

Ecology

Knowledge Organiser

Ecosystem organisation

Individual organisms

Population - the total number of organisms of the same species that live in one specific geographical area

Community - group of two or more populations of different species living in one specific geographical area

Ecosystem - the interaction of a community of living organisms with the non-living parts of their environment

A stable community is one where all the species and environmental factors are in balance so that population sizes remain fairly constant.

An example of this is the interaction between predator and prey populations, which rise and fall in a constant cycle so that each remains within a stable range

Abiotic Factors

Abiotic factors are non-living factors in the ecosystem that can affect a community. Too much or too little of the following abiotic factors can negatively affect the community in an ecosystem:

carbon dioxide level for plants, light intensity, moisture levels, oxygen levels for animals that live in water, soil pH and mineral content, temperature, wind intensity and direction

Competition

To survive and reproduce, organisms require a supply of resources from their surroundings and from the other living organisms there.

This can create competition, where organisms within a community compete for resources.

There are two types of competition - interspecific competition is between organisms of different species and intraspecific competition is between organisms of the same species.

Animals

- Food
- Mates
- Territory

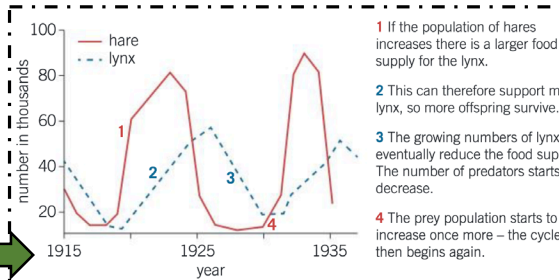
Plants

- Light
- Space
- Water and mineral ions

Interdependence

Within a community each species interacts with many others and may depend on other species for things like food, shelter, pollination, and seed dispersal.

If one species is removed it can affect the whole community - this is called interdependence.



Biotic Factors

Biotic factors are living factors in the ecosystem that can affect a community. For example, the following biotic factors would all negatively affect populations in a community:

decreased availability of food, new predators arriving, new pathogens, competition between species.

Adaptations of organisms

Organisms have features - adaptation - that enable them to survive in the condition in which they live. The adaptations of an organism may allow it to outcompete others, and provide it with an evolutionary advantage.

Structural

Physical features that allow an organism to successfully compete:

- sharp teeth to hunt prey
- colouring that may provide camouflage to hide from predators or to hunt prey
- a large or small body surface area-to-volume ratio.

Behavioural




The behaviour of an organism that gives it an advantage:

- making nests to shelter offspring or attract a mate
- courtship dances to attract a mate
- use of tools to obtain food
- working together in packs

Functional

Adaptations related to processes that allow an organism to survive:

- photosynthesis in plants
- production of poisons or venom to deter predators or kill prey
- changes in reproduction timings

Organism	Example adaptations
	<ul style="list-style-type: none"> - White fur for camouflage when hunting - Feet with large surface area to distribute weight on snow - Small ears to reduce heat loss - Thick fur for insulation
	<ul style="list-style-type: none"> - Feet with large surface to distribute weight on sand - Hump stores fat to provide energy when food is scarce - Tough mouth and tongue to allow camel to eat cacti - Long eyelashes to keep sand out of eyes.
	<ul style="list-style-type: none"> - Spines instead of leaves to reduce surface area and therefore water loss - Long roots to reach water underground - Large, fleshy stem to store water

Some organisms are extremophiles, which means they live in environments that are very extreme where most other organisms could not survive. For example, areas with very high temperatures, extreme pressures, high salt concentrations, highly acidic or alkaline conditions, low levels of oxygen or water.

Key terms

abiotic factor adaptation biotic factor community ecosystem extremophile interaction interdependence interspecific intraspecific population

Year 9 Science

Relationships in an Ecosystem

Feeding relationships within a community can be represented by food chains.

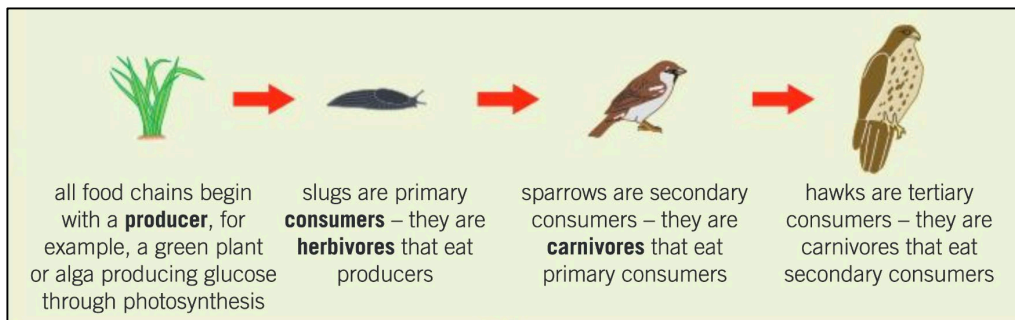
Photosynthetic organisms that synthesise molecules are the producers of all biomass for life on Earth, and so are the first step in all food chains.

A range of experimental methods using transects and quadrats are used by ecologists to determine the distributions and abundance of different species in an ecosystem.

Consumers that kill and eat other animals are predators, and those that are eaten are prey.

Apex predators are carnivores with no predators.

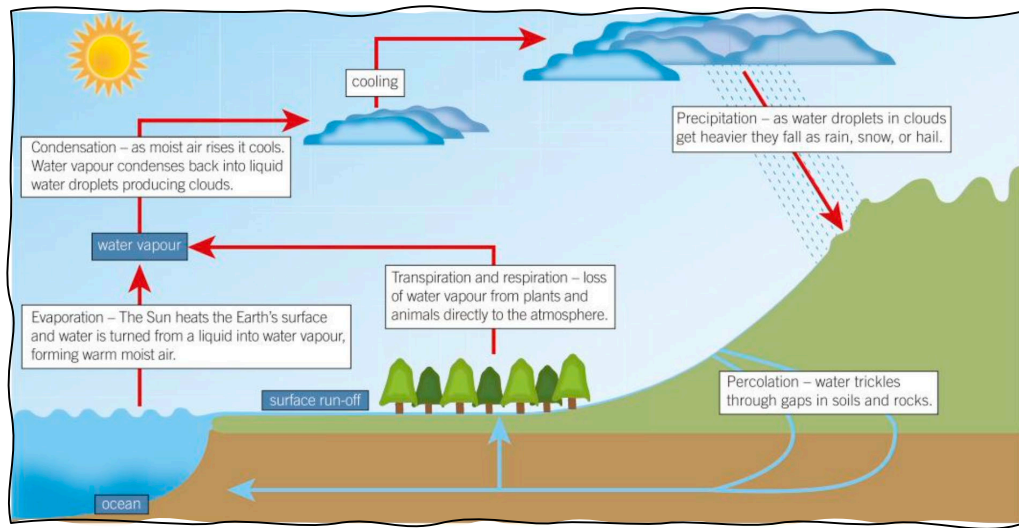
Organisms usually have more complex feeding relationships, with more than one predator or more than one source. These can be shown in a food web.



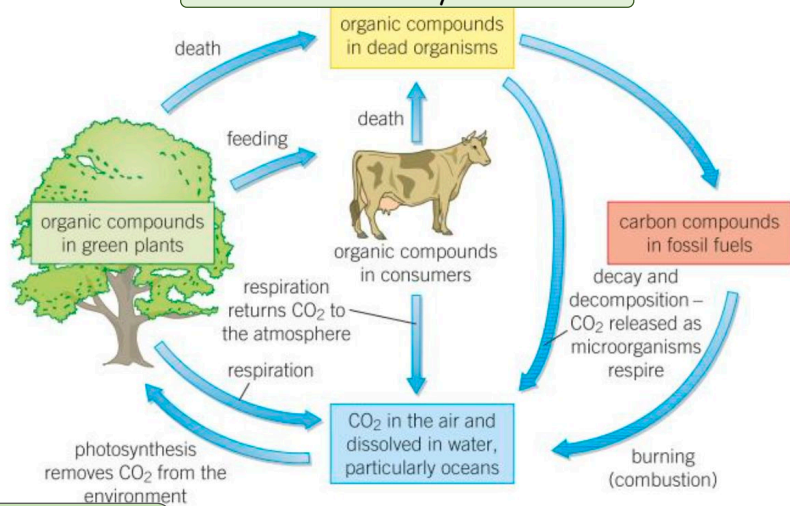
How materials are recycled

All materials in the living world are recycled, which provides the building materials for future organisms.

Water Cycle



Carbon Cycle



Key terms

biodiversity carbon cycle carnivore consumer deforestation evaporation
food chain food web herbivore precipitation predator prey producer water cycle



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Investigating Distribution

Aim: To measure the population size of a common species in a habitat and use sampling techniques to investigate the effect of a factor on the distribution of this species

- You will:**
- Use a quadrat to estimate the population size of a plant species in a survey area
 - Use a transect line and a quadrat to investigate the effect of a factor on the number of plants in a survey area

ESTIMATING POPULATION SIZE METHOD

1 USE TWO TAPE MEASURES TO LAY OUT A SURVEY AREA (e.g. 10 m x 10 m) IN YOUR CHOSEN HABITAT, SUCH AS THE SCHOOL FIELD.

2 USE A RANDOM NUMBER GENERATOR TO CREATE A SET OF COORDINATES TO PLACE YOUR FIRST QUADRAT. e.g. IF YOU GET A 4 AND A 5, PLACE YOUR QUADRAT 4 m ALONG THE x-AXIS AND 5 m ALONG THE y-AXIS.

3 COUNT THE NUMBER OF YOUR CHOSEN PLANT SPECIES (e.g. DANDELIONS) THAT ARE FOUND WITHIN THIS QUADRAT.

5 ESTIMATE THE POPULATION OF DANDELIONS IN YOUR SURVEY AREA USING THE EQUATION:

$$\text{ESTIMATED POPULATION SIZE} = \frac{\text{TOTAL AREA}}{\text{AREA SAMPLED}} \times \text{TOTAL NUMBER OF DANDELIONS COUNTED}$$

TOTAL SURVEY AREA WAS 10 m x 10 m

$$= \frac{100}{10} \times 21$$

$$= 210$$

EACH QUADRAT IS 1 m x 1 m AND 10 QUADRATS WERE PLACED

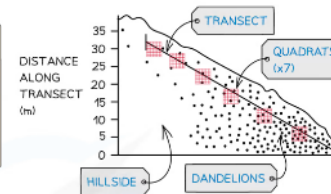
4 RECORD THIS NUMBER IN A RESULTS TABLE AND REPEAT STEPS 1-3 UNTIL YOU HAVE RECORDED THE NUMBER OF YOUR CHOSEN PLANT SPECIES IN 10 QUADRATS.

Quadrat	Number of dandelions
1	3
2	4
3	2
4	1
5	0
6	0
7	2
8	5
9	3
10	1
Total	21

INVESTIGATING THE EFFECT OF A FACTOR ON THE DISTRIBUTION OF A SPECIES METHOD

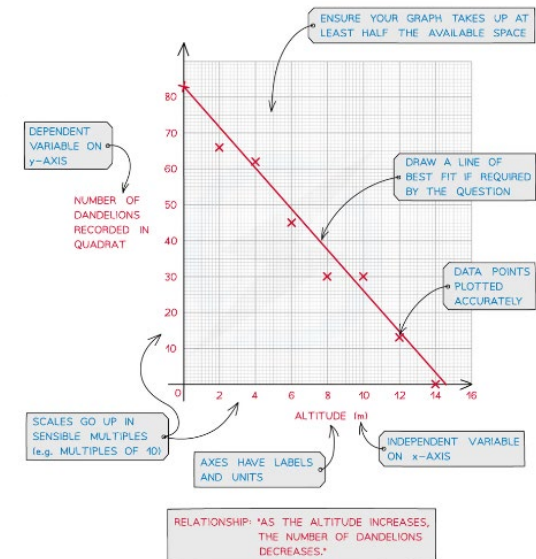
1 SET YOUR TRANSECT UP THROUGH THE AREA YOU ARE INVESTIGATING. IN THIS CASE, A 30 m TAPE MEASURE IS PLACED UP A HILLSIDE. PLACE A QUADRAT AT EQUAL INTERVALS (e.g. EVERY 5 m) ALONG THE TRANSECT.

Distance along transect (m)	Number of dandelions	Altitude (m)
0	84	2
5	66	4
10	62	6
15	45	8
20	30	10
25	30	12
30	13	14



2 RECORD THE NUMBER OF YOUR CHOSEN PLANT SPECIES INSIDE EACH QUADRAT. RECORD YOUR ABIOTIC FACTOR (e.g. ALTITUDE) AT EACH QUADRAT. RECORD YOUR RESULTS IN A TABLE.

3 PLOT YOUR DATA IN A GRAPH AND DESCRIBE ANY RELATIONSHIP THAT CAN BE OBSERVED.



Key terms

biodiversity biofuel biomass deforestation
global warming peat bog pollution

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Biodiversity

Biodiversity is the variety of all the different species of organisms (plant, animal, and microorganism) on Earth, or within a specific ecosystem.

High biodiversity ensures the stability of an ecosystem because it reduces the dependence of one species on another for food or habitat maintenance.

The future of the human species depends on us maintaining a good level of biodiversity. Many human activities, such as deforestation, are reducing biodiversity, but only recently have measures been taken to try to prevent this.

Maintaining biodiversity

Many habitats are currently under threat due to human activities such as deforestation, climate change, and habitat destruction.

There are a number of ways in which scientists and concerned citizens are trying to maintain biodiversity and reduce the negative impact of humans on ecosystems, including

- breeding programmes in zoos for endangered species
- protection and regeneration of rare habitats (e.g., national parks)
- reintroduction of hedgerows in agricultural areas where single crop species are grown, as hedges provide habitat for many organisms
- government policies to reduce deforestation and carbon dioxide emissions
- recycling resources rather than dumping waste in landfill.

Waste Management

Rapid growth of the human population and increases in the standard of living mean that humans are using more resources and producing more waste.

Waste and chemical materials need to be properly handled in order to reduce the amount of pollution they cause. Pollution kills plants and animals, and can accumulate in food chains, reducing biodiversity.

Pollution can occur

- in water, from sewage, fertiliser run-off, or toxic chemicals (e.g., from factories)
- in air, from smoke and acidic gases
- on land, from landfill and toxic chemicals.

Key
terms

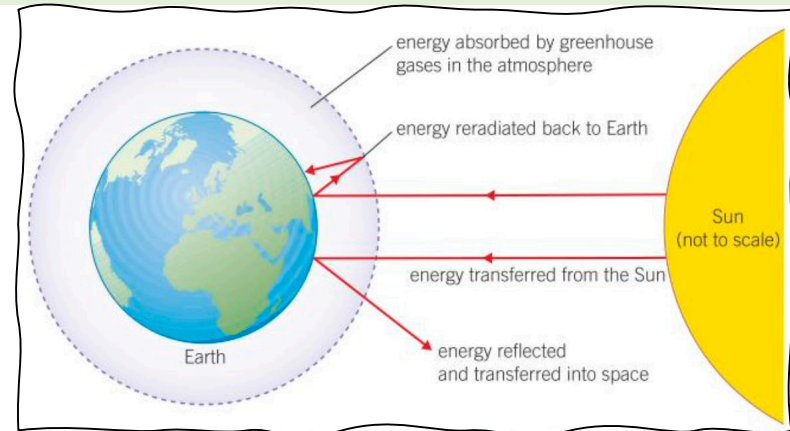
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Global warming

Levels of carbon dioxide and methane in the atmosphere are increasing due to human activity, contributing to global warming and climate change. Global warming is the gradual increase in the average temperature of the Earth. This scientific consensus is based on systematic reviews of thousands of peer-reviewed publications.

Global warming has resulted in

- large-scale habitat change and reduction, causing a decrease in biodiversity
- extreme weather and sea-level changes
- migration of species to different parts of the world, affecting ecosystems
- threats to the security and availability of food.



Land use and deforestation

Rapid population growth has led to humans using much more land for building, quarrying, farming, and dumping waste. This reduces the area in which animals can live and can further destroy habitats through pollution.

For example, the destruction of peat bogs (areas of partially decayed vegetation) to produce garden compost has decreased the amount of this important habitat, and the biodiversity it supports. The decay or burning of peat for energy also releases carbon dioxide into the atmosphere, contributing to global warming.

Large-scale deforestation in tropical areas has been carried out to provide land for cattle and rice fields, and to grow crops for biofuels.

This has resulted in

- large amounts of carbon dioxide being released into the atmosphere due to burning of trees.
- extinctions and reductions in biodiversity as habitats are destroyed
- climate change, as trees absorb carbon dioxide and release water vapour.

SEPS Only

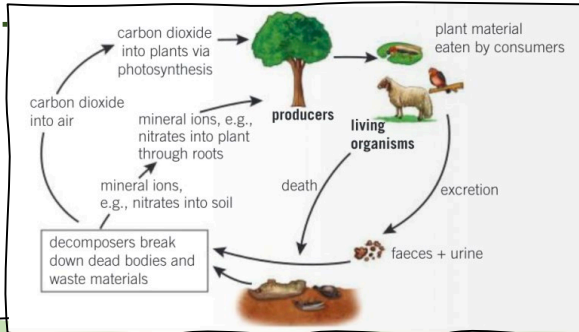
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Decomposition

Decomposers, such as bacteria and fungi, break down dead plant and animal matter by secreting enzymes into the environment. The small soluble food molecules produced then diffuse into the decomposer.

These materials are cycled through an ecosystem by decomposers returning carbon dioxide and mineral ions to the soil.



Gardeners and farmers try to provide optimum conditions for the rapid decay of waste material by decomposers.

Decomposition will occur faster in warm temperatures, when oxygen and moisture levels are high, and there is a neutral pH.

The compost produced from this decay is then added to soil as a natural fertiliser for growing garden plants and crops.

When there is a lack of oxygen, waste is decomposed anaerobically.

Anaerobic decay produces methane gas. Biogas generators use anaerobic decay to produce methane for use as a fuel.



all food chains begin with a **producer**, for example, a green plant or alga producing glucose through photosynthesis



slugs are primary **consumers** – they are **herbivores** that eat producers



sparrows are secondary consumers – they are **carnivores** that eat primary consumers



hawks are tertiary consumers – they are carnivores that eat secondary consumers

Pyramids of Biomass

The trophic level of an organism is the number of steps it is from the start of its food chain.

Pyramids of biomass represent the relative amount of biomass at each trophic level of a food chain.

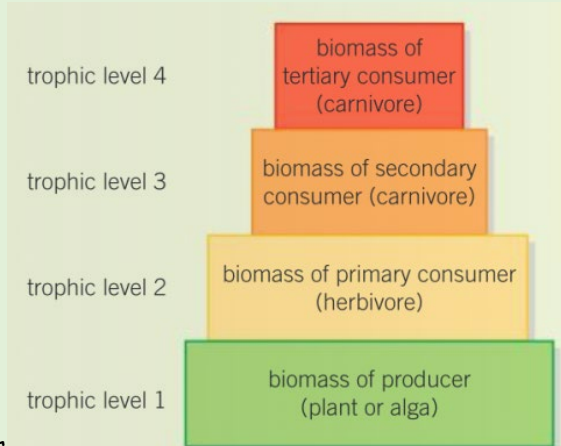
Biomass is the amount of living or recently dead biological matter in an area. Biomass is transferred from each trophic level to the level above it in the food chain.

Producers transfer about 1% of incident light energy used for photosynthesis to produce biomass.

Approximately 10% of the biomass from each trophic level is transferred to the level above it.

The loss of biomass moving up the food chain is due to several factors such as:

- Use in life processes, such as
- Not all of the matter eaten is digested, some is egested as waste products
- Some absorbed material is lost as waste
- Energy is used in movement and to keep animals warm



Key terms

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food chain food web herbivore precipitation predator prey producer water cycle



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Food Security

Food security is having enough food to feed a population.

Biological factors threatening human food security include:

- rapid population growth and increasing birth rate in some countries
- changing diets in developed countries, requiring scarce food resources to be transported globally
- new pests and pathogens impacting farming of vast amounts of crops
- environmental changes, such as drought, affecting food production
- increasing cost of agricultural inputs, like fertilisers
- conflicts in some parts of the world, which affect the availability of water or food.

Sustainable Fisheries

Fish stocks in the oceans are declining. It is important to maintain fish stocks to ensure breeding continues, or certain species may disappear altogether in some areas.

To avoid this happening, net sizes (bigger holes to stop young fish being caught) and fishing quotas (how many fish can be caught) are controlled in many places.

Farming techniques

Sustainable methods of food production need to be developed if we are going to feed the Earth's human population.

Intensive farming techniques make food production more efficient by restricting energy transfer from food animals to their environment.

This can be done by:

- limiting the movement of the animals
- controlling the temperature of their surroundings.

In order to also maximise yield from animals and crops, farmers also

- feed animals high-protein foods to increase growth
- give animals antibiotics to prevent or treat disease
- regularly use fertilisers, herbicides, and pesticides on crops.

