupting his business. Scrooge is visited by his nephew Fred, who invites his uncle to Christmas dinner. Scrooge refuses. Scrooge is visited by two charity workers, asking for donations. Scrooge refuses and exclaims he wants to be left alone. Scrooge allows Bob to have Christmas Day off. Scrooge, when he is home, is visited by the Ghost of Jacob Marley – warning him he will be visited by three more ghosts to help him change his ways.

Stave Two

Scrooge is visited by the Ghost of Christmas Past who takes him to witness his past. Scrooge is taken first to his schoolboy years and he is reminded how his friends would go home from Christmas while he was left at school. We see him with his sister, who one year took him home for the holidays. Next we are shown Scrooge as a young apprentice, working for Fezziwig. Dickens describes the Christmas ball Fezziwig organised for his employees. Finally, Scrooge is taken to see his ex-fiancée, Belle. We see the scene when they break up, as money has taken over Scrooge's life. Scrooge cannot bear to see any more and struggles with the spirit.

Stave Three

Scrooge is then visited by the Ghost of Christmas Present. The spirit shows Scrooge how the Cratchit family celebrate Christmas. Scrooge asked if Tiny Tim will life. The spirit explain unless there are changes, he will die. Scrooge is then taken to see how others celebrate Christmas: miners, lighthouse workers, sailors on a ship and to Fred's house at Christmas, where they are playing games. The spirit then begins to age, and see under the spirit's robes two children: Ignorance and Want. The Ghost of Christmas Future then appears.

Stave Four

The Ghost of Christmas Future is described. The spirit takes Scrooge to see a group of businessmen discussing someone who has died. Scrooge is then taken to see Old Joe, where he is in the process of buying property of the dead man – which have been stolen. Scrooge then returns to Bob Cratchit's house, where it is revealed Tiny Tim has died. Scrooge is then taken to the graveyard and is shown a grave stone and realises this is for him. Scrooge falls to his knees and begs that he will change his ways.

Stave Five

Scrooge wakes up in his own bed. Scrooge wonders how much time has passed and calls to a boy. He then sends the boy to the poulterer for the prize turkey to give to Bob Cratchit, Scrooge meets one of the charity collectors from earlier and whispers to him that he will give a large donation. Scrooge then goes to Fred's house and is welcomed in. He enjoys the dinner and party. On Boxing Day, Scrooge arrives early to work, and plays a trick on Bob. Scrooge then tells him he is going to raise his salary and promises to help Bob's struggling family. Scrooge is described to have completely changed and becomes a 'second father' to Tiny Tim – 'who did not die.'

Key Quotations (AO1):

Stave One

"a squeezing, wrenching, grasping, scraping, clutching, covetous old sinner" – about Scrooge
"Solitary as an oyster" – about Scrooge
'A tight-fisted hand at the grind stone' – about Scrooge
"B'ah! Humbug!" – Scrooge's reaction to Christmas
"Are there no prisons? Are there no workshouses?" – Scrooge's reaction to the charity men asking for money to support the poor
"If they are to die they had better do it, and decrease the surplus population!" – Scrooge's reaction to hearing that poor people would rather die than go to the workhouse. This quotation links to Malthusian theory (see other side of sheet)
'His face was ruddy and handsome, his eyes sparkled' – Fred (presented as the opposite to Scrooge)
'I wear the chain I forged in life' –Ghost of Marley

Stave Two

'It wore a tunic of the purest white… from the crown of its head there sprung a bright clear jet of light' – Ghost of Christmas Past
'A lonely boy was sat reading near a feeble fire' – Scrooge as a young boy
"A solitary child, neglected by his friends" – Scrooge as a young boy
"Another idol as displaced me. A golden one." – What Belle tells Scrooge before she leaves him.
'"Your lip is trembling,' said the Ghost, 'And what is that upon your cheek?' – first sign of emotion from Scrooge

Stave Three

'There sat a jolly Giant, who wore a glowing torch…it was clothed in one simple green robe' – Ghost of Christmas Present
'God bless us everyone!' – Tiny Tim's positive attitude
'Tell me Tiny Tim will live…' – Scrooge showing compassion.
"I see a vacant seat" – The Ghost's prediction about Tiny Tim if the future is not changed.
"The whole quarter reeked with crime, with filth, with misery" – A description of one of the poorer parts of London – symbol of poverty.
"This boy is Ignorance. The girl is Want. Beware them both.." – A description of the children, Ignorance and Want.

Stave Four

'The phantom slowly, gravely, silently approached' – Ghost of Christmas Yet to Come
'I fear you more than any spectre I have seen' – Scrooge
'Tell me I may sponge away the writing on this stone!' – Scrooge desperate to change his ways
'I will honour Christmas in my heart' - Scrooge

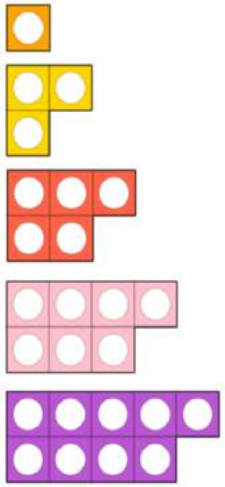
Stave Five

"I am as light as a feather. I am as happy as an angel. I am as merry as a schoolboy. I am as giddy as a drunken man!"
'I'll raise your salary Bob and endeavour to assist your struggling family' – Scrooge changing his ways.
'to Tiny Tim, who did NOT die, he [Scrooge] was a second father' – Scrooge changing his ways
'Wonderful party, wonderful games, wonderful unanimity, won-der-ful happiness!' – repetition shows Scrooge's joy at the end.

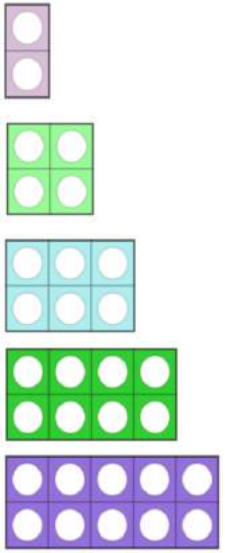
Redemption	The act of making up for something that you have done wrong
Benevolence	Kindness and generosity
Charity	Love for others and kindness in your treatment of other people
Humanity	The quality or state of being human
Ignorant	Having littler or no knowledge – being unaware either by accident or by choice
Inferior	Situated lower down from others
Superior	Situated higher up from others
Surplus	An extra amount – the amount that is more than what is needed
Misanthropy	A hatred or distrust of humankind in general
Materialistic	Being overly obsessed with material things and money
Transformed	To change completely
Regretful	To feel regret about your past actions
Empathetic	An ability to understand how people are feeling by putting yourself in their position
Resolute	To be firmly determined
Ominous	Giving a sign of future trouble or evil
Allegory	A story that contains characters and events that reflect a bigger political or social message
Gothic	Having elements of the gothic genre, often reflected in dark and ominous settings, the supernatural and elements of mystery

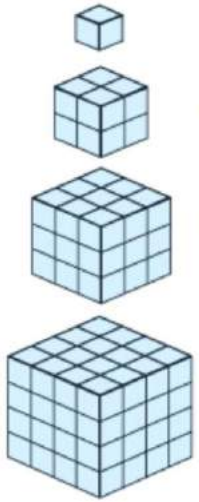
Types of Numbers

Odd Numbers



Even Numbers



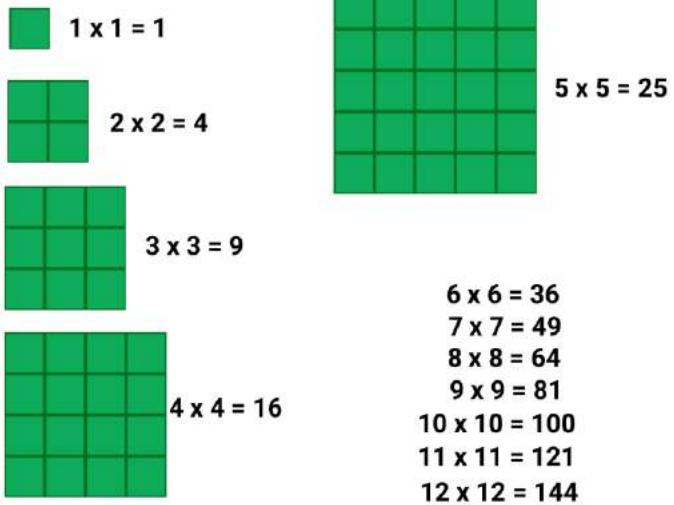


1 is the first cube number.
because 1 x 1 x 1 = 1

8 is the second cube number,
because 2 x 2 x 2 = 8

27 is the third cube number,
because 3 x 3 x 3 = 27

64 is the fourth cube number,
because 4 x 4 x 4 = 64



1 x 1 = 1

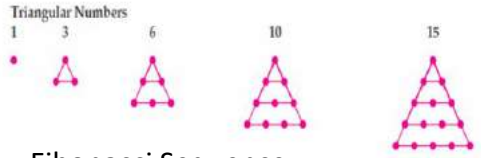
2 x 2 = 4

3 x 3 = 9

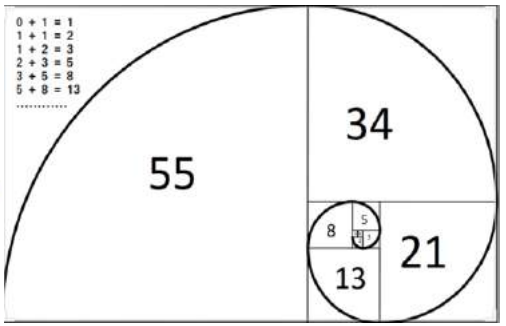
4 x 4 = 16

5 x 5 = 25

6 x 6 = 36
7 x 7 = 49
8 x 8 = 64
9 x 9 = 81
10 x 10 = 100
11 x 11 = 121
12 x 12 = 144



Fibonacci Sequence



Prime Numbers

A natural number greater than 1 with no divisors other than 1 and itself.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Remember these facts about Prime Numbers!
There are no even numbers except 2.
There are no prime numbers ending in 5, except 5.
The digits can't add up to 3 except 3 (digital root).

Factors & Multiples

Factors

Find the different factors of a number by working out which numbers divide into it evenly.

What are all the factors of 12?

12 ÷ 1 = 12

12 ÷ 2 = 6

12 ÷ 3 = 4

The factors of 12 are:
1, 2, 3, 4, 6, 12

Multiples

Multiples appear in the number's multiplication table. You can calculate them by counting on by that number.

What are all the multiples of 12?

12 × 1 = 12

12 × 2 = 24

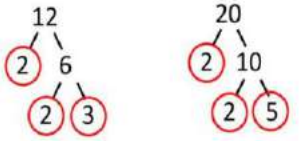
12 × 3 = 36

12 × 4 = 48

The multiples of 12 include:
12, 24, 36, 48...

Find the **Highest Common Factor (HCF)** & **Lowest Common Multiple (LCM)** of 12 & 20.

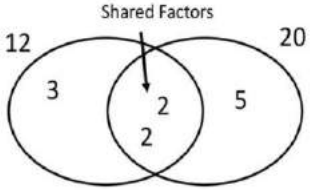
1) Complete Prime Factorisation for both numbers.



12 = 2 × 2 × 3

20 = 2 × 2 × 5

2) Input the Prime Factors into a Venn diagram



3) **HCF** = Product of **shared** factors

2 × 2 = 4

4) **LCM** = Product of **all** factors in the diagram

2 × 2 × 3 × 5 = 60

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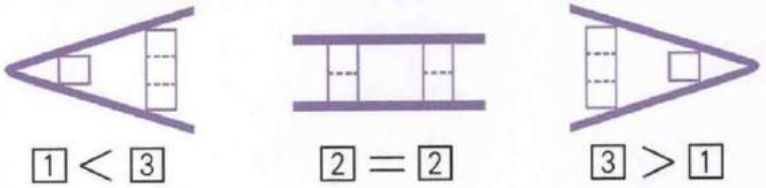
Mathematics

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
3	2	8	7	2	6	3

Place value of 3 = 3000000
Place value of 2 = 200000
Place value of 8 = 80000
Place value of 7 = 7000 → 3287263
Place value of 2 = 200
Place value of 6 = 60
Place value of 3 = 3



COMPARING & ORDERING DECIMALS

STEP 1: Stack the numbers being compared. Line up the decimal points.

4.8
4.826
4.08
4.006

STEP 2: Add zeros so that each number has the same number of decimal digits.

4.800
4.826
4.080
4.006

STEP 3: Compare each place value one by one. If a number is the same, move to the next place.

4.800
4.826
4.080
4.006

STEP 4: Order the numbers from least to greatest or greatest to least. Here, they are ordered from least to greatest.

4.006, 4.080, 4.800, 4.826

Remove the zeros you previously added.

4.006, 4.08, 4.8, 4.826

Rounding to the nearest 10

Here is a numberline showing the numbers from 20 to 30.

20 21 22 23 24 25 26 27 28 29 30

All of these numbers are closer to 20 than 30. They would stay at a tens digits of 20.
e.g. 24 → 20 (to the nearest 10)

All of these numbers are closer to 30 than 20. They would round up to 30.
e.g. 27 → 30 (to the nearest 10)

15 is exactly between 10 and 20. By convention, we round up to 20.

You might sometimes hear the rule "5 or more rounds up".

To round without a number line:

1) Identify the tens digit.
326 — The tens digit is 2, or 20.

2) Work out the next ten up.
326 is between 320 and 330

3) Decide if it stays or rounds up.
326 — Use the units digit to decide. "5 or more rounds up", so 6 will round up to the next 10.

326 → 330

Rounding to whole numbers

Here is a numberline showing the numbers from 15 to 16.

15 15.1 15.2 15.3 15.4 15.5 15.6 15.7 15.8 15.9 16

All of these numbers are closer to 15 than 16. They would stay at 15.
e.g. 15.3 → 15 (to nearest whole)

All of these numbers are closer to 16 than 15. They would round up to 16.
e.g. 15.6 → 16 (to nearest whole)

15.5 is exactly between 15 and 16. By convention, we round up to 16.

You might sometimes hear the rule "5 or more rounds up".

To round without a number line:

1) Identify the units digit.
6.42 — The units digit is 6.

2) Work out the next unit up.
6.42 is between 6 and 7

3) Decide if it stays or rounds up.
6.42 — Use the tenths digit to decide. "5 or more rounds up", so 4 will stay down.

6.42 → 6

Rounding to decimal places

Rounding to decimal places is exactly like rounding whole numbers - you just have more numbers (and therefore greater accuracy).

3.248
3 is the units digit.
2 is worth 2 tenths, and is the first decimal place.
4 is worth 4 hundredths, and is the second decimal place.
8 is worth 8 thousandths, and is the third decimal place.

You will sometimes see "decimal place" shortened to "d.p."

3.248 rounded to 1 d.p.
3.248 → 3.2
1st dp 3.2 — Look at the next digit. 4 stays down - stay at 3.2.

3248 rounded to 2 d.p.
3.248 → 3.25
2nd dp 3.24 — Look at the next digit. 8 rounds up - go to 3.25

Significant figures

If something is significant, it is big or important. The most significant thing is the biggest or most important thing.

3268
3 is worth the most in this number (3 thousand) It is the first significant figure.
2 is worth 2 hundred, and is the second significant figure.
6 is worth 6 tens, and is the third significant figure.
8 is worth 8 units, and is the fourth and least significant figure.

3268 rounded to 1 sig. fig.
3268 → 3000
1 sf 3000 — Look at the next digit. 2 is less than 5 - stay at 3000

3268 rounded to 2 sig. fig.
3268 → 3300
2 sf 3200 — Look at the next digit. 6 rounds up - go to 3300

Index, power or exponent

Base → 5^2

How to say it: *five to the power of 2*

Estimating

Billy can write 24 words a minute. Estimate how long it took him to write 643 words.

When estimating, we first need to round EVERY number in the question to one significant figure.

We round 24 to 1 s.f. 20
We round 643 to 1 s.f. 600
643 ÷ 24 ≈ 600 ÷ 20 = 30 minutes

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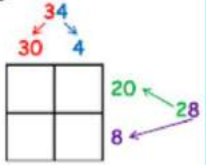
Mathematics

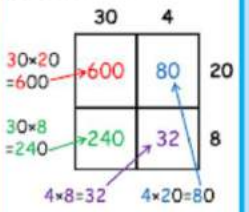
Multiplication: The grid method

The grid method is a useful starting point when first learning to multiply. However, it can get complicated with large numbers.

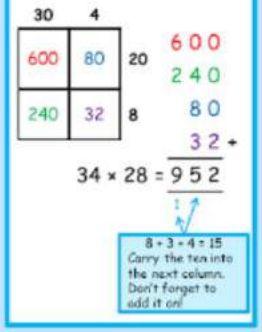
Step 1
To work out 34 × 28... split each number into tens and units, and write next to a grid like this:



Step 2
Use times tables to fill in the grid. Take care with the number of zeros needed!

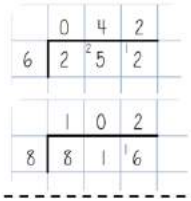


Step 3
Add up the numbers inside the grid.

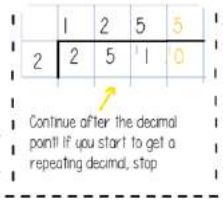


Written Methods for Division

SHORT DIVISION

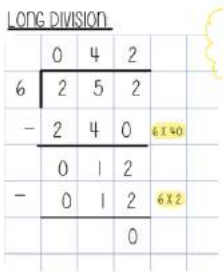


SHORT DIVISION with remainders



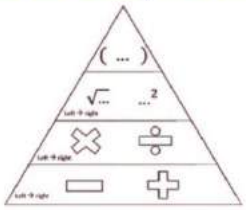
Continue after the decimal point if you start to get a repeating decimal, stop

LONG DIVISION



This method relies on you being comfortable with multiples of your divisor (in this case, 6)!

Order of Operations



Example 1
$(4 \times 7) + 3$
So we need to evaluate the brackets first, 4x7 =28
This is now 28 + 3 = 31

Example 2
$(6 + 4 - 3)^2 \times 4$
So we need to evaluate the brackets first and we work left to right ; 6 + 4 - 3 =7
This is now $7^2 \times 4 = 49 \times 4$
= 196

Example 3
$4 - 8 \times 2 + 12 \div 4$
So first we do the multiplication/division left to right; 4 - 16 + 3
Now we do the addition/ subtraction from left to right: -12 + 3 = -9

Percentages

on a calculator

39% of 82
0.39 x 82
Change to a decimal and multiply

fraction to %

$\frac{15}{20} \times 5 = \frac{75}{100} \times 5 = 75\%$
OR
15 ÷ 20 x 100 = 75%

without a calculator

50% - half
25% - half and half
75% - 50% + 25%
10% - divide by 10
5% - half 10%
20% - double 10%

increasing

Increase £60 by 12%
12% of 60 = 0.12 x 60 = £7.20
New amount = £60 + £7.20
= £67.20
ADD

decreasing

decrease £60 by 12%
12% of 60 = 0.12 x 60 = £7.20
New amount = £60 - £7.20
= £52.80
SUBTRACT

Fraction	Percent	Decimal
1	100%	1.0
1/2	50%	0.5
1/3	33.3%	0.33
1/4	25%	0.25
1/5	20%	0.2
1/6	16.6%	0.166
1/8	12.5%	0.125
1/10	10%	0.1
1/12	8.3%	0.083

Adding Fractions

Adding Fractions with Like Denominators

$\frac{1}{7} + \frac{3}{7}$

Add the numerators. Denominator is unchanged.

$\frac{1+3}{7}$

$\frac{4}{7}$

Adding Fractions with Unlike Denominators

$\frac{1}{8} + \frac{2}{3}$

Rewrite with common denominator

$\frac{3 \times 1}{3 \times 8} + \frac{2}{3} \times \frac{8}{8}$

Add the numerators

$\frac{3}{24} + \frac{16}{24}$

$\frac{19}{24}$

Dividing fractions – invert and multiply

To divide fractions take the reciprocal (invert the fraction) of the divisor and multiply the dividend.

Invert the fraction that you are dividing by: $\frac{4}{5} \div \frac{2}{3} = \frac{4}{5} \times \frac{3}{2}$

Multiply the numerators and denominators: $\frac{4}{5} \times \frac{3}{2} = \frac{12}{10}$

Simplify the fraction if necessary: $\frac{12}{10} = 1\frac{1}{5}$

The three steps of multiplying fractions

Solve: $\frac{2}{6} \times \frac{9}{16}$

Step 1. Multiply the top numbers:

$\frac{2}{6} \times \frac{9}{16} = \frac{2 \times 9}{} = \frac{18}{}$

Step 2. Multiply the bottom numbers:

$\frac{2}{6} \times \frac{9}{16} = \frac{2 \times 9}{6 \times 16} = \frac{18}{96}$

Step 3. Simplify the fraction:

$\frac{18}{96} = \frac{6}{32}$ (Divided by 3) $= \frac{3}{16}$ (Divided by 2)

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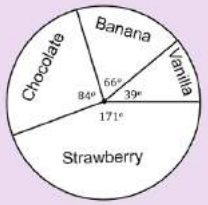
Representing data

Pie chart

The information in the pie chart shows sales of 120 ice-creams sold from an ice-cream van one Saturday afternoon in the summer. Calculate the number of each type sold.

Ice cream	Frequency	Angle
Banana	22	66°
Vanilla	13	39°
Strawberry	57	171°
Chocolate	28	84°
Total	**120**	**360°**

÷ 3



Check they add up to make the total!

Pictograms

Method of Travel	Tally	Frequency
Walk	𝍸 ||||	9
Bike	|||	3
Car	𝍸 |	6
Bus	𝍸 𝍸 ||	12

Two Way Tables

Two way tables present data which is split into different categories.

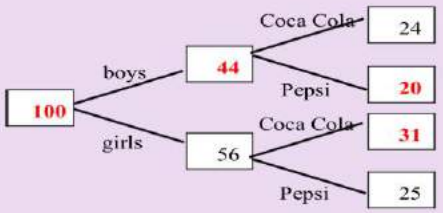
Example 2: This two way table shows the Lunch options for the pupils in a school. Complete the totals in the missing boxes.

	Year 10	Year 11	Totals
School Lunch	96	125	221
Packed Lunch	104	93	197
Totals	200	218	418

Year 10 / School: 221 - 125 = 96
Year 11 / Packed: 197 - 104 = 93
Year 10 Total: 96 + 104 = 200
Grand Total: 221 + 197 = 418

Frequency trees

100 people were asked whether they prefer Coca Cola or Pepsi. Complete the frequency tree to show the information.

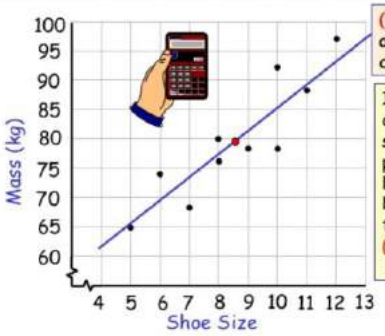


Scatter Diagrams

(1). The table below shows the shoe size and mass of 10 men.

(a) Plot a scatter graph for this data and draw a line of best fit.

Size	5	12	7	10	10	9	8	11	6	8
Mass	65	97	68	92	78	78	76	88	74	80

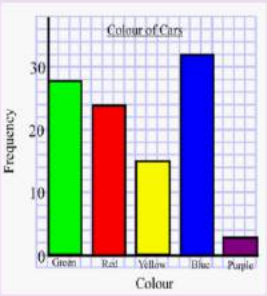


(b) Draw a line of best fit and comment on the correlation.

If you have a calculator you can find the mean of each set of data and plot this point to help you draw the line of best fit. Ideally all lines of best fit should pass through:
(mean data 1, mean data 2)
In this case: (8.6, 79.6)

Rules for a bar chart

Frequency on vertical axes
Labels on axes
Right scales
Space between bars
Bars with equal widths
Title



Algebra

Simplify:
9x + 3y + 4x + 2y

9x + 3y + 4x + 2y

Highlight the like terms. Since I have two sets of like terms, I used two different colors.

9x + 4x + 3y + 2y

Rewrite like terms side by side.

13x + 5y

Combine like terms. (Add or subtract the coefficients of the like terms.)

Expanding single brackets

To expand a single bracket, multiply whatever is inside the bracket by the number outside.

Here is x + 2:

3(x + 2) means 3 lots of x + 2 and would look like this:

Altogether this is 3x + 6.
Algebraically, we would write: 3(x + 2) = 3x + 6.

We have multiplied each term inside the bracket by 3.

4(x + 3) = 4x + 12

5(2x + 4) = 10x + 20

Watch out!
Be really careful with negatives!

3(x - 3) = 3x - 9

Remember: - × - = +

-3(x - 4) = -3x + 12

How to solve Multistep Equations

1. Simplify each side
2. Eliminate the variable from the right side
3. Eliminate the constant term from the left side
4. Divide each side by the coefficient

Example:

3(x + 1) = 5 + x
3x + 3 = 5 + x
2x + 3 = 5
2x = 2
x = 1

Example:

2(x + 2) − 5 = 3(x + 1)
2x − 1 = 3x + 3
-x − 1 = 3
-x = 4
x = -4

Inequalities on a number line

An open circle means that the value is not included:

x > 2 — x is greater than 2

x < 5 — x is less than 5

A filled in circle means that the value is included:

x ≥ 3 — x is greater than or equal to 2

x ≤ 6 — x is less than or equal to 6

If x is between two values, use two circles:

1 < x ≤ 6

x is greater than 1, but less than or equal to 6.

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Mathematics (Higher Tier)

Year 10 Term 1 Knowledge Organiser

Recurring Decimals to Fractions

1. Let x = recurring decimal.
2. Let n = the number of recurring digits.
3. Multiply the recurring decimal by 10^n.
4. Subtract (1) from (3) to eliminate the recurring part.
5. Solve for x, expressing your answer as a fraction in its simplest form.