Key terms

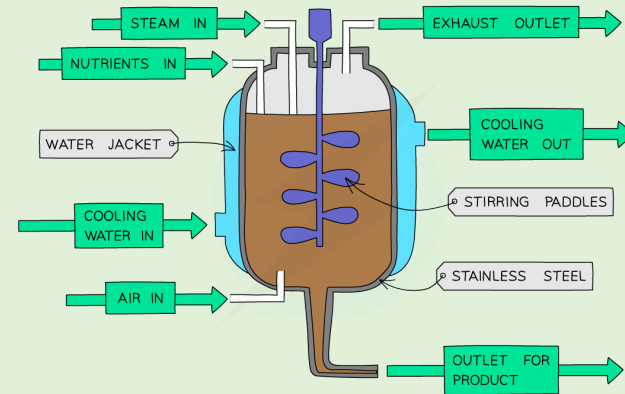
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Role of Biotechnology

Modern biotechnology techniques enable increased food production to feed and maintain the rapidly increasing human population:

- Large quantities of microorganisms can be cultured for food - for example, mycoprotein, a protein-rich vegetarian food harvested and purified after growing the fungus *Fusarium* on glucose syrup in aerobic conditions.



- Genetically modified (GM) crops can have increased yields, increased resistance to changes in their environments, or improved nutritional values (e.g., golden rice).
- Bacteria can be genetically modified to produce human insulin that can be harvested, purified, and used to treat diabetes.

Advantages of intensive farming

- High yield and quicker growth of crops and animals
- Efficient use of food, with less waste produced
- Can meet demand for food from a rapidly increasing population

Disadvantages of intensive farming

- Increased risk of antibiotic-resistant bacteria strains
- Pesticides and herbicides may kill beneficial organisms and reduce biodiversity
- Ethical issues about animal welfare and quality of life
- Large carbon dioxide and methane emissions

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Investigating Distribution

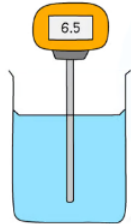
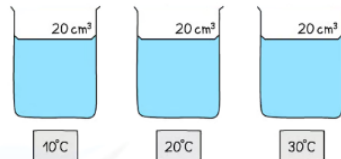
Aim: To investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change

You will:

- Decide on the range of temperatures that you wish to investigate milk decay over, considering the lesson time you have
- Use an indicator to monitor the rate of decay of milk

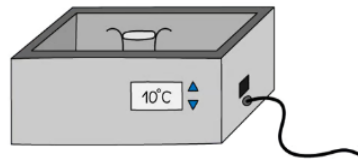
DECAY IN MILK METHOD

- 1 PLACE 20cm³ OF FRESH MILK INTO THREE BEAKERS. DECIDE THE THREE (OR MORE) TEMPERATURES YOU WILL INVESTIGATE AND WRITE THESE ONTO THE SIDES OF THE BEAKERS (e.g. 10°C, 20°C, 30°C)



- 2 USE UNIVERSAL INDICATOR PAPER OR SOLUTION, OR A pH METER TO DETERMINE THE pH OF THE MILK FOR EACH BEAKER.

- 3 COVER EACH BEAKER WITH CLINGFILM AND PLACE INTO A WATER BATH AT THE REQUIRED TEMPERATURE.



- 4 MEASURE THE pH OF THE MILK IN THE THREE BEAKERS AFTER 24, 48 AND 72 HOURS. RECORD YOUR RESULTS IN A TABLE.

	0 hours	24 hours	48 hours	72 hours
10 °C	6.5	6.3	6.2	5.9
20 °C	6.5	6.0	5.4	4.7
30 °C	6.5	5.0	4.7	4.7

TO CALCULATE THE RATE OF CHANGE WE FIRST NEED TO WORK OUT HOW MUCH THE pH VALUE CHANGED OVER EACH 24 HOUR PERIOD. THIS IS CALCULATED BY FINDING THE DIFFERENCE BETWEEN THE CURRENT pH VALUE AND THE PREVIOUS pH VALUE:

NO CHANGE AT 0 HOURS AS NO TIME HAS PASSED SO THE pH HAS NOT CHANGED

PREVIOUS pH VALUE

CURRENT pH VALUE

CHANGE IN pH VALUE

	0 hours	24 hours	48 hours	72 hours
10 °C		$6.5 - 6.3 = 0.2$	$6.3 - 6.2 = 0.1$	$6.2 - 5.9 = 0.3$
20 °C		$6.5 - 6.0 = 0.5$	$6.0 - 5.4 = 0.6$	$5.4 - 4.7 = 0.7$
30 °C		$6.5 - 5.0 = 1.5$	$5.0 - 4.7 = 0.3$	$4.7 - 4.7 = 0$

YOU CAN NOW CALCULATE THE RATE OF CHANGE FOR EACH 24 HOUR PERIOD BY DIVIDING EACH CHANGE IN pH BY THE TIME TAKEN FOR THIS CHANGE TO OCCUR:

RATE OF CHANGE =
CHANGE IN VALUE ÷
CHANGE IN TIME

CHANGE IN pH VALUE

TIME TAKEN FOR CHANGE TO OCCUR

	24 hours	48 hours	72 hours
10 °C	$0.2 \div 24 = 0.0083$	$0.1 \div 24 = 0.0042$	$0.3 \div 24 = 0.013$
20 °C	$0.5 \div 24 = 0.021$	$0.6 \div 24 = 0.025$	$0.7 \div 24 = 0.029$
30 °C	$1.5 \div 24 = 0.063$	$0.3 \div 24 = 0.013$	$0 \div 24 = 0$

RATE OF CHANGE IN pH



Key vocabulary:

Kinetic energy-Energy of a moving object due to its motion. Joules, J

Mass- The quantity of matter in an object. Kilograms, kg

Elastic potential energy-Energy stored in an elastic object when work is done to change its shape. Joules, J

Spring constant- The stiffer the spring the greater the spring constant. Newton per metre N/m

Extension- The increase in length from the original length. Metres, m

Gravitational potential energy- The energy of an object due to it's position in a gravitational field. Joules, J

Gravitational field strength - The force of gravity on an object-given in your question. Newton per kilogram N/kg

Power- Energy transferred every second. Watts, W

Work done- Energy transferred by a force. Joules, J

Specific heat capacity- Energy needed to increase the temperature of a material by 1°C when the mass is 1kg. J/kg°C

Efficiency- Useful energy transferred by a device/ total energy. There is no unit- answer should be a number less than 1. If you have multiplied your answer by 100 you have changed it into a percentage.

System- an object or group of objects.

An open system- energy is transferred between stores or to the surroundings.

A closed system -no energy can escape to or enter from the surroundings. The total energy in a closed system never changes.

Energy stores

Kinetic	Energy an object has because it is moving
Gravitational potential	Energy an object has because of its height above the ground
Elastic potential	Energy an object has when it is stretched or compressed
Thermal (or internal)	Energy an object has because of its temperature (the total kinetic and potential energy of the particles in the object)
Chemical	Energy that can be transferred by chemical reactions involving foods, fuels and the chemicals in batteries
Nuclear	Energy stored in the nucleus of an atom
Magnetic	Energy a magnetic object has when it is near a magnet or in a magnetic field
Electrostatic	Energy a charged object has when it is near another charge object

Energy transfers

Energy can be transferred to and from different stores by:

Heating
Energy is transferred from one object to another object with a lower temperature.

Waves
Waves (e.g. light and sound waves) can transfer energy by radiation.

Electricity
When an electric current flows it can transfer energy.

Forces
Energy is transferred when a force moves or changes the shape of an object.

Kinetic energy:

The kinetic energy of a moving object can be calculated using the equation:

- kinetic energy = 0.5 × mass × speed ²
- Ek = 1/2 m v²

kinetic energy, Ek , in joules, J
mass, m, in kilograms, kg
speed, v, in metres per second, m/s



Gravitational potential energy:

The amount of gravitational potential energy gained by an object raised above ground level can be calculated using the equation:

- g . p . e . = mass × gravitational field strength × height
- Ep = m g h

gravitational potential energy, Ep, in joules, J
mass, m, in kilograms, kg
gravitational field strength, g, in newtons per kilogram, N/kg
(In any calculation the value of the gravitational field strength (g) will be given.) height, h, in metres, m



Power:

Power is defined as the rate at which energy is transferred or the rate at which work is done.

- power = energy transferred / time
- $P = E / t$
- power = work done / time
- $P = W / t$

power, P, in watts, W

energy transferred, E, in joules, J

time, t, in seconds, s

work done, W, in joules, J

An energy transfer of 1 joule per second is equal to a power of 1 watt.

Specific heat capacity:

The amount of energy stored in or released from a system as its temperature changes can be calculated using the equation:

- change in thermal energy = mass \times specific heat capacity \times temperature change
- $\Delta E = m \times c \times \Delta\theta$

change in thermal energy, ΔE , in joules, J

mass, m, in kilograms, kg

specific heat capacity, c, in joules per kilogram per degree Celsius, J/kg $^{\circ}\text{C}$

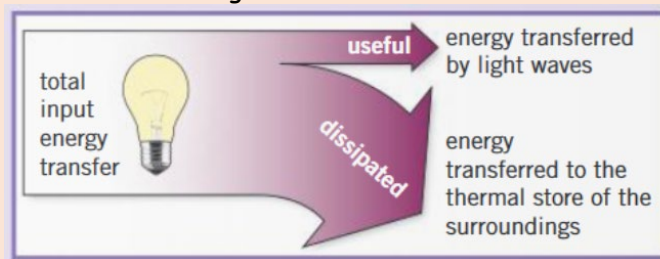
temperature change, $\Delta\theta$, in degrees Celsius, $^{\circ}\text{C}$

The specific heat capacity of a substance is the amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius.

Useful and dissipated energy:

Energy cannot be created, or destroyed-it can only be transferred usefully, stored or dissipated.

Dissipated energy means it transfers to the surroundings; this is often described as being wasted.



All energy eventually ends up transferred to the thermal stores of the surroundings.

Lubrication is a way of reducing unwanted energy transfer due to friction.

Streamlining is a way of reducing energy wasted due to air resistance or drag.

Insulation is a way of reducing thermal energy to surroundings.

Elastic energy:

The amount of elastic potential energy stored in a stretched spring can be calculated using the equation:

- elastic potential energy = $0.5 \times$ spring constant \times extension 2
- $E_e = \frac{1}{2} k e^2$

(assuming the limit of proportionality has not been exceeded)

elastic potential energy, E_e , in joules, J

spring constant, k, in newtons per metre, N/m

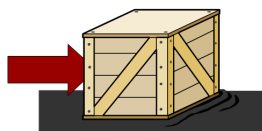
extension, e, in metres, m



Work done:

Work done = energy transferred

work done = force \times distance moved in the direction of the force



Efficiency:

Efficiency is a measure of how much energy is transferred usefully. You must know the equation to calculate efficiency as a decimal:

$$\text{efficiency} = \frac{\text{useful output energy transfer (J)}}{\text{total input energy transfer (J)}}$$

or

$$\text{efficiency} = \frac{\text{useful power output (W)}}{\text{total power input (W)}}$$

To give efficiency as a percentage you multiply your decimal by 100 and add the % sign.

NEVER add the % or J to your decimal!

Structure and bonding 01

Knowledge Organiser

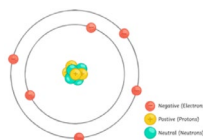
Atoms

All substances are made of atoms. An atom is the smallest part of an element that can exist.

Atoms are very small, having a radius of about $1 \times 10^{-10}\text{m}$. The radius of the nucleus is less than 1/10000 of that of the atom.

In an atom, the number of electrons is equal to the number of protons in the nucleus. Atoms have no overall electric charge.

Particle	Relative Mass	Relative Charge
Proton	1	+1
Neutron	1	0
Electron	Very small	-1



Atomic Number and Mass Number

The number of protons in an atom of an element is its **atomic number**. All atoms of a particular element have the same number of protons. The sum of the protons and neutrons in an atom is its **mass number**.

Electronic structure

The electrons in an atom occupy the lowest available energy level. The electronic structure can be represented by numbers or by a diagram. For example, the electronic structure of carbon (above) is 2,4.

Elements, compounds and mixtures

Elements are substances that only contain one type of atom. These are represented by chemical symbols, e.g. O represents oxygen. There are about 100 different elements on the periodic table.

Compounds are formed when two or more different elements chemically bond together, in fixed proportions. Compounds can only be separated by **chemical reactions**.

Mixtures consist of two or more elements or compounds **not** chemically combined together. **Mixtures** can be separated by **physical processes**.

Key
terms

atom
mass number

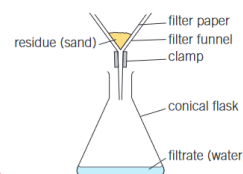
atomic number
neutron

compound
nucleus

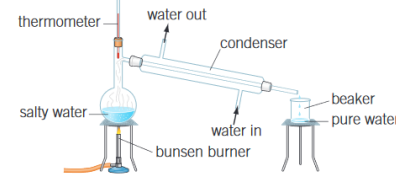
electron
proton

Separating techniques

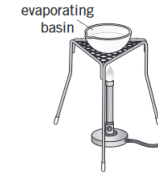
Filtration








Distillation



Evaporation



Development of the atomic model

Scientist	Period	Discovery	Model
John Dalton	1808	Atoms described as solid spheres	
JJ Thomson	1897	Plum Pudding model - the atom is a ball of positive charge with scattered electrons	
Ernest Rutherford	1911	Alpha Scattering - concentrated positive mass in the centre. Atoms are mostly empty space.	
Niels Bohr	1913	Electrons are in shells orbiting the nucleus	
James Chadwick	1932	Neutrons in the nucleus	

Structure and bonding 02

Knowledge Organiser

Periodic table

In the early 1800s, elements were arranged by **atomic weights**. The periodic table was not complete because some of the elements had not been found and some elements were put in the wrong group.

Dimitri Mendeleev (1869) left gaps in the periodic table to account for elements he thought had not yet been discovered. He put them in order of **atomic number**. Elements with properties predicted were discovered and filled the gaps. The existence of isotopes supported ordering by atomic number.

Modern Periodic table

The red step shows the divide between metals and non-metals. **Metals** are on the **left** and **non-metals** on the right.

Groups are the columns in the periodic table - they go downwards. The group number shows the number of **electrons** in the **outer shell**. Elements in the same group normally follow the same trends in properties.

Periods are the rows in the periodic table - they go sideways. Each **period** shows another full shell of electrons.

																		group number					0
1	2													3	4	5	6	7	He				
Li	Be													B	C	N	O	F	Ne				
Na	Mg													Al	Si	P	S	Cl	Ar				
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr						
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe						
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn						
Fr	Ra																						

Group 0 - Noble gases

Noble gases include: **helium, neon and argon**. They are all **non-metals** with **low** melting and boiling points. The boiling points all increase as they go down the group due to greater intermolecular forces. They are colourless gases at room temperature. Group 0 elements are typically unreactive.

He
Ne
Ar
Kr
Xe
Rn

Increasing boiling point ↓

Group 7 - Halogens

Halogens include: fluorine, chlorine, bromine and iodine. They are all **non-metals**. The reactivity **decreases** as they go down the group due to an increase in difficulty gaining an extra electron. The melting and boiling points become **higher** down the group.

F
Cl
Br
I
At

Decreased reactivity ↑
Increased melting/boiling point ↓

Group 1 - Alkali metals

Alkali metals include: lithium, sodium, potassium and rubidium. They are all soft reactive **metals**. The reactivity **increases** as they go down the group. They get bigger and it is easier for them to lose an electron if it is further from the nucleus. The melting and boiling points become **lower** down the group.

Li
Na
K
Rb
Cs
Fr

Increased reactivity ↑
Decreased melting/boiling point ↓

Key terms

alkali metals

group 1

group 7

group 0

halogen

noble gas

Period

Trend

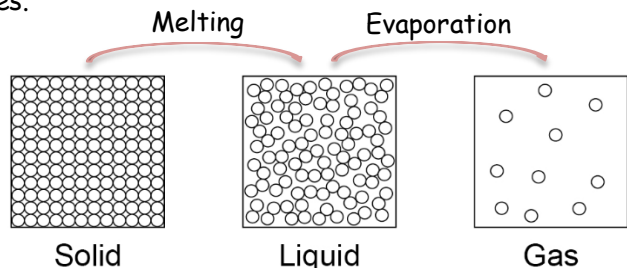


Structure and Bonding 03

Knowledge Organiser

States of matter

The three states of matter are solid, liquid and gas. They can be represented using the particle model, by small solid spheres.



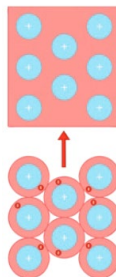
The amount of energy needed to change the state of the substance depends on the strength of the forces between the particles. The stronger the forces between the particles, the higher the melting and boiling point of the substance. There are limitations to this model, due to the following assumptions:

- No forces between the particles
- Particles are all solid spheres

In chemical equations, the three states of matter are shown as (s), (l) and (g), with (aq) for aqueous solutions.

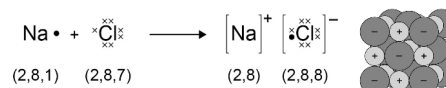
Metallic bonding

Metallic bonding occurs only in metals. Tightly packed rows of **positive ions** are surrounded by a **sea of delocalised electrons** which are free to move through the whole structure. There are strong **electrostatic** forces of attraction between the **positive** metal ions and **negative** electrons. They have **high** melting and boiling points. **Pure metals** are **malleable (soft)**, as the layers can slide over each other, so are mixed with other metals to make **alloys**.



Ionic bonds

When a **metal** atom reacts with a **non-metal** atom, outer-shell electrons are transferred. Metal atoms **lose** electrons to become positively charged ions, whilst non-metal atoms **gain** electrons to become negatively charged ions.



Ionic compounds are giant structure of ions, held together by strong electrostatic forces of attraction between oppositely charged ions. These forces act in all directions in the **lattice**. These compounds have **high** melting and boiling points, as large amounts of energy is needed to break the strong bonds. When in liquid or aqueous form, they can conduct electricity as the ions are free to move.

Covalent bonds

A covalent bond forms when electrons are **shared** between **non-metal** atoms. The number of electrons shared depends on how many extra electrons are needed to fill the outer shell. Covalent bonds can be represented in a number of ways.



Atoms forming **covalent bonds** form different types of structures.

Giant structures consist of billions of atoms covalently bonded together. An example is diamond.

Small molecules contain only a few atoms. Different molecules are held together by weak **intermolecular forces**. An example is water.

Large molecules contain many repeat units joined covalently in a chain. Polymers are examples.

Carbon allotropes

There are numerous carbon structures. **Diamond** and **graphite** are **giant covalent structures** with **very high** melting and boiling points. **Graphite** contains layers of covalently bonded carbon atoms. Between the layers, there are no covalent bonds. This means the layers can **slide**, making graphite soft. Graphite can conduct electricity due to delocalised electrons. For **diamond**, the carbon atoms have a **rigid** structure, making it very hard. **Graphene** consists of a single layer of graphite. **Fullerenes** exist as **cage-like** structures and **tubes**, where molecules are held together by **weak** intermolecular forces. They typically **can** conduct electricity.

Key
terms

Boiling point

Covalent bond
small molecules

delocalised electrons
boiling point

conductor

fullerene
electrostatic

giant covalent
ionic bond

graphene
ion

diamond
lattice

Key vocabulary:

Potential difference - the work done in moving one coulomb of charge from one point in the circuit to another.

Current - a flow of electrons.

Charge - the rate of flow of electrons.

Resistance - the opposing of a current.

Power - how much energy is transferred (work done) in a certain amount of time.

Series - all components in a circuit follow on directly from each other.

Parallel - the current has alternate pathways to possibly take in a circuit.

Free (or delocalised) electrons - electrons that are free to move through the conductor (eg metal).

Key equations:

$Q = It$ (charge = current x time)

$V=IR$ (potential difference= current x resistance)

Total resistance = $R1 + R2$

$P = VI$ (power=potential difference x current)

$P= I \times I \times R$ (power=current squared x resistance)

$E=Pt$ (energy transferred=power x time)

$E=QV$ (energy transferred=charge flow x potential difference)

Key Units:

Current-Amps (**A**)

Potential difference-volts (**V**)

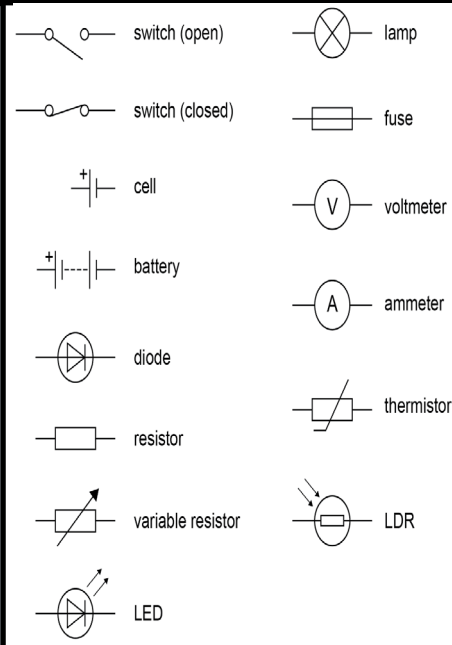
Charge-coulombs (**C**)

Resistance-ohms (**Ω**)

Power-watts (**W**)

Energy transferred-joules (**J**)

Energy transferred is the same as work done.

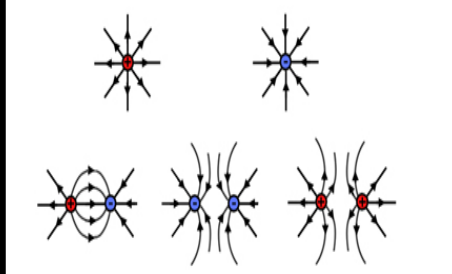


Electric fields

Electric fields will always run from positive to negative - shown by arrows. The greater the number of arrows, the stronger the electric field.

Like charges - the field lines show a gap in the electric field.

Unlike charges - field lines move from + to -.



Series circuits - all components follow on directly from each other. The current only has one pathway to follow. The current is the same all the way around a series circuit. The potential difference is shared between the components in the circuit.

Parallel circuit - the electricity has more than one pathway to take. The current will take the path of least resistance. The current will be shared between the branches in the circuit. The potential difference will be the same across each component in the circuit.

Resistance - caused by the collision between free electrons and metal ions. The more collisions the greater the resistance.

Factors that can affect resistance are:

- Length - double length, double resistance: directly proportional
- Temperature - increase temperature, increase resistance
- Diameter - bigger diameter, less resistance
- Material - number of free electrons

Static

Static is caused because of friction between two insulators resulting in the transfer of electrons.

Object gains electrons - object is negatively charged.

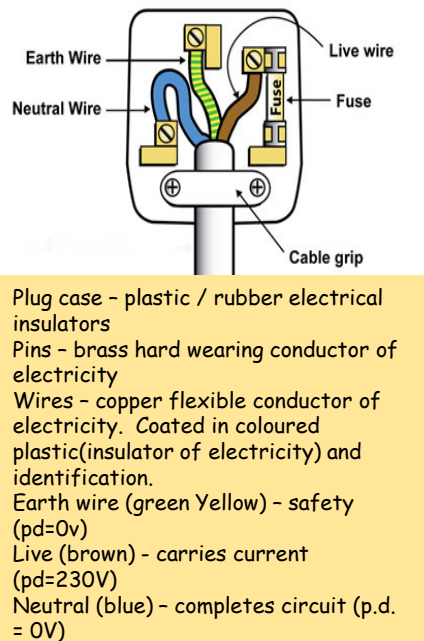
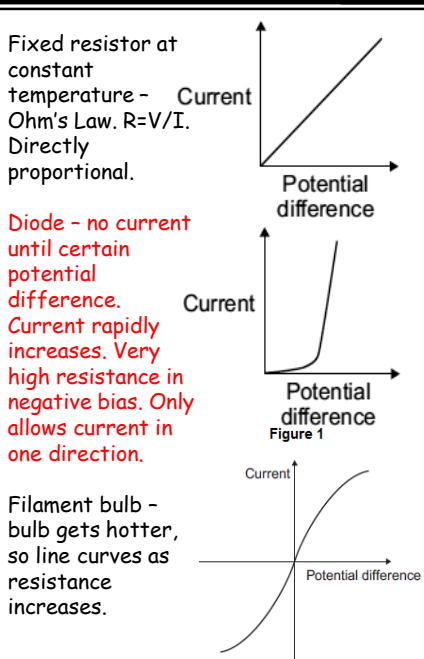
Object loses electrons - object is positively charged.

If there is a build-up of charge and the potential difference between two objects is great enough, a spark will 'jump' - this is a discharge of electricity.

The objects do not have to be touching - no contact needed for attraction / repulsion.

The National Grid: a system of transformers (step up and step down) and cables.

Cables can be overhead or underground. Electricity transmitted at high voltage, low current in order to reduce heat loss from the cables. Less energy is wasted therefore it makes the National Grid more efficient.



Quantitative Chemistry 01

Knowledge Organiser - Year 10 - Science



Conservation of mass

The conservation of mass states that atoms cannot be created or destroyed during a chemical reaction, so the mass of the reactants will equal the mass of the product. In other words, all the atoms you had in the reactants must be present in the products. For some reactions, the mass appears to **decrease**. This typically occurs when a gas is produced and lost to the surroundings. For other reactions, the mass appears to **increase**. This typically occurs when a gas is a reactant.

Decrease in mass

Sodium carbonate (s) → sodium oxide (s) + carbon dioxide (g)

When sodium carbonate is thermally decomposed, carbon dioxide gas is produced and released into the surroundings.



Increase in mass

Magnesium (s) + Oxygen (g) → Magnesium oxide (s)

Oxygen from the air is added to the magnesium which will be heavier in mass.



Relative mass

The masses of atoms are compared by measuring them relative to atoms of carbon-12. You can work out the relative formula mass (M_r) of a compound by adding up the relative atomic masses (A_r) of the elements in it, in the ratio shown by its formula

Concentration

Concentration is the amount of solute in a volume of solvent. The more substance that is dissolved, then the more concentrated the solution is.

It is possible to calculate concentration using:

$$\text{Concentration} = \frac{\text{Mass}}{\text{Volume}}$$

With concentration measured in g/dm^3 , mass in g and volume in dm^3 .

Remember:

$$\text{Volume}(\text{dm}^3) = \frac{\text{Volume}(\text{cm}^3)}{1000}$$

Moles (HT)

The **Avogadro constant**, 6.02×10^{23} , is the number of molecules of a substance that make up one mole of that substance.

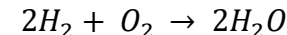
One mole of a substance has the same mass as the M_r of the substance. E.g. Oxygen (O_2) has an M_r of 32, so 1 mole of oxygen has a mass of 32g.

The number of moles can be determined using:

$$\text{Moles} = \frac{\text{Mass (g)}}{M_r}$$

Balanced equations (HT)

When writing symbol equations you need to ensure that the number of each atom on each side is equal.



There are 4 hydrogen and 2 oxygen atoms on each side.

You can deduce the balanced symbol equations from the masses (and hence the ratios of the numbers of moles) of substances involved in a chemical reaction. On the other hand, balanced symbol equations tell you the number of moles of substances, and thus the masses of reactants and products.

Excess and limiting reactants (HT)

In a chemical reaction between two or more reactants, often one reactant will run out before the others.

The reactant that is left over is in **excess**. The reactant that runs out is the **limiting reactant**.

Key
terms

Avogadro constant
excess

balanced
limiting reactant

concentration
mass

conservation
mole

equation
ratio

formula mass
state



Quantitative Chemistry 02 - Separates only

Knowledge Organiser - Year 10 - Science

Titration

Titrations are used to experimentally determine the concentration of an unknown solution in a reaction.

Method

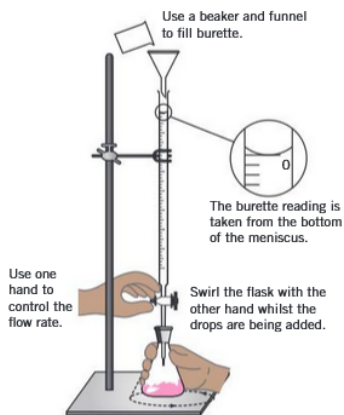
1. Measure 25 cm³ of sodium hydroxide solution into a conical flask.
2. Place flask on a white tile.
3. Clamp the burette vertically and close the burette tap.
4. Using a small funnel, fill the burette with sulfuric acid.
5. Put 5-10 drops of phenolphthalein indicator into the conical flask. Swirl the flask to ensure the indicator mixes with the sodium hydroxide.
6. Slowly open the burette tap so that the sulfuric acid slowly flows into the flask. Add acid drop by drop until you see a permanent colour change from pink to colourless in the flask. Close the burette tap.
7. Read the burette scale and record the volume of added acid.
8. Repeat steps 1-7 until you get 2 concordant titres. i.e. are within 0.1 cm³ of each other.
9. Determine the mean:

$$\text{Mean} = \frac{\text{sum of the concordant results}}{\text{number of concordant results}}$$

To determine the concentration of the unknown:

1. Construct a balanced equation
2. Determine the number of moles from the known solution
3. Use the ratio from the equation to determine the moles of the unknown
4. Determine the concentration using:

$$\text{Concentration (mol/dm}^3\text{)} = \frac{\text{moles}}{\text{volume (dm}^3\text{)}}$$



Theoretical yield

The theoretical yield is the mass of a product that you expect to be produced. It is not always achievable because:

- Some product is lost when separated from reactant mixture
- Unexpected side reactions occur and produce other products
- The reaction may be reversible

The theoretical yield can be calculated as follows:

1. Balance the equation
2. Calculate moles of substance with known mass
3. Use the balanced equation to work out the ratio of moles.
4. Determine mass from mass = moles \times Mr

Concentration in mol/dm³

Concentration can also be measured in mol/dm³.

$$\text{Concentration of solution (mol/dm}^3\text{)} = \frac{\text{number of moles of solute}}{\text{volume of solution (dm}^3\text{)}}$$

You can combine this formula with the moles equation to calculate the mass of solute dissolved in a solution.

Percentage yield

The percentage yield is the mass of a product that is actually produced.

Percentage yield can be calculated as follows:

$$\text{Percentage yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$$

Atom economy

The atom economy gives an indication of the proportion of atoms that become part of the useful products.

The percentage atom economy is determined as follows:

$$\text{Atom economy} = \frac{M_r \text{ of useful products}}{M_r \text{ of all products}} \times 100$$








Moles of gas

At room temperature (25° C) and atmospheric pressure (1 atm), one mole of gas will occupy 24 dm³

To determine the number of moles of a gas:

$$\text{Moles of gas} = \frac{\text{volume of gas (dm}^3\text{)}}{24 \text{ dm}^3}$$

$$\text{Moles of gas} = \frac{\text{volume of gas (cm}^3\text{)}}{24000 \text{ cm}^3}$$

Key Ideas				
 <p>Nature of God</p>	<ul style="list-style-type: none"> - One God, the creator and the sustainer of all that exists - God is omnipotent - almighty and unlimited power: <i>‘In the beginning God created the heavens and the earth’</i> - God is benevolent - all-loving and all-good: <i>‘For God so loved the world that he gave his one and only Son’</i> - God is just - fair judge: <i>‘For he has set a day when he will judge the world with justice’</i> 		<ul style="list-style-type: none"> - The Problem of Suffering asks: if God is all these things why do they allow bad things to happen to good and innocent people? - Christian response – Adam and Eve, ‘test’, Satan, free will etc 	
 <p>The Trinity</p>	<ul style="list-style-type: none"> - God is three persons in one - Each person of the Trinity is fully God 		<ul style="list-style-type: none"> - The Father is creator of all life - The Son is Jesus Christ who is both fully human and fully God - The Holy Spirit is the constant guide and comforter <p>“We believe in one God, Father, Son and Holy Spirit” – The Nicene Creed</p>	
 <p>Creation</p>	<ul style="list-style-type: none"> - God is the sole and omnipotent Creator: <i>‘In the beginning God created the heavens and the earth’ Genesis 1:1</i> - God is the source of everything in the universe and sustains it: <i>‘And God said, Let there be light, and there was light’ Genesis 1:3</i> 		<p>Interpretations:</p> <ul style="list-style-type: none"> - Literal – word of God - Conservative – humans inspired by God - Liberal - interpret passages differently to fit modern society - Theistic – religion and science 	
 <p>Incarnation and Crucifixion</p>	<p><u>Incarnation</u></p> <ul style="list-style-type: none"> - God took on human form as Jesus - <i>‘The word became flesh’</i> - The virgin conception is evidence that Jesus was the Son of God - He was able to suffer and feel pain 		<p><u>Crucifixion</u></p> <ul style="list-style-type: none"> - Jesus was sentenced to death by Pontius Pilate - Jesus was then nailed to a cross where he died - Jesus was able to forgive those who were killing him - Good Friday - Jesus’ last words before dying were: <i>‘Father, into your hands I commit my spirit’</i> 	
 <p>Resurrection and Ascension</p>	<p><u>Resurrection</u></p> <ul style="list-style-type: none"> - Easter Sunday: rose from the dead 3 days after crucifixion: <i>‘But Christ has indeed been raised from the dead’</i> - Tomb was empty 		<p><u>Ascension</u></p> <ul style="list-style-type: none"> - Forty days after he rose from the dead Jesus ascended into heaven - Great Commission: After meeting his disciples for the final time he told them to carry on his work - <i>‘go and make disciples of all nations’</i> 	
 <p>Afterlife</p>	<ul style="list-style-type: none"> - God will judge on Day of Judgement - Judged on behaviour and faith - Parable of the Sheep and goats - Gods left-hand side (goats) haven’t helped others – hell. God’s right hand side (sheep), have helped others –heaven 		<p>Heaven – Presence of God. No sadness or unhappiness: <i>‘He will wipe away every tear from their eyes. There will be no more death or mourning or crying’</i></p> <p>Purgatory – Catholic view. Undergo a process of cleansing and purification before eventually securing entry to heaven.</p> <p>Hell – Existence without God. Place of eternal torment in a fiery pit ruled by Satan: <i>‘and throw them into the blazing furnace, where there will be weeping and gnashing of teeth’</i></p>	
 <p>Sin and Salvation</p>	<p><u>Origins of sin</u></p> <ul style="list-style-type: none"> - lust - <i>‘Everyone who looks at a woman lustfully has already committed adultery in his heart’</i> - greed - <i>‘You cannot serve both God and worldly things’</i> - Satan - Adam and Eve – original sin - Free will 		<ul style="list-style-type: none"> - Salvation - saved from sin and its consequences, and to be granted eternal life with God - Salvation achieved by law, grace and spirit - Jesus’ death and resurrection made it possible for all who follow his teachings to gain eternal life 	<p>Atonement - Removes the effects of sin and allows people to restore their relationship with God</p> <ul style="list-style-type: none"> - Jesus atoned for the sins of humanity: <i>‘we were reconciled to him through the death of his son’</i>

AQA Religious Studies A – Christian Beliefs

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



Knowledge Organiser Dance Year 10



DANCER

RESPONSIBILITIES / ROLES:

- To portray the creative intention of the choreographer through performing the intended style of movement.
 - Ability to discuss and interpret choreography.
- To look after their own health and safety by enforcing professional manner.
 - Deliver dance workshops / teach / engage with the community.
 - Self management of personal administration / financial needs.

SKILLS:

- Strong technical ability in chosen / supporting styles.
 - Excellent physical fitness.
- Performance and interpretive skills to show the intention of the piece.
 - Ability to discuss and interpret choreography.
 - Creativity – to create movement.
 - Confidence – to perform to an audience.
 - Motivation and self discipline.
 - Ability to work alone and with others.
 - Perseverance – as can work long hours

CHOREOGRAPHER

RESPONSIBILITIES / ROLES:

- To direct of the work overall and manage the dancers.
- They create and plan the choreographic material and ideas for routines.
- Deliver dance workshops / teach / engage with the community.
- Self management of personal administration / financial needs.
- To look after their own health and safety by enforcing professional manner.

SKILLS:

- High level of dance ability and understanding.
- Excellent management and communication skills – to delegate roles to dancers.
 - Perseverance – as can work long hours
 - Creativity
- Ability to discuss and interpret choreography.
 - Organisational skills
 - Ability to work in a team.

LIGHTING DESIGNER

RESPONSIBILITIES / ROLES:

- To manage all aspects of lighting for a performance.
 - To direct lighting cues.
 - To plan and budget the lighting set out.
 - To manage the technical team.
- To meet the client requirements and portray the idea.

SKILLS:

- To work in partnership with other practitioners to achieve the indented outcome of the artistic director / choreographer.
 - Creativity and adaptability.
 - Organisational skills / planning ability
- Advanced computer and electric knowledge / skills.
 - Budget and financial knowledge



COMPOSER

RESPONSIBILITIES / ROLES:

- To create the musical score for a piece of music.
- To support the intentions of the choreography through music.
- To manage the musical team to achieve the creative vision.
 - To create an atmosphere.

SKILLS:

- Very rhythmic
- Creative / Imaginative
- High musical ability- editing and creating / playing music.



GCSE ART, CRAFT & DESIGN

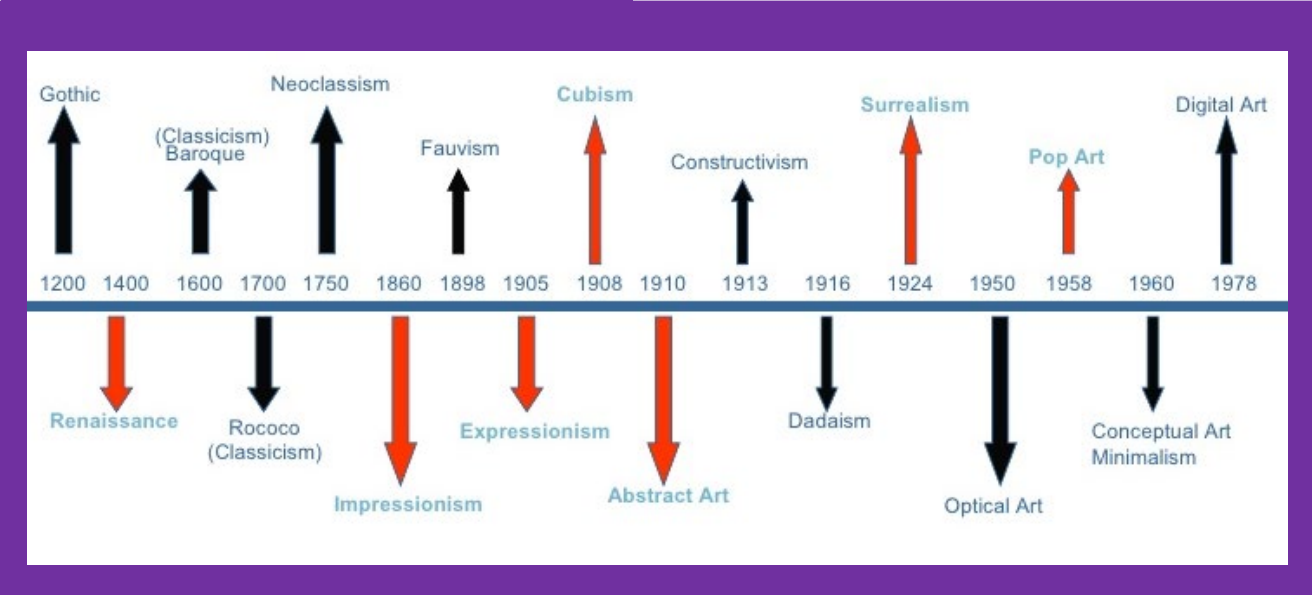
Assessment Objectives

AO1 Contextual understanding	Understanding of historical and contemporary visual elements of Arts, Crafts and Design. Analyse and compare using the Formal Elements to demonstrate your understanding.
AO2 Experiment	Using a range of materials, techniques and processes to explore and develop ideas and intentions as your work progresses. This may be in both 2D and 3D.
AO3 Recording Ideas	Develop and record ideas through drawing and annotation towards a personalized outcome. Link all work to AO1 and AO2 as your project progresses.
AO4 Presenting an Outcome	Create and present a personalized outcome, realizing your intentions.
Coursework Portfolio	Worth 60% of your overall grade. Contains project work evidencing the four assessment objectives above.
Exam Portfolio	Worth 40% of your overall grade. Contains exam work evidencing the four assessment objectives above.

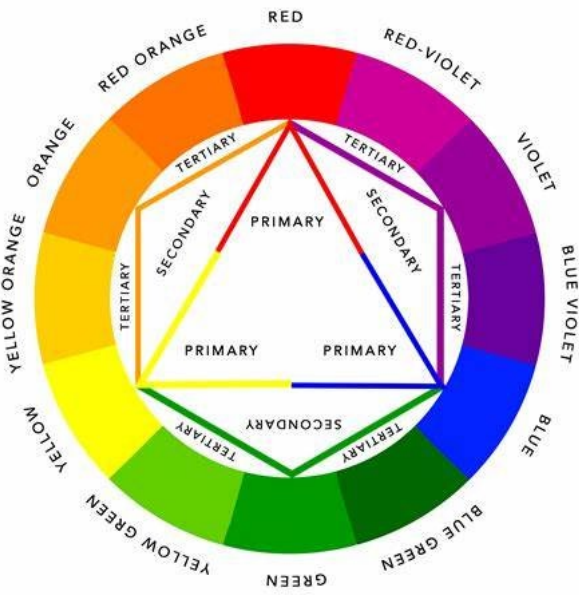
Key Terms	
Abstract	Abstract art seeks to break away from traditional representation of physical objects. It explores the relationships of forms and colours
Aesthetics	Aesthetics is the branch of philosophy that is concerned with the nature of beauty and taste
Aperture	The opening through which light passes to expose sensitized material or a sensor.
Composition	Composition is the placement or arrangement of visual elements in a work of art.
Contemporary Art	Embraces late 20th century contemporary art movements in painting, sculpture and architecture, as well as new media such as installation art, (including sound), conceptualism and video art.
Contrast	Contrast is the scale of difference between dark and light areas in images.
Depth of Field	The distance in front of the point of focus and the distance beyond that is acceptably sharp.
Exposure	The amount of light that is allowed to reach the image sensor which is controlled by the shutter speed and aperture setting.
Form	Form is the aesthetics of recording in 2 and 3D
Line	Lines can be horizontal, vertical, or diagonal, straight or curved, thick or thin.
Macro Photography	Photography producing photographs of small items larger than life size
Modernism	Modernism is the term given to the succession of styles and movements in art and architecture which dominated Western culture from 19th Century up until the 1960's.
Photograph	A drawing with light
Primary source	Your own photographs/ drawings based on real objects
Sculpture	To make or represent (a form) by carving, casting, or other shaping techniques.
Secondary source	Images from the internet, books or magazines
Texture	Texture is the perceived surface quality of a work of art.
Tone	This could be a shade or how dark or light a colour appears

Timeline of Art Movements

SMSC: Creative Thinkers



THE COLOUR WHEEL



Component 1: Human Lifespan and Development Knowledge Organiser

Topic Content:

- You will study the areas of growth and development that contribute to the whole person considering PIES
- Will reflect on the factors that impact on everyone’s life e.g. lifestyle culture etc.