Examples:

$0.\dot{7}$ (one recurring digit)

$x = 0.7777...$
$10x = 7.777...$
$10x - x = 7$
$9x = 7$
$x = \frac{7}{9}$

$1.2\dot{5}\dot{6}$ (two recurring digits)

$x = 1.25656...$
$100x = 125.6565...$
$100x - x = 125.6565... - 1.256565...$
$99x = 124.4$
$x = \frac{124.4}{99} = \frac{1244}{990} = \frac{622}{495}$

Multiplying out two linear expressions

Expand & Simplify: $(x+3)(x-2)$

×	x	$+3$
x	x^2	$+3x$
-2	$-2x$	-6

$x^2 + 3x - 2x - 6$
$x^2 + x - 6$

Expand & Simplify: $(x+5)(x-3)$

×	x	$+5$
x	x^2	$+5x$
-3	$-3x$	-15

$x^2 + 5x - 3x - 15$
$x^2 + 2x - 15$

Factorising Quadratic Expressions

Factorise $x^2 + 11x + 24$

$x^2 + 11x + 24$ → +24 x, +11 +

Find two numbers that multiply to get +24 and add to get +11

+24 x | +3 | +8 | +11 +

Final answer: (x + 8)(x + 3)

Factorise $x^2 - 5x - 84$

$-12 \times +7 = -84$
$-12 + +7 = -5$

-84 x | -12 | +7 | -5 +

Final answer: (x - 12)(x + 7)

Rules of surds

$3\sqrt{5} + 4\sqrt{5}$
$a\sqrt{x} + b\sqrt{x} = (a+b)\sqrt{x}$
$3\sqrt{5} + 4\sqrt{5}$
$(3+4)\sqrt{5}$
$= 7\sqrt{5}$

$\sqrt{2} \times \sqrt{10}$
$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$
$\sqrt{2} \times \sqrt{10}$
$= \sqrt{20}$
$= \sqrt{4}\sqrt{5}$
$= 2\sqrt{5}$

$5\sqrt{3} \times 4\sqrt{6}$
$a\sqrt{b} \times c\sqrt{d} = ac\sqrt{bd}$
$5\sqrt{3} \times 4\sqrt{6}$
$= 5 \times 4\sqrt{3 \times 6}$
$= 20\sqrt{18}$
$= 20\sqrt{9}\sqrt{2}$
$= 20 \times 3\sqrt{2}$
$= 30\sqrt{2}$

$\frac{\sqrt{18}}{\sqrt{2}}$
$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$
$\frac{\sqrt{18}}{\sqrt{2}}$
$= \sqrt{\frac{18}{2}}$
$= \sqrt{9}$
$= 3$

Rules of indices

Rule	Example
$a^m \times a^n = a^{m+n}$	$2^5 \times 2^3 = 2^8$
$a^m \div a^n = a^{m-n}$	$5^7 \div 5^3 = 5^4$
$(a^m)^n = a^{m \times n}$	$(10^3)^7 = 10^{21}$
$a^1 = a$	$17^1 = 17$
$a^0 = 1$	$34^0 = 1$
$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$\left(\frac{5}{6}\right)^2 = \frac{25}{36}$
$a^{-m} = \frac{1}{a^m}$	$9^{-2} = \frac{1}{81}$
$a^{\frac{x}{y}} = \sqrt[y]{a^x}$	$49^{\frac{1}{2}} = \sqrt[2]{49} = 7$

Re-arranging Formula

Rearrange the formula to make v the subject

This means we want to rearrange the formula so it says v =

$e = \frac{3v + t}{5}$
×5 ×5
$5e = 3v + t$
-t -t
$5e - t = 3v$
÷3 ÷3
$\frac{5e - t}{3} = v$

Our answer should say ... $v = \frac{5e - t}{3}$

Significant figures

If something is significant, it is big or important. The most significant thing is the biggest or most important thing.

3268

3 is worth the most in this number (3 thousand) It is the first significant figure.

2 is worth 2 hundred, and is the second significant figure.

6 is worth 6 tens, and is the third significant figure.

8 is worth 8 units, and is the fourth and least significant figure.

3268 rounded to 1 sig. fig.

3268 → 3000

1 sf 3000 — Look at the next digit. 2 is less than 5 - stay at 3000

3268 rounded to 2 sig. fig.

3268 → 3300

2 sf 3200 — Look at the next digit. 6 rounds up - go to 3300

Estimating

Billy can write 24 words a minute. Estimate how long it took him to write 643 words.

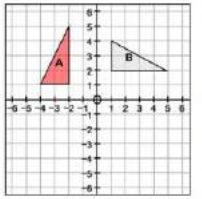
When estimating, we first need to round EVERY number in the question to one significant figure.

We round 24 to 1 s.f. 20
We round 643 to 1 s.f. 600
643 ÷ 24 ≈ 600 ÷ 20 = 30 minutes

Describing Transformations

Describing Rotations

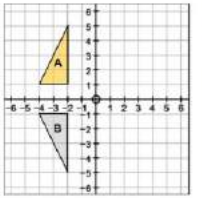
State...
1. The centre of rotation
2. The angle of rotation
3. The direction of rotation



- Centre of rotation is (0,0)
- Angle of rotation is 90°
- Direction of rotation is clockwise

Describing Reflections

State...
1. The line of symmetry

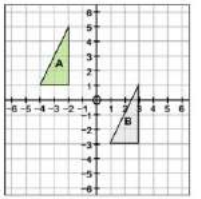


- The line of symmetry is the X axis

Describing Translations

State...
1. Movement left or right
2. Movement up or down

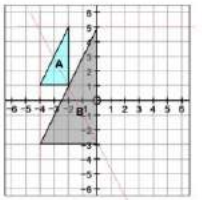
- Or write the column vector



- Translation of 5 to the right and 4 down
- $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$

Describing Enlargements

State...
1. Centre of enlargement
2. Scale Factor



- The centre of enlargement is (-4, 5)
- The scale factor is 2

Area

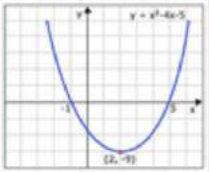
Shape	Formula
Triangle	Area = ½b × h b = base h = height
Rectangle	Area = w × h w = width h = height
Trapezoid	Area = ½(a+b) × h h = vertical height a, b are the parallel sides
Square	Area = a^2 a = length of side
Parallelogram	Area = b × h b = base h = vertical height
Circle	Area = πr^2 r = radius
Sector	Area = ½$r^2\theta$ r = radius θ = angle in radians

TYPES OF GRAPHS

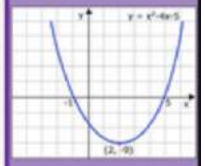
Knowing and being able to sketch the various types of graphs in Mathematics is vital. The following examples are standard graphs with their given names.

LINEAR GRAPH

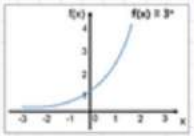
QUADRATIC CURVE



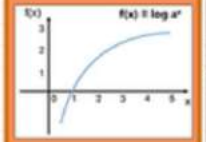
CUBIC CURVE



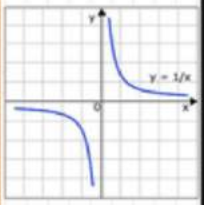
EXPONENTIAL CURVE



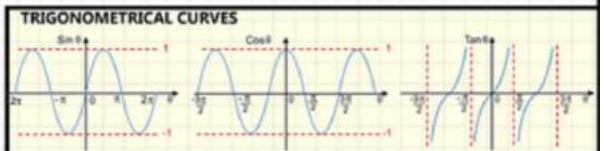
LOGARITHMIC CURVE



RECIPROCAL CURVE



TRIGONOMETRICAL CURVES



FIND THE MIDPOINT

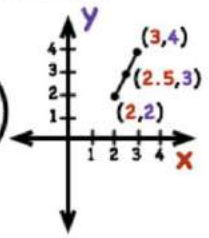
$(3,4)$ $(2,2)$

$x_1\ y_1$ $x_2\ y_2$

$$(x,y)_{MDPT} = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$= \left(\frac{3+2}{2}, \frac{4+2}{2}\right)$$

$$= (2.5,3)$$

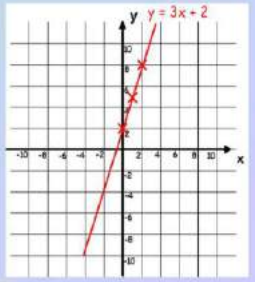


Plotting Straight Line Graphs

- To plot a graph, you need to know at least 3 points

Plot a graph of the equation:

$y = 3x + 2$

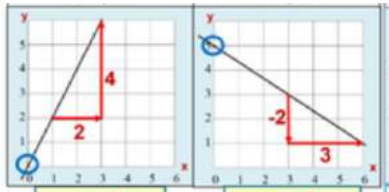


Choose any values for x, what y value will

$x = 0$ $y = 2$ (0,2)

$x = 1$ $y = 5$ (1,5)

Equation of a line



Gradient $= \frac{4}{2} = 2$

Gradient $= \frac{-2}{3}$

Best way to find out a gradient

1) Draw a triangle, going from left to right
2) Change in y and change in x?
3) Use the formula:

Gradient $=$ The change in y / The change in x

Y intercept = 0

Y intercept = 5

Remember

The y intercept is the point on the y axis where the straight line cross the y axis

Equation:

$y = 2x + 0$ or

$y = 2x$

Equation:

$y = \frac{-2}{3}x + 5$

Remember

$y = mx + c$

m is gradient

c is y-intercept

Relationship with Slopes (m)	
Parallel Lines	$m_1 = m_2$
"Equal Slopes"	
Line 1	Line 2
$\frac{1}{3}$	$\frac{1}{3}$
5	5
$-\frac{2}{7}$	$-\frac{2}{7}$
Perpendicular Lines	$m_1 = -\frac{1}{m_2}$
"Opposite Reciprocal Slopes"	
Line 1	Line 2
$\frac{1}{3}$	$-\frac{3}{1}$
5	$-\frac{1}{5}$
$-\frac{2}{7}$	$\frac{7}{2}$

Solving Quadratic Equations

Quadratic Formula

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

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

Examples:

$3x^2 + 5x - 7 = 0$

$a = 3, b = 5, c = -7$

$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(3)(-7)}}{2(3)}$$

$$= \frac{-5 \pm \sqrt{25 + 84}}{6}$$

$$= \frac{-5 \pm \sqrt{109}}{6}$$

$$= \frac{-5 + \sqrt{109}}{6} \text{ or } \frac{-5 - \sqrt{109}}{6}$$

$= 0.907$ or -2.573

$-x^2 - 6x + 8 = 0$

$a = -1, b = -6, c = 8$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(-1)(8)}}{2(-1)}$$

$$= \frac{6 \pm \sqrt{36 + 32}}{-2}$$

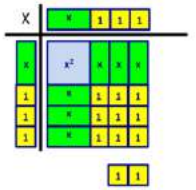
$$= \frac{6 \pm \sqrt{68}}{-2}$$

$$= \frac{6 + \sqrt{68}}{-2} \text{ or } \frac{6 - \sqrt{68}}{-2}$$

$= -7.123$ or 1.123

Completing the square

Write $x^2 + 6x + 11$ in the form $(x + a)^2 + b$

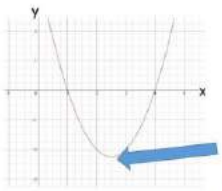


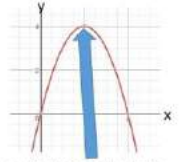
Both factors are the same so you need to share your x terms equally between columns and rows.

The remainder 1s left over is the b term.

$(x + 3)^2 + 2$

Here are the graphs of $y = f(x)$ and $y = g(x)$





Here are the turning points. Here the gradients of the graphs are zero

$(x \pm a)^2 - b$

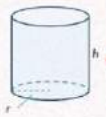
If + a then x coordinate is −a
If − a then x coordinate is +a

b is the y coordinate

Volume of Cylinders, Cones and Spheres

Cylinders

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



Find the volume of a cylinder with radius 3 and height 4. *(Express in terms of π).*

$V = \pi r^2 h$

$V = \pi(3)^2(4)$

$V = \pi(9)(4)$

$V = 36\pi$

Cones

$V = \frac{1}{3}bh$ $V = \frac{1}{3}\pi r^2 h$

Find the volume of a cone with radius 3 and height 4. *(Use 3.14 for π and round your answer to the nearest tenth).*

$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}(3.14)(3)^2(4)$

$V = \frac{1}{3}(3.14)(36) = (12)(3.14)$

$V = 37.68$ $V = 37.7$

Spheres

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

Find the volume of a sphere with radius 3. *(Express in terms of π).*

$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(3)^3$

$V = \frac{4}{3}\pi(27) = 4\pi(9)$ $V = 36\pi$

Volume

Accuracy and calculations

Nothing that is measured can be 100% accurate. Whether you are using a ruler, a protractor, a thermometer or a set of kitchen scales, there will always be an error of ± half the unit of accuracy used.

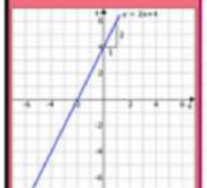
Quantity given to the nearest...	Minimum value	Maximum Value
0.1 (to 1 decimal place)	Given value – 0.05	Given value + 0.05
Whole Number	Given value – 0.5	Given value + 0.5
Ten	Given value – 5	Given value + 5
Hundred	Given value – 50	Given value + 50
Thousand	Given value – 500	Given value + 500

Operation	Minimum value	Maximum Value
Addition	LB + LB	UB + UB
Subtraction	LB - UB	UB - LB
Multiplication	LB x LB	UB x UB
Division	LB/UB	UB/LB

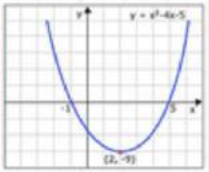
TYPES OF GRAPHS

Knowing and being able to sketch the various types of graphs in Mathematics is vital. The following examples are standard graphs with their given names.

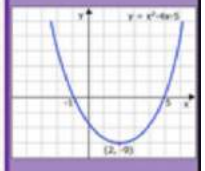
LINEAR GRAPH



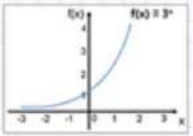
QUADRATIC CURVE



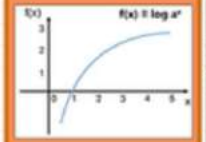
CUBIC CURVE



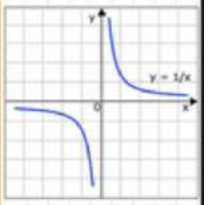
EXPONENTIAL CURVE



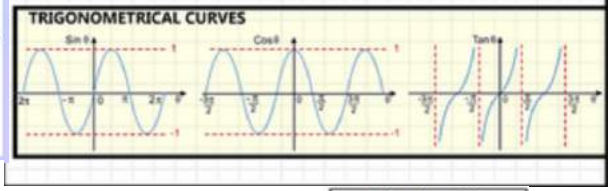
LOGARITHMIC CURVE



RECIPROCAL CURVE



TRIGONOMETRICAL CURVES



FIND THE MIDPOINT

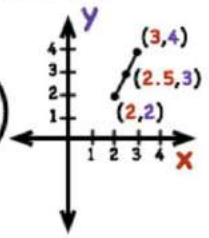
$(3,4)$ $(2,2)$

$x_1\ y_1$ $x_2\ y_2$

$$(x,y)_{MDPT} = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$= \left(\frac{3+2}{2}, \frac{4+2}{2}\right)$$

$$= (2.5,3)$$

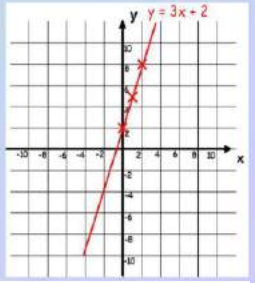


Plotting Straight Line Graphs

- To plot a graph, you need to know at least 3 points

Plot a graph of the equation;

$y = 3x + 2$



Choose any values for x, what y value will

$x = 0$ $y = 2$ (0,2)

$x = 1$ $y = 5$ (1,5)

Solving Quadratic Equations

Quadratic Formula

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

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

Examples:

$3x^2 + 5x - 7 = 0$

$a = 3, b = 5, c = -7$

$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(3)(-7)}}{2(3)}$$

$$= \frac{-5 \pm \sqrt{25 + 84}}{6}$$

$$= \frac{-5 \pm \sqrt{109}}{6}$$

$$= \frac{-5 + \sqrt{109}}{6} \text{ or } \frac{-5 - \sqrt{109}}{6}$$

$= 0.907$ or -2.573

$-x^2 - 6x + 8 = 0$

$a = -1, b = -6, c = 8$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(-1)(8)}}{2(-1)}$$

$$= \frac{6 \pm \sqrt{36 + 32}}{-2}$$

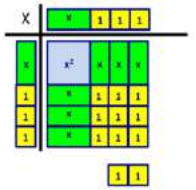
$$= \frac{6 \pm \sqrt{68}}{-2}$$

$$= \frac{6 + \sqrt{68}}{-2} \text{ or } \frac{6 - \sqrt{68}}{-2}$$

$= -7.123$ or 1.123

Completing the square

Write $x^2 + 6x + 11$ in the form $(x + a)^2 + b$

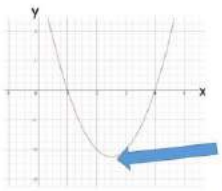


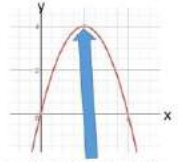
Both factors are the same so you need to share your x terms equally between columns and rows.

The remainder 1s left over is the b term.

$(x + 3)^2 + 2$

Here are the graphs of y = f(x) and y = g(x)





Here are the turning points. Here the gradients of the graphs are zero

$(x \pm a)^2 - b$

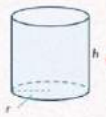
If + a then x coordinate is −a
If − a then x coordinate is +a

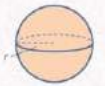
b is the y coordinate

Volume

Volume of Cylinders, Cones and Spheres

Cylinders	Cones	Spheres
$V = bh$ or $V = \pi r^2 h$	$V = \frac{1}{3}bh$ or $V = \frac{1}{3}\pi r^2 h$	$V = \frac{4}{3}\pi r^3$





Find the volume of a cylinder with radius 3 and height 4. *(Express in terms of π).*

$V = \pi r^2 h$

$V = \pi(3)^2(4)$

$V = \pi(9)(4)$

$V = 36\pi$

Find the volume of a cone with radius 3 and height 4. *(Use 3.14 for π and round your answer to the nearest tenth).*

$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}(3.14)(3)^2(4)$

$V = \frac{1}{3}(3.14)(36) = (12)(3.14)$

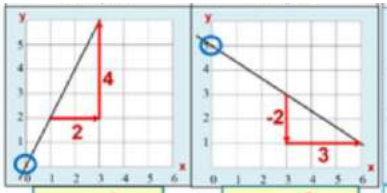
$V = 37.68$ $V = 37.7$

Find the volume of a sphere with radius 3. *(Express in terms of π).*

$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(3)^3$

$V = \frac{4}{3}\pi(27) = 4\pi(9)$ $V = 36\pi$

Equation of a line



Gradient = $\frac{4}{2} = 2$

Gradient = $\frac{-2}{3}$

Best way to find out a gradient

1) Draw a triangle, going from left to right
2) Change in y and change in x?
3) Use the formula:

Gradient = $\frac{\text{The change in y}}{\text{The change in x}}$

Y intercept = 0

Y intercept = 5

Remember

The y intercept is the point on the y axis where the straight line cross the y axis

Equation:

$y = 2x + 0$ or

$y = 2x$

Equation:

$y = \frac{-2}{3}x + 5$

Remember

$y = mx + c$

m is gradient

c is y-intercept

Relationship with Slopes (m)	
Parallel Lines	$m_1 = m_2$
"Equal Slopes"	
Line 1	Line 2
$\frac{1}{3}$	$\frac{1}{3}$
5	5
$-\frac{2}{7}$	$-\frac{2}{7}$
Perpendicular Lines	$m_1 = -\frac{1}{m_2}$
"Opposite Reciprocal Slopes"	
Line 1	Line 2
$\frac{1}{3}$	$-\frac{3}{1}$
5	$-\frac{1}{5}$
$-\frac{2}{7}$	$\frac{7}{2}$

Accuracy and calculations

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Multiplication	LB x LB	UB x UB
Division	LB/UB	UB/LB

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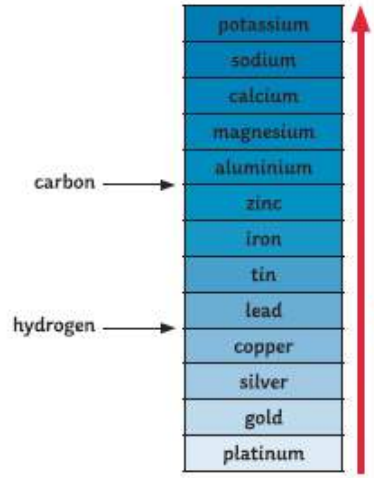
AQA GCSE Chemistry (Combined Science) Unit 4: Chemical Changes Knowledge Organiser

The Reactivity Series

Here's a mnemonic to help you learn the order:

purple (potassium)
slime (sodium)
can (calcium)
make (magnesium)
a (aluminium)
careless (carbon)
zebra (zinc)
insane (iron)
try (tin)
learning (lead)
how (hydrogen)
camels (copper)
surprise (silver)
gorillas (gold)



The reactivity series is a league table for metals. The more reactive metals are near the top of the table with the least reactive near the bottom. In chemical reactions, a more reactive metal will displace a less reactive metal.

Reactions of Metals with Water

Metals, when reacted with water, produce a metal hydroxide and hydrogen.

lithium + water ⟶ lithium hydroxide + hydrogen

$2Li + 2H_2O \longrightarrow 2LiOH + H_2$

The more reactive a metal is, the faster the reaction.

Reactions of Metals with Dilute Acid

Metals, when reacted with acids, produce a salt and hydrogen.

Sodium + hydrochloric acid ⟶ sodium chloride + hydrogen

$2Na + 2HCl \longrightarrow 2NaCl + H_2$

Metals that are below hydrogen in the reactivity series **do not** react with dilute acids.

Reactions of Acids

The general formula for the reaction between an acid and a metal is: acid + metal ⟶ salt + hydrogen

For example: hydrochloric acid + sodium ⟶ sodium chloride + hydrogen

$2HCl + 2Na \longrightarrow 2NaCl + H_2$

When an acid reacts with an alkali, a neutralisation reaction takes place and a salt and water are produced.

The general formula for this kind of reaction is as follows:

acid + alkali ⟶ salt + water

hydrochloric acid + sodium hydroxide ⟶ sodium chloride + water

$HCl + NaOH \longrightarrow NaCl + H_2O$

Naming Salts

The first part comes from the metal in the metal carbonate, oxide or hydroxide. The second part of the name comes from the acid that was used to make it.

For example, sodium chloride.

Acid Used	Salt Produced
hydrochloric	chloride
nitric	nitrate
sulfuric	sulfate

Redox Reactions (Higher Tier Only)

When metals react with acids, they undergo a redox reaction. A **redox reaction** occurs when both **oxidation** and **reduction** take place at the **same time.**

For example:

$2H^+ + Ca \longrightarrow Ca^{2+} + H_2$

The ionic equation can be further split into two half equations.

$Ca \longrightarrow Ca^{2+} + 2e^-$

Oxidation is loss of electrons.

$2H^+ + 2e^- \longrightarrow H_2$

Reduction is gaining of electrons.

Reactions with Bases

The general formula for the reaction between an acid and a metal oxide is: acid + metal oxide ⟶ salt + water

sulfuric acid + copper oxide ⟶ copper sulfate + water

$H_2SO_4 + CuO \longrightarrow CuSO_4 + H_2O$

Reactions with Carbonates

The general formula for the reaction between an acid and a carbonate is: acid + carbonate ⟶ salt + water + carbon dioxide

hydrochloric acid + calcium carbonate ⟶ calcium chloride + water + carbon dioxide

pH Scale

In aqueous solutions, acids produce H^+ ions and alkalis produce OH^- ions.

Neutral solutions are pH7 and are neither acids or alkalis.

For example, in neutralisation reactions, hydrogen ions from an acid react with hydroxide ions from an alkali to produce water:

$H^+ + OH^- \longrightarrow H_2O$

Making Soluble Salts

1. Make a saturated solution by stirring copper oxide into the sulfuric acid until no more will dissolve.

2. Filter the solution to remove the excess copper oxide solid.

3. Half fill a beaker with water and set this over a Bunsen burner to heat the water. Place an evaporating dish on top of the beaker.

4. Add some of the solution to the evaporating basin and heat until crystals begin to form.

5. Once cooled, pour the remaining liquid into a crystallising dish and leave to cool for 24 hours.

6. Remove the crystals with a spatula and pat dry between paper towels.

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AQA GCSE Chemistry (Combined Science) Unit 4: Chemical Changes Knowledge Organiser

Strong and Weak Acids (Higher Tier Only)

A **strong** acid **completely dissociates** in a solution. For example: $HCl \longrightarrow H^+ + Cl^-$

Hydrochloric acid is able to completely dissociate in solution to form hydrogen and chloride ions.

Examples of strong acids include nitric acid (HNO_3) and sulfuric acid (H_2SO_4).

Weak acids in comparison only partially dissociate.

For example acetic acid **partially dissociates** to form a hydrogen and acetate ion.

$CH_3COOH \rightleftharpoons CH_3COO^- + H^+$

The **double arrow** symbol indicates that the reaction is **reversible**. Both the forward and reverse reaction occur at the same time and the reaction never goes to completion.