LAA – Understand human growth and development across life stages and the factors that affect = it.

Main life stages

Age Group	Life stage	Developmental progress
0-2 years	Infancy	Still dependent on parents/carers but growing
3- 8 years	Early Childhood	Becoming increasingly independent, improving thought processes and learning how to develop friendships
8-18 years	Adolescence	Onset of puberty, growth spurts and emotional changes.
19-45 Years	Early Adulthood	Leaving home, making your own choices about family and career
46-65 years	Middle Adulthood	Having more time to travel, socialise and take up hobbies as any children may be leaving the home, beginning of menopause and ageing process.
65+ years	Later Adulthood	The ageing process continues which may affect memory and mobility.



P.I.E.S

- P** – Physical – how a body grows and changes and how their motor skills change
- I** – Intellectual - how people develop cognitive abilities (thinking skills) such as memory/recall and language.
- E** – Emotional - describes how people learn to cope with their feeling towards themselves and others
- S** – Social – describes how people form relationships and learn how to be independent.

Lear ning Objectives

- A – Understand the different types of health and social care services and barriers to accessing them.
- B – Understanding the skills, attributes and values required to give care.

Factors affecting growth and development

Inherited conditions – are as a result of genes that are passed from a parent/parents to their child.



Illness and disease – Chronic or serious illness during their lifetime that impacts their growth and development.

Mental ill health – It affects the way a person feels about themselves and how they interact with others.

Disability – Something that may limit an individual’s ability to carry out some activities.



Sensory Impairment - Partial or complete loss of one of the sense e.g. sight, hearing, touch or taste.



Lifestyle – Choices people make about their lives e.g. Smoking, Alcohol consumption, substance misuse, exercise.



Emotional – Someone’s feelings – emotions change depending on life experiences and decisions.

Social – Relationships with others supportive/unsupportive



Cultural – The religious/cultural and community groups people belong to.



Gender roles – roles and responsibilities determined by a person’s gender



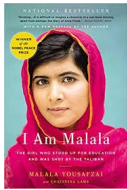
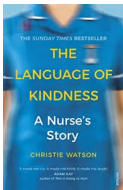
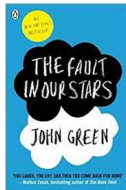
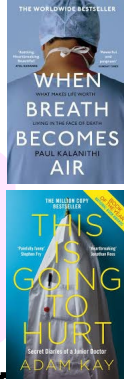
Environmental – Our surroundings and conditions which we live in, could be your home, community, air around us.



Economic – A person’s employment situation and their financial resources.



Challenging texts



Key terms –

Characteristics

Life stages

Growth

Classification

Development

- Physical
- Intellectual
- Emotional
- Social

Gross Motor Development

Fine Motor Development

Inherited conditions

Supportive

Unsupportive

Cultural factors

Gender Roles

Housing

Pollution

Life events

Expected events

Unexpected events

Informal support

Professional support

Voluntary Support

Multi-agency working

Multidisciplinary

Component 1: Human Lifespan and Development Knowledge Organiser

Topic Content:

- You will study the areas of growth and development that contribute to the whole person considering PIES
- Will reflect on the factors that impact on everyone’s life e.g. lifestyle culture etc.

Life events can be **expected**: you would expect this event to happen to you in your lifetime, or **unexpected**: you would **not** expect this event to happen to you in your lifetime. Unexpected life events are harder to adapt to because you do not expect them to happen.

Life circumstances

Like the other life events , life circumstances can be **expected** and **unexpected**.

Expected life circumstances include, leaving school, getting a job, moving out of parents house, moving home and retirement.

Unexpected life events would include, being excluded from education, periods of unemployment due to redundancy, losing a job



Changes in living conditions and standards. In addition, due to life choices a person may find themselves imprisoned

You need to explain what support a person has, how the support works and how the support enables the person to adapt to the life event.

Positive: The support an individual receives enables them to adapt to their new circumstances and the development of their PIES is not impacted in the long term.
This is because all four types of support are available, and the individuals confidence and self-esteem is maintained or even improved. The individual is well informed and can feel secure that they have a support network to help them during the adjustment period.

Learning Objectives

- A – Understand the different types of health and social care services and barriers to accessing them.
- B – Understanding the skills, attributes and values required to give care.

Support comes in three different types. Informal support is the everyday type of support a person would receive. Informal Support is **unpaid**.



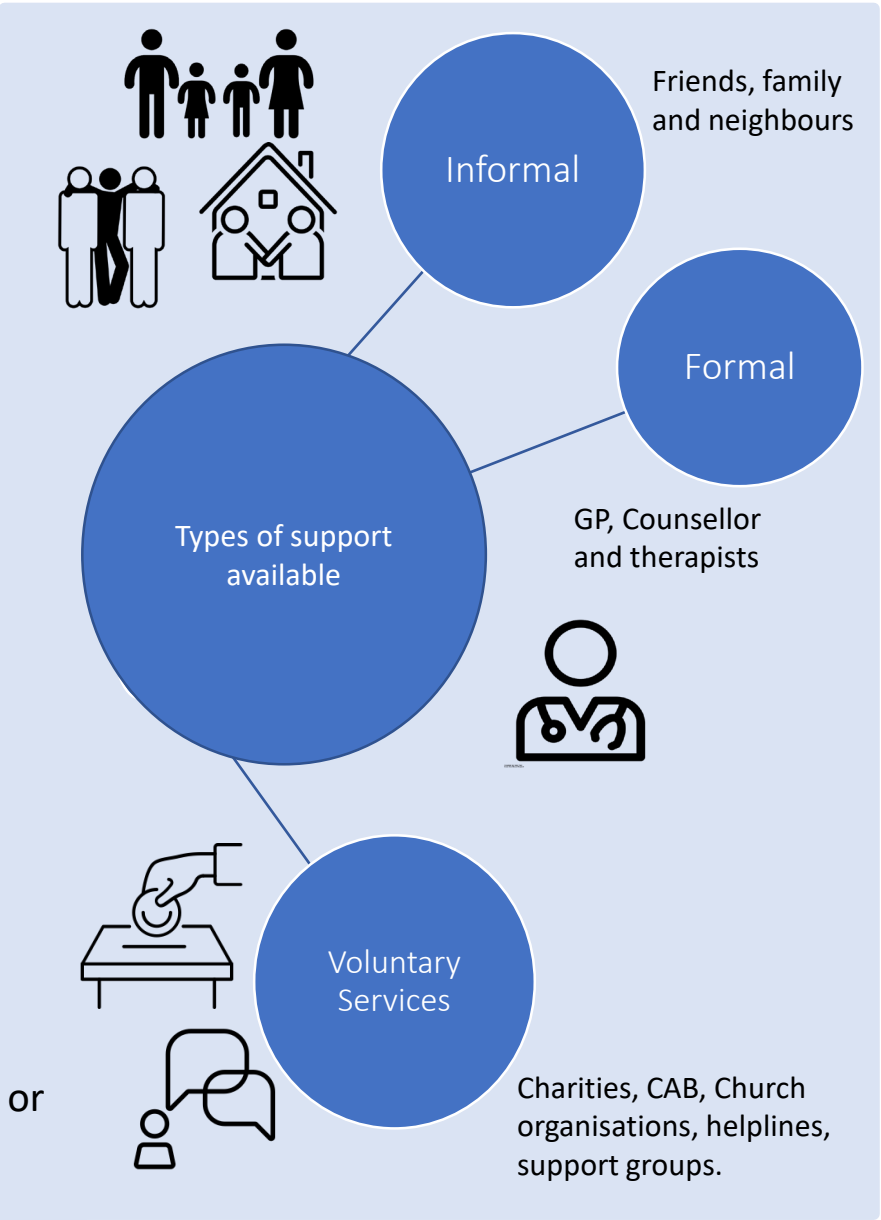
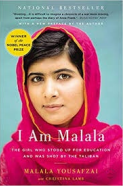
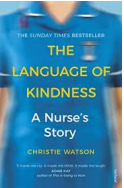
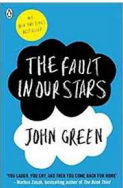
Support can also be formal , people who provide formal support are paid for their service. Such services could be doctors, midwives speech therapists etc.



Voluntary Services offer support , free of charge, in many different forms, such as support groups help lines and advice groups. Voluntary groups rely on donations from the Government and the public.

Negative: There is either a lack of support or ineffective support for the individual to access. This can lead to negative state of mind, anger, withdrawal or mental health issues. Ultimately the individual is unable to adapt both mentally and physically and the development of their PIES is impacted both in the short and long term.

Challenging texts



You need to explain what support a person has, how the support works and how the support enables the person to adapt to the life event.

1. What is development?

Development is an improvement in living standards through better use of resources.

Economic	This is progress in economic growth through levels of industrialisation and use of technology.
Social	This is an improvement in people's standard of living. For example, clean water and electricity.
Environmental	This involves advances in the management and protection of the environment.

2. Measuring development

These are used to compare and understand a country's level of development.



Economic indicators examples

Employment type	The proportion of the population working in primary, secondary, tertiary and quaternary industries.
Gross Domestic Product per capita	This is the total value of goods and services produced in a country per person, per year.
Gross National Income per capita	An average of gross national income per person, per year in US dollars.

Social indicators examples



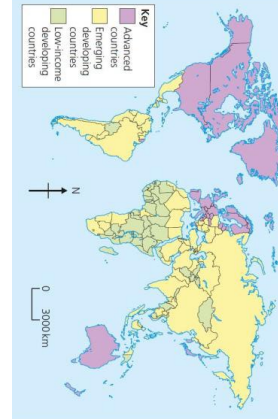
Infant mortality	The number of children who die before reaching 1 per 1000 babies born.
Literacy rate	The percentage of population over the age of 15 who can read and write.
Life expectancy	The average lifespan of someone born in that country.

Mixed indicators

Human Development Index (HDI)	A number that uses life expectancy, education level and income per person.
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3. Variations in the level of development

LIcs	Poorest countries in the world. GNI per capita is low and most citizens have a low standard of living.
NEEs	These countries are getting richer as their economy is progressing from the primary industry to the secondary industry. Greater exports leads to better wages.
HICs	These countries are wealthy with a high GNI per capita and standards of living. These countries can spend money on services.



4. Causes of uneven development

Development is globally uneven with most HICs located in Europe, North America and Oceania. Most NEEs are in Asia and South America, whilst most LICs are in Africa. Remember, development can also vary within countries too.

Unit 2b



The Changing Economic World

5. Physical factors affecting uneven development

Natural Resources <ul style="list-style-type: none"> Fuel sources such as oil. Minerals and metals for fuel. Availability for timber. Access to safe water. 	Natural Hazards <ul style="list-style-type: none"> Risk of tectonic hazards. Benefits from volcanic material and floodwater. Frequent hazards undermines redevelopment.
Climate <ul style="list-style-type: none"> Reliability of rainfall to benefit farming. Extreme climates limit industry and affects health. Climate can attract tourists. 	Location/Terrain <ul style="list-style-type: none"> Landlocked countries may find trade difficulties. Mountainous terrain makes farming difficult. Scenery attracts tourists.

6. Human factors affecting uneven development

Aid <ul style="list-style-type: none"> Aid can help some countries develop key projects for infrastructure faster. Aid can improve services such as schools, hospitals and roads. Too much reliance on aid might stop other trade links becoming established. 	Trade <ul style="list-style-type: none"> Countries that export more than they import have a trade surplus. This can improve the national economy. Having good trade relationships. Trading goods and services is more profitable than raw materials.
Education <ul style="list-style-type: none"> Education creates a skilled workforce meaning more goods and services are produced. Educated people earn more money, meaning they also pay more taxes. This money can help develop the country in the future. 	Health <ul style="list-style-type: none"> Lack of clean water and poor healthcare means a large number of people suffer from diseases. People who are ill cannot work so there is little contribution to the economy. More money on healthcare means less spent on development.
Politics <ul style="list-style-type: none"> Corruption in local and national governments. The stability of the government can effect the country's ability to trade. Ability of the country to invest into services and infrastructure. 	History <ul style="list-style-type: none"> Colonialism has helped Europe develop, but slowed down development in many other countries. Countries that went through industrialisation a while ago, have now develop further.

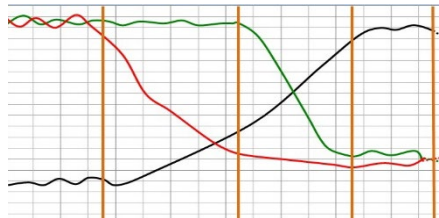
7. Consequences of Uneven Development

Levels of development are different in different countries. This uneven development has consequences for countries, especially in wealth, health and migration.

Wealth	People in more developed countries have higher incomes than less developed countries.
Health	Better healthcare means that people in more developed countries live longer than those in less developed countries.
Migration	If nearby countries have higher levels of development or are secure, people will move to seek better opportunities and standard of living.

8. The Demographic Transition Model

The demographic transition model (DTM) shows population change over time. It studies how birth rate and death rate affect the total population of a country.



STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
High DR High BR Steady	BR Low Declining DR Very High	Rapidly falling DR Low BR High	Low DR Low BR Zero	Slowly Falling DR Low BR Negative
e.g. Tribes	e.g. Kenya	e.g. India	e.g. UK	e.g. Japan

Reducing the Global Development Gap

Microfinance Loans



This involves people in LICs receiving smalls loans from traditional banks.
+ Loans enable people to begin their own businesses
- Its not clear they can reduce poverty at a large scale.

Foreign-direct investment



This is when one country buys property or infrastructure in another country.
+ Leads to better access to finance, technology & expertise.
- Investment can come with strings attached that country's will need to comply with.

Aid



This is given by one country to another as money or resources.
+ Improve literacy rates, building dams, improving agriculture.
- Can be wasted by corrupt governments or they can become too reliant on aid.

Debt Relief



This is when a country's debt is cancelled or interest rates are lowered.
+ Means more money can be spent on development.
- Locals might not always get a say. Some aid can be tied under condition from donor country.

Fair trade



This is a movement where farmers get a fair price for the goods produced.
+ Paid fairly so they can develop schools & health centres.
-Only a tiny proportion of the extra money reaches producers.

Technology



Includes tools, machines and affordable equipment that improve quality of life.
+ Renewable energy is less expensive and polluting.
- Requires initial investment and skills in operating technology

CS: Reducing the Development Gap In Jamaica



Location and Background

Jamaica is a LIC island nation part of the Caribbean. Location makes Jamaica an attractive place for visitors to explore the tropical blue seas, skies and palm filled sandy beaches



Tourist economy



-In 2015, 2.12 million visited.
-Tourism contributes 27% of GDP and will increase to 38% by 2025.
-130,000 jobs rely on tourism.
-Global recession 2008 caused a decline in tourism. Now tourism is beginning to recover.

Multiplier effect

-Jobs from tourism have meant more money has been spent in shops and other businesses.
-Government has invested in infrastructure to support tourism.
-New sewage treatment plants have reduced pollution.

Development Problems

- Tourists do not always spend much money outside their resorts.
- Infrastructure improvements have not spread to the whole island.
- Many people in Jamaica still live in poor quality housing and lack basic services such as healthcare.

Case Study: Economic Development in Nigeria



Location & Importance

Nigeria is a NEE in West Africa. Nigeria is just north of the Equator and experiences a range of environments. Nigeria is the most populous and economically powerful country in Africa. Economic growth has been base on oil exports.



Influences upon Nigeria's development

Political

Suffered instability with a civil war between 1967-1970. From 1999, the country became stable with free and fair elections. Stability has encouraged global investment from China and USA.

Social

Nigeria is a multi-cultural, multi-faith society. Although mostly a strength, diversity has caused regional conflicts from groups such as the Boko Haram terrorists.

Cultural

Nigeria's diversity has created rich and varied artistic culture. The country has a rich music, literacy and film industry (i.e. Nollywood). A successful national football side.

Industrial Structures

Once mainly based on agriculture, 50% of its economy is now manufacturing and services. A thriving manufacturing industry is increasing foreign investment and employment opportunities.

The role of TNCs

TNCs such as Shell have played an important role in its economy.
+ Investment has increased employment and income.
- Profits move to HICs.
- Many oil spills have damaged fragile environments.



Changing Relationships

Nigeria plays a leading role with the African Union and UN. Growing links with China with huge investment in infrastructure. Main import includes petrol from the EU, cars from Brazil and phones from China.

Environmental Impacts

The 2008/09 oil spills devastated swamps and its ecosystems. Industry has caused toxic chemicals to be discharged in open sewers - risking human health. 80% of forest have been cut down. This also increases CO² emissions.

Aid & Debt relief

+ Receives \$5billion per year in aid. + Aid groups (ActionAid) have improved health centres, provided anti-mosquito nets and helped to protect people against AIDS/HIV. - Some aid fails to reach the people who need it due to corruption.

Effects of Economic Development

Life expectancy has increased from 46 to 53 years. 64% have access to safe water. Typical schooling years has increased from 7 to 9.

Case Study: Economic Change in the UK



UK in the Wider World

The UK has one of the largest economies in the world. The UK has huge political, economic and cultural influences. The UK is highly regarded for its fairness and tolerance. The UK has global transport links i.e. Heathrow and the Eurostar.



Causes of Economic Change

De-industrialisation and the decline of the UK's industrial base. Globalisation has meant many industries have moved overseas, where labour costs are lower. Government investing in supporting vital businesses.

Towards Post-Industrial

The quaternary industry has increased, whilst secondary has decreased. Numbers in primary and tertiary industry has stayed the steady. Big increase in professional and technical jobs.

Developments of Science Parks

Science Parks are groups of scientific and technical knowledge based businesses on a single site.

- Access to transport routes.
- Highly educated workers.
- Staff benefit from attractive working conditions.
- Attracts clusters of related high-tech businesses.

CS: UK Car Industry



Every year the UK makes 1.5 million cars. These factories are owned by large TNCs. i.e. Nissan.

- 7% of energy used there factories is from wind energy.
- New cars are more energy efficient and lighter.
- Nissan produces electric and hybrid cars.

Change to a Rural Landscape



Social

Rising house prices have caused tensions in villages. Villages are unpopulated during the day causing loss of identity. Resentment towards poor migrant communities.

Economic

Lack of affordable housing for local first time buyers. Sales of farmland has increased rural unemployment. Influx of poor migrants puts pressures on local services.

Improvements to Transport



UK North/South Divide

A £15 billion 'Road Improvement Strategy'. This will involve 10 new roads and 1,600 extra lanes. £50 billion HS2 railway to improve connections between key UK cities. £18 billion on Heathrow's controversial third runway. UK has many large ports for importing and exporting goods.