The Process of Electrolysis

Electrolysis is the **splitting up** of an ionic substance using **electricity.**

On setting up an electrical circuit for electrolysis, two **electrodes** are required to be placed in the electrolyte. The electrodes are **conducting rods.** One of the rods is connected to the **positive** terminal and the other to the **negative** terminal.

The **electrodes** are **inert** (this means they do not react in the reaction) and are often made from **graphite** or platinum.

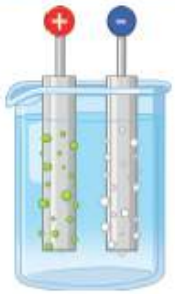
During the process of electrolysis, **opposites attract.** The positively charged ions will be attracted toward the negative electrode. The negatively charged ions will be attracted towards the positive electrode.

When ions reach the electrodes, the charges are lost and they become elements.

The **positive** electrode is called the **anode.**

The **negative** electrode is called the **cathode.**

Electrolysis of Aqueous Solutions



Gases may be given off or metals deposited at the electrodes. This is dependent on the reactivity of the elements involved.

If the metal is **more reactive** than **hydrogen** in the reactivity series, then **hydrogen** will be **produced** at the **negative cathode.** At the **positive anode,** negatively charged ions **lose** electrons. This is called **oxidation** and you say that the ions have been oxidised.

Using Electrolysis to Extract Metals

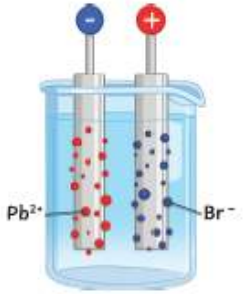
Metals are extracted by electrolysis if the metal in question reacts with carbon or if it is too reactive to be extracted by reduction with carbon. During the extraction process, large quantities of energy are used to melt the compounds.

Aluminium is manufactured by the process of electrolysis. Aluminium oxide has a high melting point and melting it would use large amounts of energy. This would increase the cost of the process, therefore molten **cryolite** is added to aluminium oxide to lower the melting point and thus reduce the cost.

Electrolysis of Molten Ionic Compounds – Lead Bromide

Lead bromide is an **ionic** substance. Ionic substances, when solid, are **not** able to conduct electricity. When molten or in solution, the ions are free to move and are able to carry a charge.

The **positive** lead ions are attracted toward the **negative cathode** at the same time as the **negative bromide** ions are attracted toward the **positive anode.**



Oxidation **i**s the **l**oss of electrons and **r**eduction **i**s the **g**aining of electrons. **OIL RIG** (Higher Tier Only).

We represent what is happening at the electrodes by using **half equations** (Higher Tier Only).

The lead ions are attracted towards the negative electrode. When the **lead ions** (Pb^{2+}) reach the cathode, each ion **gains two electrons** and becomes a neutral atom. We say that the lead ions have been **reduced.**

$Pb^{2+} + 2e^- \longrightarrow Pb$

The bromide ions are attracted towards the positive electrode. When the **bromide ions** (Br^-) reach the anode, each ion **loses one electron** to become a neutral atom. Two bromine atoms are then able to bond together to form the covalent molecule Br_2.

$2Br^- \longrightarrow Br_2 + 2e^-$

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AQA GCSE Chemistry (Combined) Unit 5 Energy Changes Knowledge Organiser

Exothermic and Endothermic Reactions

When a chemical reaction takes place, **energy** is involved. Energy is transferred when chemical **bonds are broken** and when new **bonds are made.**

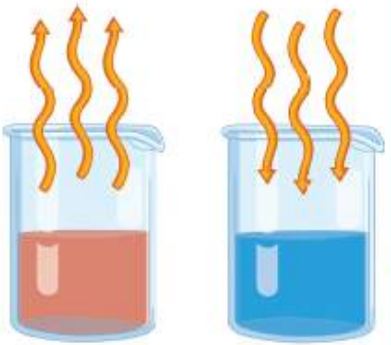
Exothermic reactions are those which involve the transfer of energy **from the reacting chemicals to** the surroundings. During a practical investigation, an exothermic reaction would show an **increase in temperature** as the reaction takes place.

Examples of exothermic reactions include **combustion, respiration and neutralisation** reactions. Hand-warmers and self-heating cans are examples of everyday exothermic reactions.

Endothermic reactions are those which involve the transfer of energy **from the surroundings to** the reacting chemicals. During a practical investigation, an endothermic reaction would show a **decrease in temperature** as the reaction takes place.

Examples of endothermic reactions include the **thermal decomposition** of calcium carbonate.

Eating **sherbet** is an everyday example of an endothermic reaction. When the sherbet dissolves in the saliva in your mouth, it produces a cooling effect. Another example is **instant ice packs** that are used to treat sporting injuries.



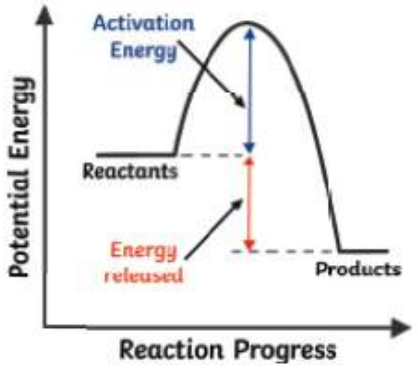
Exothermic Endothermic

Reaction Profiles – Exothermic

Energy level diagrams show us what is happening in a particular chemical reaction. The diagram shows us the **difference in energy** between the reactants and the products.

In an exothermic reaction, the **reactants** are at a **higher** energy level than the products.

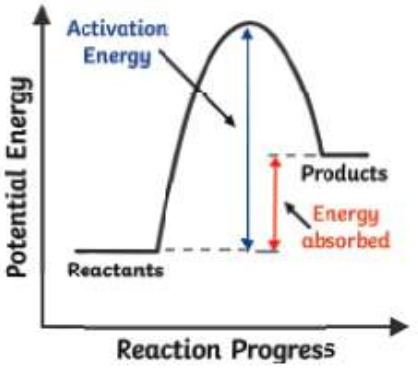
In an **exothermic** reaction, the difference in energy is **released** to the surroundings and so the **temperature** of the surroundings **increases.**



Reaction Profiles – Endothermic

In an **endothermic** reaction, the **reactants** are at a **lower** energy level than the products.

In an **endothermic** reaction, the difference in energy is **absorbed** from the surroundings and so the **temperature** of the surroundings **decreases.**



Activation Energy – the minimum amount of energy required for a chemical reaction to take place.

Catalysts – increase the rate of a reaction. Catalysts provide an alternative pathway for a chemical reaction to take place by **lowering** the activation energy.

Bond Making and Bond Breaking

In an **endothermic** reaction, energy is needed to break chemical bonds. The **energy change (ΔH)** in an endothermic reaction is **positive.**

You may also find, in some textbooks, **ΔH** referred to as the **enthalpy change.**

In an **exothermic** reaction, energy is needed to form chemical bonds. The **energy change (ΔH)** in an exothermic reaction is **negative.**

Bond energies are measured in **kJ/mol.**

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AQA GCSE Chemistry (Combined) Unit 5 Energy Changes Knowledge Organiser

Calculations Using Bond Energies (Higher Tier Only)

Bond energies are used to calculate the change in energy of a chemical reaction.

Calculate the change in energy for the reaction: $2H_2O_2 \longrightarrow 2H_2O + O_2$

The first step is to write the symbol equation for the reaction. Once you have done this, work out the bonds that are breaking and the ones that are being made.

H-O-O-H ⟶ 2H-O-H + O=O

Bond	Bond Energy kJ/mol
H-O	464
O-O	146
O=O	498

On the **left-hand side** of the equation, the **bonds are breaking.**

There are two **O-H** bonds and one **O-O** bond.

So 464 + 146 + 464 = 1074

There are two moles of H_2O_2 therefore the answer needs to be multiplied by two.

So 1074 × 2 = 2148

On the **right-hand** side of the equation, the **bonds are made.**

There are two **H-O** bonds

So 464 + 464 = 928

Two moles of H_2O are made therefore the answer needs to be multiplied by two.

So 928 × 2 = 1856

There is also one **O=O** bond with a bond energy of 498

So 1856 + 498 = 2354

ΔH = sum (bonds broken) – sum (bonds made)

ΔH = 2148 – 2354 = -206 kJ/mol

The reaction is exothermic as ΔH is negative.

Required Practical

Aim

To investigate the variables that affect temperature changes in reacting solutions, e.g. acid plus metals, acid plus carbonates, neutralisations and displacement of metals.

Equipment

- polystyrene cup
- measuring cylinder
- thermometer
- 250cm^3 glass beaker
- measuring cylinder
- top pan balance

Method

1. Gather the equipment.
2. Place the polystyrene cup inside the beaker. This will prevent the cup from falling over.
3. Using a measuring cylinder, measure out 30cm^3 of the acid. Different acids such as hydrochloric or sulfuric acid may be used. Pour this into the polystyrene cup.
4. Record the temperature of the acid using a thermometer.
5. Using a top pan balance, measure out an appropriate amount of the solid (for example, 10g) or use one strip of a metal such as magnesium.
6. Add the solid to the acid and record the temperature. You may choose to record the temperature of the acid and metal every minute for 10 minutes.

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AQA GCSE (Combined Science) Unit 4: Bioenergetics Higher

Photosynthesis

Photosynthesis is a chemical reaction which takes place in plants. It converts **carbon dioxide** and **water** into **glucose** and **oxygen**. It uses **light** energy to power the chemical reaction, which is absorbed by the green pigment **chlorophyll**. This means that photosynthesis is an example of an **endothermic** reaction. The whole reaction takes place inside the **chloroplasts** which are small organelles found in plant cells.

Plants acquire the carbon dioxide via diffusion through the **stomata** of their leaves. The water is absorbed from the soil through the **roots** and transported to the cells carrying out photosynthesis, via the **xylem**.

The glucose made in photosynthesis is used for respiration, stored as starch, fat or oils, used to produce cellulose or used to produce amino acids for protein synthesis.

The Rate of Photosynthesis and Limiting Factors

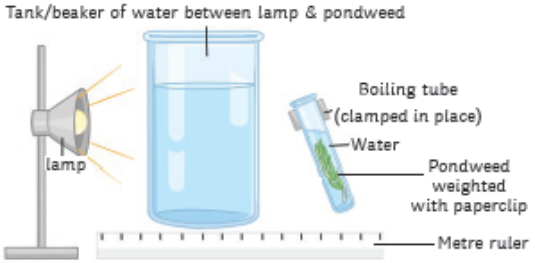
A **limiting factor** is something which stops the photosynthesis reaction from occurring at a faster rate. **Temperature**, **light intensity** and **carbon dioxide** level are all limiting factors.

Increasing the temperature of the surroundings will increase the rate of reaction, but only up to around 45°C. At around this temperature, the enzymes which catalyse the reaction become denatured.

Increasing the light intensity will increase the rate of reaction because there is more energy to carry out more reactions. Increasing the carbon dioxide concentration will also increase the rate of reaction because there are more reactants available.

The Effect of Light Intensity on the Rate of Photosynthesis (RPI)

The amount of light a plant receives affects the rate of photosynthesis. If a plant receives lots of light, lots of photosynthesis will occur. If there is very little or no light, photosynthesis will stop.



Method

1. Measure 20cm^3 of sodium hydrogen carbonate solution and pour into a boiling tube.
2. Collect a 10cm piece of pondweed and gently attach a paper clip to one end.
3. Clamp the boiling tube, ensuring you will be able to shine light onto the pondweed.
4. Place a metre rule next to the clamp stand.
5. Place the lamp 10cm away from the pondweed.
6. Wait two minutes, until the pondweed has started to produce bubbles.
7. Using the stopwatch, count the number of bubbles produced in a minute.
8. Repeat stages 5 to 7, moving the lamp 10cm further away from the pondweed each time until you have five different distances.
9. Now repeat the experiment twice more to ensure you have three readings for each distance.

The **independent** variable was the light intensity.

The **dependent** variable was the amount of bubbles produced. Counting the bubbles is a common method, but you could use a gas syringe instead to more accurately measure the volume of oxygen produced.

The **control** variables were same amount of time and same amount of pondweed. A bench lamp is used to control the light intensity and the water in the test tube containing the pondweed is monitored with a thermometer to monitor and control the temperature.

Interaction of Limiting Factors (HT only)

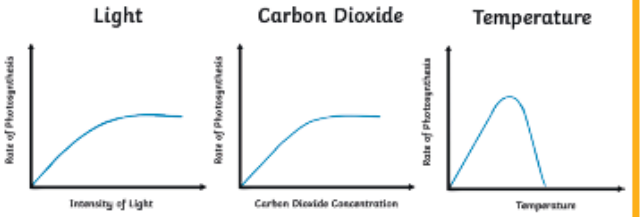
The limiting factor for the reaction will depend on the environmental conditions.

For example:

At night, light intensity is the limiting factor.

In winter, temperature is the limiting factor.

In other conditions, carbon dioxide is usually the limiting factor.



From the graph, you can see that increasing one of the factors will also increase the rate of reaction, but only for so long before it plateaus. This is because another factor will have then become the limiting factor. E.g. you could increase the supply of carbon dioxide, but if there is not enough chlorophyll to absorb the sunlight, then the sunlight will become the limiting factor instead.

Greenhouse Economics (HT only)

To grow plants in the most suitable conditions, a greenhouse can be used.

A greenhouse traps the sun's radiation as heat inside the greenhouse, so that temperature is not a limiting factor for the rate of photosynthesis.

Artificial lighting can be installed in the greenhouse to provide constant light energy and prevent light intensity being a limiting factor.

A paraffin heater can be used in the greenhouse to not only maintain a suitable temperature, but the by-product of the combustion off the paraffin is carbon dioxide.

Enclosing the crops in a greenhouse and regulating all the conditions in this way can be expensive; however, it is often outweighed because the harvest of the crop is much healthier, faster-grown crops. Furthermore, the enclosed conditions mean that disease and pests can be easily controlled and prevented.

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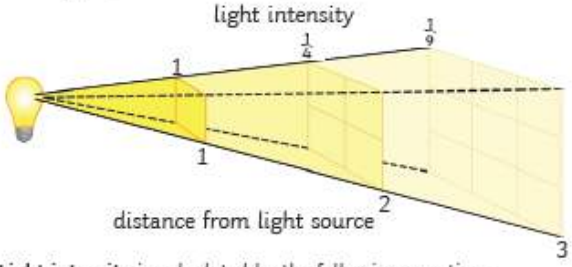
Inverse Square Law and Light Intensity

The **inverse square law** is used to describe the light intensity at different distances from the source.

The inverse square law states that: **the intensity of light is inversely proportional to the square distance from the source.**



Light intensity is calculated by the following equation:

$$\text{light intensity} \propto \frac{1}{\text{distance}^2}$$

- The symbol, ∝, means 'is proportional to'.
- Distance is measured in metres, m.

In other words, if an object is moved twice as far away from the light source, the light intensity received is reduced to just one quarter.

Worked example:

If the light source is 10cm from a plant, calculate the light intensity reaching the plant.

$1 \div (\text{distance}^2)$
$1 \div (0.10 \times 0.10)$
$1 \div 0.01$
= 100 arbitrary units

If the light source is moved 25cm from the plant, calculate the light intensity reaching the plant.

$1 \div (\text{distance}^2)$
$1 \div (0.25 \times 0.25)$
$1 \div 0.0625$
= 16 arbitrary units

Respiration

Respiration is the chemical reaction which occurs inside the **mitochondria** of all living cells to release energy for living functions and processes, e.g. movement, warmth and building larger molecules for growth and repair. The reaction is **exothermic**, meaning that energy is released to the surroundings.

Respiration can be either **aerobic** (using oxygen) or **anaerobic** (without using oxygen).

glucose + oxygen → carbon dioxide + water + energy

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$$

In anaerobic respiration, the glucose is not completely oxidised. This means that there is less energy released than in aerobic respiration.

glucose → lactic acid + energy

$$C_6H_{12}O_6 \rightarrow 2C_3H_6O_3 + ATP$$

In plants and yeast, anaerobic respiration makes some different products. The reaction is also called fermentation and is used in bread-making and beer-brewing.

glucose → ethanol + carbon dioxide + energy

$$C_6H_{12}O_6 \rightarrow C_2H_5OH + CO_2 + ATP$$

Effect of Exercise

When a person exercises, their body (specifically their **muscles**) need much more energy. To release more energy, the amount of respiration reactions occurring has to increase.
The **heart** pumps faster and the **breathing** rate and breath volume all increase to supply more **oxygen** to the muscles via the bloodstream.

If the muscles are not receiving enough oxygen to keep up the demand needed by the respiration reactions, then **anaerobic** respiration begins to occur. This incomplete oxidation of the glucose produces **lactic acid**, which can build up in the muscles and results in an **oxygen debt**.

After long periods of exercise, the muscles can become fatigued and stop contracting. You might experience a pain commonly called a **stitch**.

Metabolism

Metabolism is the combination of all the reactions in a cell or in the body.

Energy released during respiration is used during metabolic processes to synthesise new molecules:

- Glucose is converted to starch, glycogen and cellulose.
- Glycerol and three fatty acids are joined to form a lipid molecule.
- Glucose and nitrate ions are joined to form amino acids.
- Amino acids are joined to form proteins.
- Excess proteins are broken down and released as urea during excretion.

Respiration itself is also a process which is included in metabolism.

Oxygen Debt (HT only)

During vigorous exercise, the body can begin to carry out **anaerobic respiration** and produces **lactic acid**.

Lactic acid is transported via the bloodstream to the **liver**. The liver converts the lactic acid back into **glucose**. However, **oxygen** is needed to carry out this reaction.

The **oxygen debt** is the amount of the oxygen required by the body to convert the built-up lactic acid back into glucose and remove it from the respiring cells.

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AQA Combined Science: **Physics Topic 3 Particle Model of Matter**

Required Practical

Measuring the density of a regularly shaped object:

- Measure the mass using a balance.
- Measure the length, width and height using a ruler.
- Calculate the volume.
- Use the density ($\rho = m/V$) equation to calculate density.

Measuring the density of an irregularly-shaped object:

- Measure the mass using a balance.
- Fill a eureka can with water.
- Place the object in the water - the water displaced by the object will transfer into a measuring cylinder.
- Measure the volume of the water. This equals the volume of the object.
- Use the density ($\rho = m/V$) equation to calculate density.

Density

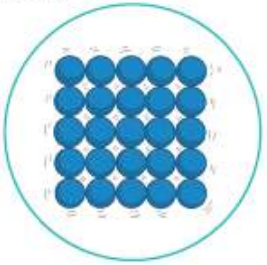
Density is a measure of how much mass there is in a given space.

Density (kg/m^3) = mass (kg) ÷ volume (m^3)

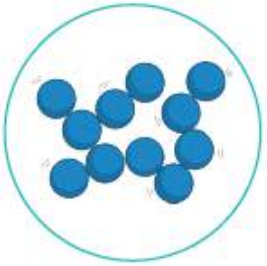
A more dense material will have more particles in the same volume when compared to a less dense material.

Particles

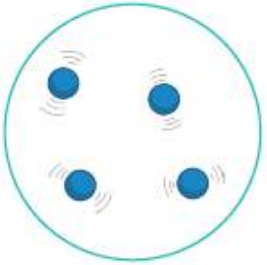
Solids have strong forces of attraction. They are held together very closely in a fixed, regular arrangement. The particles do not have much energy and can only vibrate.



Liquids have weaker forces of attraction. They are close together, but can move past each other. They form irregular arrangements. They have more energy than particles in a solid.



Gases have almost no forces of attraction between the particles. They have the most energy and are free to move in random directions.



Particles

Gas particles can move around freely and will collide with other particles and the walls of the container. This is the pressure of the gas.

If the temperature of the gas increases, then the pressure will also increase. The hotter the temperature, the more kinetic energy the gas particles have. They move faster, colliding with the sides of the container more often.

Density

The density of an object is $8050 kg/m^3$ and it has a volume of $3.4 m^3$ - what is its mass in kg?

8050 = mass ÷ 3.4

8050 × 3.4 = mass

27 370kg

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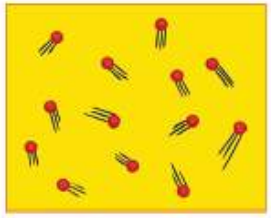
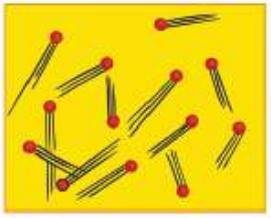
AQA Combined Science: **Physics Topic 3 Particle Model of Matter**

Internal Energy

Particles within a system have kinetic energy when they vibrate or move around. The particles also have a potential energy store. The total internal energy of a system is the kinetic and potential energy stores.



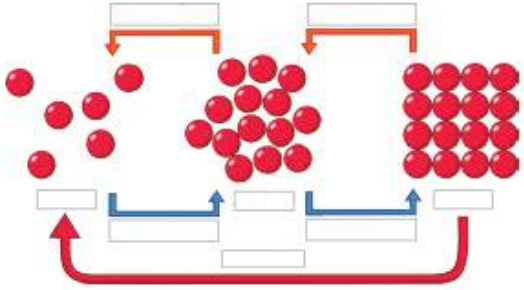
Low Temperature



High Temperature

If the system is heated, the particles will gain more kinetic energy, so increasing the internal energy.

Changing State

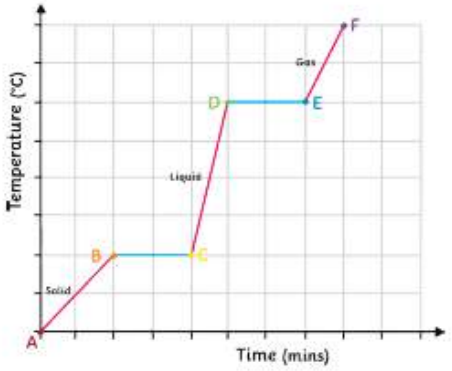


If a system gains more energy, it can lead to a change in temperature or change in state. If the system is heated enough, then there will be enough energy to break bonds.

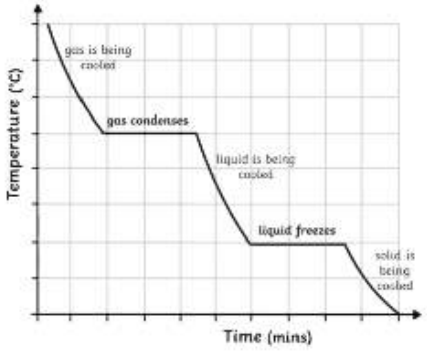
When something changes state, there is no chemical change, only physical. No new substance is formed. The substance will change back to its original form. The number of particles does not change and mass is conserved.

Specific Latent Heat

Energy is being put in during melting and boiling. This increases the amount of internal energy. The energy is being used to break the bonds, so the temperature does not increase. This is shown by the parts of the graph that are flat.



When a substance is condensing or freezing, the energy put in is used to form the bonds. This releases energy. The internal energy decreases, but the temperature does not go down.



The energy needed to change the state of a substance is called the latent heat.

Specific latent heat is the amount of energy needed to change 1kg of a substance from one state to another without changing the temperature. Specific latent heat will be different for different materials.

- solid → liquid - specific latent heat of **fusion**
- liquid → gas - specific latent heat of **vaporisation**

Specific Latent Heat Equation

The amount of energy needed/released when a substance of mass changes state.

energy (E) = mass (m) × specific latent heat (L)

E = mL

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Geography - The Challenge of Natural Hazards

Key Terms

Tectonic Hazard: Issues which arise from the movement of tectonic plates – e.g. volcanic eruptions or earthquakes

Atmospheric Hazards: Issues which arise from weather systems

Geomorphological Hazards: Issues which involve the features of the earth's surface, such as river flooding

Biological Hazards: Issues which involve living organisms, such as forest fires

Natural Disaster: When a natural hazard has a significant impact on humans and/or property

Extreme Weather: Weather which is significantly different from the long-term climate averages for an area

Plate Margin: The point at which two tectonic plates meet. Can be constructive (moving away), destructive (moving together) or conservative (sliding side-by-side)

Richter Scale: The unit of measurement used to show the force (magnitude) of an earthquake. It's a logarhithmic scale.