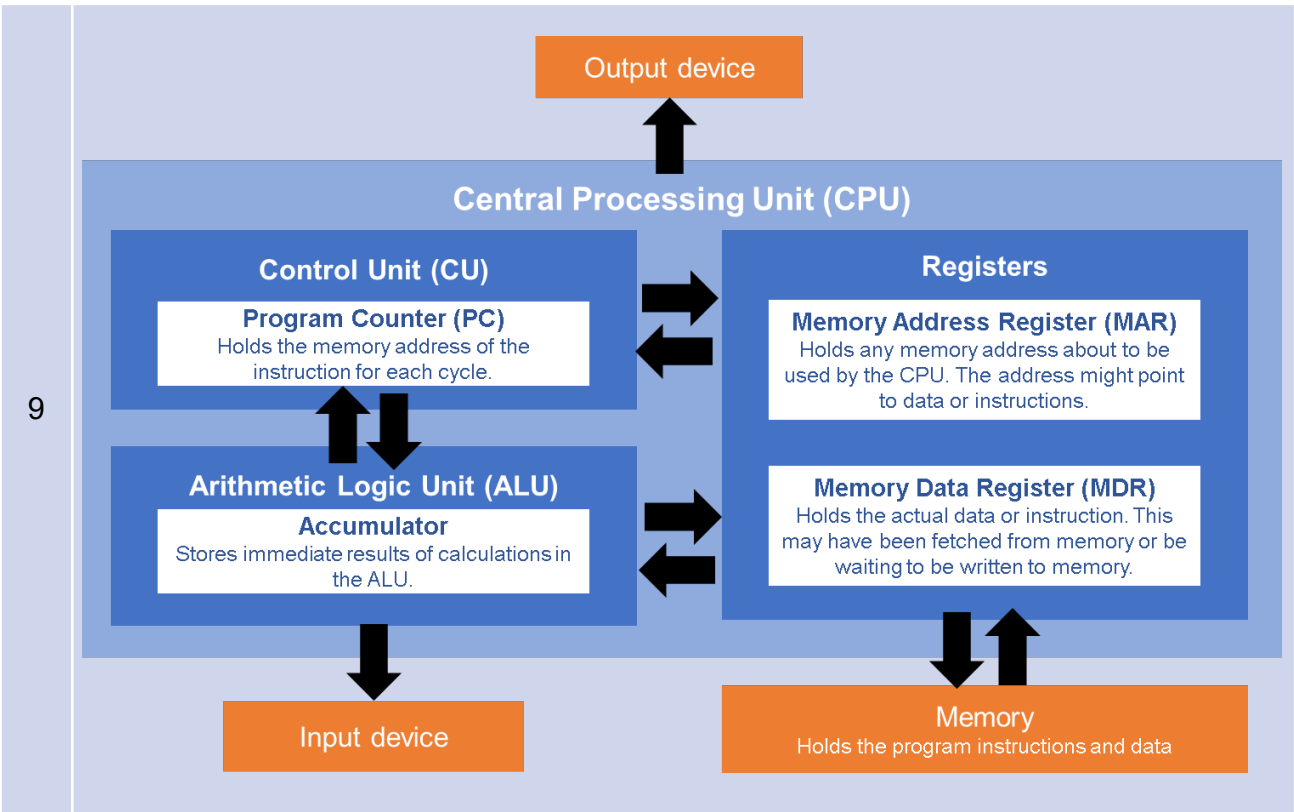
- Wages are lower in the North.
- Health is better in the South.
- Education is worse in the North.
+ The government is aiming to support a Northern Powerhouse project to resolve regional differences.
+ More devolving of powers to disadvantaged regions.

KS4 - Computer Science - 1.1.1 ARCHITECTURE OF THE CPU - Knowledge Organiser

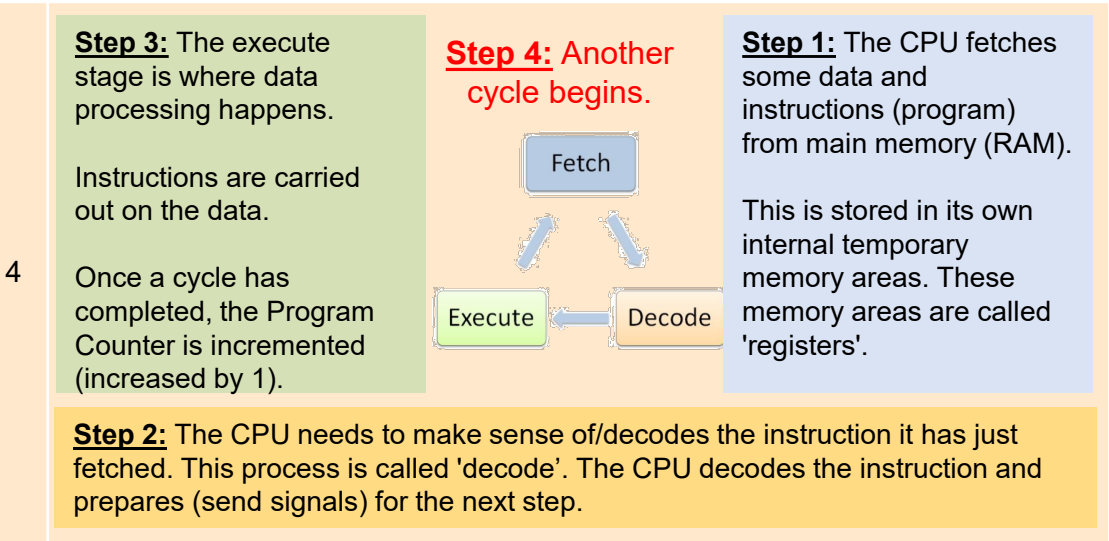
KEYWORDS

1	Central processing unit (CPU)	The CPU is a piece of hardware in a device that carries out the instructions of a computer program.
2	Von Neuman architecture	The design that many general purpose computers are based. Based on a 1945 description by the mathematician and physicist John von Neumann. See diagram in the blue box below.
3	Fetch-decode – execute	When a program is being executed, the CPU performs the fetch-decode-execute cycle , which repeats until reaching the STOP instruction.

VON NEUMAN ARCHITECTURE (CPU STRUCTURE)



The FETCH -> DECODE -> EXECUTE CYCLE



MAIN COMPONENTS OF THE CPU




5	Control unit (CU)	<ul style="list-style-type: none">Has <u>overall control</u> of the CPU.Main job to <u>execute program instructions</u> by following the <u>fetch-decode-execute</u> cycle.Controls the flow of data inside the CPU (e.g cache) and outside the CPU (e.g main memory).
6	Arithmetic Logic Unit (ALU)	<ul style="list-style-type: none">The ALU does all the <u>calculations</u> such as addition, subtraction, multiplication and division.It <u>performs logic operations</u> such as AND, OR and NOT and binary shifts.
7	Cache memory	<ul style="list-style-type: none">The cache is very fast memory. Faster than RAM.It stores regularly used data so it can be accessed quickly next time it is needed.Three levels of cache memory. L1 is the fastest and smallest and L3 is the slowest but largest.
8	Registers	<ul style="list-style-type: none">Another type of memory in CPU that temporarily holds tiny bits of data. Quickest of all memory.

KS4 - Computer Science - 1.1.2 CPU PERFORMANCE & 1.1.3 EMBEDDED SYSTEMS – Knowledge Organiser

KEYWORDS

1	Central processing unit (CPU)	The CPU is a piece of hardware in a device that carries out the instructions of a computer program.
2	Characteristics	Feature/quality of the CPU that affects performance.
3	Performance	How quickly a CPU can process data/instructions. This can have an impact on a devices responsiveness and ability to multitask.
4	Embedded systems	A computer System that is made up of both Hardware and Software (Often known as Firmware), usually for very specialised tasks and doesn't usually contain an Operating System. For example: washing machine, Sat Nav, Microwave, cars (parking sensors) etc.
5	General Purpose Computer	A computer that is designed to be able to carry out many different tasks. Desktop computers and laptops are examples of general purpose computers.

THINGS THAT AFFECT CPU PERFORMANCE

6	Clock speed 	<ul style="list-style-type: none"> The is the number of instructions a single processor can carry out per second - measured in Hertz A standard computer would be about 3.5Hz – this is <u>3.5 billion instructions per second!!</u> The higher the clock speed, the greater the number of instructions can be carried out per second. Increasing the clock speed is called overclocking, however, overclocking increases the temperature, so improved cooling may be required.
7	Number of Cores 	<ul style="list-style-type: none"> Each core in the CPU can process data independently. The more cores, the more instructions it can carry out at once, <u>this doesn't mean increased speed!</u> Most PCs have four or more cores now.
8	Amount of Cache 	<ul style="list-style-type: none"> Cache is memory inside the CPU. It is much <u>faster than RAM.</u> A larger cache gives the CPU more capacity for the most frequently used instructions, meaning it can access more instruction in its fastest memory.

DOES ONE CHARACTERISTIC IMPROVEMENT MEAN BETTER PERFORMANCE?

- 9 **NO!** - Each characteristic can have some impact upon the performance of a device, an improvement in one alone will not necessarily improve the devices overall performance.
- For example:** An increase in the number of cores will allow a device to perform multitask or parallel, BUT if the clock speed is slow, then the cores only perform as fast as the clock speed, therefore impacting performance.

PARALLEL PROCESSING & MULTI-TASK PROCESSING

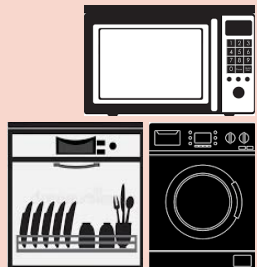
10	Parallel Processing	The same program can have two instructions processed at the same time.
11	Multi-Task Processing	Each core can each process two different programs' instructions at the same time.
12	Coding of Software	Some programs do not allow more than one instruction to be processed at once, not necessarily mean better performance!

EMBEDDED SYSTEMS

- An embedded system is designed with a specific task in mind. All parts and components are usually built on a single printed circuit board. This board is then built into the larger piece of equipment.
- An embedded system is a single microprocessor that includes RAM, ROM and a CPU. Without them a digital device would not be able to perform specific functions. **For example:** a dishwasher wouldn't know how to heat the water, or a satnav wouldn't know how to communicate with a satellite.

Embedded Systems:

- Have no operating system
- Purpose and function is limited to a few dedicated tasks
- Program is held in ROM
- RAM is used to accept user input
- Built into the object or device that it controls



KS4 - Computer Science - 1.2.1 PRIMARY STORAGE (MEMORY) - Knowledge Organiser

KEYWORDS

1	Random Access Memory (RAM)	RAM holds the loaded operating system as well as all the running applications and data. Stores data as electricity in transistors etched into a circuit in the device. Charge needs to be refreshed every few milliseconds otherwise it leaks away. <u>Needed as too slow for CPU to access data from hard disk.</u>
2	Read Only Memory (ROM)	ROM is used to store start up routines in a computer. The contents of ROM can't be changed. ROM is a type of Flash memory.
3	Virtual Memory	Virtual memory is located in the Hard Disk Drive (HDD) and used when the RAM is full.
4	Flash Memory	Doesn't need constant power to hold data. Sends large electric current to force electrons through a barrier and trap them. The arrangement of them is data.
5	Primary storage	RAM and ROM that directly interacts with the CPU – NOT storage for files created by user.
6	Volatile	Volatile means data will be lost when power is lost.

MEMORY - This is why computers store data as binary!

7	<ul style="list-style-type: none"> Made from semi-conductor switches / transistors. Position of the switch can only be in one of two states, open or closed / on or off, which is used to represent binary 0 (closed/off) or 1 (open/on). Single unit of memory = BIT = 0 or 1.
8	<p><u>Memory access:</u> Memory linked to CPU by 2 busses (a BUS is a set of very thin parallel wires that transmit binary data).</p> <ul style="list-style-type: none"> <u>ADDRESS BUS</u> identifies the location of the data (a bit like a house number/postcode does). <u>DATA BUS</u> is used to transfer the contents of the memory address (the data) between the memory location and the CPU (and visa-versa with RAM).

ROM (Read Only Memory)

9	<p>When you switch off your computer the data that the CPU can access (the RAM) loses its data.</p> <p>This is a problem because, when you restart your computer, data must be in the RAM for the computer to work.</p> <p>This is where ROM comes in, ROM is:</p> <ul style="list-style-type: none"> a memory chip that can store data even without power: non-volatile. Can only be read, not easily written to. Stores computer boot-up sequence called the BIOS (Basic Input Output System). Everything the computer needs to start and load the operating system. Built into the motherboard. Used a lot in embedded systems to store the software to control the hardware.
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RAM (Random Access Memory)

10	<ul style="list-style-type: none"> Volatile. Data constantly changing (when a program is opened data and instructions needed for it are loaded into RAM). Stores currently running programs/data. More RAM = <ul style="list-style-type: none"> more currently in use programs and data can be stored and accessed by CU for processing Better responsiveness & ability to have several programs open at once (multitask) or memory intensive ones like high end games.
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VIRTUAL MEMORY

11	<p>When RAM is full, part of secondary storage (hard drive) acts as RAM. This ensures your computer does not simply crash.</p> <p>At any one time only some blocks of data in RAM are actively being used by the CPU, the operating system copies blocks of inactive data from RAM to the hard drive and copies active blocks of data into RAM to be accessed by the CPU, once space available OS copies data back to RAM.</p> <p>Hard disk has a slower read/write access speed, swapping inactive & active data blocks causes a delay as the computer switches tasks. Accessing VM slows down as too much time is spent swapping blocks of data between real and virtual memory (disk thrashing). Area of hard disk acting as VM = "page file". Size can set using OS (usually twice size of RAM).</p>
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KS4 - Computer Science - 1.2.2 SECONDARY STORAGE - Knowledge Organiser





























KEYWORDS

1	Secondary storage	Allows for permanent, long term of storage of data (files and software), even when there is no power. Non-volatile , e.g. HDD, USB etc.
2	Characteristics	Feature/quality of the storage type that affects it's ideal use.
3	Optical	A laser light creates marks in a pattern on the disk. A laser light detects where the marks are and translates this into a readable format.
4	Magnetic	Read/write needle moves across a disk and changes how magnetised that part is. E.g. one level of magnetism is a 1, a second is a 0.
5	Solid State (Flash Memory)	Made of microchips (switches). The state of the switches(open/on or closed/off) determine if a 1, or 0 is stored.
6	Cloud	Storing data at a remote location online. When files and data are sent to the cloud, they are being sent to a server that is connected to the internet. Files can be uploaded and downloaded as required.

WHY SECONDARY STORAGE IS NEEDED. NOT BACKUP STORAGE!

7	<p>In everyday computer use, we need a way to write data, rewrite data, store data when the computer is switched off and retrieve data the next time we switch our computer back on.</p> <p>RAM allows us to write data and store it...but the data is lost when it is switched off (volatile).</p> <p>ROM allows us to store data when it has no power (non-volatile)...but we cannot write to it.</p> <p>We therefore need another device/medium by which we can re-write data when we want AND store the data when the computer has no power.</p> <p>This is where SECONDARY STORAGE comes in!</p> <p>Without secondary storage software would need to be installed each time we use it and you couldn't save any files, data, images, videos etc.</p>
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TYPES OF STORAGE AND THEIR CHARACTERISTICS

8	Optical  E.g. DVD, CD, BluRay.	<ul style="list-style-type: none"> • Use: Storage of small media files and documents • Capacity: 650MB (Small) • Speed: Moderate read/write speeds • Portability: Very portable and light • Durability: Fair durability, can survive knocks but scratches can damage the data. • Reliability: CD-Rs are write once but can be read indefinitely. CD-RW can be reused. • Cost: Very cheap 	     
9	Magnetic  E.g. Hard Disc Drives (HDD), magnetic tapes.	<ul style="list-style-type: none"> • Use: Desktop computers to store large files, programs and operating systems • Capacity: 750GB – 3TB (3000GB) (Large) • Speed: High read/write speeds • Portability: Heavy / poor portability (even external are clunky!) • Durability: Dropping could cause damage, especially to 'read head' as is a moving part • Reliability: Can be used again and again but does have a limited life (a good few years) • Cost: Low cost (quite cheap) 	     
10	Solid state / Flash  E.g. Solid State Drives (SSD) and USB sticks/pens.	<ul style="list-style-type: none"> • Use: Desktop computers, laptops and tablets to store large files, programs and operating systems / Phones, Cameras (portable devices), no moving parts, function whilst moving. • Capacity: 64GB - 480GB (Moderate) • Speed: Super Fast (Read/Write) • Portability: Very portable (small and lightweight) • Durability: No moving parts so can survive knocks and scrapes • Reliability: Can be re-used many times (up to 100,00 times) • Cost: Very Expensive (per Gb) 	     
11	Cloud  E.g. iCloud, GoogleDrive, DropBox etc.	<ul style="list-style-type: none"> • Use: Used to store documents and media files online. This means that you can go to another computer and access your files (providing you have internet access). • Capacity: Unlimited (providing you can pay for it). • Speed: Depends on network / bandwidth speeds. Poor bandwidth can cause uploading and downloading of large files to take a long time. • Portability: It is virtual so you don't have anything physical to move around. • Durability & Reliability: Providing you keep up payments and the company looks after their storage devices - very durable and reliable. This is often because they back up storage devices in many places. There can be issues with the law as a company's data may be stored in a country which doesn't follow the same data protection laws. The hosting company could also be attacked by hackers who could steal your data. • Cost: Can be expensive depending on the service – but often it is free for a few GBs. 	     

Year 10 - iMedia - Interactive Multimedia Products - Knowledge Organiser

Types Of Interactive Products



Website



Apps



E-kiosk



E-learning Portal

Visualisation Diagram

Show the final product

Annotations

Drawings



Title

Layout

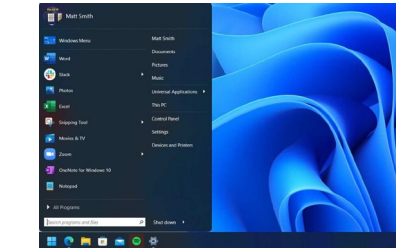
Text

Fonts

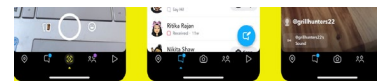
Logos

GUI - Graphical User Interface

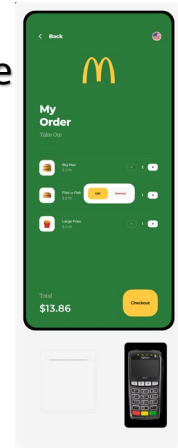
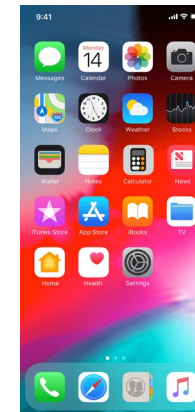
iOS – Smartphone App Orientated



Windows – Desktop PC



Snapchat - App



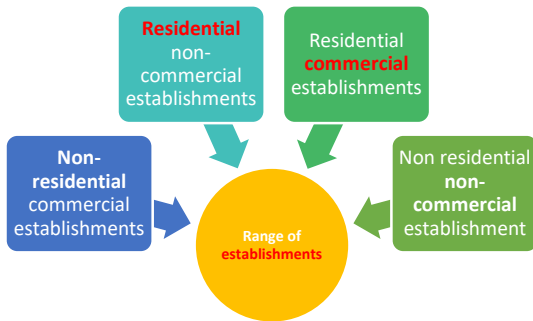
E-Kiosk

Key Words:	
House Style	Consistent use of a colour scheme, font, layout and images style across the product - should be easily recognisable
Colour scheme	Colours that are consistent throughout and are recognisable to the brand or product.
Layout	How elements are positioned, this should be eye catching, but also easy to use/follow.
GUI	Graphical user interface, the interface between the audience and the screen. This should be as user friendly as it can be.
Navigation	The action of moving around a website or application, with the intent to access a particular part of the content
Non-linear	The ability to navigate between pages in a non-sequential order

AC 1.1.1

The structure of the hospitality and catering industry

1. Types of Provider



Establishment	Service provided	Examples
Commercial residential	Accommodation, house keeping, food, beverages, conference or training facilities	Hotels, guest houses, campsites, bed and breakfasts, holiday parks, farmhouses
Commercial non-residential	Food and beverage to eat in or take away, areas to sit to eat and drink	Restaurants, cafes, tea rooms, coffee shops, fast food outlets, pubs and bars, street food and pop up restaurants, mobile vans
Non-commercial residential	Accommodation, food and beverages	Hospitals, care homes, prisons, armed forces, boarding schools, colleges, universities.
Non-commercial non-residential	Food and beverages	Canteens in offices, day-care centres, schools and nurseries, charity food suppliers, for example soup kitchen

2. Suppliers



Types of service

Food Service	Description
Formal food	Food is usually served to customers by waiting staff. <ul style="list-style-type: none">Plate: the meal is plated up and brought to the customers table by waiting staffWaiting service: the food is served to the customers at the table by waiting staffGuerridon (trolley or movable service): the customer's food is cooked at the table, usually for dramatic effect, for example flambéed Steaks and crepes.
Street food	Ready-to-eat food or drink sold on the street or in a public place, such as a market or festival.
Self Service	Customers help themselves to food, for example a canteen, or a carvery (the meal is on display and carved by a chef, and a customer can help themselves to vegetables, sauces and gravy.
Fast food	Food is made to order very quickly and can be taken away from the restaurant or stall to eat; seats and tables are often provided.
Cafeteria	Small and inexpensive restaurant or coffee bar, serving light meals and refreshments
Takeaway	Takeaway restaurants (for example Chinese, Indian, pizza) take an order and deliver the food to the customer's home; customers can also order at the restaurant and then take the food away to eat it.
Buffet	A selection of dishes is laid out for customers to help themselves; different buffet styles include: <ul style="list-style-type: none">Sit-down buffet: once the customer has chosen their food from the buffet, they can sit down at a table to eat it.Stand-up or fork buffet: once the customer has chosen their food, they stand to eat it; this allows guests to circulate and meet other guestsFinger buffet: all the food is prepared to be eaten with fingers (without the need for a knife and fork); foods are normally bite-size and easy to eat.
Automatic vending	Drinks and snacks are stored in a machine with a glass front and items are selected by the customer; they are often coin operated and placed in establishments where it is may not always be possible to get access to food, for examples colleges and hospitals
Transport catering	A variety of food service options are available on trains, planes and ships.
Hotel	Provides overnight accommodation and food and drink options. Many hotels offer breakfast, evening meals, bar snacks, lunch, room service (food ordered and delivered to your room), budget hotels usually have a simpler offering
Bed and breakfast	Offers overnight accommodation and breakfast; often these are private family homes where rooms are made available to guests; breakfast is usually served in a dining room or the owners kitchen

Hospitality at non-catering venues

Contract Caterers provide:

- food for functions such as weddings, banquets and parties in private houses.
- prepare and cook food and deliver it to the venue, or cook it on site.
- They may also provide staff to serve the food, if required.
- Complete catering solutions for works canteens etc



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3. Standards and ratings

★ ONE STAR At least 5 bedrooms with ensuite or private facilities Open 7 days a week Guests have access at all times	Clearly defined reception area Restaurant serving breakfast 7 days a week & evening meals 5 days a week Uncovered bar
★★ TWO STARS All of the above, plus: Higher standards of cleanliness, hygiene & maintenance	At least 10 bedrooms Uncovered bar
★★★ THREE STARS All of the above, plus: Access without a key (10pm - 11pm) & with a key at all other times Dinner served 6 evenings a week, snacks on the bar Room service for drinks & snacks during daytime & evening	All bedrooms en suite In-room telephone system Wi-Fi in public areas
★★★★ FOUR STARS All of the above, plus: 24-hour room service with full breakfast and dinner Reservations open to residents & non-residents for breakfast & dinner every day of the week Higher staffing levels Wi-Fi in bedrooms	24-hour access facilitated by on-duty staff Reservations with 24-hour telephone system Enhanced services such as afternoon tea, luggage assistance or in-room bar service
★★★★★ FIVE STARS All of the above, plus: Open all year round Proactive service & customer care Additional receptionists Additional facilities such as a second dining area, business centre, spa & permanent luxury suite	Enhanced services such as valet parking, concierge & access to business Reservations open every day for all meals Bar/club in at least 80% of bedrooms

Hotel and Guest house standards

Hotels and guest houses are often given a star rating. Star ratings help customers to know what services and facilities they can expect at a hotel or guest house. The quality of the service provided is rated on a scale of one to five stars

3. Standards and ratings

Food hygiene standards

The Food standards agency runs a scheme with local authorities where they score businesses on a scale from zero to five to help customers make an informed choice about where to eat. The rating is usually displayed as a sticker in the window of the premises. The scores mean:



Keywords



Extended reading



Exam question



Video links



Revision Techniques

Restaurant standards

The three main restaurant rating systems used in the UK are Michelin stars, AA Rosette Awards and The Good Food Guide reviews: **Michelin stars** are a rating system used to grade restaurants for their quality: One star is a very good restaurant Two star is excellent cooking Three stars is exceptional cuisine



AA Rosette Awards score restaurants from one (a god restaurant that stands out from the local competition) to five (cooking that compares with the best in the world)

The Good Food Guide gives restaurants a score from one (capable cooking but some inconsistencies) to ten (perfection)

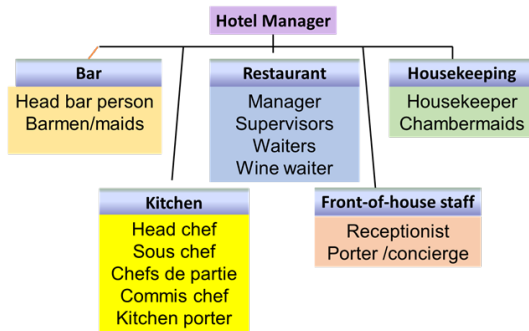
Environmental standards

The Sustainable Restaurant Association awards restaurants a one-two-three star rating in environmental standards. To achieve this the restaurant has to complete an online survey about sourcing, society and the environment. It is then given an overall percentage for environmental standards: One star: 50-59% Two star: 60-69% Three stars: more than 70%

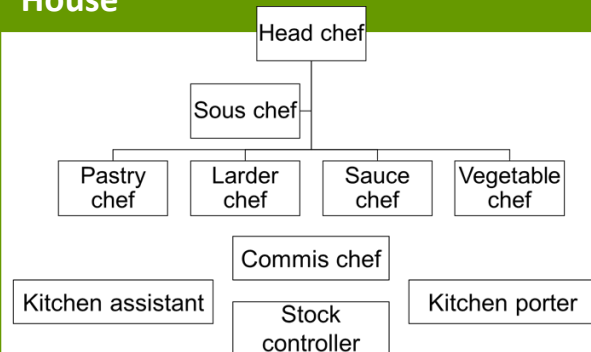


4. Job roles in the industry

Staff structure in a hotel



5. The Kitchen brigade- Back of House



Most large establishments could have **chefs de partie** in the following areas:

- **Sauce chef-** Le Saucier
- **Pastry chef-** Le Pâtissier- baked goods and dessert
- **Fish chef-** Le Poissonnier
- **Vegetable chef-** L'entremetier
- **Soup chef-** Le Potager
- **Larder chef-** Le garde manger- cold starters and salads
- The **commis chef** or assistant chef is a chef in training
- The **kitchen porter** washes up and may do basic vegetable preparation
- The **stock controller** is in charge of all aspects of store keeping and stock control.

6. Front of House roles

Reception

Receptionist: meet customers and direct them to the correct person or place; they manage visitor lists and booking systems
Porter/ Concierge: assist hotel guests by making reservations, booking taxis and booking tickets for local attractions and events.

Restaurant and bar

Restaurant manager (Maitre d'Hote): The restaurant manager is in overall charge of the restaurant; they take bookings, relay information to the head chef, complete staff rotas, ensure the smooth running of the restaurant

Head waiter (ess): Second in charge of the restaurant,. Greets and seats customers, relays information to the staff, Deals with complaints and issues referred by the waiting staff.

Waiting staff Serve customers, clear and lay tables, check the customers are satisfied with the food and service. May give advice on choices from the menu and special order foods

Wine waiter- Le sommelier: Specialises in all areas of wine and matching food, advises customers on their choices of wine, Wine waiters serve the wine to the customer and can advise customers on their choices as well

Bar staff serve drinks and take food orders , wash up, clear tables, change barrels and fill shelves.

Baristas make and serve hot and cold beverages, in particular different types of coffee such as espresso, cappuccino and latte.



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7. Average salaries in the hospitality and catering industry

Role	Average Salary
Hotel Management	£37,310
Head executive chef	£36,613
Pastry chef	£30,530
Housekeeper	£24,055
Receptionist	£21,596
Porter	£17,718
Waiting and bar staff	£16,735
Kitchen staff	£16,556

8. Training

Level	Types of training
Key stage 4 school courses	Level 1/2 Vocational award in Hospitality and Catering
Post 16-19	Colleges offer many courses for those leaving school after Year 11, for example: <ul style="list-style-type: none">• Certificate in Hospitality and Catering Level 1• Certificate in Introduction to Culinary Skills Level 1• Diploma in Introduction to Professional Cookery Level 1• Diploma in Hospitality and Catering Level 2• Diploma in Professional Cookery Level 2
Universities	Universities offer degree, HND and HNC courses in subjects such as: <ul style="list-style-type: none">• Catering• Hospitality• Culinary Arts• Hotel management• Food and beverage service
Apprenticeships	These provide both work experience and training
In-house training	On-the-job training provided by the organisation you work for

9. Personal attributes



Job Role	Desirable Attributes
Waiter/waitress	<u>Attentive</u> listener, good memory, clear <u>communicator</u> , diplomatic, calm and <u>assured</u> , high level of focus and attention, multitasker, can work in a team, physical <u>stamina</u> , <u>courteous</u> and polite, hardworking.
Receptionist	Professional, positive attitude and behaviour, clear communicator, helpful, an work in a team, courteous and polite, can learn skills quickly, calm, <u>composed</u> , approachable.
Housekeeper	Physical stamina, tactful, diplomatic, calm, courteous and polite, good memory, can work in a team.
Head Chef	Organised, able to accept criticism, physical stamina, creative, attention to detail, can handle highly stressful situations, passion for food and cooking.
Commis chef	Attentive listener, clear communicator, can work in a team, passion for food and cooking, physical stamina, creative.

Keywords



Extended reading



Exam question



Video links



Revision Techniques

1.1.3 Working conditions across the hospitality and catering industry

1.3 Working conditions across the hospitality and catering industry

Employers want to employ most workers when they have busy times

Busy times of year:

- Christmas
- Tourist season
- School holidays
- Mothers day
- valentines

Days of the week

- Friday
- Saturday
- Sunday
- Pay day

Time of day

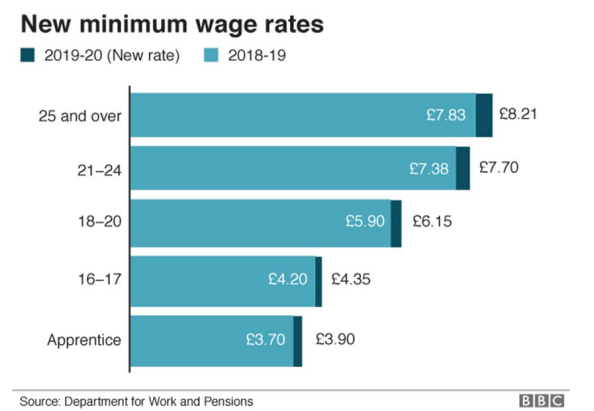
- Lunchtime
- Afternoon
- Dinner time
- (breakfast)



10. Working hours

- Hospitality and Catering jobs tend to be long hours, early starts for breakfast in a hotel to late nights for dinner in a restaurant.
- Staff will still get 2 days off a week but it will be quieter days instead of the weekend
- Shifts could be 6-3. 11-6. 3-11 or other hours.
- Monthly salaried staff may not have set hours eg Head Chef who might work from early morning to late night every day

11. The national Minimum Wage



12. Contracts of employment



- Full-time and part-time employees must have
1. a written statement of employment or **contract** setting out their duties, rights and responsibilities
 2. the statutory minimum level of paid holiday 28 days for full time workers
 3. a pay slip showing all deductions, eg National insurance, tax . Earning above £166 a week
 4. the **statutory** minimum length of rest breaks- one 20 min break for 6 hrs worked
 5. Statutory Sick Pay (SSP) £94.25 pw for 28 weeks (some may get full wages for a limited amount of time)
 6. Maternity, paternity and adoption pay and leave-90% of earnings for 6 weeks then ££148.68 for next 33 weeks

Casual staff / Agency staff

- work for specific functions and can be employed through an agency.
- They do not have a contract or set hours of work.
- They are needed at busier times of the year e.g. at Christmas or for weddings, New years eve

Temporary staff

- Employed for a specific length of time such as the summer tourist season or the month of December.
- Temporary staff have the same rights as permanent staff for the duration of their contract.
- Temporary staff employed for longer than 2 years become permanent by law

Zero Hours Contract

This type of contract is between the employer and a worker, where the worker may sign an agreement to be available to work when they are needed, but no specific number of hours or times to start or end work are given. The employer is not required to offer the person any work and the worker is not required to accept the work.

13. Remuneration

Remuneration is a term used for the reward that people receive from working somewhere. It includes their basic pay, plus extra money t top u their income from:

- **Tips and gratuities**- money given to someone by a customer as a way of saying 'thank you' for good service
- **Service charge**- a percentage added to the customers bill to reward the employees who have provided the customer with a service
- **Bonus payments and rewards**- given by some employers as a way of rewarding hard work throughout the year and helping make the business successful.

It is quite common for all he tips, gratuities and service charges to be divided equally amongst all the workers in, e.g. restaurant. This is known as a tronc arrangement, and the person who works out and distributes the extra money is known as a 'troncmaster'.

14. Paid annual leave

- All workers are entitled to 28 days paid leave annually
 - **no** legal right for employees to be given Bank and Public Holidays. Most hospitality staff would work these days
- To calculate holiday entitlement,
Multiply the full-time entitlement (28 days) by the number of days worked and divide by the number of days full-time staff work
Entitlement for 3 days a week: $28 \times 3/5 = 16.8 \text{ days}$


15. Compulsory Rest Breaks

Adult workers are entitled to 24 hours off in each 7 day period and young workers (15-18) are entitled to 2 days in 7.


Adult workers are entitled to at least 20 minutes uninterrupted rest if their working day is longer than 6 hours.

Young workers are entitled to 30 minutes rest if their working day is over 4.5 hours long.

Keywords



Extended reading



Exam question



Video links



Revision Techniques

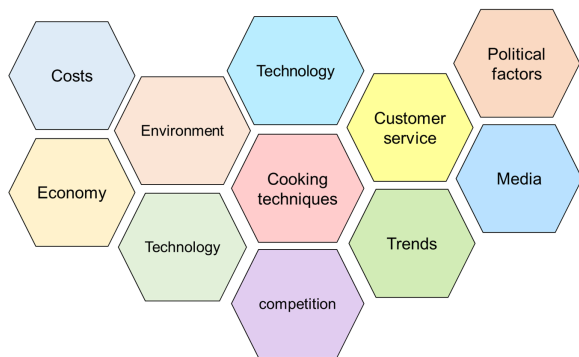


1.1.4 Factors that affect the **success** of Hospitality and catering providers

16. Reasons for **failure**

- 1. A **saturated market** – there is a fine line between competition & too many for the number of customers
- 2. **General business incompetence** – 46% of business fail due to lack of business knowledge
- 3. Lack of **capital** – not enough money to get through the first few months
- 4. **Location** – either not enough people walk past (foot-fall) live & work nearby
- 5. **Quality of life** - most restaurateurs work 60 hours a week – not the glamorous life they thought
- 6. **Lack of industry experience** – most successful restaurateurs tend to have previous industry experience
- 7. **Failure to create a good enough brand** – They did not incorporate the 12 Ps of restaurant branding,(Place, Product, Price, People, Promotion, Promise, Principles, Props, Production, Performance, Positioning and Press)
- 8. **Name of the restaurant is too long-** A restaurant with a name that is brief, descriptive and attractive is more likely to succeed.
- 9. **Lack of differentiation** -the brand is not different enough
- 10. **Poor financial controls** – Main costs – labour and food exceeded 60% of sales

17. Factors affecting success



Costs - need to make a profit. Consider cost of everything you buy and selling price.

- Material - Anything involved in making product
- Labour - Costs of staff
- **Overheads** - Anything not connected with making products

Economy - when the economy slows down, business have lower sales as consumers eat out less because they have less disposable income

Environment – 3 R's, packaging, food waste, global warming, carbon footprint, clean eating

Technology - Using technology to improve service, delivery and stock control – touch screen customer ordering, EPOS systems, stock management, apps for delivery services

Emerging and innovative cooking techniques – sous vide, clean eating, steaming, new restaurants,

Customer demographics and lifestyle

– delivery services Facebook Twitter

Customer service–customer satisfaction – free WiFi, order online

Competition - Low cost food (£1 menu, coffee McDs espresso v Starbucks)

Trends healthy food options, pop-up bars, cafes and restaurants, cronut, clean eating, low carb, good fats,

Political factors - Increasing regulations – from

government due to health issues, Brexit, use of migrant labour, migrants – ethnic foods

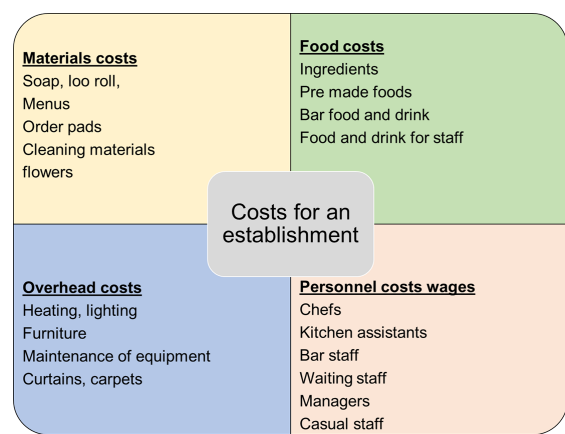
Media - Strong global brand, Good community reputation – children's charities / Ronald McDonald House, celebrity chefs, celebrity endorsements, Masterchef,



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18. Costs for an establishment



19. Costing a recipe

Costing recipes

In order to calculate selling price and profit for dishes you need to calculate the recipe cost

Ingredient cost = $\frac{\text{Pack cost}}{\text{Pack weight}} \times \text{weight used}$

Divide by the number of portions made for the portion cost

Selling price

Selling price = $\frac{\text{Portion cost}}{30} \times 100$

20. What is portion control?

- Portion control is the amount of each menu item that is served to the customer.
- It depends on the type of customer, the type of food served,
- some foods are served in very small portions due to the high cost of the item eg caviar is served by the teaspoon



Keywords



Extended reading



Exam question



Video links



Revision Techniques



Contexts

- Released in the UK on 30 September 2021.
- global premiere at the Royal Albert Hall on 28 September 2021.
- Starring Daniel Craig as 007, this is his fifth and final performance.
- The film was produced by the British company EON (Everything or Nothing) Productions and distributed in UK cinemas by Universal Pictures. No Time to Die is available to stream on Amazon Prime.
- The release was significantly delayed from April 2020, following a change in director and the COVID-19 pandemic.

Audiences

- Barthes' enigma code: The film poster create a sense of mystery regarding the plot, characters and the fate on Bond himself, leading an audience to want to discover these answers.
- Inherited audience: Some audiences are drawn to this film because they are already fans of the long running franchise or fans of the actors involved.
- Polysemic responses: Audiences can have different reactions to the portrayal of characters in this poster.

Industries

- The film's budget was an estimated \$250-301 million, making it the most expensive Bond film to date.
- It has grossed over \$774 million worldwide at the box office.
- The first teaser poster for the film was released on James Bond Day, 5th October 2019, as part of a global marketing campaign for the film.

Media Language

Image

- Iconographic props (such as the gun and the mask) clearly establish the genre as action and the character as a Proppian villain.
- The plethora of action shots create a sense of danger and threat, hinting at elements of the narrative.

Written Language

- No Time to Die leaves the audience worried about the fate of their favourite protagonist from the long running franchise. (Barthes' enigma code).
- The credit block lists the plethora of reoccurring actors in this film, using their star appeal to draw in an inherited audience

Layout and Design

- Bond as the largest figure clearly establishes his role as the Proppian hero.
- The background features the iconic "007" logo that would appeal to avid fans of the long running franchise. It also features a gun to appeal to newer fans of the action genre unfamiliar with Bond.

Representation

Race

- Traditionally, Bond has adhered to strong, and often negative, racial stereotypes.
- Minority races are often portrayed as "dangerous" villains (alvarado's racial stereotypes).
- Still heavily dominated by a white cast.
- However, Naomi's powerful portrayal creates a positive and dominant representation of race.

Gender

- Traditionally, Bond has adhered to strong, and often negative, gender stereotypes.
- Still centred around a battle between male heroes and villains.
- Paloma's (Ana De Armas) glamorous and low cut dress is typical of how 'Bond Girls' have been depicted by the franchise.
- However, Naomi's military attire and serious gesture codes reflect the shift in the Bond narrative towards more contemporary depictions of women.

Other Key Ideas

- Create hypermasculine representations of excessive manliness that force a male audience to feel inferior.
- There is still a female damsel in distress that a male Proppian hero must rescue.



Key Terms

- **Xenophobic:** a fear/ distrust of anything foreign.
- **Mulvey's male gaze:** The objectification of women for visual pleasure.
- **Barthes' enigma code:** any mystery created within the text to intrigue.
- **Franchise:** a long running media production over various platforms.

Target audience

- Typically aimed at a male audience who enjoyed identifying with Bond as the epitome of a manly hero.
- Fans of the spy genre who enjoyed escaping into an exciting world of action.

Notes

-

Media Language

Image

- Bond's calm gesture codes reinforce his masculine role as a wall of defence against the evil and chaotic threats.
- The imagery surrounding him both creates a sense of chaos and hints at the narrative of the film, creating intrigue (Barthes' enigma code).

Written Language

- The ambiguous title creates a clear sense of intrigue about the Proppian villain's identity and establishes him as a serious threat to bond (Barthes' enigma code).
- The large top billing (Roger Moore as James Bond) would appeal to avid fans of the actor and the iconic film franchise.

Layout and Design

- The centrality of Bond clearly connotes that he is the Proppian hero comfortably at the centre of the chaos.
- The POV shot used creates a clear sense of intrigue about the Proppian villain's identity and establishes him as a serious threat to bond (Barthes' enigma code).

Contexts

Production Context

Released on 19/12/74. Roger Moore as 007, Moore's second appearance as 007. Based on a book by Ian Fleming. Produced by British company Eon (Everything or Nothing), same as SPECTRE. Distributed by United Artists. Estimated \$7m budget, grossed \$97m+ million world-wide. Reflects popularity of Martial Arts film genre, here were several Kung Fu scenes and the film was filmed predominantly in Asia, having being shot in Hong Kong, Thailand and Macau. The artwork for poster was produced by artist and illustrator Robert McGinnis.

Historical Context

Illustrations commonly used on film posters due to the limited technology. TMWGG was set in the middle of the 1973 energy crisis, when the oil producing Arab nations proclaimed an oil embargo – the decision to stop exporting oil to USA causing an oil crisis. This had short and long-term effects across on politics and the economy across the globe. This is hinted at through the poster's iconography of the power plant in the lower left corner.

Representation

Race






- This film poster follows the typical xenophobic misrepresentation of ethnic minorities as an exotic threat to us.
- The only representations shows that they are dangerous villains threatening Bond's safety.
- The central Asian woman is stereotypically designed to be in a karate pose, reduced to a simplified aspect of her culture.