Seismograph: The machine used to measure the movement of the earth

Geothermal Energy: Energy harnessed by heating water in thin areas of the earth's crust. Can be used as hot water (instead of heating it at home) or steam used to drive turbines and generate electricity

Monitoring: Looking carefully at and measuring natural features. Taking action should they seem to be becoming active or likely to cause a natural hazard/disaster

Prediction: Using statistical models or scientific evidence to predict when a natural hazard is likely to take place

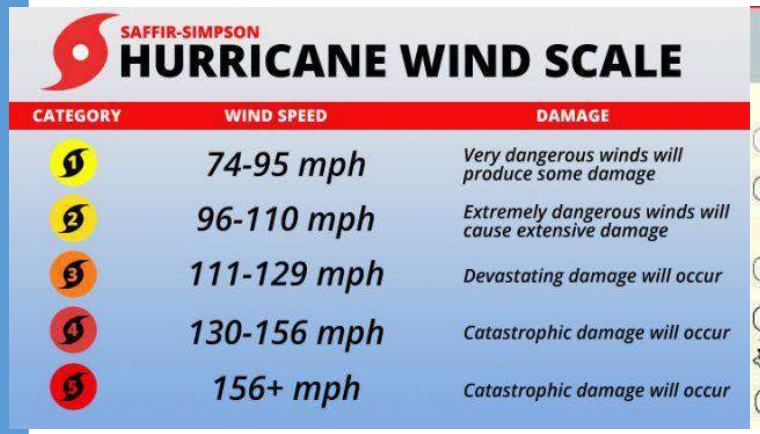
Planning: Taking action to prepare an area for a natural hazard/disaster. For example, earthquake-proof buildings like the Transamerica Tower in San Francisco

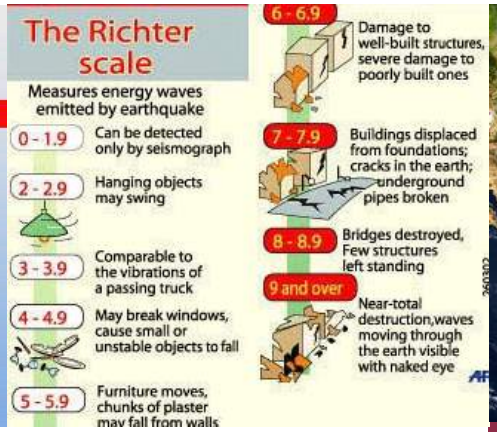
ITCZ (inter Tropical Convergence Zone): An area close to the equator where air meets and rises due to the low pressure. Deep rain-bearing cumulonimbus thunder clouds are formed

Hurricane: A tropical revolving storm, also known as a typhoon or a cyclone

Saffir-Simpson Hurricane Wind Scale: The five-category system of measuring the strength of a tropical revolving storm

Storm Surge: The rise in ocean level during a hurricane event. Causes flooding in coastal/low-lying areas



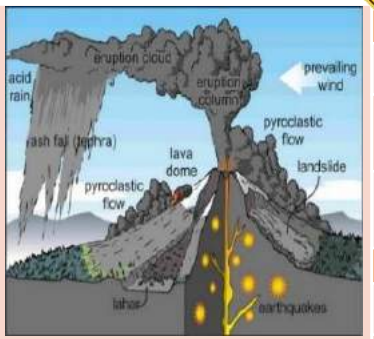


The structure of the Earth

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.

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.



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.

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 –Case Study: Nepal 2015

Causes
R7.8 magnitude earthquake struck the Gorka district just 80km northwest of Kathmandu, the capital city. 25 April 2015.

Effects
Primary: 9000 deaths and 1700 injuries. Historic buildings and temples were destroyed. 26 hospitals and half of all schools were destroyed.
Secondary: Triggered avalanches on Mt. Everest where 19 tourists and sherpas died

Management
Immediate Responses: International aid, $126million from UK alone. Temporary shelters were set up and water cleansing stations established.
Longer term responses included using UN and World Bank money to repair damaged buildings and tourism resources

Year 10 Geography - Unit 1a

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The Challenges of Natural Hazards

Earthquake Management

PREDICTING

Methods include:
- 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.

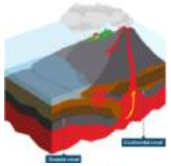
PROTECTION

You can't stop earthquakes, so earthquake-prone regions follow these three methods to reduce potential damage:
- Building earthquake-resistant buildings
- Raising public awareness
- Improving earthquake prediction

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 ways up to the surface to form a volcano. This margin is also responsible for **devastating earthquakes**.

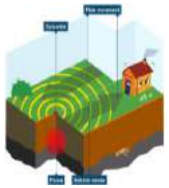


Constructive Plate Margin

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.**

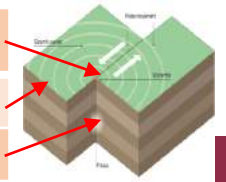
Causes of Earthquakes

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**.



HIC – Case Study: Amatrice, Italy, 2016

Causes
R6.2 magnitude earthquake struck the area which was 150km northeast of Rome, the capital city. 24 August 2016

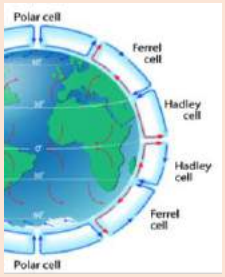
Effects
Primary: 299 people killed and 400 injured. The town of Amatrice, including its church and school were destroyed. Damage estimated to be 22 Billion Euros
Secondary: Farmers struggled to work as their barns and milking equipment were destroyed. Some areas closed

Management
Immediate Responses: 5000 Italian soldiers lead the rescue effort and Facebook was used to try to account for the victims and mark people 'safe'.
Long term: Students had to attend neighbouring schools and loans were offered to rebuild people's homes

Global pattern of air circulation

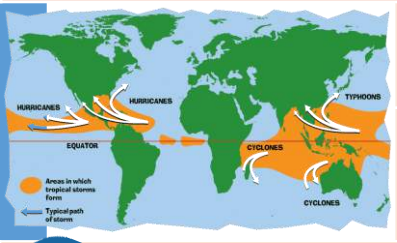
Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

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.



High and Low Pressure

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

1	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
2	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**.
3	With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to **spin**.
4	When the storm begins to **spin faster than 74mph**, a tropical storm (such as a hurricane) is officially born.
5	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**.
6	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

Scientist 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

HURRICANE EVACUATION ROUTE

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 **2rd November 2013** and gained strength. Became a Category 5 **"super typhoon"** and made landfall on the Pacific islands of the Philippines.

Effects
- Almost **6,500 deaths**.
- **130,000 homes destroyed.**
- Water and sewage systems destroyed had caused **diseases**.
- **Emotional grief** for dead.

Management
- 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
- People suffered from heat strokes and dehydration.
- 2000 people died from causes linked to heatwave.
- Rail network disrupted and crop yields were low.

Management
- 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.

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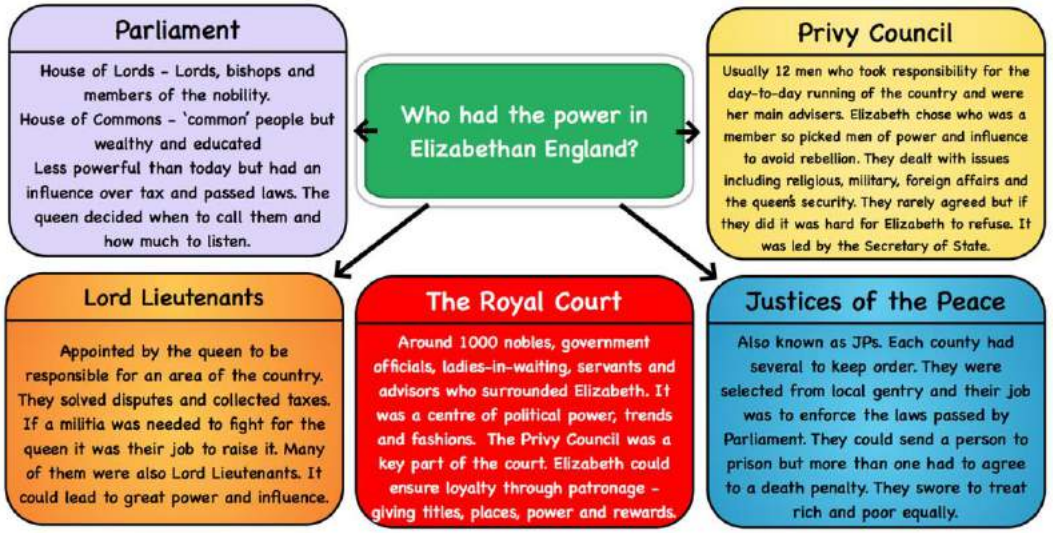
History - Elizabeth: Early Life

Early life

Her father, Henry VIII divorced his 1st wife to marry Elizabeth's mother Anne Boleyn. Anne was executed when Elizabeth was 3 for treason. After Henry's death, her brother Edward (Protestant) ruled, followed by her sister Mary (Catholic). Elizabeth became queen in 1558, aged 25.

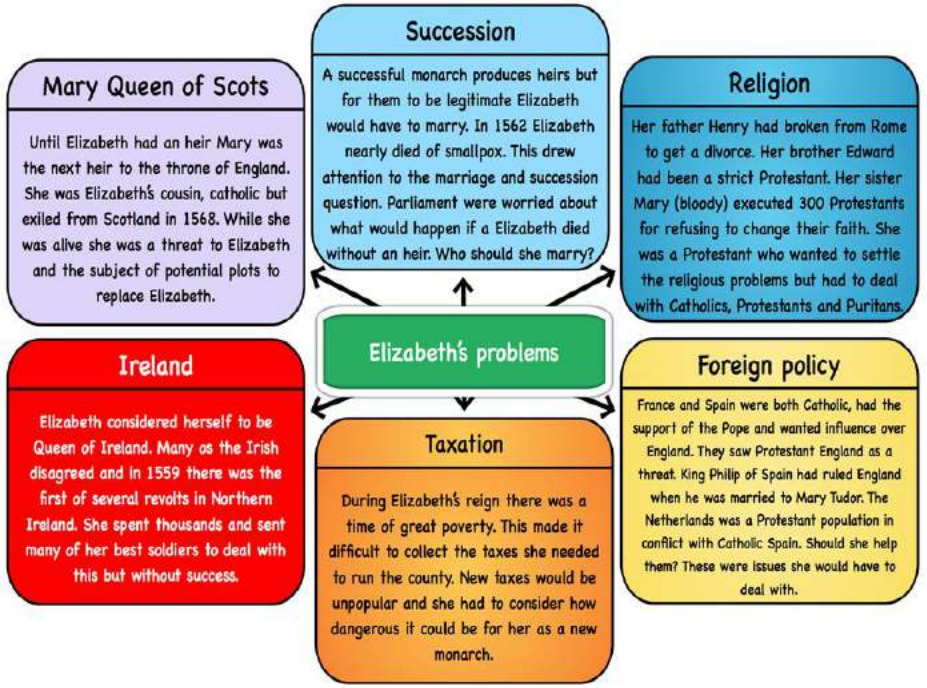
Who had power in Elizabethan England?



Key individuals

William Cecil: was Elizabeth's most trusted advisor. Served as Secretary of State twice.
Francis Walsingham: one of Elizabeth's closest advisors from 1573 onwards. Served as Secretary of State. Known as Elizabeth's 'spymaster'.

Elizabeth's problems



Key Terms	Definitions
Treason	A crime against the king
Parliament	The group which makes laws in England
Militia	A non-professional army called up to fight when needed
Patronage	Giving land, titles or power to gain an individual's support

Foreign affairs	Dealing with other countries
Gentry	The second highest class in England, they might be local JPs or hold other local jobs
Nobility	The highest social class in England, earls, lords & dukes. Given special rights & privileges

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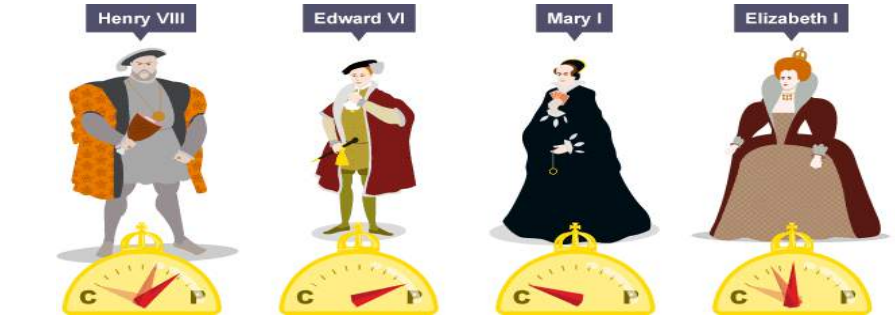
History - Marriage & Early Religious Change

Why was marriage important?

Arguments for marriage	Arguments against marriage
• England could gain an alliance with a foreign power • Elizabeth might produce an heir and ensure the Tudor line continued • An heir would prevent the Catholic Mary, Queen of Scots from ruling after Elizabeth	• England could fall under the control of a foreign king or prince • Marrying an Englishman could create problems over who had authority • Mary's marriage to Philip II of Spain had dragged England into war • Childbirth was risky



What was Elizabeth's religious settlement?
Elizabeth tried to find a compromise that all her subjects could work with. She chose a '**middle way**'. Therefore there were Protestant elements such as allowing priests to marry, services being held in English & her taking the title of 'governor' of the church. However there were Catholic elements too. Anyone who refused to attend church would pay a recusancy fine). She referred loyalty rather than religious conformity.

Who were the possible suitors?

Robert Dudley, Earl of Leicester	Philip II of Spain	Francis, Duke of Anjou & Alencon
• Elizabeth's friend from childhood • English • Protestant • BUT: other English nobles might be jealous of his power • His wife died in mysterious circumstances.	• Wealthiest monarch in the world • Spanish • Catholic • England would gain an alliance • BUT: the English disliked him • He had dragged England into an unsuccessful war with France when married to Mary.	• French king's brother • French • Catholic • England would gain an alliance • BUT: Elizabeth was 46 (probably too old for children) • The English disliked him

Key Terms	Definitions
Alliance	An agreement with a foreign country to support each other
Heir	The next in line to the throne
Suitor	Possible husbands
Catholic	Believed the Pope was god's representative on earth. Religion of Mary I & Mary, Queen of Scots.
Protestant	Newer form of Christianity, believed a person didn't need a priest to communicate with God & church services should be in English.
Religious Settlement	Elizabeth's attempt to find a religious compromise. Introduced in 1559.
Recusancy fines	Money paid for not attending church

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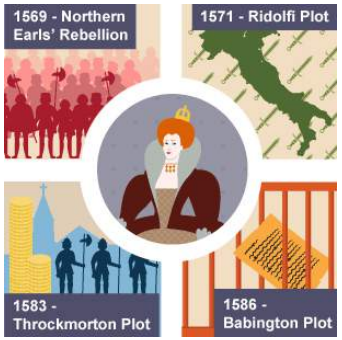
History - Rebellions & later religious changes

Northern Rebellion 1569
Why: many Catholic northern lords angry with Elizabeth's changes to their power (more Protestant southern lords on the Council of the North)
Events: Duke of Norfolk plotted to marry Mary, Queen of Scots. Supported by the Earls of Northumberland and Westmorland. Plot was uncovered, Norfolk sent to the Tower of London.
Rebellion continued without him, Took control of Durham cathedral & celebrated mass. Turned towards Tutbury (where M, Q of S was imprisoned). Earl of Sussex raised an army of 14,000 and the rebels broke up.

The papal bull 1570
The Pope excommunicated Elizabeth from the Catholic Church & called on Catholics to end her rule. English Catholics now had to chose between loyalty to Elizabeth or their religion

Ridolfi Plot 1571
Led by Roberto Ridolfi. Wanted to replace Elizabeth with M, Q of S, who would marry Norfolk. This time there would be help from the Netherlands at the same time as another Northern Rebellion took place. Discovered by Walsingham's network of spies. Norfolk executed.



How did Elizabeth's policy towards Catholics change?
Became stricter. 1581: it became treason to attend a Catholic mass & recusancy fines increased to £20.
1585: treason to have a priest in your home.
1593: Catholics couldn't travel more than 5 miles from their home.

Key Terms	Definitions
Mass	Catholic religious service
Missionaries	Someone who wants to spread their religious faith
Jesuits	Members of the Catholic Society of Jesus, their aim was to spread their religion.
Seminary	A college for training Catholic priest.

Foreign interference in religion
Missionaries: started arriving in England from the seminary in Douai from 1574. They aimed to convert England back to the Catholic faith.
Jesuits: first arrived in 1580 with the aim of returning England to Catholicism. Jesuit priests were seen as a threat to Elizabeth's rule & treated harshly. Many executed, including Edmund Campion. He entered England secretly & travelled around preaching. He was arrested after a few months & found guilty of treason.

France & Spain's actions
Both countries hoped Elizabeth would be overthrown but neither went to war with her until Spain attacked in 1588. Philip supported the seminary at Douai.

Who were the Puritans?
Extreme Protestants who believed that Elizabeth's Church of England was not strict enough
Issues: bishops clothing. Elizabeth told her bishops to wear a white surplice during services. Puritans wanted them to wear ordinary clothing. By 1566, Elizabeth told them to accept or be sacked.
By 1568: most Puritans asked the changes, but a small group called Presbyterians refused.
Prophesyings: prayer meetings held from 1570s. Often included critics of Elizabeth's church, so Elizabeth saw them as dangerous. Archbishop of Canterbury supported them, so Elizabeth suspended him
1580s: Elizabeth became stricter, unlicensed preaching banned, Puritans who did not conform imprisoned & fined. Puritan church broken during this time.

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History - Mary, Queen of Scots

Why was Mary, Queen of Scots a problem for Elizabeth?

1542: became Queen of Scotland at 6 days old

1548: sent to live in France

1558: married the Dauphin of France, Francis

1559: became Queen of France, when her father-in-law died

1560: Francis died, Mary was sent back to Scotland

1565: married Henry, Lord Darnley

1566: Mary's secretary David Rizzio was murdered in front of her. Darnley was probably involved.

1566: gave birth to her son, James

1567: Darnley was murdered in suspicious circumstances. Shortly after Mary married Lord Bothwell who many people thought had been involved in Darnley's murder

July 1567: Mary was forced to abdicate from the throne

1568: she lost a battle against the Protestant lords & ran away to England. She hoped that her cousin Elizabeth would help her get her throne back. Elizabeth put her in prison for the next 19 years

1586: Babington Plot uncovered. This was a plan to assassinated (murder) Elizabeth

1587: executed

What was the Babington Plot?

- A plot to murder Elizabeth & replace her with Mary, Queen of Scots
- Led by Anthony Babington, a Catholic
- Letters were smuggled into Mary hidden in barrels
- BUT Sir Francis Walsingham, Elizabeth's spy master, found out about it
- Mary, Babington and the other plotters were arrested.
- Mary was put on trial & found guilty

Should Elizabeth execute Mary?

NO	YES
• Mary said she was innocent • Powerful countries like Spain would be angry if Mary was killed • Mary was a queen, chosen by God.	• There had been lots of plots to replace Elizabeth with Mary, these would carry on for as long as she was alive • Parliament wanted her killed • Mary was a Catholic & a threat to the Protestant Elizabeth

Did killing Mary solve Elizabeth's problems?

- Elizabeth's heir was now James VI of Scotland (Mary's Protestant son).
- Catholics viewed Mary as a martyr & saw Elizabeth as a heretic.
- Elizabeth had murdered a queen, why couldn't other people do the same & murder her?

Key Terms	Definitions
Martyr	A person who dies for their beliefs
Heretic	Someone who holds different religious beliefs, that are seen as wrong

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History - The Essex Rebellion & the voyages of exploration

Why did Essex rebel?

1595: became a privy councillor, had a monopoly on sweet wine, developed a rivalry with Robert Cecil, defeated the Spanish in 1596. **1598:** nearly drew his sword in a privy council meeting.
1599: sent to Ireland, made a truce with the Irish, knighted his army leaders & then left Ireland without permission.
1601: rebelled but arrested & then executed.

Why did the plots fail?

Spies: Walsingham's spy network meant that few plots got past their earliest stages.
A skilled politician: Elizabeth dealt with her Parliament effectively. She listened to advice but normally got her own way.
Unconvincing alternatives: the other options were M, Q of S or a foreign king such as Philip II of Spain. Neither of these were popular choices.
Punishments: Rebels were tortured & executed. Anyone who challenged Elizabeth could see what the consequences were.
Religious settlement: kept most people happy. It was not always applied strictly in the most Catholic areas.

Why is Sir Francis Drake famous?

1577-1580: becomes the first person to circumnavigate the globe. He & his cousin, John Hawkins first Englishmen to kidnap Africans & sell them as slaves. Drake was a privateer who attacked Spanish ships & stole their cargo.

What new technology was developed?

Lateen sails: triangular sails which made ships faster & easier to steer.
Astrolobe: sailors could judge how far south/north they were.

Where were trade links established?

Attempts were made to find a direct route to India & the Far East to cut out the middlemen. Muscovy Company established in 1555 & given the monopoly of trade with Moscow. East India Company established in 1600 to overseas trade with India. English involvement in the slave trade grew throughout the period.

How successful were attempts to colonise?

1584: Sir Walter Raleigh given permission by Elizabeth to explore, colonise & rule any land not already ruled by a Christian. In return she would receive 1/5 of all the gold & silver found there.
Raleigh sent colonists to North America. Colony established at Roanoke but it failed.

How did the voyages benefit England?

Wealth	Power	Territory
• Drake stole from Spanish ships & ports • Hawkins made money for himself & the country though selling slaves • England started to build the foundations of a trading empire that would grow in future centuries	• Navy grew & was successful • The navy could be used to dominate smaller countries	• The first attempt to develop a colony failed but more were built in the next few centuries

Key terms	Definitions
Circumnavigate	Travel all the way around the globe
Privateer	A ship's captain with permission to attack foreign ships
Colonies	Areas of other countries ruled by another

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History - Naval Warfare & Arguments with Spain

Key Terms	Definitions
Line of battle	Ships created a single line & then fired on the enemy.

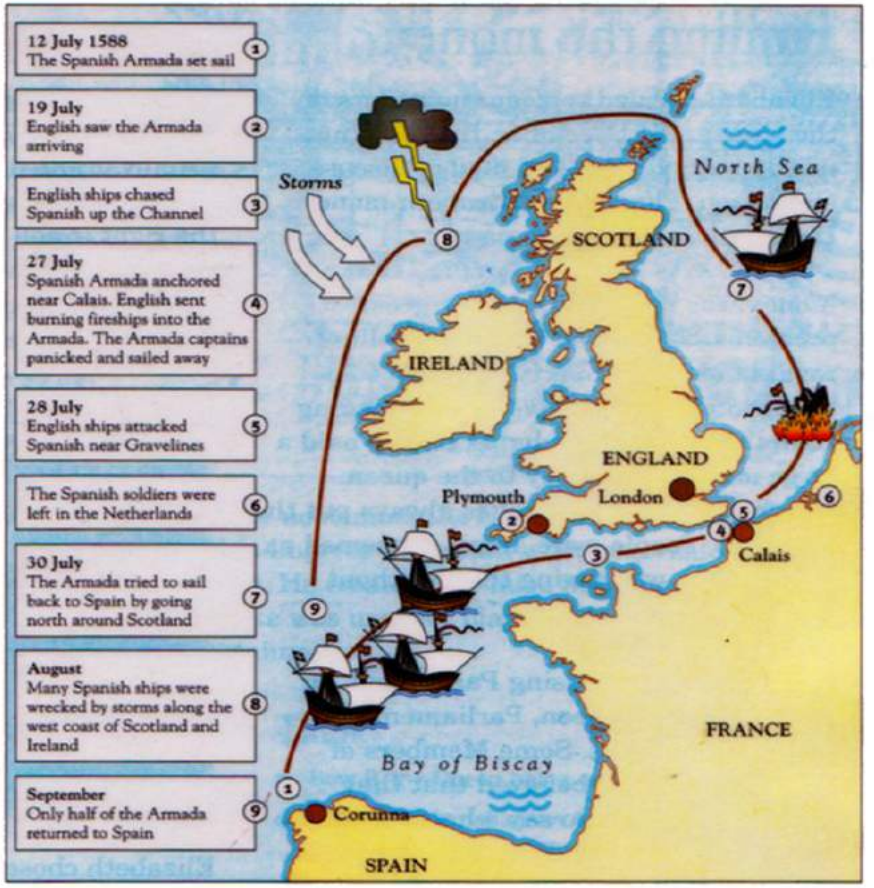
Why was the Netherlands an issue between England & Spain?
1566: Protestant uprising in several Dutch cities (Philip ruled the Netherlands). Philip sent in soldiers, but this led to more rioting. Elizabeth sent money to help the rebels & allowed English volunteers to fight. She also allowed the rebel ships to use English ports. She was in a difficult position as she needed to maintain English trade routes as well as not upsetting Philip.
Philip sent a powerful army under the Duke of Alava to put down the rebellion but he was unable to. The Protestant leader of the Dutch rebels, William, Duke of Orange was assassinated in 1584 & Elizabeth sent troops under the command of the Duke of Leicester in 1585. This achieved nothing but was clearly an act of war against Philip.

Why did Philip attack England in 1588?
Execution of Mary, Queen of Scots
English attacks on Spanish shipping
English troops sent to intervene in the Netherlands

Armada plan
- Philip would send a n armada of ships from Spain to anchor off the Dutch coast.
- Spanish soldiers would be sailed across to England & march on London.
- Lead by the Duke of Medina-Sidonia, who had no experience of commanding a navy.

Why did the Armada fail?
English tactics: The fireships broke up the Spanish fleet & mean that individual ships could be attacked. Commanders like Drake were good tacticians. The English ships were faster.
Spanish mistakes: The Spanish ships were slower & less manoeuvrable. The soldiers were not ready when the fleet arrive to pick them up. Many of their cannons were designed to fight on land, not sea.
Weather: many Spanish ships were destroyed on their way home.

English navy
John Hawkins given responsibility for developing Elizabeth's navy. Philip II of Spain also doing the same at this point. English sailors such as Drake & Hawkins involved in many raids of Spanish, such as attack on Cadiz in 1587.
Other tactics: fireships & line of battle. Cannons allowed attacks from a distances instead of boarding.