Gender

- The costume creates a clear binary representation: Bond's suit reinforces the dominance of men whereas the revealing outfits limit the women to objects for visual pleasure (Mulvey's male gaze).
- As an older text, it relies on outdated stereotypical roles of gender.

Character

- The calm gesture codes in the midst of all the action clearly portrays Bond as a powerful Proppian hero: a wall of defence against dangerous evil.
- The helpless flailing of the women are pathetically portrayed as Proppian damsels in distress who need a male to rescue them.
- The image is from the POV of the Proppian villain: a mysterious and sinister threat to Bond.

Key Ideas				
 Family	Types of families: Nuclear family, stepfamily and extended family - The family provides stability - Christians must <i>'love one another'</i> it is in the family that a child learns love - <i>'Honour your father and mother'</i> : when parents are elderly and need support	<u>The role of parents</u> - Raise children in Christian faith, teaching them to pray - Send children to religious schools - Teach right from wrong and pass on values - Christian parents are good role models: <i>'Fathers do not embitter your children, or they will become discouraged'</i> <u>Beliefs about children</u> - Children respect and obey their parents and care for them when they are old - <i>'Listen to your father, who gave you life, and do not despise your mother when she is old'</i>		<u>Polygamy</u> : Having more than one wife at the same time - Christianity: one man and one woman for life was created from the beginning - Islam: allows with the consent of the first wife but only if a husband is able to support, love and treat additional wives equally
 Marriage	<u>The nature and purpose of marriage</u> - Provides a stable, secure environment for the family - Is the proper place to enjoy sex and raise children - It is a sacrament, a lifelong union blessed by God - It is a covenant before God in which the couple promises to live faithfully till death: <i>'That is why a man leaves his father and mother and is united to his wife, and they become one flesh'</i>	<u>Arranged marriage</u> - Marriages can be arranged in Islam (where parents find a suitable partner) but young people have the right to refuse - <i>'If a man gives his daughter in marriage while she is averse to it then such marriage is invalid'</i>	<u>Cohabitation</u> : a couple living together and having sexual relationship without being married to one another - Catholic Church and Islam oppose as sex should only take place within marriage - Anglican and Protestant Christians accept that although marriage is best, people may cohabit in a faithful, loving and committed way	
Sex before and outside marriage	<u>Sex before marriage</u> - Sex expresses a deep, lifelong union that requires the commitment of marriage - Sex is a gift from God, for the purpose of creation, but also a sign of a couple's loving bond - Paul warns: <i>'whoever sins sexually, sins against their own body'</i>		<u>Sex outside marriage (adultery)</u> - Breaks vows couples make before God and threatens the stable relationship The Bible says <i>'Do not commit adultery'</i> - Break all the promises you made before God when marrying	
 Religious Views on Sexuality	<u>Catholic Church</u> - Same sex relationships are not sinful, but should remain chaste (not have sex) to avoid sinful acts - Acts are against natural law as they cannot result in children - <i>'If a man has sexual relations with a man as he does a woman, both of them has done what is detestable.'</i>	<u>Quakers</u> - Fully accept same sex relationships into their community and do not condemn - Base relationships on the quality and depth of feeling between 2 people - <i>'All people are created in the image of God'</i>	<u>COE</u> - Members of the COE may enter in to same-sex marriages without facing any punishment; however, weddings cannot be conducted by the Church - The Church teaches that marriage should be between a man and a woman, with one of its purposes being procreation. - <i>'Each man should have his own wife and each woman her own husband.'</i>	
 Divorce and remarriage	<u>Disagree</u> - Offer counselling and prayer as an alternative - Jesus taught that anyone who divorced and remarried was committing adultery: <i>'Anyone who divorces his wife and marries another woman commits adultery'</i> - Vows made in God's presence must be kept: <i>'Man must not separate what God has joined together'</i>			<u>Agree</u> - Divorce is the lesser of 2 evils - The Church should reflect God's forgiveness and allow couples a second chance of happiness
Contraception and family planning	<u>Advantages of using contraception</u> - Responsible way to bring children in the world - Allows a couple to enjoy a sexual relationship without getting pregnant	<u>Catholic Church</u> - Artificial contraception goes against natural law/purpose of marriage and can encourage infidelity - The purposes of sex is to procreate: <i>'Be fruitful and multiply'</i>	<u>COE</u> - People should only have as many children as they can care for - Contraception allows the couple to develop their relationship and avoids harming the mother's health	
 Gender	<u>Gender equality in Britain</u> - Traditional roles: men working to support the family, women cared for the home and raised children - In the past men had positions of power e.g. in the workplace, and women were not allowed to vote - Legislation has given women equal rights: Sex Discrimination Act 1975, Equal Pay Act 1970, Equality Act 2010 etc		- All people are created equal in the image of God: <i>'There is neither...male or female...for you are all one in Christ Jesus'</i> - Jesus respected women, welcomed them as disciples - <i>'Love thy neighbour'</i> : discrimination is wrong. Paul taught that all people are equal. - Traditional Christians interpret Bible texts literally: <i>'wives must submit to their husbands'</i> - The Catholic Church does not allow women to be priests. The COE has allowed women priests since 1994	

AQA Religious Studies

A – Theme A:

Relationships and Families

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

Year 10 - Drugs and Alcohol

KEYWORDS:

Drug – any chemical that changes the way the mind and body work.

Depressants – chemicals that reduce brain activity and make you sleepy e.g. cannabis, alcohol, and solvents.

Stimulants – chemicals that increase brain activity and make you feel alert e.g. caffeine and cocaine.

Hallucinogens – chemicals that cause you to see and hear things that are not real e.g. LSD, magic mushrooms

Painkillers – chemicals that reduce pain and create numbness e.g. aspirin, heroin

Performance Enhancing Drugs (PEDs) – chemicals used to change hormones, increase pain thresholds for performance in sport.

Peer Pressure – influence from peer group

Dependency – inability to stop doing something harmful

Vaping – inhaling a vapour norming containing Nicotine via an electronic device.



Reasons why people drink...

Availability: It is widely available, and some pubs and off-licences are not as strict as they should be. People of legal drinking age have been known to purchase it for younger people.

Peer pressure: some are influenced or pressurised to drink by 'friends'

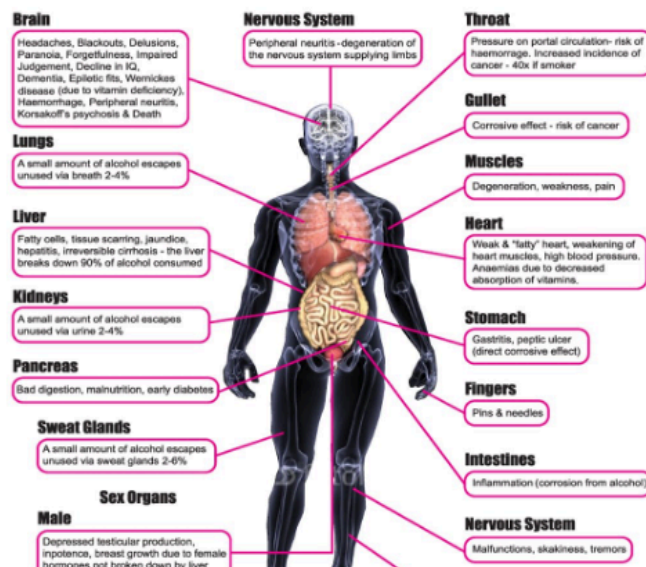
Packaging: there are no real health warnings on the packaging and young people tend not to stop and think about its dangers. Colourful drinks like Alcopops are eye-catching.

Advertising: drink adverts are on TV, social media, posters and magazines.

Home environment: approx. 40% of alcoholic drinks sold are drunk at home. Parental attitudes to alcohol can influence whether a young person drinks under the age of 18.

Culture: Growing up in a 'binge-drinking' culture. Seeing others dinking and drunk may encourage them to engage in similar behaviour.

Pricing: Happy hours and drink promotions raise the debate about whether it is too cheap.



Consequences of Substance Abuse:

- Anti-social behaviour
- Impaired judgement
- Violence and injuries
- Vomiting
- Slurred speech
- Heart attack
- Seizures
- Cancer
- Liver or heart disease
- Nerve damage
- Stress, anxiety, depression
- Underage sex
- Debt
- Family breakdown

Illegal drugs are classified A-C and it is illegal to possess, supply or make them.

Drug	Possession	Supply and production
Class A		
Crack cocaine, cocaine, ecstasy (MDMA), heroin, LSD, magic mushrooms, methadone, methamphetamine (crystal meth)	Up to 7 years in prison, an unlimited fine or both	Up to life in prison, an unlimited fine or both
Class B		
Amphetamines, barbiturates, cannabis, codeine, ketamine, methyphenidate (Ritalin), synthetic cannabinoids, synthetic cathinones (for example mephedrone, methoxetamine)	Up to 5 years in prison, an unlimited fine or both	Up to 14 years in prison, an unlimited fine or both

ARGUMENTS FOR LEGALISING DRUGS:

- Some drugs such as cannabis relieve symptoms and pain
- Police resources could be better used for more violent crimes
- Likely to disband the black market (organized crime/gangs etc.)
- Drug users could afford to fund their habit without stealing or prostitute, etc.
- Drug users would be able to seek help without having to worry about punishment

ARGUMENTS AGAINST LEGALISAING DRUGS:

- Illegal drugs are illegal because they are harmful
- Legalisation has been tried before and failed miserably
- Many people could be more tempted to experiment
- The government will not be protecting people from harm

It is illegal for people under the age of 18 to purchase smoking or vaping products.



BUSTED 5 Vaping Myths

Myth: Nicotine is just like caffeine.

Fact: Nicotine is highly addictive. It can harm the parts of the brain that control mood and learning.

Myth: Vaping is healthier than smoking cigarettes.

Fact: The chemicals in vape juice are linked to cancer, asthma, wheezing and shortness of breath.

Myth: If I vape, I won't smoke cigarettes.

Fact: Eighth graders who vape are 10 times more likely to eventually smoke cigarettes.

Myth: Vaping doesn't hurt the people around me.

Fact: When you vape, you inhale aerosol into your lungs. Bystanders breathe this in when you exhale into the air.

Myth: E-cigarettes just produce a harmless water vapor.

Fact: Vaping exposes you to diacetyl, a chemical linked to serious lung disease.

Y10 Prejudice and Discrimination

Individuals who have faced prejudice and discrimination

What causes prejudice and discrimination?

UPBRINGING – families pass on prejudice to the next generation who know no better.

EXPERIENCE – a negative experience with someone from a group may cause them to view everyone the same way.

SOCIAL NORMS – people are influenced by their social circles and adopt similar prejudicial views.

FEAR – people may feel threatened by certain groups or individuals because of preconceived attitudes and treat them negatively as a result.

MEDIA – power influence that can promote and reinforce negative stereotypes of a particular group or individual.

IGNORANCE – a lack of education or choosing to ignore their education on the need for tolerance of others.

VICTIMS – a group or individual may have prejudicial views because they have been victims of it themselves.

Rosa Parks

Rosa decided to make a stand. Together with her husband Raymond, she joined the National Association for the Advancement of Coloured People (NAACP), working towards putting an end to discrimination and segregation.

But it was on the 1 December 1955 that Rosa truly sparked change when she refused to give up her seat on the bus. She was arrested. On news of Rosa's arrest, the black citizens of Montgomery came together and agreed to boycott the city's buses in protest.

On 13 November 1956 their efforts were finally rewarded. After 381 days of boycotting the buses, the Supreme Court ruled that Alabama's racial segregation laws were 'unconstitutional' – meaning they weren't valid and should not be recognised.



P4L
Non
GCSE

Martin Luther King Jr

Martin Luther King was an American Baptist, minister, and activist. He dedicated his life to leading non-violent protests with a goal of gaining equal rights for the black community.

Dr King led marches for the right to vote desegregation, and civil and labour rights for the black community. One of the most famous marches was in 1963 to Washington DC where he delivered his famous 'I Have a Dream' speech.



The Civil Rights Act of 1964 ended all state and local segregation laws. In 1964, King won the Nobel Peace Prize for combating racial inequality through non-violent resistance.

King was assassinated in 1968 by gunshot in Memphis. His death led to national mourning and riots in many cities.

How do the LGBTQ+ community face prejudice and discrimination?

HATE CRIME - According to reports by LGBTQ charity Stonewall, 1 in 5 LGBTQ people have experienced a hate crime or incident related to either their sexual orientation or gender identity in the last 12 months. Many crimes also go unreported as younger LGBTQ people are reluctant to go to police.

SOCIAL - Many people report facing discrimination when accessing social services such as healthcare and housing services. This can lead to a decline in physical and mental wellbeing as they avoid using these essential services.

SCHOOL - Bullying is common in educational settings. Young LGBTQ people can be harassed, face exclusion from social groups and become victims of both verbal and physical abuse. As a result, they are at high risk of self-harm and suicide.

MEDIA - Under representation in media resulting in a lack of understanding, awareness, and healthy role models for people of the LGBTQ+ community. This reinforces the need to hide their identity and can lead to self-isolation out of fear.

SPORT - is an area where LGBTQ people are excluded. Rugby star, Gareth Thomas investigated prejudice against this group in football and found that people chose to hide their true identity out of fear of the hatred that would be directed at them.

Key Words

Prejudice – forming unfair opinions of individuals or groups based on their identity

Discrimination – acting upon prejudice and treating people unfairly

Social Injustice – lack of equal opportunities and rights within society.

Racism – belief in the superiority of one race over another. Prejudice and acts of discrimination based on a person's race

Segregation – a policy or practice of ensuring racial groups live apart from each other.

Oppression – prolonged cruel or unjust treatment

Social exclusion – lack of access to areas or services within society.

Homophobia – prejudice and acts of discrimination based on a person's sexual orientation.

Transphobia - prejudice and acts of discrimination based on a person's gender identity.

Allie – a person who supports the LGBTQ+ community.

Equality Act 2010 – legal document that protected people from discrimination based on parts of their identity.

Protected Characteristics – aspects of our identity protected from discrimination by law.

How can it be prevented?



Advocate for all identities and support campaigns such as 'Love Has No Labels' which seeks to raise awareness on equality and diversity.

Actively support festivals that celebrate diversity such as Pride and Notting Hill Carnival. Take part in peaceful protests such as BLM which advocate for social change and equality.

Challenge prejudicial attitudes and report discrimination that we see in both daily life and online.

Refuse to use language that is racist, homophobic, transphobic etc and educate ourselves on terminology.

Become an ally to proactively build inclusion for the LGBTQ+ community

Promote compassion and empathy to individual identity experiences

Uphold and promote our British Values – Individual Liberty, Mutual Respect and Tolerance.

Educate ourselves and others on historical events and the need for tolerance of diversity.

Year 10 Sentence Builder Relationships with family and friends					
À mon avis [In my opinion] Personnellement [Personally] Pour moi [For me] Je pense que [I think that] Je sais que [I know that] Je trouve que [I find that] Je crois que [I believe that] Je dois admettre que [I must admit that] Je dirais que [I would say that]	je m'entends bien avec [I get on well with]	mon meilleur ami [my best friend]	nous avons les mêmes intérêts [we have the same interests]		
	j'adore [I love]	mon père [my dad]	nous avons les mêmes goûts [we have the same tastes]		
	j'adore vraiment [I really love]	mon frère [my brother]	nous regardons les mêmes films [we watch the same films]		
	je préfère [I prefer]	mon grand-père [my grandad]	nous écoutons la même musique [we listen to the same music]		
	j'aime [I like]	mon beau-père [my step-dad]	nous jouons toujours au foot le weekend [we always play football at the weekend]		
		mon demi-frère [my half-brother]	nous faisons du vélo ensemble [we do cycling together]		
		mon oncle [my uncle]	nous sortons tous les soirs [we go out every evening]		
		ma meilleure amie [my best friend]	nous n'avons rien en commun [we have nothing in common]		
	je ne m'entends pas bien avec [I don't get on well with]	ma mère [my mam]	il est têtu/égoïste/impoli/ennuyeux [he is stubborn/selfish/impolite/boring]		
	je me dispute avec [I argue with]	ma sœur [my sister]	il n'est pas gentil/intéressant/amusant [he isn't kind/interesting/fun]		
je me fâche de [I fall out with]	ma grand-mère [my grandma]	elle est têtu/égoïste/impolie/ennuyeuse [she is stubborn/selfish/impolite/boring]			
je ne peux pas supporter [I can't stand]	ma belle-mère [my step-mam]	elle n'est pas gentille/intéressante/amusante [she isn't kind/interesting/fun]			
je déteste [I hate]	ma demi-sœur [my half-sister]				
je n'aime pas [I don't like]	ma tante [my auntie]				

Year 10 Sentence Builder Describing people – nationality and physical description					
Je suis [I am] Je m'appelle [I am called] Il est [He is] elle est [She is] il s'appelle [He is called] elle s'appelle [She is called]	NAME	anglais [English]	les yeux verts [green eyes]		grand [big/tall]
		britannique [British]	les yeux bleus [blue eyes]		petit [small/short]
		français [French]	les yeux marron [brown eyes]		de taille moyenne [average sized]
		espagnol [Spanish]	les cheveux blonds [blond hair]		jeune [young]
		écossais [Scottish]	les cheveux noirs [black hair]		vieux [old]
		irlandais [Irish]	les cheveux roux [red hair]	et je suis [and I am]	mince [slim]
		gallois [Welsh]	les cheveux bruns [brown hair]	et il est [and he is]	
		allemand [German]	j'ai [I have]	et elle est [and she is]	
		italien [Italian]	il a [he has]		grande [big/tall]
		européen [European]	et aussi [and also]		petite [small/short]
africain [African]	et en plus [and in addition]	les cheveux longs [long hair]	de taille moyenne [average sized]		
asiatique [Asian]	et également [and equally]	les cheveux mi-longs [mid-length hair]	jeune [young]		
indien [Indian]		les cheveux courts [short hair]	vieille [old]		
		les cheveux bouclés [curly hair]	mince [slim]		
		les cheveux raides [straight hair]			
		les cheveux nattes [braided hair]			

<div> <div>Year 10 Sentence Builder</div> <div>Describing people - personal qualities</div> </div>			
Je travaille bien au collège [I work well at school]			sympa [nice]
Je suis un bon ami [I am a good friend]	je suis [I am]	très [very]	agréable [pleasant, nice]
Je n’écoute pas [I don’t listen]		vraiment [really]	casse-pieds/pénible [annoying]
Je m’ennuie souvent [I often get bored]	je ne suis pas [I am not]	un peu [a bit]	égoïste [selfish]
J’aide tout le monde [I help everyone]		assez [quite]	désagréable [unpleasant]
Je ne fais jamais mes devoirs [I never do my homework]		extrêmement [extremely]	drôle/marrant [funny]
J’aime obtenir de bonnes notes [I like to get good grades]		évidemment [obviously]	méchant [mean, nasty]
J’adore parler [I love to talk]		trop [too]	bavard [chatty, talkative]
Je pense seulement à moi [I only think about myself]	je suis [I am]	plutôt [rather]	gentil [kind]
Je fais des blagues [I make jokes]		tout à fait [totally]	compréhensif [understanding]
Je dors beaucoup [I sleep a lot]	je ne suis pas [I am not]	tellement [so]	ennuyeux [boring]
Je suis toujours en retard [I am always late]		si [so]	affreux [awful]
		absolument [absolutely]	paresseux [lazy]
		incroyablement [incredibly]	travailleur [hard-working]
			jaloux [jealous]
			sympa [nice]
			agréable [pleasant, nice]
			casse-pieds/pénible [annoying]
			égoïste [selfish]
			désagréable [unpleasant]
			drôle/marrante [funny]
			méchante [mean, nasty]
			bavarde [chatty, talkative]
			gentille [kind]
			compréhensive [understanding]
			ennuyeuse [boring]
			affreuse [awful]
			paresseuse [lazy]
			travailleuse [hard-working]
			jalouse [jealous]