The route of the Spanish Armada

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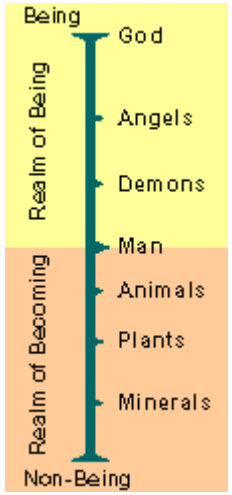
History - Life: Wealth & Poverty

Key Terms	Definitions
Enclosure	The change from arable (crop) farming to sheep, which involving putting a barriers around the land
Debasing	Mixing in less valuable metals into coins
Rack renting	When landlords unfairly increased rents
Deserving poor	The old, sick or young
Undeserving poor	Those who could work but chose not to

Great Chain of Being



Nobility

- Second to the queen
- Dukes, earls & barons
- Average income £6,000
- Special privileges e.g. if they committed treason they would be beheaded

Gentry

- Landlords of the countryside
- Average income £10-200
- Some took on roles such as JPs & members of Parliament

Poverty

1495: beggars punished in the stocks
1531: publically whipped, a second offence resulted in a hole burnt in their ear, for a third they were hanged.
Deserving poor: treated with sympathy& given help such as wealthy providing charity.
Undeserving poor: punished
1576: Act for setting the poor on work – local towns given responsibility for looking after the poor. Each town used different methods e.g. York established a House of Correction & beggars had to work. Ipswich a youth training scheme was introduced, so children learnt a trade.
1601: Poor Law – wealthy of each area would be taxed to pay for the care of the poor. Healthy poor would work for their upkeep & any who refused would be sent to the House of Correction

Elizabethan country houses

- Gentry had increased prosperity, some built grand houses to demonstrate this.
- Often had references to classical civilisations in their deign and decoration.
- Wealth was demonstrated through new technology such as huge glass windows & elaborate furnishings.

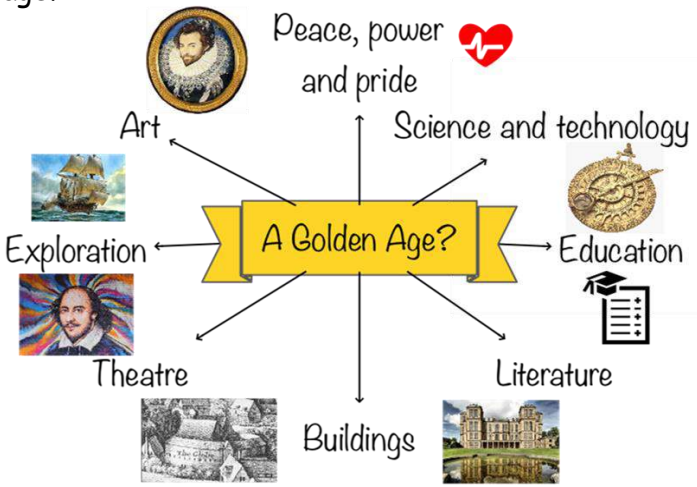
Why was poverty increasing?

- Closure of the monasteries
- Henry VIII's decision to debase coins
- A series of poor harvests 1594-98
- Enclosure
- Rack renting

Leisure time

Theatres popular entertainment for all classes. Purpose built theatres such as The Globe & The Rose could hold about 3,000 spectators. Standing was cheaper.
Puritans opposed the theatre, seeing it as sinful. People thought large gatherings might spread disease & encourage crime.

Why can the Elizabethan age be seen as a golden age?



Year 10 French Term 1

Quelle est ta personnalité ?	A	What is your personality?
Je dirais que je suis assez **drôle** et	1	I would say that I am quite **funny** and
je pense que je suis un peu **intelligente** aussi.	2	I think that I am a bit **intelligent** also.
Cependant, je me trouve plutôt **têtue**	3	However, I find myself rather **stubborn**
et il faut que je dise que	4	and I must say that
je ne suis pas très **patiente** non plus.	5	I am not very **patient** either.
C'est quoi un bon ami, pour toi?	**B**	**What makes a good friend, for you?**
Pour moi, un bon ami est **compréhensif**	6	For me, a good friend is **understanding**
et il **a les mêmes centres d'intérêts que moi.**	7	and he **has the same interests as me.**
De plus, il **ne me juge jamais**	8	Moreover, he **never judges me**
et il faut qu'il soit aussi **marrant.**	9	and it is essential that he is also **funny**.
Mon meilleur ami, qui s'appelle **Alex**,	10	**My best friend**, who is called **Alex,**
est très **gentil** et assez **sympa**	11	is very **kind** and quite **nice**
tandis qu'il n'est pas toujours **sensible**	12	whereas he is not always **sensitive**
et il est parfois **pénible**.	13	and he is sometimes **annoying**.
Tu t'entends bien avec ta famille ?	**C**	**You get on well with your family?**
Dans ma famille, il y a **cinq** personnes.	14	In my family there are **five** people.
Je dirais que je rassemble à **mon père** car	15	I would say that I look like my father because
on a tous les deux les cheveux **bruns** et les yeux **verts**.	16	we both have **brown** hair and **green** eyes.
En général, je **m'entends très bien** avec **mes parents**	17	In general, I **get on very well** with my **parents**
même si on se **chamaille de temps en temps.**	18	even though we **bicker from time to time.**
Ma mère est vraiment **travailleuse** et je l'admire beaucoup.	19	**My mother** is really **hardworking** and I admire her a lot.
Quand j'étais plus jeune, j'adorais **ma petite sœur**,	20	**When** I was younger, I loved **my little sister**,
mais maintenant je **la** trouve vraiment **agaçante**	21	but now I find **her** really **annoying**
surtout quand on **se dispute tout le temps.**	22	especially when we **argue all the time.**
Tu vas faire quoi le week-end prochain ?	**D**	**What are you doing next weekend?**
Le week-end prochain je vais **aller à un match de foot**	23	Next weekend I'm going **to go to a football match**
avec **mon copain** après avoir **mangé au fast-food.**	24	with **my friend** after having **eaten at a fast food place.**
Aussi, je vais **jouer à des jeux vidéo** avec mon frère.	25	Also I'm going **to play video games** with **my brother.**
Ce sera **génial!** Je l'attends avec impatience !	26	It will be **great!** I'm looking forward to it!
Qu'est-ce que tu as fait le week-end dernier ?	**E**	**What is it you have done the weekend last?**
Le weekend-dernier je suis sortie avec **mes amies**	27	**Last weekend** I went out with **my friends.**
D'abord on a **visité le musée**	28	Firstly we **visited the museum**
où il y avait **une expo cool**.	29	where there was **a cool exhibit.**
Puis on est allées **au centre commercial**	30	then we went **to the shopping centre**
où **j'ai acheté un nouveau t-shirt.**	31	where **I've bought a new t-shirt.**
C'était une **super** journée, même s'il faisait **froid**.	32	It was a **great** day, even if it was **cold**.

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Sentence builder 1 – Describing relationships

Pour moi, un bon ami est (For me, a good friend is…)
À mon avis, un bon ami n'est pas (In my opinion a good friend isn't)
Je pense qu'un bon ami doit être (I think that a good friend must be…)
Je dirais qu'un bon ami est (I would say that a good friend is…)
Il faut qu'on bon ami soit (A good friend needs to be…)
Je voudrais me marier avec quelqu'un qui est (I want to marry someone who is…)

Je m'entends bien avec I get on well with **Je m'amuse avec** I have fun with **Je me confie à** I trust / confide in **Je me chamaille avec** I bicker with **Je me dispute avec** I argue with **Je me fâche contre** I get angry with	**mon père** my father **mon frère** my brother **mon oncle** my uncle **mon grand-père** my grandfather **mon beau-père** my step-father **mon demi-frère** my step/half brother **mon meilleur ami** my best friend (m)	**parce qu'il est** because he is **bien qu'il soit** although he is	**très** very **assez** quite **plutôt** rather **un peu** a bit **toujours** always **trop** too	**agaçante** annoying **arrogante** arrogant **bavardes** chatty **casse-pieds** annoying **compréhensif/ive** understanding **drôle** funny **égoïste** selfish **fidèle** loyal **généreux/se** generous **gentille** kind **honnête** honest **jaloux/se** jealous **marrante** funny **méchante** mean **optimiste** optimistic **paresseux/ses** lazy **pessimiste** pessimistic **pénible** annoying **(im)patiente** (in)patient **rigolote** funny **sensible** sensitive **stricte/sévère** strict **sympa** nice **têtue** stubborn **travailleur/se** hardworking	**et** (and) **mais** (but)	**il/elle…** (he/she…) **a le sens de l'humour.** has a sense of humour. **a les mêmes centres d'intérêt que moi.** has the same interests as me. **accepte mes imperfections.** accepts my imperfections. **aide tout le monde.** helps everyone. **croit en moi.** believes in me. **discute de tout avec moi.** discusses everything with me. **dit toujours la vérité.** always tells the truth. **écoute mes problèmes et mes secrets.** listes to my problems and secrets. **me fait rire.** makes me laugh. **ne me juge jamais.** never judges me. **prend soin de moi.** takes care of me. **respecte mes opinions.** respects my opinions. **voit le bon côté de choses.** sees the positive side of things.
	ma mère my mother **ma sœur** my sister **ma tante** my aunt **ma grand-mère** my grandmother **ma belle mère** my step-mother **ma demi-sœur** my step/half sister **ma meilleure amie** my best friend (f)	**parce qu'elle est** because she is **bien qu'elle soit** although she is				

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Sentence builder 2 – Using the near future tense to say what you are going to do (*le futur proche*)

FUTURE TIME PHRASE	SUBJECT + ALLER (to go)	INFINITIVE ACTIVITY	VERB	INTENSIFIER	ADJECTIVE
Après-demain the day after tomorrow	**je vais** I am going	**acheter des vêtements.** to buy clothes.	**Ce sera** it will be	**assez** quite	**amusant** fun
Demain tomorrow	**tu vas** you are going	**aller au cinéma/au parc/à la piscine.** to the cinema/park/swimming pool.		**très** very	**barbant** tedious
L'année prochaine next year	**il/elle/on va** he/she/we are going	**boire du champagne/coca.** to drink champagne/coke.		**plutôt** rather	**ennuyeux** boring
L'été prochain next summer	**nous allons** we are going	**danser à la boite/fête.** to danse at the club/party.		**un peu** a bit	**formidable** terrific
La semaine prochaine next week	**vous allez** you (pl) are going	**écouter de la musique.** to listen to music.		**vraiment** really	**génial** great
Le week-end prochain next weekend	**ils/elles vont** they (m/f) are going	**faire les magasins/du sport/les devoirs.** to do shopping/sport/homework.			**nul** rubbish
Bientôt soon		**jouer au foot/au rugby/à des jeux vidéo.** to play football/rugby/video games.			**relaxant** relaxing
		lire un livre/un journal. to read a book/a newspaper.			
		manger au restaurant/au fast-food. to eat at the restaurant/fast-food place.			
		regarder un film/la télé. to watch a film/the tv.			
		rentrer à la maison. to go back home.			
		rester à la maison. to stay at home.			
		retrouver des amis en ville. to meet some friends in town.			
		trainer en ville. to hang out in town.			
		sortir avec des amis. to go out with friends.			
		visiter le musée/le château. to visit the museum/the castle.			

N.B. To extend your sentences, link several events using SEQUENCERS:

d'abord = first of all
puis = then
ensuite = next
après = afterwards

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Sentence builder 3 – Using the perfect tense to say what you did in the past (*le passé composé*)

PAST TIME PHRASE	SUBJECT + AUXILIARY VERB (mostly '**avoir**', sometimes '**être**')	PAST PARTICIPLE + ACTIVITY	VERB	INTENSIFIER	ADJECTIVE
Avant-hier the day before y'day **Hier** yesterday **L'année dernière** last year **L'été dernier** last summer **La semaine dernière** last week **Le week-end dernier** last weekend **Récemment** recently	**AVOIR (to have)** **j'ai** (I) **tu as** (you) **il/elle/on a** (he/she/we) **nous avons** (we) **vous avez** (you pl.) **ils/elles ont** (they m/f)	**acheté des vêtements.** bought clothes. **bu du champagne/coca.** drank champagne/coke. **dansé à la boite/fête.** danced at the club/party. **écouté de la musique.** listened to music. **fait les magasins/du sport/les devoirs.** did shopping/sport/homework. **joué au foot/au rugby.** played football/rugby. **lu un livre/un journal.** read a book/a newspaper. **mangé au restaurant/fast-food.** ate at a restaurant/fast-food place. **regardé un film/la télé.** watched a film/tv. **retrouvé des amis en ville.** met some friends in town. **traîné en ville.** hung out in town. **visité le musée/le château.** visited the museum/castle.	**C'était** it was	**assez** quite **très** very **plutôt** rather **un peu** a bit **vraiment** really	**amusant** fun **barbant** tedious **ennuyeux** boring **formidable** terrific **génial** great **nul** rubbish **relaxant** relaxing
	ÊTRE (to be) **je suis** (I) **tu es** (you) **il/elle/on est** (he/she/we) **nous sommes** (we) **vous êtes** (you pl.) **ils/elles sont** (they m/f)	**allé(e)(s) au cinéma/au parc/à la piscine.** went to the cinema/park/swimming pool. **sorti(e)(s) avec des amis.** went out with some friends. **rentré(e)(s) à la maison.** went back home. **resté(e)(s) à la maison.** stayed at home. *NB with these few verbs that take '**être**' as the auxiliary verb, you need an extra '**e**' ending on the past participle if your subject is **feminine** & an '**s**' if **plural** ('**es**' if both **feminine** & **plural**).			

N.B. To extend your sentences, link several events using SEQUENCERS:

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AO1

Develop ideas through investigations and showing understanding of sources

Mind map

Keywords – add branches to your mind map that include key ideas and words, using one word for each branch will allow you to develop more ideas rather than using a phrase or sentence

Central idea – this is the starting point of your mind map and shows the topic you are exploring. All keywords should link from this idea.

Include images – imagery can convey much more than a word or sentence and can help you to develop your ideas as w

Mood board

Theme – consider your theme, have you got a set idea already or are you happy to collect a wider range of ideas

Use a range of sources – don't find pictures from just one place use different sources like, photographs, wallpapers/fabric samples, lettering, magazines etc…

Pick a style – pull it all together with a colour/theme or style to make your page 'work' as a whole

Apply ideas – your mood board should be a visual representation of your mind map

Artist Research and Analysis of Work

There are several things you must include in your research to show understanding of your chosen artist

Bio – a quick gathering of facts with the artists birth/death, style, important works

Collect images – select images of their work that are relevant and images that appeal to you, comment on why you like them

Analysis – To show understanding of the artist you must discuss their work. This will allow you to explore ideas and consider different options before you begin creating you own art work.

Reproduction – either copy a small piece of their work or work in the artist's style to show your understanding of their work

Content – Looking at the subject of the work.
What is it? What exactly can you see? What is happening? What does the work represent?
What does the artist call the work?
Does the title change the way we see the work?
What is the theme of the work?
Landscape, portrait, journey, moment, memory, event, surreal, fantasy, abstract, message.

Form – Looking at the formal elements.
What colours does the artist use? Why? How is the colour organised?
What kind of shapes can you see?
What kinds of lines and marks does the artist use?
What is the surface like? What textures can you see?
What patterns can you see?
How big is the work?
Light, delicate, layered, strong, rough, dark, peaceful, dripped, textured, scale, vivid, bright.

Process – How the work has been developed and made.
What materials and tools have been used?
What is the evidence for how it has been made?
Painted, drawn, woven, printed, cast, stitched, constructed, collaged.

Mood – Looking at the communication of moods and feelings.
How does the work make you feel?
Why do you feel like this?
Does the colour, texture, form or theme of the work affect your mood?
Quiet, contemplative, thoughtful, hopeful, peaceful, elated, joyful, reflective.

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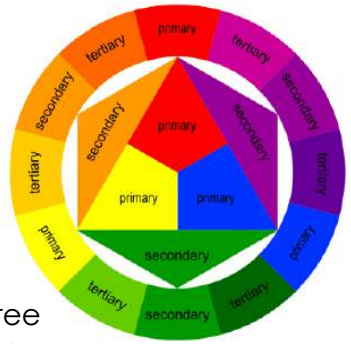
AO2

Refine ideas by experimenting with appropriate media, materials, techniques and processes

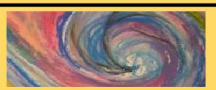
You don't have to use a specific media in your project, just show some variation.
For example if an artists uses pen, you could try using, pen, pencil, charcoal, biro, coloured pen etc.



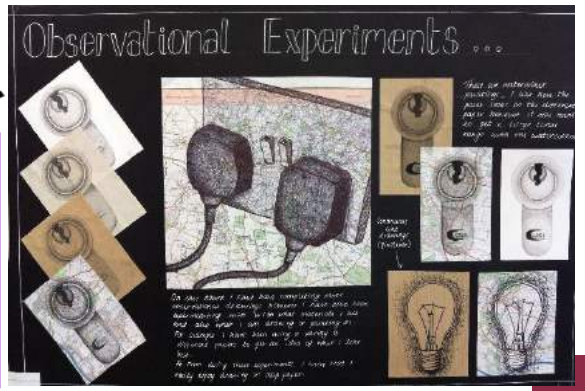
Colour Theory

Primary colours are the three main colours, they can't be made, but are used to mix all of the other colours
Secondary colours are made by mixing two primary colours
Tertiary colours are made by mixing a primary and a secondary colour
Harmonious colours are next to each other on the colour wheel
Complementary colours are opposite each other on the colour wheel
Tint – when you add white to a colour to make it lighter

Shade – when you add black to a colour to make it darker

Pencil		The basic tool for drawing, can be used for linear work or for shading
Biro		Drawings can be completed in biro and shaded using hatching or cross hatching
Pastel (chalk/oil)		Oil and chalk pastels can be used to blend colours smoothly, chalk pastels give a lighter effect
Coloured pencil		Coloured pencil can be layered to blend colours, some are water soluble
Acrylic paint		A thick heavy paint that can be used smoothly or to create texture
Watercolour		A solid or liquid paint that is to be used watered down and layered
Monoprint		Where ink is transferred onto paper by drawing over a prepared surface
Collograph		A printing plate constructed of collaged materials
Card construction		Sculptures created by building up layers of card or fitting together

Experimentation
You MUST try things more than once to show improvement and refinement. See how the artist has tried the same sketches in lots of different media and on different surfaces.



Be brave in your use of media, aim to show off your best skills.

Media	The substance that an artist use to make art
Materials	The same as media but can also refer to the basis of the art work eg, canvas, paper, clay
Techniques	The method used to complete the art work, can be generic such as painting or more focus such as blending
Processes	The method used to create artwork that usually follows a range of steps rather than just one skill

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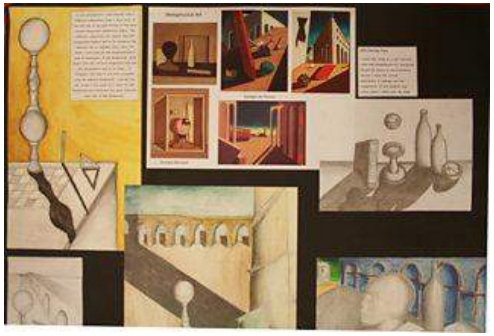
AO3

Record observations, ideas and understandings as you develop your work

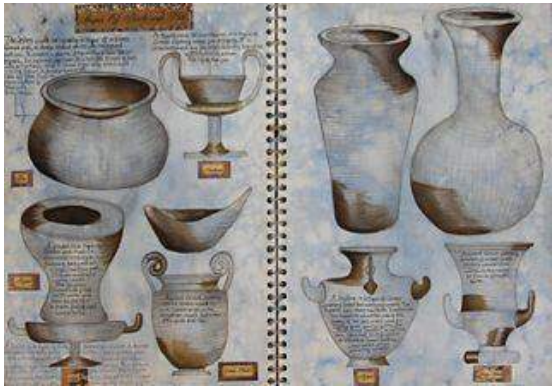
Take your own photographs and work from them as much as possible. Taking your own photographs will allow you to create a more personalised response.

Create both primary and secondary studies.



Create **maquettes** (a miniature scale model) in paper, card, etc to show your ideas.

You may want to produce another mood board or mind map as you develop your project and narrow down ideas.



All ideas and observations **MUST** clearly link to your project/theme. No random art work.

How to 'record'

Observational drawing	Drawing from looking at images of objects
Primary observation	Drawing directly from looking at objects in front of you
Secondary observation	Drawing from looking back at images of objects
Photographs	Using a camera or smartphone to take pictures to draw from (this is also classes as a primary observation)
Sketches	Basic sketches and doddles to show undeveloped and initial ideas.
Annotations	Writing about your art work

Annotation

Describes writing notes, using images and explain your thoughts to show the development of your work.

You must annotate and reflect on your work as it progresses to show your intentions and ideas.

Step 1 – Describe

What is the image of?

What have you done?

Step 2 – Explain

How was this work made?

How did you produce these effects?

How did you decide on the composition?

Step 3 - Reflect

Why did you use these methods?

Why do some parts of the work 'work' better than others?

Why might you do things differently next time?

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AO4

Present a personal and meaningful response that realises intentions and shows an understanding of visual language

Telling a story with your art and sketchbook, using your work to convey a message instead of relying on words.

Avoid sticking with your first idea. Sometimes your initial idea is worth pursuing but before a final piece is decided upon you should have considered at least three different design ideas.

Thinking about your Final Piece

- Use materials and media that you can control well and have practised with.
- Your final piece should show influences from the artists you have studied
- Remember to think about composition rules when designing your final piece

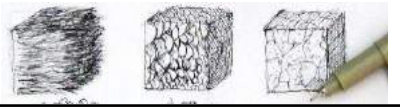
Present your work well, this doesn't mean fancy background. Just take care on every page.

A rough idea	A visual Maquette	Final piece
A basic sketch of a final idea	A small image or model created in materials that replicate the end result	An image or sculpture pulling all prep work together.

Sketchbook checklist

- ❑ Have you demonstrated what the starting point, theme or brief means to you personally?
- ❑ Have you established a link between the starting point and your chosen sources?
- ❑ Have you reflected your understanding of the social and cultural context?
- ❑ Is there a clear link between your sources and your own work?
- ❑ Is it clear what ideas or techniques from your sources you have developed?
- ❑ Have you selected and presented your studies carefully?
- ❑ Made use of your discoveries?
- ❑ Made clear links between your work and that of other artists, designers and craftspeople?
- ❑ Collected images to show your inspiration and stimuli?
- ❑ Made use of drawings, sketches, jottings, photographs and experiments with different media?
- ❑ Annotated images to explain how they fit into your development process?
- ❑ Demonstrated your understanding through correct use of art and design vocabulary?
- ❑ Shown experimentation and selection of the most successful results for your project?
- ❑ Organised your recordings and presented them to show and explain your decisions?
- ❑ Clearly linked all of your work to your starting point?

The Formal elements of Art

Tone	How light or dark something is
Line	A mark which can be long, short, wiggly straight etc…
Colour	What you see when light reflects off something. Red, blue and yellow are primary colours
Texture	How something looks or feels e.g. smooth or rough 
Pattern	A symbol or shape that is repeated
Shape	A 2D area which is enclosed by a line e.g. a triangle
Form	Something which has 3 dimensions e.g. a cube, sphere or a sculpture

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Drawing

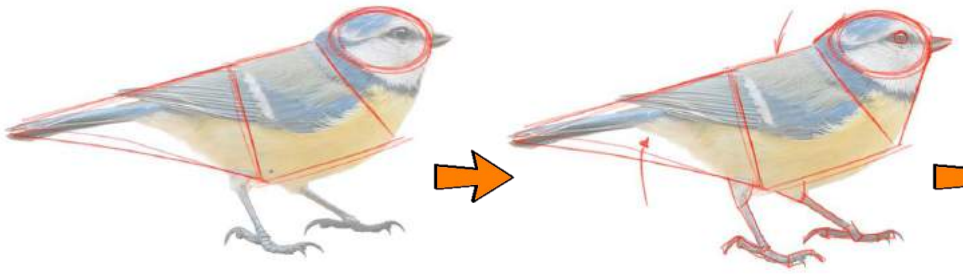
Another method to consider when drawing is using the grid method.

The **Grid method** is a tool used to help you draw whilst keeping everything in proportion. It allows you to break down drawings into lots of small squares. Therefore you can concentrate on smaller sections at a time. The more squares the use the more accurate you can be.

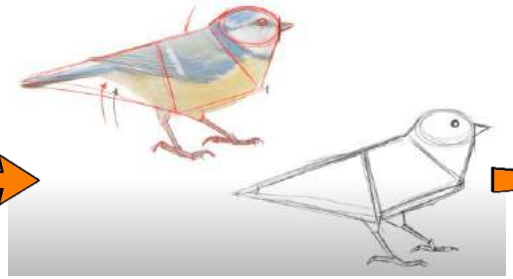
Constructing a drawing is important to ensure you keep correct proportion. Use simplified shapes to develop the structure of your drawing. Start with the largest structures first.

1. **Large rough shapes** – block out the most basic version of your drawing
2. **Accurate shapes** - Refine shapes so that they resemble the object more closely
3. **Detail** – add the detailed sections of the drawing like fine lines etc (then apply tone once drawing is completed)

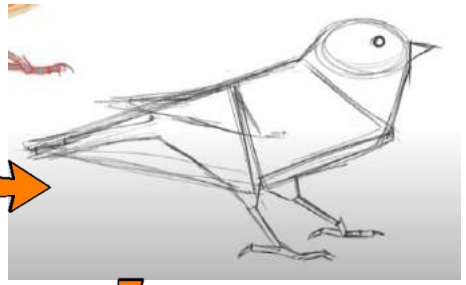
Take a look at the images below to see how it is done



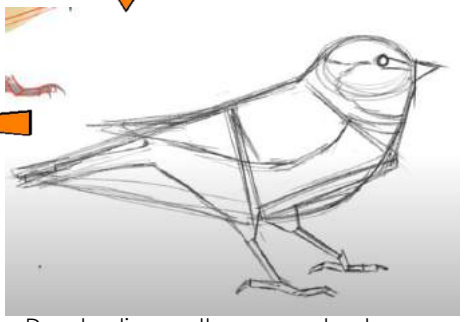
Block out the large rough shapes that make up your image.



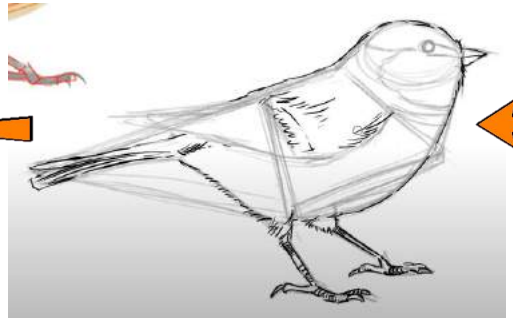
Draw out those shapes on their own



Add other structural detail i.e. the wings



Develop lines so they more closely resemble they way the final image will look. See how the breast of the bird is now curved, not straight and angular.



Rub out the large rough shapes so you can barely see them and draw using lines that show the texture of the finished object, in this case a bird.

Completely remove any construction lines.

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Adding Tone

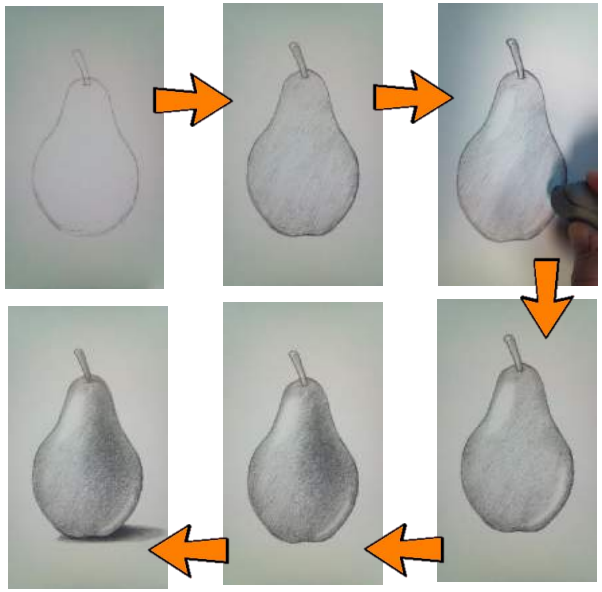
Making things look 3D: To stop drawings looking flat use a range of tone and marks. Pressing harder and light and layering with your pencil creates different tones and adds depth.

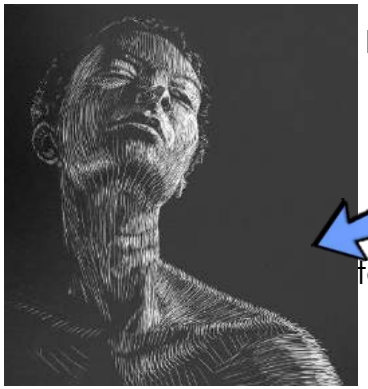
Grades of pencil

Pencils come in different grades, the softer the pencil, the darker the tone.
H=Hard B=Black
In art the most useful pencils for shading are 2B and 4B. If your pencil has no grade, it is most likely HB(hard black) in the middle of the scale.

Mark Making: To make drawings look more realistic try to use different marks on the surface. You can do this by changing the direction, pressure or length of your marks. Mark making can be used in conjunction with shading or separately.

When **applying tone** to a drawing you must remember to apply <u>base shades first</u> to add depth and suggest form. Secondly, add mark making to develop the texture and fine details line work to finish.



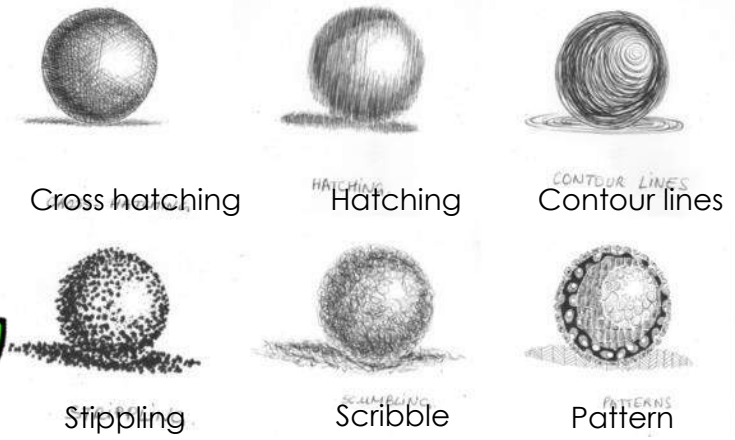


Directional shading is shading that follows the contours of an object. Using this method makes your work appear more realistic. Look at the portrait, see how the shading changes direction and curves with the shape of the figure. This technique should be used on all drawings. See how it has been used on the spheres below.

Tonal shade

Produce a range of tones by varying the pressure and layering - consider using softer pencils for darker shades

Mark Making - techniques



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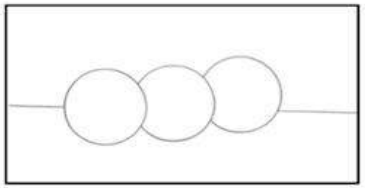
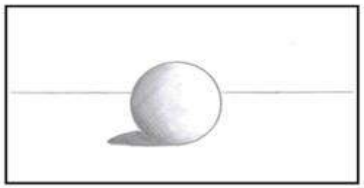
Composition

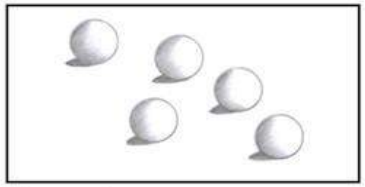
Creating a sense of **space and depth** is important in art work to make it feel sophisticated and well thought out. Knowing how to raise objects over the top of each other is important in communicating space and depth to your viewer.



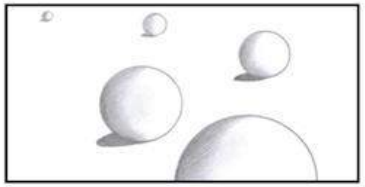
Overlap
One object appears to be behind the other



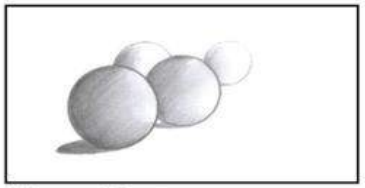
Shading
Light and shadow create the illusion of form and space



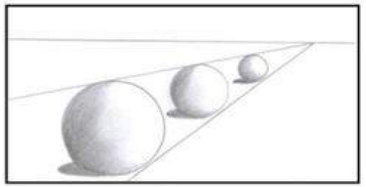
Placement
Objects higher in the picture appear to be in the distance



Size
Small objects look distant, while closer objetcs should be larger

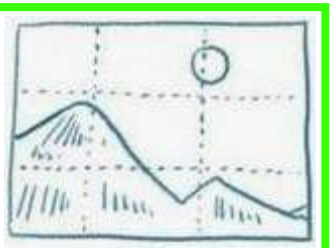


Value and Focus
Lighter values and less details suggest distant objects



Linear Perspective
Parallel lines and edges seem to go toward one or more vanishing points

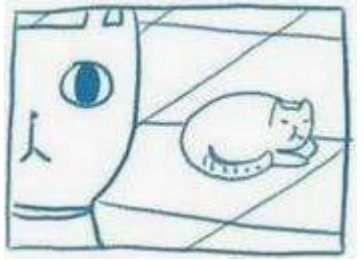
Rule of thirds – Place focal elements (objects) at 1/3 or 2/3 of the image horizontally or vertically, not in the middle



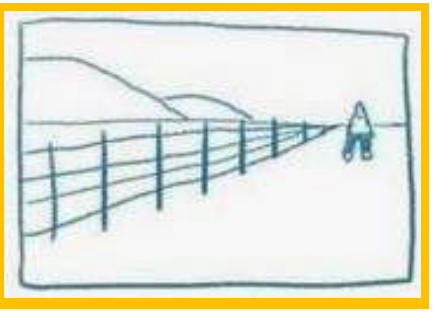
Repetition and grouping
Try grouping objects in odd numbers, this often looks better than an even number of objects.

Simplify and fill – Enlarge or crop the image to fill the space and draw your viewers attention to that particular object

Balance elements – If there is an emphasis on one side of the piece balance it out with smaller objects on the other side.



Line – Use lines to draw the viewers eye across the work. The lines don't have to be straight, think about using S or C shaped lines.



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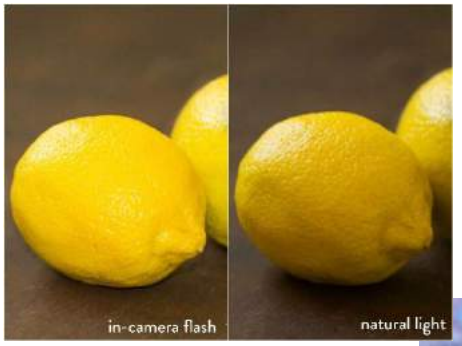
Taking a Good Photograph

Light
Use natural light as much as possible. The best times for shooting are sunrise and sunset. As far as possible avoid taking shots in artificial light i.e. bedroom lights or with flash.



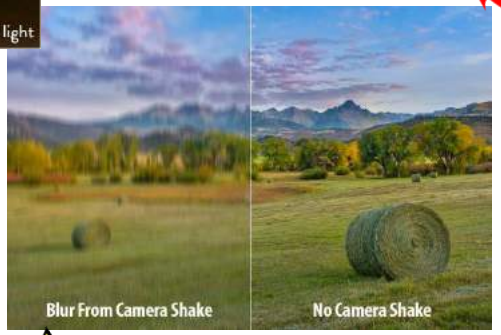
Notice that most of the tone is removed with flash on

Taking a good photograph will be key to your project. You will be using these images to draw from. Photography is another great way to record (AO3) the work you are carrying out.

If your picture is blurry, it means you are probably too close to your subject. Move back a little bit until your image becomes sharper.

Think – don't just point your camera and click. Think about what you want to take a picture of, is it…

- Texture? Get in really close, just make sure your picture is focused and not blurry.
- A portrait? Make sure nothing distracts from your main subject, try to use a plain background,
- Landscape? Then hold your camera steady, stand far back and line up your scene with the rule of thirds.

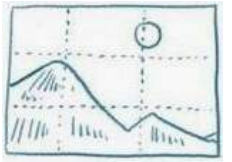


When there is less light your camera finds it harder to focus and often it will create an image with 'camera shake'. If you need to take an image in low light try to rest your camera of a flat surface to help steady it.

Noise
Avoid digital zoom, it can make images grainy, this is called noise in photography. Try to get physically closer to your subject instead (if you can).

Pro tip: Take lots of pictures from similar angles and only make slight changes with each photograph. Once you have finished capturing you can choose which images are the best.

Grid lines – on most phones/cameras you can go into the settings and add grid lines. Using these grid lines will help you to create a successful composition and therefore photograph. Check out the 'Composition' page and look at the 'rule of thirds'.



To switch the grid on ...
iPhone: Go to "Settings," choose "Photos & Camera," and switch "Grid" on.
Samsung Galaxy: Launch the camera app, go to "Settings," scroll down and switch the "grid lines" option to "on."

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Painting

Painting with watercolour – Tips

- If water is pooling at all on the paper, you generally have too much water, it will be harder to control the flow of the paint.
- Use two jars of water, once for cleaning your brushes and one with clean water to mix paints.
- Use thicker 'watercolour paper' normal paper will become wavy as it cannot handle so much water.
- Tape down your paper before, during and after painting until your image is completely dry, this way you will have nice flat paintings.
- Let you watercolour dry between layers,
- Use a layering technique, just remember that you cannot put lighter colours over darker colours when using watercolour, work from light to dark.

Tape Masking

- Tape of sections of your paper with masking tape.
- Paint over the tape and let dry.
- Peel tape off and reveal white paper underneath.

Blot

- Use a paper towel to blot up wet paint to reveal white paper underneath.

Salt

- Sprinkle salt into a wet (still shiny) wash of watercolor paint.
- The results will appear when dry.

Consider using some of the watercolour techniques mentioned here to give your work texture and visual interest.

Crayon Resist

- Draw with any color of crayon on dry paper.
- Paint wet watercolor over crayon to reveal drawing underneath.

Wet-in-Wet

- Apply clean water to your paper.
- Before the water dries, load up your brush with paint and touch it to the water. The color will spread quickly.

Dry Brush

- Start with a dry brush and almost dry paint.
- Run your brush over your paper to create grass or scratchy lines.

Wash

- Load your brush with plenty of wet paint. Smooth your brush over the paper with swooping strokes.

Painting in layers

Painting, just like drawing (or making a sandwich) needs to be done in layers.
You must start from the base of your image and work forwards.
Think about background, midground and foreground

- We can add different materials or techniques individually one over the other,
- waiting until one layer is dry before applying the next.
- Each layer could be the same technique as before, or a different one.
- A layer doesn't have to cover the surface in its entirety.

A **layer** can consist merely of one small dab of paint, or can involve thick overlays covering the whole surface. A technique does not have to be applied over the whole surface to qualify as a layer.

Painting with acrylic - In stages

Once you have finished drawing out what you want to paint you should follow these rules when painting with acrylic

Brights: a colour that is lighter than your background

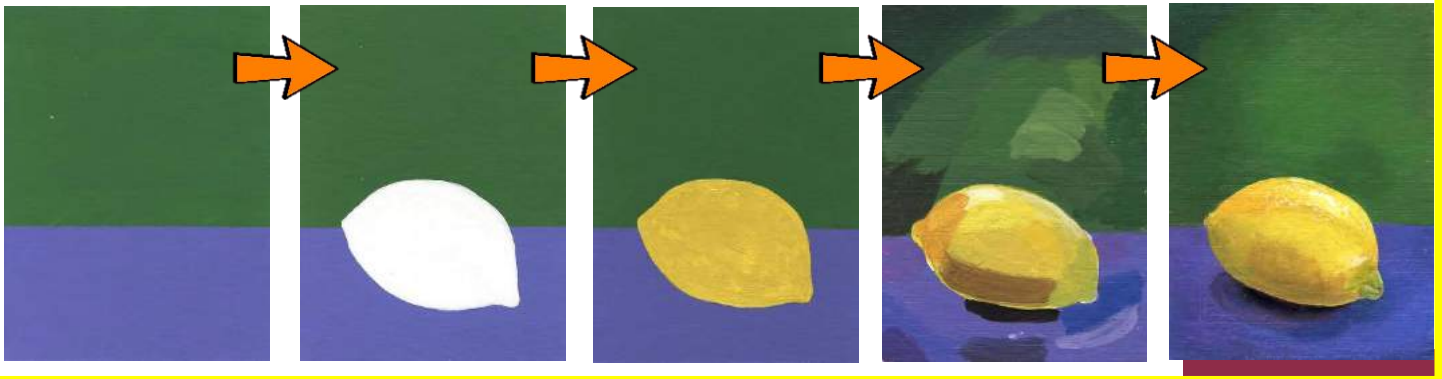
Paint a background

White under brights

Brights over white(block colour)

Apply tonal range, shadows/highlights

Soften edges and blend colours



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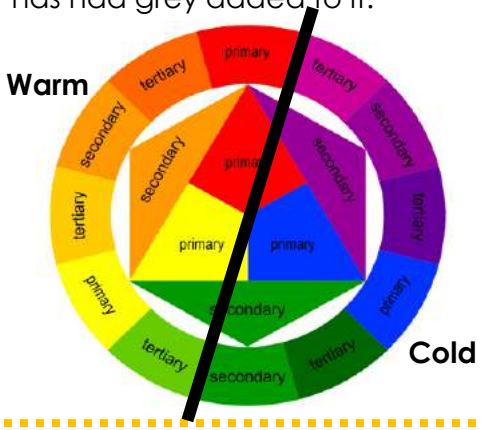
Colour Theory

Colour Theory

Primary colours are the three main colours, they can't be made, but are used to mix all of the other colours
Secondary colours are made by mixing two primary colours
Tertiary colours are made by mixing a primary and a secondary colour
Tint – when you add white to a colour to make it lighter

Shade – when you add black to a colour to make it darker

Hue – any colour that appears on the colour wheel, note that neither black nor white appear on there
Tone – used to describe a colour that has had grey added to it.



Complementary colours are opposite each other on the colour wheel. When placed next to each other, there is an extremely strong contrasting and vibrant effect. If overused, your painting may become jarring and uncomfortable to look at.
You should select a dominant colour and use the other colour as an accent.

Harmonious colours are relaxing colour combinations using colours positioned next to each other on the wheel. Harmonious colour combinations were famously used by impressionist artists such as Claude Monet to create beautiful harmonious paintings. It is often most effective to select one dominant colour, a secondary colour and a third accent colour.

Colour and emotion

Colour has a powerful influence over human behaviour, to the extent it can manipulate your perception of what is actually there.

- Red: Passion, love, anger and danger
- Orange: Vitality, creativity and activity
- Yellow: Energy, light and hope
- Green: Health, nature and wealth
- Blue: Trust, security and spirituality
- Purple: Creativity, royalty and wealth

We can use these psychological triggers to influence how we want the viewer to perceive the painting. If you want the viewer to have a passionate and aggressive response, then you should be utilizing reds and other warm colours. If you want a calming scene, then greens and blues should be utilized.

What can I actually see?

We all have preconceived ideas of what colour an object should be, i.e. a tree is green. But that is not always the case. If you are not careful and do not observe the tree for what it actually is, then you may be drawn towards adding more green than is necessary. This is because we forget to observe and we try to paint from a memory or idea. - **Paint what you see, not what you think.**

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Construction– Unit 1 Safety and Security in Construction

Legislation

The Act places a general duty to 'ensure so far as is reasonably practicable the health, safety and welfare at work of all their employees'.
Employers must comply with the Act. Examples include: provide and maintain **safety equipment** and safe systems of work, provide **training**, provide a **risk assessment**
Employees have specific responsibilities too - they must: take care of their **own health and safety and that of other persons** (employees may be liable), follow the **rules** of the company.

Working At Height

Working at Heights regulation 2005
They include all work activities where there is a need to **control a risk of falling** a distance liable to cause **personal injury**.
This is regardless of the work equipment being used, the duration the person is at a height, or the height at which the work is performed.

Provision and
Use of
Work
Equipment
Regulations 1998

The regulations deal with the work equipment and machinery used every day in workplaces and **aims to keep people safe wherever equipment and machinery is used** at work, The regulations aim to ensure that all equipment is: **suitable** for its intended purpose, **regularly maintained** to ensure safety, only used by people who have received adequate **training** inspected by a **competent** worker.

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Manual Handling Regulations 1992

The Regulations define manual handling as: "...any transporting or supporting of a load (including the **lifting, putting down, pushing, pulling, carrying or moving** thereof) by hand or bodily force". The load can be an object, person or animal.
The MHOR 1992 clear **measures for dealing with risks** from manual handling, these are:
first : avoid hazardous manual handling operations so far as is reasonably practicable;
second : assess any hazardous manual handling operations that cannot be avoided; and
third: reduce the risk of injury so far as is reasonably practicable e.g. use of wheelbarrow, sharing load.
Max load: 25kg

Personal Protective Equipment Regulations 2002 (PPE)

Employers have duties concerning the provision and use of personal protective equipment (PPE) at work .
PPE is equipment that will **protect the user against health or safety risks at work**. It can include items such as safety helmets and hard hats, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses.
The Regulations also require that PPE is:
- **properly assessed** before use to make sure it is fit for purpose;
- **maintained and stored properly**;
- provided with **instructions** on how to use it safely;
- used **correctly** by employees.

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)

is the law that requires employers, and other people in charge of work premises, **to report and keep records of:**
- work-related accidents which cause **deaths.**
- work-related accidents which cause **certain serious injuries** (reportable injuries)
- diagnosed cases of certain **industrial diseases**;
- certain '**dangerous occurrences**' (incidents with the potential to cause harm)

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Risks—
Key terms:
Likely—The more likely something is, the higher the chance there is of it happening
Severity—The more severe something is, the more high risk it is
High/medium/Low
Control measures
Control measures include actions that can be taken to **reduce** the potential of exposure to the hazard, or the control measure could be to **remove** the hazard or to reduce the likelihood of the risk of the exposure to that hazard being realised.
Could include: Method statements , Safe systems of work , Work permits , **Competent** persons , **PPE**

The Control of Substances Hazardous to Health Regulations 2002 (COSHH) is the law that requires **employers to control substances that are hazardous to health.** You can prevent or reduce workers exposure to hazardous substances by:
- deciding how to **prevent harm** to health (risk assessment);
- providing **control measures** to reduce harm to health;
- **making sure they are used** ;
- keeping all control measures **in good working order**;
- providing **information**, instruction and **training** for employees and others; COSHH cupboard/locked/correct PPE

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HSE Health & Safety Executive

The Health and Safety Executive (HSE) is Britain's national regulator for workplace health and safety. It **prevents work-related death, injury and ill health**. We achieve this using a variety of methods to influence change and **help people manage risks at work**. These include:

- providing **advice, information and guidance**
- raising awareness in workplaces by influencing and engaging
- operating permissioning and licensing activities in major hazard industries
- carrying out **targeted inspections** and investigations
- taking **enforcement** action to prevent harm and hold those who break the law to account

We take enforcement action if there is harm / potential harm:

- deal immediately with **serious risks** (so they prevent harm) - e.g. **shut down site**, ensure control measures are put into place
- comply with the law
- are **held to account** if they fail in their responsibilities e.g can give fines / **prosecute** businesses

Colour	Meaning or purpose	Instruction and information
Red	Prohibition sign Danger alarm	Dangerous behaviour; stop; shutdown; emergency cut-out devices; evacuate
Yellow Amber	Warning sign	Be careful; take precautions; examine
Blue	Mandatory sign	Specific behaviour or action, eg wear protective equipment
Green	Emergency escape First-aid sign No danger	Doors; exits; escape routes; equipment and facilities Return to normal

The Health and Safety (Safety Signs and Signals) Regulations 1996

Prohibitory signs

Warning signs

Mandatory signs

Emergency escape or first-aid signs

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Food and Nutrition – Nutrition

CARBO-HYDRATES

Simple Carbohydrates = Sugars
Fast release Carbohydrates such as Fruit, Energy drinks, Sweets, honey.

Simple Sugars (Monosaccharides)

Glucose Fructose Galactose

Disaccharides – 2 sugar molecules

Maltose Lactose Sucrose

Complex Carbohydrates= Starch
Slow release carbohydrates such as Potatoes, Pasta, Rice.

Complex Carbohydrates
Polysaccharides – long chain sugar molecules

All carbohydrates, no matter what type, provide **4kcal** of energy per gram. The difference is complex carbs take longer to break down and therefore satisfy hunger for longer, whereas simple sugars leave you feeling empty and wanting more. **Complex carbs provide dietary bulk and fibre** which makes us **feel full!**

Keyword	Meaning
Monosaccharides	A simple sugar: the most basic sugar molecule.
Disaccharides	Made up of two monosaccharides.
Polysaccharides	Complex carbohydrates: made up of lots of monosaccharides joined together.

Deficiency
Low carbohydrate diets may cause blood sugar (glucose) to drop, resulting in feeling hungry, weak and dizzy.

Excess
If more energy is consumed than burnt off, the excess glucose is stored in the liver and muscles as energy.
Over time, this leads to weight gain and obesity.
Obesity puts the body at higher risk of heart disease and type 2 diabetes.

Energy Balance

Energy from food is measured in calories (kcal).

Carbohydrates = 4kcal per gram
Too much energy from food and drink is stored as **fat** in the body.

The amount of food and therefore calories is different from person to person based on; age, gender and physical activity levels

RDA - It is recommended that 1/3 of the diet should come from starchy foods. 1g carbohydrate = 16kJ/3.75 kcal

Ranks carbohydrate foods based on blood glucose levels: Foods absorbed slowly have a low GI rating. Foods absorbed quickly have a high GI rating.

Glycaemic Index – GI

Low GI Foods – 55 or less	most fruits non-starchy vegetables carrots 100% stone ground whole wheat bread legumes
Medium GI Foods - 56 - 69	brown rice basmati rice oats
High GI Foods – 70 or more	white bread corn flakes white rice white pasta pineapple melon

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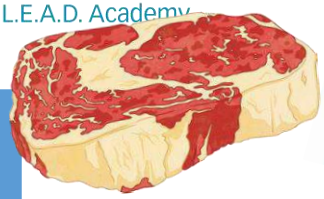
Food and Nutrition – Nutrition



PROTEIN

Proteins are made up of amino acids of which there are:

9 essential	12 non-essential
Body cannot manufacture (make) these.	Can be made by the body.
Must be provided by our diet.	**Low Biological Value**
High Biological Value	**Plants, legumes, grains, nuts, seeds and vegetables.**
Animal sources of protein, such as meat, poultry, fish, eggs, milk, cheese and yogurt.	**Complementary Proteins**

Revision Tip

Proteins are needed for repair, growth and maintenance. Use a mnemonic like ' Really Good Macronutrient' (RGM)

Protein
(4kcal per gram)

Combining two or more LBV protein foods can provide the essential amino acids found in a meat dish:

baked beans on wholemeal toast
dhal with rice
hummus and pitta bread

Kwashiorkor

Deficiency

Symptoms of protein deficiency include:

- wasting and shrinking of muscle tissue;
- oedema: build up of fluids (especially in feet and ankles);
- anaemia: blood cannot deliver enough oxygen to the cells often caused by a lack of iron;
- slow growth in children.

Excess

Too much protein can put pressure on the liver and kidneys (the organs which help process the protein).

Keyword	Meaning
Amino Acid	Proteins are made up of Amino acids- these can be thought of as the building blocks of the body
High Biological Value	HBV Proteins contain all of the essential amino acids we need
Low Biological Value	LBV proteins are missing one or more of the essential amino acids we nee.
Protein Complementation	If we don't get enough HBV protein we can combine different LBV proteins to get all of the essential amino acids in our diet

Protein Alternatives	
Soya	• plant-based HBV source • used to make soya milk • processed to make tofu and TVP
TVP	• textured vegetable protein • made from soya beans • soya flour makes a dough • when baked has a meat-like texture • can be made into sausages, burgers and ready meals
Mycoprotein	• Quorn • made from a mushroom like fungus and egg white • vegan alternatives use potato starch • can be turned into mince, chunks and fillets
Tofu	• made by curdling soya milk • soft texture used for dips and desserts • firmer texture used in stir fries

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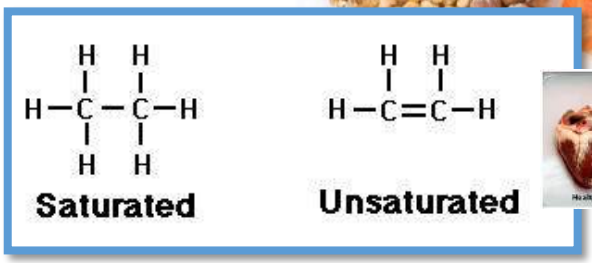
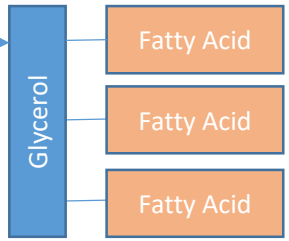
Food and Nutrition– Nutrition



Fats are made up of **Fatty acids** and **glycerol** in the form of **triglycerides.**
Fatty acid chains are made of **carbon** and **hydrogen.** They can be **saturated** or **unsaturated-** the difference is in how **carbon atoms** bond with **hydrogen atoms.**

A triglycerides



RDA – Fat should make up less than 35% of our daily food energy. No more than 11% should be from Saturated fats. It is recommended that an average adult consume 70g of fat.

Deficiency
Fat-soluble vitamins cannot be processed in the body, leading to health issues revolving around lack of vitamins (A, D, E, K).

Less fat means less insulation to keep the body warm and a thinner protective layer under the skin to protect the body from knocks and falls.

Lack of carbohydrate means the body uses the fat as an energy store, which can result in weight loss.

Excess
An excess of fat in the diet can cause weight gain. Over time, this can lead to obesity, which in turn puts the body at risk of diabetes, heart disease, strokes and some cancers.

Fats
(9kcal per gram)

RDA – Dietary fibre
Children aged 2-5 = 15g
Children aged 6-11 = 206
Children ages 11-16 =30g
Adults = 30g

Dietary Fibre

Keyword	Meaning
Insoluble fibre	is not easily broken down by the digestive system. It passes through the body unchanged, keeping the bowels healthy and preventing digestive problems such as constipation and haemorroids.
Soluble fibre	is broken down by bacteria in the bowel to be digested. It can help reduce cholesterol in the blood and guard against coronary heart disease.

Fats

Keyword	Meaning
Saturated	considered the unhealthiest if eaten in large amounts- often from animal sources
Unsaturated	healthier fats, usually liquid at room temperature, help promote healthy cholesterol
Visible fats	Those you can see, such as butter and lard.
Invisible fats	Fats hidden within products, such as milk, cheese and other dairy items.
Monounsaturated	Monounsaturated fats contain one C=C double bond in their carbon chains
Polyunsaturated	Polyunsaturated fats contain more than one C=C double bond in their carbon chains
Omega 3 + Omega 6	are polyunsaturated fats and are classed as 'good' and 'essential' as they cannot be produced by our bodies.
Cholesterol	is a waxy substance which circulates in the blood. It is used by the blood to carry lipoproteins, which take the cholesterol between cells. The body needs a balance of good and bad cholesterol.
Low Density Lipoproteins (LDL)	are often called 'bad cholesterol'. High levels build up in the arteries, meaning a higher risk of heart disease.
High Density Lipoproteins (HDL)	are often called 'good cholesterol'. They carry cholesterol from around the body to the liver, which processes cholesterol out of the body.

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Food and Nutrition – Nutrition

Fat Soluble	Needed For	Found In	Deficiency
A Antioxidant	Vision	Dairy Products Dark Green Veg Orange coloured fruit and veg Fish Oils and Liver	Poor vision
D	Bone growth	Fish Oils Dairy Products Sun Light Absorption	Rickets Osteomalacia
E Antioxidant	Protect tissue	Dairy Products Dark Green veg Nuts	Age quickly Wrinkles Skin loses elasticity
K	Blood clotting	Dark Green Veg Fish, liver, fruit	Haemorrhages

Water Soluble	Needed For	Found In	Deficiency
C Antioxidant	Normal structure and function of connective tissue Antioxidant (protects from free radicals) Helps absorb iron	Main sources from plants – fruits and vegetables. Milk and liver contain small amounts.	Scurvy
B1 Thiamin	Normal function of the nervous system and heart	Whole grains, meat, flour and breakfast cereals.	Beri-beri (disorder of the nervous system).
B2 Riboflavin	Release of energy from food	Milk, eggs, green vegetables.	Dry cracked skin around the mouth and nose.
B12	Cell division and blood formation Normal structure of nerves	Animal sources – milk, meat and eggs. Some algae and bacteria can produce B12.	Anaemia (rare), may be found in vegetarians.

Iron

Iron is important in making red blood cells, which carry oxygen around the body.
A lack of iron can lead to iron deficient anaemia.
Women who lose a lot of blood during their monthly period are at higher risk of iron deficiency anaemia and may need to take iron supplements.

Sodium

Salt is also called sodium chloride.
Too much salt can raise your blood pressure, which puts you at increased risk of health problems such as heart disease and stroke.
Sometimes, food labels only give the figure for sodium. There is a simple way to work out how much salt you are eating from the sodium figure:
Salt = sodium x 2.5
Adults should eat no more than 2.4g of sodium per day,
as this is equal to 6g of salt.

Calcium

Calcium has several important functions.
These include:
- helping build strong bones and teeth
- regulating muscle contractions, including heartbeat
- making sure blood clots normally

A lack of calcium could lead to a condition called rickets in children and osteomalacia or osteoporosis in later life.
Taking high doses of calcium (more than 1,500mg a day) could lead to stomach pain and diarrhea.

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BTEC Sport, Unit 1; Fitness for sport and exercise.

Components of Physical fitness:

Speed = The ability to perform a movement or cover a distance in a short period of time = distance/time taken. Measured in metres per second.3 types of speed – accelerative (up to 30m), pure speed (up to 60m) and speed endurance (sprints with a short recovery time in between)

Aerobic endurance = It is the ability of the cardio-respiratory system to efficiently supply nutrients and oxygen to working muscles during sustained physical activity. It is used mainly for low intensity exercise that lasts for a long time.

Muscular strength = The maximum force a muscle or muscle group can produce. (Measured in N or KG)

Muscular endurance = It is the ability of a muscle or group of muscles to keep contracting over a period of time against light to moderate load. It is the ability of the muscles to keep repeating the same action and keep working efficiently.

Body composition = This is the relative ratio of fat mass to fat-free mass (vital organs, muscle, bone) in the body.

Flexibility = Having an adequate range of motion in all joints of the body. It is the ability to move a joint through its complete range of movement.

Pink Cars Race Around Butterfly's

Super Angry Monkeys make Banana's Fall.

Components of Skill related fitness:

Power = The work done in a unit of time.
It is the ability to apply a combination of strength and speed.
Power = Force (kg) x Distance (m)/time (min or s)
This is expressed as kilogram-metres per min (kgm/min) or kilogram-metres per second (kgm/s)

Coordination = The smooth flow of movement needed to perform a task efficiently and accurately. It often involves being able to use 2 or more body parts together.

Reaction Time = The time taken for a sports performer to respond to a stimuli and the start their response.

Agility = The ability of a sports performer to quickly and precisely move or change direction without losing their balance.

Balance = The ability to maintain your centre of mass over a base of support.
Static balance means being balanced without movement.
Dynamic balance means staying balanced while moving.

YOU MUST KNOW THESE DEFINITIONS

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BTEC Sport, Unit 1; Fitness for Sport and Exercise.

Basic Principles of Training

F **Frequency** = how often you train.
You could increase from training twice a week to training three times a week.

I **Intensity** = how hard you train. Intensity can be prescribed using HR or RPE
You could increase the weights you lift or raise heart rate to a higher level when exercising.

T **Time** = how long you train for. You could increase the time you train from 20 minutes to 25 minutes.
You could increase the time you train from 20 minutes to 25 minutes.

T **Type** = type of activity.
How you train. The appropriate method/s of training should be selected according to your needs and goals. For example if you wanted to increase muscular strength you may choose to do weight training

Exercise intensity and how it can be determined:

- Exercise intensity: how hard an individual is training.
- Heart rate: the amount of beats your heart makes in 1 minute.
- The lower and upper rate you should be training between for aerobic endurance is: Lower = 60% and upper = 85%
- Maximum heart rate (HR max) = 220 – age (Years)
- RPE (rating of perceived excursion) is another The RPE (rating of perceived exertion) can be used to predict the exercise HR (heart rate) of an individual by:
- RPE x 10 = HR(bpm)

Maximal; training or testing at your highest level.

Sub- Maximal; training or testing below your highest level.

Additional Principles of Training

Progressive Overload – In order to progress, training needs to be demanding enough to cause the body to adapt, improving performance. Overload can be achieved by using the FITT principles

Adaption = this occurs during the recovery period after the training session is complete. Adaption is how your body increases its ability to cope with training loads

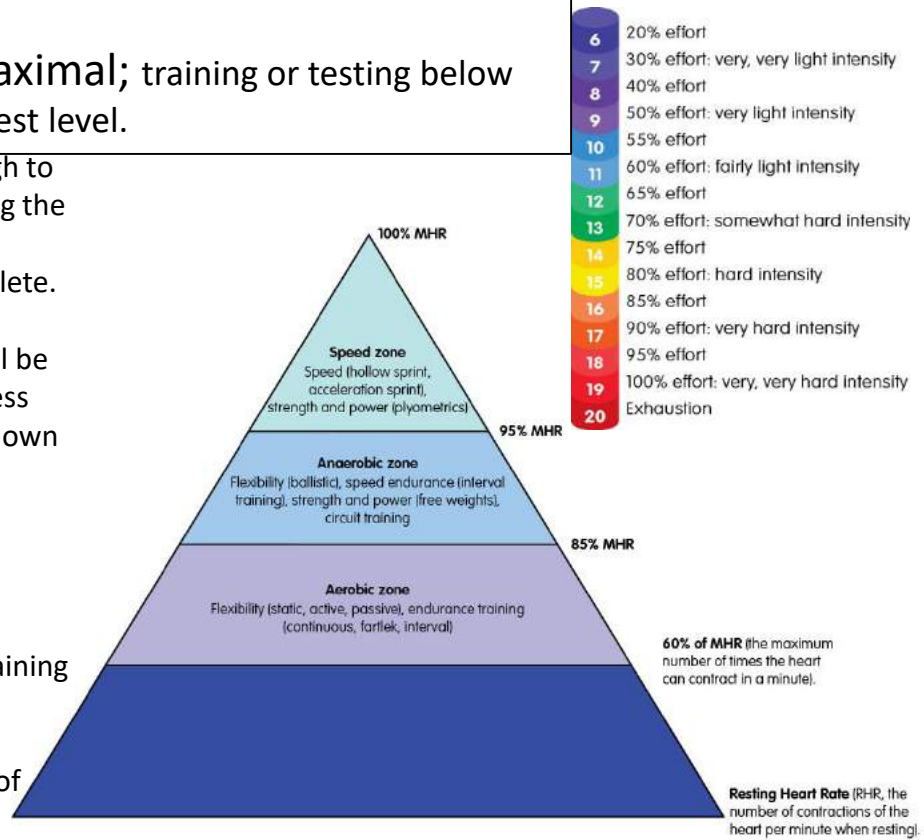
Reversibility = any improvement in fitness that takes place as a result of training will be reversed when a person stops. If you are unable to train due to injury or illness fitness levels will decrease. Also known as de-training. If muscles get smaller then this is known as atrophy.

Individual differences/needs = the programme should be designed to meet your training goals, needs, ability, level of fitness, skill level, and exercise likes/dislikes.

Specificity = training should be specific to the individual's sport, activity or physical/skill related fitness goals to be developed

Variation = boredom can lead to a decrease in motivation to train so try to make training fun.

Rest and recovery = these are essential to allow the body to repair and adapt, with renewal of body tissues. If your body doesn't get a chance to recover then the rate of progression can be reduced.



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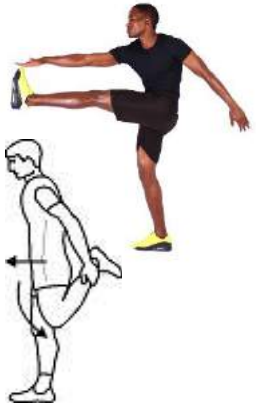
BTEC Sport, Unit 1; Fitness for Sport and Exercise.

Flexibility training:

● **static:** there are two types of static flexibility training. Firstly active stretching, which is performed independently where the performer applies internal force to stretch and lengthen the muscle. The second is passive stretching, also known as assisted stretching, which requires the help of another person or an object such as a wall. The other person/object applies external force causing the muscle to stretch.

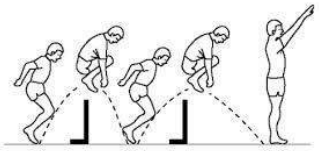
● **Ballistic**: this is where the performer makes fast, jerky movements through the complete range of motion, usually in the form of bobbing or bouncing. Ballistic stretching is specific to the movement pattern of the sport/activity to be performed. It needs to be undertaken with care a the technique can cause muscle soreness and strains.

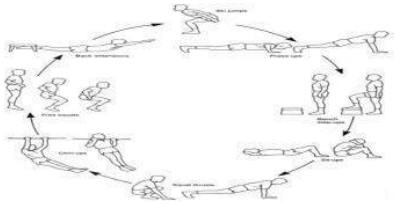
● **Proprioceptive Neuromuscular Facilitation (PNF)** technique: this is used to develop mobility, strength and flexibility. The technique may be performed with the help of a partner or alternatively by using an immovable object (as resistance to inhibit movement).



Strength, muscular endurance and power training

- circuit training: this is where different stations/exercises are used to develop strength, muscular endurance and power. The stations/exercises use different muscle groups to avoid fatigue.
- Free weights: = use of barbells or dumb-bells to perform different types of dynamic exercises
- Resistance machines - push and pull
- Use when training for strength (low reps and high loads), use when training for endurance (high reps and low loads)
- Training for strength endurance (50–60% 1RM and 20 reps – repetitive movements of a muscle or muscle group)Training for elastic strength (75% 1RM and 12 reps – for producing movements in very close succession, like in gymnastics) Training for maximum strength (90% 1RM and 6 reps – producing a single movement against a resistance/load), reps, sets, rest period.
- Plyometrics: this type of training develops sport-specific explosive power and strength. It is used by sports performers such as sprinters, hurdlers, and netball, volleyball and basketball players. Plyometric exercises need maximal force as the muscle lengthens (eccentric action) before an immediate maximal force as the muscle shortens (concentric action). Types of exercises include lunging, bounding, incline press-ups, barrier hopping and jumping. This type of training needs to be performed carefully because it can cause muscle soreness.





Aerobic endurance training:

● **continuous training**: this is training at a steady pace and moderate intensity for a minimum period of 30 minutes.

● **fartlek training:** this is where the intensity of training is varied by running at different speeds or over different terrain. The training is continuous with no rest period.

● **interval training:** this is where the individual performs a work period followed by a rest or recovery period.

● **circuit training:** this is where different stations/exercises are used to develop aerobic endurance. The station order/order of exercises is important to ensure different muscle groups are used to avoid fatigue. The number of stations, time spent at each station, number of circuits, rest period between exercises and number of circuit sessions per week can be varied.

Maximal, Sub MaxiamalSafety, Correct Technique, Warm up, Cool

BTEC Sport, Unit 1

Speed training:

● **hollow sprints**: a series of sprints separated by a 'hollow' period of jogging or walking.

● **acceleration sprints.** This is where the pace is gradually increased from a standing or rolling start to jogging, then to striding, and then to a maximum sprint. Different drills can be used, such as resistance drills and hill sprints. Rest intervals of jogging or walking are used in between each repetition.

● **interval training:** the individual performs a work period followed by a rest or recovery period. For speed training, the work intervals will be shorter and more intense – performed at a high intensity, close to maximum. Increase the number of rest periods and increase work intensity to develop speed

Aerobic endurance training:

● **continuous training**: this is training at a steady pace and moderate intensity for a minimum period of 30 minutes.

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Body Composition

Skin Fold Calliper, %

Body Mass Index, BMI, KG/m2

Bioelectrical impedance Analysis, BIA

Aerobic Endurance

Forestry Step test, Ml.Kg.Min

Multistage fitness test, Ml.Kg.Min

VO2 max (ml/kg/min): maximum amount of oxygen uptake, measured in ml of oxygen per kg of body mass per minute.

Flexibility

Sit and reach, CM

Speed

35M sprint test, S

Illinois agility test, S

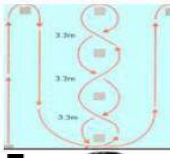
Validity

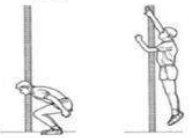
"refers to the test measuring what it claims to measure"

FITNESS TESTING

Reliability

"requires that the test should produce similar results each time the test is taken"





Agility

Illinois Agility test, S

Power

Vertical Jump test, KgM/S

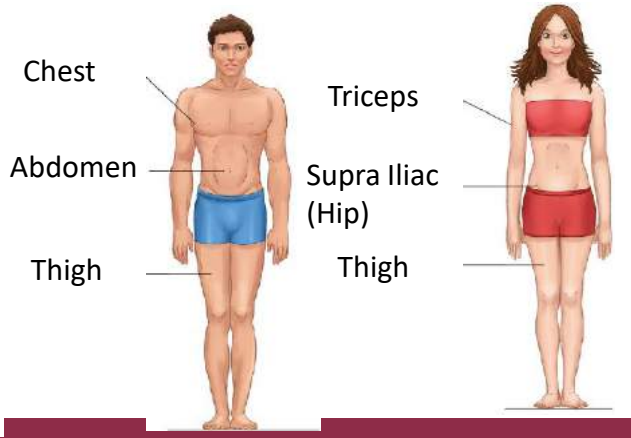
Muscular Endurance

One minute sit up test, Rep/min

One minute press up test Rep/min

Practicality

- Cost
- Number of participants.
- Ease of completion
- Time



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Music – Unit 2; Managing a Music Product

Learning Aims for this Unit:

A Plan, develop and deliver a music product
B Promote a music product
C Review the management of a music product.

Planning Factors:
Target audience – Who is the event aimed at?
Artistic intention – As performers/a production team, what do we want to achieve?
Type of venue – Where will the event be held?
Purpose – Does is have a theme? What is the reason for the event?
Selection of repertoire – What items will be in the show?
Technical aspects of the venue – Think about the size, type of venue, location, equipment and resources available, health and Safety?
Availability and allocation of technical support – Have you thought who will run the equipment on the night and during rehearsals?
Time constraints – How long will it take to set up, when do you need to have rehearsals, what is the length of performance?
Availability of performers and other personnel – Do we have the performers we need? Are all job roles covered?
Awareness of copyright issues – What licenses do we need?

Key Terms	Definitions
RISK ASSESS	Workout the potential for harm and determine safe practice
COLLEAGUES	A person you work with in a professional setting
TIMEKEEPING	Being punctual/being on time
DEADLINES	The time/date when a task needs to be completed by
REHEARSAL	Practising before a performance
REPERTOIRE	Items a performer prepares for a concert
PROFESSIONAL	Being skilful and assured
CONSTURCTIVE	Having a useful purpose
POSITIVE	Being constructive, optimistic and confident
CONSISTENT	Keeping something up over time
SIGNIFICANT	Important, being worthy
CONTRIBUTION	Working with others to bring together a result
TIMESCALES	The time allowed to be taken

How is this unit marked?

PASS – You make a POSITIVE CONTRIBUTION throughout, you DESCRIBE in your review.
MERIT – You make a CONSISTENT CONTRIBUTION throughout, you EXPLAIN in your review.
DISTINCTION – You make a SIGNIFICANT CONTRIBUTION throughout, you JUSTIFY in your review.

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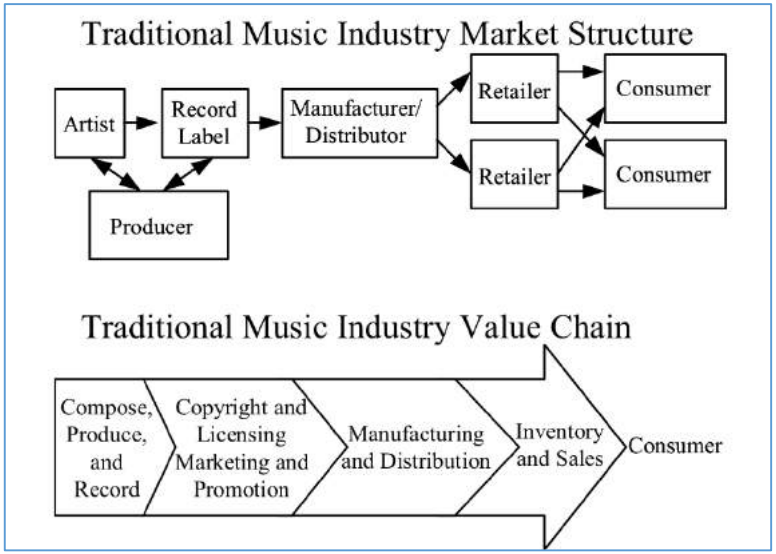
Music – Unit 2; Managing a Music Product

What is Promotion?
Definition: The publicising of a product, organization, or venture so as to increase sales or public awareness.



Online Development with Promotion:

MOBILE DEVICES – iPhone and Android now dominate promotion methods: apps, instant global access, push notifications
STREAMING – Spotify, We7: instant access, subscriptions, adverts, new music, huge library
SOCIAL MEDIA – Facebook, Instagram: Band/artist posts, videos, fan pages, discussion forums etc.
ONLINE DISTRUBUTION – iTunes: search a huge library, pay and download music to keep. No need to visit stores or buy physical copies of albums.

Measuring the success of Promotion:
- **Sales: tickets, merchandise, albums**
- **Audience interest: sharing online material, becoming a talking point**
- **-Audience response: reviews, customer feedback, reactions**
- **Attendance: Do people turn up to the event at the right time and location? Did they have the right information**

MUSIC
Download on the App Store
YouTube
amazon.com
iHeartRADIO
GET IT ON Google Play
SOUNDCLOUD
Spotify

Methods of Promotion:

-Websites
-Social Media
-Leaflets
-Posters
-News/Media
-Radio/TV
-Merchandise

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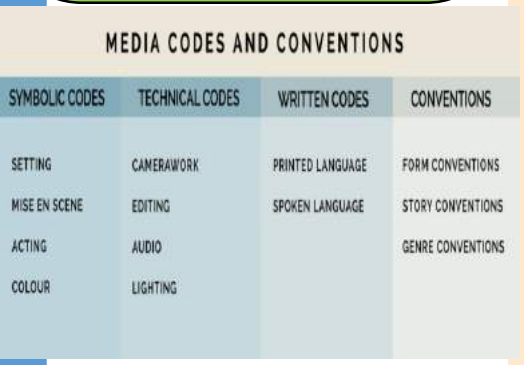
Film Studies 2020-2021 Term 1

Film Form

Codes and Conventions

Media codes and conventions are like the building blocks of all the media around us. **Media codes** generally have an agreed meaning, or connotation, to their audience. There are three types of media codes, **symbolic codes**, **technical codes** and **written codes**. **Conventions** are expected ways in which codes are organised in a product.



Cinematography:

- **Camera Angles- Close up and Extreme Close up, POV shot, Mid shot, Long shot, High angle, Low angle.**
- **Camera Movement- Pan, Crane, Track, Roll, Tilt, Frame**
- **Lighting and Colour**

Editing:

- **Jump Cut**
- **Fade**
- **Dissolve**
- **Straight Cut**
- **Style**
- **Fast/Slow/ Speed**
- **Graphic Matching**
- **Wipe**

Mise En Scene:

- Costume
- Hair
- Make up
- Setting
- Props
- Positioning in the Frame

Sound:

- Parallel and Contrapuntal
- Ambient
- Diegetic
- Non- Diegetic Sound
- Sound Bridges

What we will be studying:

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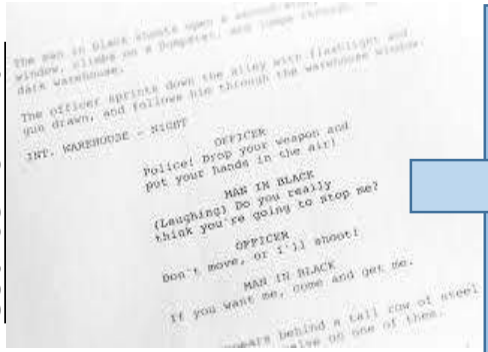
Coursework Plan



The man in black shoots open a second door, window, climbs on a Dumpster, and jumps through. dark warehouse.

The officer sprints down the alley with flashlight and gun drawn, and follows him through the warehouse window.

INT. WAREHOUSE - NIGHT

OFFICER
Police! Drop your weapon and put your hands in the air!

MAN IN BLACK
(Laughing) Do you really think you're going to stop me?

OFFICER
Don't move, or I'll shoot!

MAN IN BLACK
If you want me, come and get me.

behind a tall row of steel

one of them.

For your coursework, you will have to create a portfolio of the following based on as genre of film:

- ❑ Planning Sheet according to the brief
- ❑ Script
- ❑ Shooting Script
- ❑ Storyboard
- ❑ Evaluation

Term 1

1. **Film Form**
2. **Contemporary Global Film -UK British**
3. **Production - Planning**

British UK Global Contemporary Film

Skyfall, 2015, Sam Mendes, UK

Representation of age/tradition vs youth/ modernity: a core theme of the film is whether Bond, M and their agency is 'out of step' with the more technological threats of the modern world. Are they "dinosaurs" (how she branded Bond in her first film as M), powerless to the point of incompetence? This theme is made explicit when Bond meets the new, youthful Q in the National Gallery and they interpret a Turner painting differently: Q sees a "once great ship towed to the junkyard", whilst 007 ignores complexity and nuance: "I just see a bloody great big ship". Is his blunter, straightforward approach what is actually needed to defend against the 'new breed' of cyber-criminal?

Skyfall is similar to two other successful franchises that were 're-booted' around the same time: Batman (in Nolan's Dark Knight Trilogy) and Star Trek. All three take familiar characters that have grown almost comical, and add depth, humanity and darker, more complex themes. They also cleverly balance fresh perspectives and elements with iconography that is familiar to fans. In Skyfall, the references to Bond's past haunting the present becomes a source of danger (Silva) and power: his Walther PPK gun, the Aston Martin, with the Skyfall estate of his childhood a fresh element that provides back-story.

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Child Development - Unit 3: The Principles of Early Years Practice

Learning Aim A: Understand the Importance of Inclusive Practise in Early Years Settings

Inclusive practice ensures that all children are supported and given equal opportunities to succeed regardless of age, disability, race, background, gender or lifestyle

Benefits of Inclusive Practice

1. Positive self image – affects confidence, motivation and positive attitudes towards others
2. Developmental benefits - needs identified early & support put in place
3. Opportunities to play & socialise – with others developing social & emotional skills
4. Development of self efficacy – confidence to try new activities & cope in new situations
5. Emotional wellbeing – as a result of being accepted and cared for
6. Positive health outcomes – health & physical needs met
7. Positive attitudes towards others – by observing how people are treated

Non-Inclusive Practice

1. Poor self image – result of feeling unwanted and inferior
2. Low self efficacy – learnt helplessness
3. Delayed development – late identification of needs or needs not met
4. Poor health outcomes – health & physical needs not met
5. Lower educational outcomes – needs not met so skills & knowledge not developed as well

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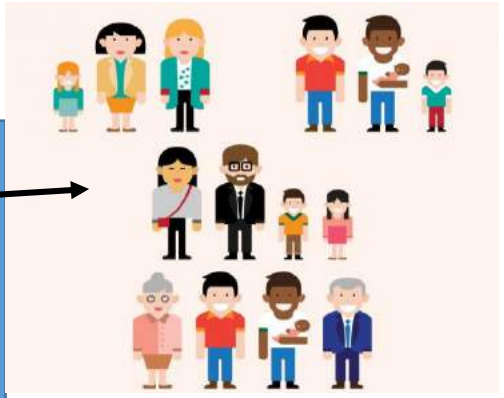
Child Development - Unit 3: The Principles of Early Years Practice

Learning Aim B: Explore Ways in Which Early Years Settings Implement Inclusive Practice

1. Adopting a non-judgemental attitude
2. Implementing a welcome environment
3. Using/displaying resources that reflect a children's lives and diversity
4. Strong relationships with children & their families
5. Adapting provisions to meet children's individual needs
6. Keeping children safe
7. Establishing routines
8. Adults are consistently positive role models



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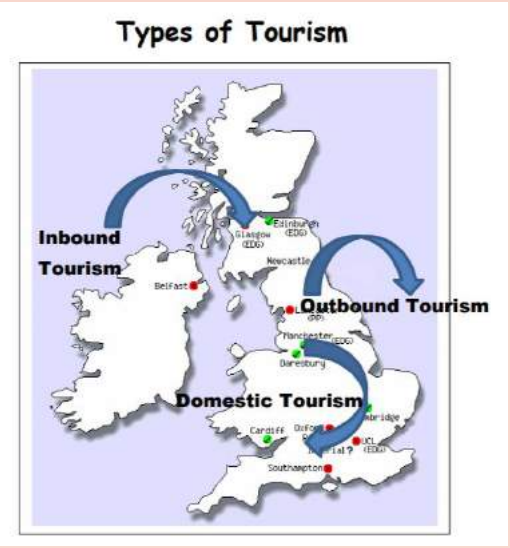
Travel and Tourism - Unit 1 Key Facts

What are the different types of tourism?



Why do people travel? LEISURE TRAVEL

Leisure travel: Travelling to relax and enjoy yourself, outside of work hours.

- **Day trips**, visiting an attraction and returning home in one day.
- **Short breaks**, less than 4 nights away from home.
- **Holidays**, a period of rest and pleasure away from work, usually 1 week but could be longer, usually during school holidays.
- **Visiting Friends and Relatives (VFR)**, travel to get together with friends and family
- **Staycations**, a holiday spent at home or in your hometown doing activities or going on trips that there isn't normally time for because of work.
- **Special Events**, a one-off or repeated event that people travel to specifically attend; such as concerts, festivals, football matches.

Why do people travel? BUSINESS TRAVEL

Why do people travel? SPECIALIST TRAVEL

- Adventure tourism
- Cultural/heritage
- Health tourism
- Education
- Volunteer Tourism
- Dark tourism
- Eco-tourism
- Conservation

What is SUSTAINABLE TOURISM?

- Meeting the needs of the present population whilst protecting natural, historic and cultural resources for the future.
- Environmental factors:
  - Make best use of natural resources
  - Protect the environment
  - Protect wildlife
- Social/cultural factors:
  - Be good for the country and local people
  - Improve local quality of life
  - Protect traditions/traditional way of life
- Economic factors:
  - Make money for local people
  - Make jobs for local people
  - Improve life for the poor

What are the benefits of sustainable tourism?

- It helps to protect the environment
- It reduces the amount of energy used, e.g. electricity, petrol
- It reduces the amount of waste created
- t creates links with the local community
- It makes businesses more competitive
- It improves the image of businesses
- It saves business money

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Travel and Tourism - Unit 1 Key Facts

How important is tourism to the UK economy? EMPLOYMENT

- Direct employment
  - Jobs that are created by the travel and tourism industry, for example airline cabin crew, train driver, travel agent
- Indirect employment
  - Jobs that are created to SUPPLY and SUPPORT the travel and tourism industry, for example the baker who supplied pastries to the hotel, the mechanic who fixes coaches used by the tour operator etc.

How impoerant is tourism to the UK economy? GDP

- GDP stands for Gross Domestic Product
- It is the total value of goods and services bought and sold over a set period – usually a year.
- Tourism is worth around £250bn in a normal year
- It is very important to our GDP

What is the TOURISM MULTIPLIER EFFECT?

- This is where tourism has an impact not just on the place the tourist is visiting, but upon other people/places nearby. For example:
  - A new hotel opens up
  - They pay a local laundrette to clean their sheets
  - The new launderette employs a new member of staff for this job
  - That member of staff spends more money in local stores
  - Local store owners benefit through increased income

What is a TOUR OPERATOR?

- A company which takes the separate elements of a holiday, and packages them together to be sold to a customer.
- A tour operator may typically sell you a package which includes:
  - A flight to your destination
  - Transfers between the holiday airport and the holiday accommodation
  - Holiday accommodation and services
- Tour operators can be DOMESTIC (UK holiday), OUTBOUND (holidays abroad for UK tourists), and INBOUND (holidays in the UK for foreign tourists)

What is a TRAVEL AGENT?

- The travel agent is the place from where the tour operator's package can be purchased, or, you can buy the different elements and other elements of the holiday from them.
- For example, you could buy the package holiday mentioned previously from the Travel Agent, who may then also sell you:
  - Travel insurance
  - Foreign currency
  - UK airport parking
  - Car hire whilst abroad
  - Attraction tickets
- The may be MULTIPLES (lots of branches, e.g. Hayes Travel), INDEPENDENTS (one-off independent retailers) or ONLINE (web presence only, e.g. Expedia)

What are the advantages and disadvantages of using online travel services?

Advantages of Online Travel Services	Disadvantages of Online Travel Services
• Easy for the customer to book their holiday when they want 24/7 availability • Customers can compare products and costs of services of lots of holiday providers. • Easy to make up the holiday that matches your own needs. • You find out instantly what is available, making it easy to get last minute deals. • Offers of Blogs for further information	• No expert help, no one to talk to for advice. • Limited choice of itinerary. • Lack of security online can lead to credit card theft or identity theft. • Customer has to sort out their own problems if something goes wrong. • It is easy to miss things when you book yourself e.g. transport to and from the airport, insurance etc. • Difficult for group bookings

What is road travel?

- Most domestic travel takes place by road, usually by car or by coach

Advantage of Road Travel	Disadvantages of Road Travel
• Cars can stop whenever they want • They can take more luggage • There are not many toll roads (ones you have to pay to travel on) in the UK • You can listen to your own music-as loud as you want! • These days navigation is easy if you have a sat nav device.	• Fuel is expensive • There is a lot of traffic which slows you down • It is hard for inbound tourists who have to get use to driving on the opposite side of the road. • You have to concentrate to avoid accidents, (there are more road accidents than other forms of travel), this is tiring for the driver.

How popular is rail travel in the UK?

- Rail travel tends to be very popular in the UK for both local and long distance journeys. Our stations tend to be centrally located and the network is comprehensive

Advantages of Rail Travel	Disadvantages Of Rail Travel
• Very comfortable (especially first class) • You can get almost everywhere by rail. • You can sleep, read and work while travelling. • There is a very good safety record • You can buy food and drink, there is a toilet and some have a restaurant. • Most now have charging facilities and WiFi	• It is expensive • Prices can be very confusing • Changes can be difficult for foreign travellers. • Sometimes you have to change train a few times to get to where you want to go, this can be difficult with a lot of luggage or children. • Can be very busy and noisy. • Trains can be cancelled and delayed.

Is air travel all the same?

- Air travel is the most popular way to travel long distances, and the price of air travel (versus other items, such as petrol or groceries) has fallen in recent decades.
- SCHEDULED FLIGHTS operate to a regular fixed timetable and travel between major airports and provide some services – e.g. Air France
- LOW COST AIRLINES offer very limited services and charge for most 'extras' such as refreshments, suitcases. They sometimes fly from less well-known airports
- CHARTER FLIGHTS one company pays the airline to operate the entire flight. Timetables may be irregular

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Travel and Tourism - Unit 1 — Key Facts

What types of sea travel exist?

- Most people who travel by sea from the UK g on short ferry crossings, e.g. Dover to Calais or Holyhead at Dublin.
- Some crossings are longer (e.g. Portsmouth to Santander in Spain takes 24 hours)
- Most ferries accept cars and lorries/coaches
- Some people travel onboard as 'foot passengers;
- Some ferries are fast – e.g. Seacat Catamarans
- A small number of hovercraft services still operate – passenger only between Southampton and the Isle of Wight.

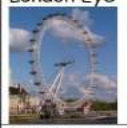
What types of ACCOMMODATIONS to tourists tend to stay at?

- Serviced accommodation
  - Hotels
  - Motels
  - Guest houses/B&B's
- Non-serviced Accommodation
  - Self Catering (e.g. apartments)
  - Youth Hostels
  - Caravans and campsites
  - Holiday parks

What are the main purposes of VISITOR ATTRACTIONS in the UK?

- Entertainment – many purpose built visitor attractions are designed to give people a fun experience
- Education – some purpose built visitor attractions are there to educate people about the past, present or future.
- Leisure and recreation – the natural environment creates a place for outdoor activities e.g. climbing. Some leisure places are built for relaxation or healthy activities e.g. spa
- Conservation – these are attractions designed to protect the natural environment. They can also provide education and enjoyment
- Visitor Attractions provide a range of products and/or services; These include information and interpretation for people who cannot speak English, rides, exhibits, events, tours and guides, educational talks, hospitality and catering and souvenirs.

What types of visitor attractions exist in the UK?

Type of attractions	Definition	Example 1	Example 2	Example 3
Natural attraction	A natural feature of the environment that is interesting to tourists. Some natural areas have been built to help protect the environment.	National Park	Dorset coast	Amazon rainforest
Purpose built attraction	A man-made attraction that has been built to attract tourists	London Eye 	Alton Towers	Chester zoo
Heritage attractions	Attractions associated with history and/or culture. These can include: 1. Historic buildings or historic coastlines that were NOT built for tourists in the past however, they do attract tourists due to their history. 2. Places that contain pieces of history. E.g. museum. Heritage tourism may also help protect traditions and historic features.	Windsor Castle	Manchester museum	Stone Henge

Why else would people visit the UK?

- ARTS AND ENTERTAINMENT
  - Mega events (e.g. the Olympic Games)
  - Hallmark Events (regularly scheduled special events, e.g. Chelsea Flower Show)
  - Major Events (those which attract national TV coverage, e.g. the Grand Prix)
  - Local Events (which people in a specific area may know of, e.g. Derby Carnival
- FESTIVALS are events which occur (usually) once per year and celebrate something special
- THEATRE: Drama, comedy, plays, musicals, ballet etc.

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Travel and Tourism - Unit 1 Key Facts

Who leads and regulates the UK tourism industry?

Trade organisation (Letters)	Full name of the trade organisation	What they do.
CAA	Civil Aviation Authority	• Regulate aviation (flying) • Make sure that the air is managed safely and customers are protected.
ATOL	Air Travel Organisers' Licence	• Financial protection scheme. • Run by CAA. • Ensures that travellers do not lose their money or become stranded abroad.
ORR	Office of Rail Regulation	• Regulates health and safety on Britain's railways. • Makes sure customers are treated fairly and gives taxpayers value for money.
ABTA	Association of British Travel Agents	• Regulates British travel agents and tour operators. • Ensures that customers receive a high standard of service. • Has a fund to help repatriate stranded holidaymakers.
AITO	Association of Independent Tour Operators	• Represent independent tour operators and travel agents. • They want high levels of customer satisfaction and good quality service.
N/A	UK Inbound	• Their aim is to encourage inbound tourism by helping members manage a successful business.

What are ANCILLIARY ORGANISATIONS?

- These are organisations or companies which can sell you a product to enhance/make better/support a travel experience. For example:
  - Car hire firms like Herz or Europcar
  - Travel Insurance such as Norwich Union
  - Price Comparison Sites
  - Airport Service Providers
  - Event Booking

What types of organisations operate in the UK tourism sector?

- Private: -Most organisations in the travel and tourism industry are privately owned by an individual or partners or by a group of people called shareholders. The main function is to make a profit, which can then be paid out to shareholders or kept by the owner. Profits can be made by selling more holidays, flights or other tourism products and services. Examples include; TuI, EasyJet, Haven and Hilton. Theme parks, travel agents and tour operators are all privately owned.
- Public: - Public sector organisations are run by the government. Their primary aim is to not make a profit; instead they exist to provide a service to the community by informing, educating and advising the customer
- Voluntary:- These organisations are often charities. They do not try to make a profit any money made funds their cause. They get their money from merchandise (things sold in shops), donations and grants. Some exist to educate the public, to promote a cause, educate and inform

What is HORIZONTAL INTEGRATION?

- HI is where a company in the travel and tourism sector buys-out, merges, or forms a company at a different stage in the holiday chain.
- For example, a travel agent may buy a tour operator, who has an airline, and between them, then invest in a chain of hotels and bring it all under one name/brand

What is VERTICAL INTEGRATION?

- VI is where a company buys another similar one in order to make it bigger/more dominant.
- This can reduce competition and force prices up.
- In the early 2000s, Ryanair (the largest airline at Stansted) purchased an airline called BUZZ (the second largest airline at Stansted)

What is COMMON OWNERSHIP and BUSINESS PARTNERSHIP?

- Common ownership is where one company owns multiple different organisations.
- Business partnerships see companies owned by different owners work in partnership with each other

What are the advantages of common ownership and business partnerships?

Advantages of Common Ownership and Commercial Partnerships

- Increases sales and money coming in due to more efficient business operations.
- Marketing and promotion (advertising) efforts are doubled, increasing customer and trade recognition (more people know who they are).
- Combined expertise helps companies to provide good customer care.
- Gives them more power over suppliers (because they are buying more, suppliers don't want to lose them as customers so make their prices cheaper).
- Enables greater economies of scale (when making larger quantities of one thing it costs less to make each one), this happens because they are selling more of the same product
- Shared resources (things all the business can share)
- Wider customer base (more customers).

What are the disadvantages of common ownership and business partnerships?

Disadvantages of Common ownership and commercial partnerships:

- Size of operation, it becomes too big to manage properly.
- Less competition means that the customer has less choice.
- Loss of personalised customer care
- The company ends up monopolising the market (having most of the customers) so it has more control over the whole industry.
- Inflexibility, not easy for them to change products to meet changing customer wants and needs.
- Can lead to large scale redundancies (people losing their jobs) if the company decides to close branches and offices

How can consumer technology benefit the industry?

- Online bookings – available 24/7
- Virtual tours
- Online check-in for flights etc
- Self-service ticketing machines
- M-Tickets/E-Tickets
- Websites

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GCSE Statistics – Key Definitions

1 Collection of data

Types of data

- **Quantitative** data is numerical observations or measurements.
- **Qualitative** data is non-numerical observations.
- Quantitative data can be either continuous or discrete.
- **Continuous data** can take any value on a continuous numerical scale.
- **Discrete data** can only take particular values on a continuous numerical scale.
- **Categorical data** can be sorted into non-overlapping categories.
- **Ordinal data** can be written in order or can be given a numerical rating scale.
- **Bivariate data** involves pairs of related data.
- H **Multivariate data** involves sets of three or more related data values.
- **Primary data** is collected by, or for, the person who is going to use it.
- **Secondary data** has been collected by someone else.

Sampling

- A **population** is everything or everybody that could possibly be involved in an investigation.
- A **census** is a survey or investigation of a whole population.
- If a sample is not representative of a whole population, it is **biased**. A sample that is selected unfairly or that is too small can bias the results. In general, the larger the sample, the more reliable the results.
- The **sampling units** are the people or items that are to be sampled.
- The **sampling frame** is a list of the people or items that are to be sampled.
- H The **Petersen capture–recapture** formula is $N = \frac{Mn}{m}$ or $\frac{m}{n} = \frac{M}{N}$
- In a **random sample,** every member of the population has an equal chance of
- A **stratified sample** selects a random sample from each stratum of the population in proportion to the size of that stratum.

Collecting data

- A **questionnaire** is a set of questions designed to obtain data.
- An **open question** has no suggested answers.
- A **closed question** has a set of given answers to choose from.
- A **pilot survey** is conducted on a small sample to test the design and methods of that survey.
- H A **random response method** uses a random event to decide how to answer the question.
- An **outlier** or **anomalous value** is a value that does not fit the pattern of the data.
- Data may be **cleaned** by identifying and assessing extreme values, missing data and errors before it is used.
- In an investigation or experiment, you need to try to control **extraneous variables**. These are any variables that you are not interested in but that could affect the result of your experiment.
- H A **control group** is selected randomly from the population and is not subject to any factors under investigation.
- A **hypothesis** is a statement made as a starting point for an investigation.

GCSE Statistics – Key Definitions

2 Processing and representing data

Recording data

- A **database** is a collection of information.
- A **two-way** table shows information in two categories.
- **Tables** give exact data values for different categories, but do not show trends and patterns as clearly.
- **Bivariate data** has two variables.

Pictograms, bar charts and vertical line graphs

- A **pictogram** uses symbols or pictures to represent a number of items.
- In a **bar chart**, bars are **equal width** with equal spaces between them. The height (or length) of the bar represents the **frequency**.
- A **vertical line graph** is similar to a bar chart, but uses lines instead of bars.
- **Multiple bar charts** have more than one bar for each class. A **key** shows what each bar represents. The frequencies of each category can easily be compared.
- A **composite bar chart** compares data for each category in a single bar, divided into components that show the frequency for each part. A key identifies each component.
  - The **total frequencies** and the frequencies of each component group can be compared.
- **Bar charts** and **vertical line graphs** show trends and patterns in data.

Stem and leaf diagrams

- A **stem and leaf diagram** shows numerical data split into a 'stem' and 'leaves'. The numbers are written in order. A key shows how to combine the stem and leaves to read the numbers.
- A stem and leaf diagram shows the shape of the data distribution in the same way as a bar chart, but retains the original data values.
- A **back-to-back stem and leaf diagram** shows two sets of data with the same stem. The smallest values on each row are always nearest the stem.

Pie charts

- A **pie chart** is a way of displaying data when you want to show how something is shared or divided. Pie charts show proportions but not accurate data values.
- The **area of each sector** of a pie chart is proportional to the frequency it represents. The **area of the whole pie chart** is proportional to the total frequency.
- **Comparative pie charts** are used to compare two sets of data with different total frequencies.
  - The areas of the two circles should be **in the same ratio** as the two total frequencies.
  - To compare the **total frequencies**, compare the **areas**. To compare **proportions**, compare the individual **angles**.

Population pyramids

- **Population pyramids** are similar to stem and leaf diagrams. They show the age groups in a population, usually divided by gender.

Choropleth map

- A **choropleth map** is used to classify regions of a geographical area. Regions are shaded with an increasing depth of colour. A key shows what each shade represents.
- A choropleth map can be a diagram rather than an accurate map.

Histogram

- A **histogram** is similar to a bar chart but, because the data is continuous, there are no gaps between the bars.
- To draw a **histogram for unequal class intervals**, adjust the height of the bars so the **area** of the bar represents the frequency. The height of each bar represents the **frequency density**.
- Frequency density $= \dfrac{\text{frequency}}{\text{class width}}$
- You can compare data from histograms if they have the same class intervals and the same frequency density scales.

Frequency polygons

- A **frequency polygon** joins the midpoints of the tops of the bars of a histogram with straight lines. A frequency polygon may be drawn with or without a histogram.

Cumulative frequency

- **Cumulative frequency** is the running total of the frequencies from each class interval.
- For discrete data, you can draw a **cumulative frequency step polygon**. Plot the cumulative frequencies against the upper class boundaries. Join the steps with straight lines.
- For grouped continuous data, you can draw a **cumulative frequency diagram**. Plot the cumulative frequencies against the upper class boundaries. Join the points with a smooth curve or straight lines.
- Cumulative frequency diagrams can be used to estimate or predict other values.

Distributions

- The **shape of a distribution** is the shape formed by the bars in a histogram, or by a frequency polygon, or by the rows of a stem and leaf diagram.
- A **distribution** can be **symmetrical**, or have **positive skew** or **negative skew**.

Misleading diagrams

- **Three-dimensional diagrams** make comparisons difficult as data proportions appear distorted.
- Diagrams without clear scales, labels or keys may be misleading.

GCSE Statistics – Key Definitions

3 Summarising data

Averages

- When the number of data values, n, is odd the **median** is the value of the $\frac{1}{2}(n+1)$**th** observation. When n is even, the median is the mean of the two middle values.
- **Mean** $= \bar{x} = \frac{\sum x}{n}$
  - $\bar{x}$ is the mean of all the x values.
  - $\sum x$ is the sum of all the x values.
- The **mode** is the data item with the highest frequency.
- The data in a frequency table is written in order. The median is the $\frac{1}{2}(n+1)$th value.
- The **modal class** is the class with the highest frequency.
- For grouped continuous data, or for large data sets, the median is the $\frac{1}{2}n$th value.
- For grouped data, estimated median $= L + \frac{\frac{n}{2} - F}{f} \times w$ where:
  - L is the lower boundary of the class containing the median
  - n is the total number of values
  - F is the cumulative frequency of the intervals before the one containing the median
  - f is the frequency of the median class interval
  - w is the width of the median class interval.
- When all the data values are increased (or decreased) by the same amount or percentage, the averages are increased (or decreased) by the same amount or percentage.

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- Weighted mean $= \frac{\sum(\text{value} \times \text{weight})}{\sum \text{weights}}$

Measures of dispersion

- An **interpercentile range** is the difference between two percentiles.
  An **interdecile range** is the difference between two deciles.
- The standard deviation is a measure of how much all the values deviate from the mean value, or how spread out they are.
- **Standard deviation** $= \sqrt{\frac{1}{n}\sum(x-\bar{x})^2}$ or $\sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$
- The two formulae to calculate the **standard deviation for a frequency table or grouped data** are:
  - standard deviation $= \sqrt{\frac{\sum f(x-\bar{x})^2}{\sum f}}$ or $\sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$

- Summary statistics summarise the data. The mean, median, mode, standard deviation, range and interquartile range are all summary statistics.
- A **box plot** represents the maximum and minimum values, the median and the upper and lower quartiles for a set of data.
- **Range** = largest value − smallest value.
- Interquartile range (IQR) = upper quartile − lower quartile.

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- An **outlier** is any value that is more than 1.5 times the interquartile range below the lower quartile or more than 1.5 times the interquartile range above the upper quartile.
  - Small outlier is less than LQ − 1.5 × IQR
  - Large outlier is greater than UQ + 1.5 × IQR
- Another definition of an outlier is a value more than 3 standard deviations from the mean.

Distributions

- A **distribution** can be **symmetrical**, or have **positive skew** or **negative skew**.
- For a set of data:
  - mean > median > mode could indicate positive skew
  - mode > median > mean could indicate negative skew.

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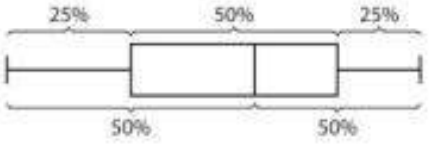
- Skew $= \frac{3(\text{mean} - \text{median})}{\text{standard deviation}}$

- If a sample is representative of a population, you can use the mean, median, range and IQR of the sample to estimate these statistics for the population.
- In a distribution:
  - 50% of the data in a distribution is less than the median, and 50% is greater than the median.
  - 25% of the data is less than the lower quartile
  - 25% of the data is greater than the upper quartile
  - 50% of the data is between the lower and upper quartiles.