Characters		Plot	
Macbeth	Eponymous protagonist, ambitious and ruthless.	Act 1	M and Banquo meet witches, Cawdor executed, Lady M reads letter, taunts M, Duncan arrives.
Lady Macbeth	Defies expectations, strong and ambitious, but goes mad.		
Witches	Supernatural beings, prophesy, could represent conscience.	Act 2	M kills Duncan, Malcolm flees, M crowned.
Banquo	Macbeth’s friend, sons prophesied to rule, killed and returns as ghost.	Act 3	Banquo suspects M, murder of B, Fleance escapes, M haunted by B’s ghost at a banquet
Duncan	Good king, praises Macbeth at start, murdered in Act 2.	Act 4	Witches show M future kings – sons of Banquo, Macduff’s family murdered, Malcolm says he is dishonest to test Macduff’s loyalty.
Macduff	Wife and children killed; kills Macbeth; born by caesarian		
Malcolm	Heir to throne, good man, flees to England, finally crowned.	Act 5	Lady M sleepwalks, dies, Macduff kills Macbeth, Malcolm restored as King.
Fleance	Banquo’s son, represent innocence and justice.		
Key quotes		Dramatic/Stylistic Devices	
Appearance/reality	Witches: Fair is foul and foul is fair (1.1)	Soliloquy	One character speaking to audience; M uses to make audience complicit
M plots his crime	Macbeth: Stars, hide your fires/Let not light see my black and deep desires (1.4)	Dramatic irony	Audience knows more than characters; audience knows D will die
Unnatural	Lady M: Come, you spirits... Unsex me here (1.5)	Hamartia	Tragic flaw; M’s could be easily influenced/ambition
Hallucination	Macbeth: Is this a dagger I see before me? (2.1)	Hubris	Pride; M could be said to have this or Lady M
Lady M is braver	Lady M: My hands are of your colour but I shame to wear a heart so white (2.2)	Catharsis	Purgation of pity and fear; happens at the end
Paranoid	Macbeth: To be thus is nothing but to be safely thus (3.1)	Anagnorisis	Recognition or the tragedy to come
Guilt	Macbeth: Full of scorpions is my mind dear wife (3.2)	Peripeteia	Sudden reversal of fortune
M hides info	Macbeth: Be innocent of the knowledge, dearest chuck (3.2)	Rhyme	Used by the witches to create chant-like, supernatural atmosphere
Cyclical	Macbeth: Blood will have blood (3.4)	Motifs	
Tragic hero	Malcolm: This tyrant whose sole name blisters our tongue was once thought honest (4.3)	Nature	'Against the use of nature' (1.3); 'Tis unnatural,/ Even like the deed that's done' (3.4); 'And his gash'd stabs looked like a breach in nature' (3.1); 'Boundless intemperance/ In nature is a tyranny' (4.3)
Guilt/anxiety	Lady M: All the perfumes of Arabia will not sweeten this little hand (5.1)	Light and dark	'Stars, hid your fires; Let not light see my black and deep desires' (1.4); 'that darkness does the face of earth entomb,/When living light should kiss it?' (4.2); 'Come, seeling night,/ Scarf up the tender eye of pitiful day' (3.2)
Existential crisis	Macbeth: Life’s but a walking shadow, a poor player (5.5)	Children	'Your children shall be kings' (1.3); 'And pity, like a naked new-born babe,' (1.7); 'I have given suck, and know / How tender 'tis to love the babe that milks me' (1.7); 'He has no children. All my pretty ones?' (4.3)
Betrayal of prophecy	Macbeth: I bear a charmed life (5.8)	Blood	'Make thick my blood' (1.5); 'And on thy blood and dungeon gouts of blood.../It is the bloody business which informs thus to mine eyes' (2.1); 'Will all great Neptune's ocean wash this blood clean from my hand?' (2.1); 'Here's the smell of blood still.' (5.1)
Key themes		Sleep	'Nature seems dead, and wicked dreams abuse / The curtain'd sleep' (2.1); 'There's one did laugh in's sleep, and one cried 'Murder!' (2.2); 'Macbeth does murder sleep' (2.2); 'A great perturbation in nature, to receive at once the benefit of sleep and do the effects of watching!' (5.1)
Fate and free will	Is the action pre-decided?	Dreams	'Art thou not, fatal vision, sensible / To feeling as to sight? (2.1); 'Hence, horrible shadow! Unreal mockery, hence!' (3.4); 'Wash your hands; put on your nightgown; look not so pale! I tell you yet again, Banquo's buried.' (5.1); 'My wife and children's ghosts will haunt me still' (5.7)
Ambition	The Macbeths’ ambition drives the play.		
Appearance and reality	People and events are not always as they seem.		
Supernatural	Witches; ghosts; prophecies.		
Violence	Many battles throughout the play.		

Year 10 Foundation Topic 1 Expressions Student Knowledge Organiser

Key words and definitions

Expression - Mathematical expression that consists of variables, numbers and operations. Eg $4a + 2y$

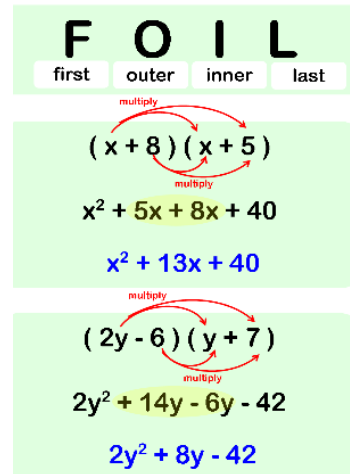
Term - A term is either a single number or variable. Terms are separated by a + or - sign in an overall expression.

Simplify - condense an algebraic expression by grouping and combining similar terms.

Expand - Removing the (), the terms inside the bracket will be multiplied by the term outside of the bracket.

Factorise - Taking an algebraic expression and putting it back into brackets.

Expanding double brackets



Factorising quadratic expressions

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

$$(x - 1)(x - 2)$$

$$x^2 + 3x - 10$$

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

$$x^2 - x - 30$$

$$(x + 5)(x - 6)$$

Identify the factors of the last number, then combine to make the required amount of x. Be careful with the sign!

Expanding Single brackets

Expand the brackets

multiply

$$2(x + 8)$$

$$2x + 16$$

$$6y(9 - y)$$

$$54y - 6y^2$$

Expand the brackets and simplify

multiply

$$12(4x + 8) - 6x$$

$$48x + 96 - 6x$$

$$42x + 96$$

multiply

$$7(a - 11) + 2(3 + a)$$

$$7a - 77 + 6 + 2a$$

$$9a - 71$$

Factorising linear expressions

$$5x + 25$$

$$5(x + 5) \checkmark$$

$$5x + 25$$

Find the HCF of 5 and 25. This is put outside of the brackets. Work backward to decide the terms inside of the bracket eg. $5x$? Will give $5x$?

Difference of 2 squares

Factorise

$$a^2 - 81$$

$$= (a - 9)(a + 9)$$

One - and one +

Solving quadratic equations by factorising

Solve $(x + 7)(x - 2) = 0$

$$x + 7 = 0 \quad \text{or} \quad x - 2 = 0$$

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

$$x = -7$$

$$x - 2 + 2 = 0 + 2$$

$$x = 2$$

Hegarty Maths Links

Expanding single brackets 160-161
 Expanding double brackets 162-165
 Factorising single brackets 168-169
 Factorising double brackets 170

Year 10 Foundation Topic 2 Sequences Student Knowledge Organiser

Key words and definitions

Difference – amount between two numbers,
e.g. difference between 8 and 6 = $8 - 6 = 2$

Term – A number in a sequence

Nth Term – The term at the nth position

Coefficient – A number in front of an algebraic term
e.g. coefficient of $3a^2$ is 3

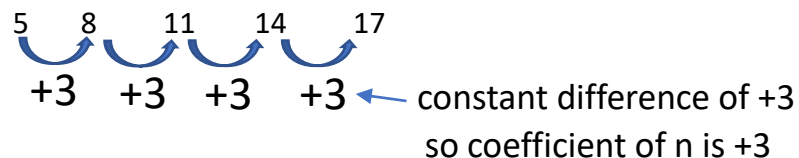
Linear sequence – has a constant difference between each term

Quadratic sequence – has a constant second difference between each term

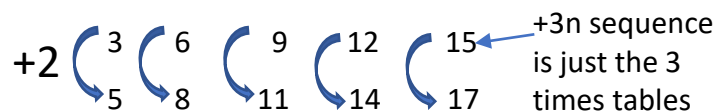
Geometric sequence – has a constant multiplier to get to the next term

Nth term of linear sequences

Find the nth term of the linear sequence below :



Compare with sequence of $+3n$

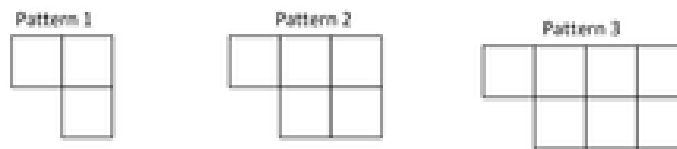


Nth term = $3n + 2$

For sequences that go up, you will have a **positive** coefficient of n.

For sequences that go down, you will have a **negative** coefficient of n.

Pattern recognition and continuation



When given patterns, turn them into number sequences to help continue and find the nth term of them.

So the sequence above becomes :

3 5 7 ...

Next pattern will include 9 squares.

Common Sequences to know

Square Numbers – 1 4 9 16 25 36 ...

Cube Numbers – 1 8 27 64 125 ...

Triangle Numbers – 1 3 6 10 15 ...



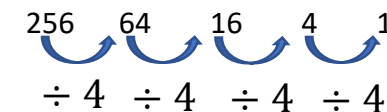
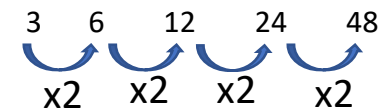
These numbers can be represented as a triangle of dots

Fibonacci sequence – 1 1 2 3 5 8 ...

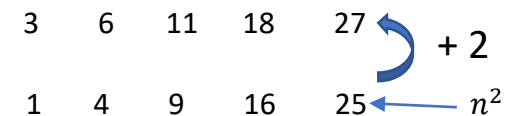
These numbers are created by adding the two previous terms in the sequence to get the next term

Recognising other sequences

Geometric sequences either multiply or divide by the same number to get to their next term



Quadratic sequences are sequences that include an n^2 in the nth term. Use the square numbers sequence to help describe the rule.



So the rule is $n^2 + 2$ or *square numbers increased by 2*

Hegarty Maths Links

Linear sequences – 196, 197, 198

Other sequences – 261, 263, 264

Year 10 Foundation Topic 3 Graphs Student Knowledge Organiser

Key words and definitions

Graph – A diagram showing the relationship between two variables (letters), each measured along one of a pair of axes.

Equation – A statement that the values of two mathematical expressions are equal (indicated by the sign '=')

Plot – Mark out (points on) a graph.

Parallel – Describing two lines that never meet.

Perpendicular – Describing two lines that meet at right angles.

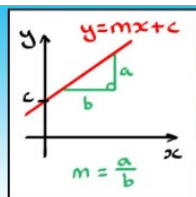
Gradient – The steepness of a graph

Intercept – The point at which a given line cuts an axis; the value of the coordinate at that point.

The Equation of a Straight Line

The Equation of a Line

$$y = mx + c$$

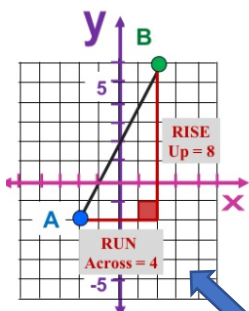


m is the gradient

c is the y-intercept

To find the equation of a line:

- 1) Find the gradient
- 2) Find the y-intercept
- 3) Write the equation of the line



The "Gradient" or "Slope" between two points is how far UP we have gone, DIVIDED BY how far we have gone ACROSS.

$$m = \frac{\text{RISE}}{\text{RUN}}$$

$$m = \frac{8}{4}$$

$$m = 2 \checkmark$$

In this example:

$$m = \frac{8}{4} = 2$$

$$c = 2$$

So the equation is $y = 2x + 2$

Midpoint and Length of a Line Segment

The Midpoint Formula is used to find the exact center point between two defined points in a line segment.

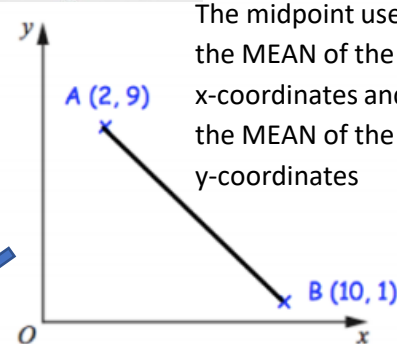
$$\text{midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

x: (mean of 2 and 10)

$$\frac{2 + 10}{2} = 6$$

y: (mean of 1 and 9)

$$\frac{1 + 9}{2} = 5$$



The midpoint uses the MEAN of the x-coordinates and the MEAN of the y-coordinates

A is the point with coordinates (2, 9).
B is the point with coordinates (10, 1).

Work out the coordinates of the midpoint of the line AB.

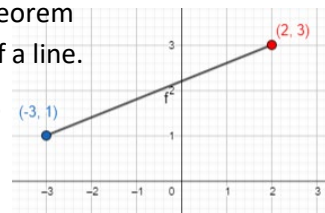
Midpoint = (6, 5)

THE DISTANCE FORMULA

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Use Pythagoras' Theorem to find the length of a line.

$$\begin{aligned} \text{Length} &= \sqrt{(2 - -3)^2 + (3 - 1)^2} \\ &= \sqrt{5^2 + 2^2} = \sqrt{29} = 5.39 \end{aligned}$$

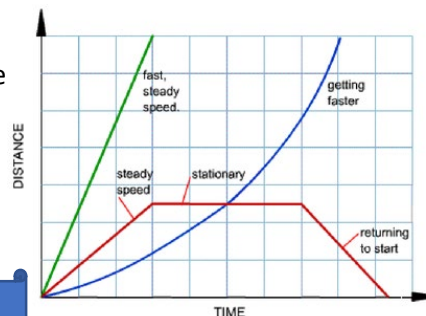


Real Life Graphs

Graphs can be used to model real life situations, for example a car journey.

When using a distance-time graph, the following parts of a graph have to be considered.

The gradient of the graph shows the speed of the car.



Drawing Straight Line Graphs

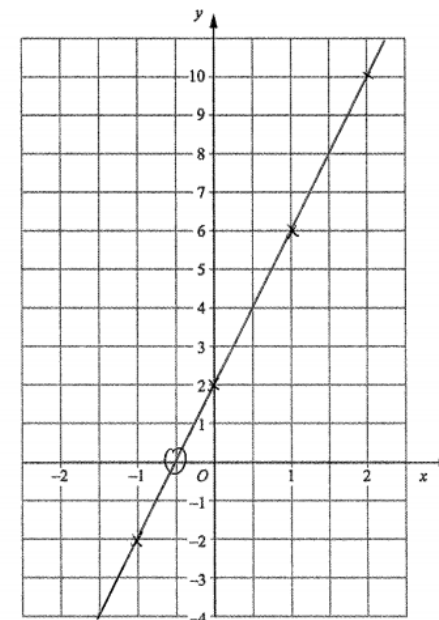
(a) Complete the table of values for $y = 4x + 2$.

x	-1	0	1	2
y	-2	2	6	10

To find y, multiply x by 4 and add 2.

$$2 \times 4 + 2 = 10$$

(b) On the grid, draw the graph of $y = 4x + 2$.



Plot the points:
(-1, -2)
(0, 2)
(1, 6)
(2, 10)
And join with a straight line.

Hegarty Maths Links

Coordinates and Midpoint: 199-200

Gradient: 201-204

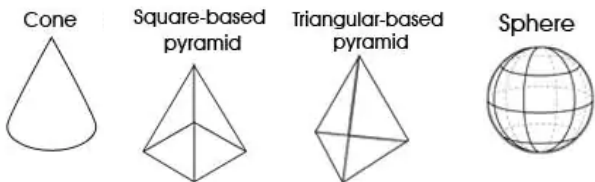
Drawing Graphs: 205-213

Parallel and Perpendicular Lines: 214-216

Distance/Speed – Time Graphs: 874-886

Year 10 Foundation Topic 4 Area and volume Student Knowledge Organiser

Key words and definitions



Conversion

A change in the units something is given in, e.g. cm to m.

Metric units

Length: mm, cm, m, km
Mass: mg, g, kg, tonnes
Capacity: ml, cl, l

Prior Knowledge

Name all the basic parts of a circle.

Understand how to use formula.

Calculate the area of basic 2D shapes.

Calculate the circumference and area of a circle.

Use and apply Pythagoras' Theorem.

Perimeter and area of a sector

$$\text{perimeter of a sector} = \frac{\theta}{360^\circ} \times 2\pi r + 2r$$

$$= \frac{90^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 7 + (2 \times 7)$$

$$= \underline{\underline{25\text{cm}}}$$

Area of sector

$$\text{Area of sector} = \frac{\theta}{360} \times \pi r^2$$

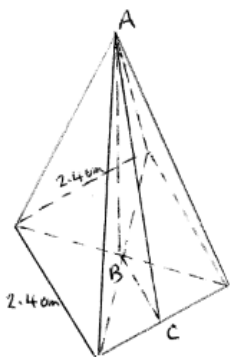
$$\text{Area of sector} = \frac{30}{360} \times \pi \times 18^2$$

$$\text{Area of sector} = \frac{1}{12} \times 324 \times \pi$$

$$\text{Area of sector} = 27\pi$$

$$\text{Area of sector} = 84.82\text{cm}^2 \text{ (2dp)}$$

Volume and surface area of a pyramid



Volume = $\frac{1}{3} \times \text{Area of the base} \times \text{height}$

$$S = B + \frac{1}{2}Pl$$

B is the area of base
P is the perimeter of base
l is the slant height

$$\text{Volume of pyramid} = \frac{1}{3}(2.4 \times 2.4)(4) = 7.68 \text{ cm}^3$$

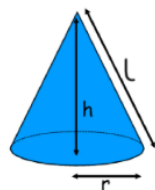
In the sketch, $AB = 4 \text{ cm}$ and $BC = 2.4/2 = 1.2 \text{ cm}$

$$\text{Length } AC = \sqrt{(4^2 + 1.2^2)} = 4.176 \text{ cm}$$

$$\text{Hence, area of a side} = \frac{1}{2}(2.4)(4.176) = 5.01 \text{ cm}^2$$

$$\text{Total surface area of pyramid} = 4[5.01] + (2.4)^2 = 25.81 \text{ cm}^2$$

Volume and surface area of a cone



$$\text{Curved surface area of cone} = \pi r l$$

$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Curved surface area} = \pi \times 5 \times 12$$

$$= 188.4955$$

$$= 188.50$$

$$\text{Base area} = \pi r^2$$

$$= \pi \times 5^2$$

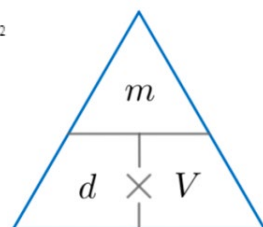
$$= 78.54$$

$$\text{Total surface area} = 188.50 + 78.54 = 267.01 \text{ cm}^2$$

$$\text{Volume} = \frac{\pi \times 5^2 \times 10}{3} = \frac{785.3981634}{3} = 261.80 \text{ cm}^3$$

$$\begin{aligned} R &= 5 \\ H &= 10 \\ L &= 12 \end{aligned}$$

Problems involving density



$$m = 36 \text{ g} \quad v = 3 \text{ mL}$$

$$\text{density of the object} = \frac{m}{v} = \frac{36 \text{ g}}{3 \text{ mL}} = 12 \text{ g/mL}$$

Volume and surface area of a sphere

$$\text{Surface Area (SA)} = 4 \pi r^2$$

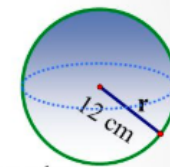
$$\text{Volume (V)} = \frac{4}{3} \pi r^3$$

Leave answers in terms of π

Example: Find the surface area and volume of the sphere.

$$S.A = 4 \pi (12)^2 = 576 \pi \text{ cm}^2$$

$$V = \frac{4}{3} \pi (12)^3 = 2304 \pi \text{ cm}^3$$



Hegarty Maths Links

Perimeter of a sector	536, 537, 544, 545
Area of a sector	541, 542, 546, 547
Surface area of a cone	587
Volume of a cone	576, 577
Volume of a pyramid	579
Surface area of a sphere	588
Volume of a sphere	580, 581
Density	725, 726, 727, 728, 729

Year 10 Higher - Topic 1 – Equations – Student Knowledge Organiser

Key words and definitions

Quadratic: an expression where the highest order term is x^2

Formula: an equation with more than 1 type of letter in it.

Brackets: mathematical punctuation that tells you which part of the equation to calculate first.

Product: the answer when you multiply things together.

Sum: the answer when you add things together.

Factorise: write an expression in terms of a common factor.

Expand: multiplying sets of brackets together.

Complete the square

EXAMPLE

Solve $y^2 - 10y + 20 = 0$
by completing the square.

$$y^2 - 10y + 20 = 0 \quad \text{Complete the square.}$$

$$(y - 5)^2 - 25 + 20 = 0$$

$$(y - 5)^2 - 5 = 0$$

$$(y - 5)^2 = 5 \quad \text{Add 5 to both sides.}$$

5 has positive and negative square roots.

$$y - 5 = \sqrt{5} \quad \text{or} \quad y - 5 = -\sqrt{5}$$

Leave your answers in surd form.

$$y = 5 + \sqrt{5} \quad \text{or} \quad y = 5 - \sqrt{5}$$

Expanding Brackets

RECAP

- To expand double brackets, you multiply each term in the second bracket by each term in the first bracket.

$$\begin{array}{c} \text{F} \quad \text{L} \\ (2x + 7) \quad (3x - 4) \\ \text{O} \end{array} = 6x^2 - 8x + 21x - 28 = 6x^2 + 13x - 28$$

- To factorise into double brackets, look for two numbers that add to give the coefficient of x and multiply to give the constant.

$$\begin{array}{ccc} \text{EXPAND} & & \\ (x + 4)(x + 7) & \rightarrow & x^2 + 11x + 28 \\ & \leftarrow & \begin{array}{cc} 4 + 7 & 4 \times 7 \end{array} \\ & & \text{FACTORISE} \end{array}$$

Quadratic Formula

- You can use the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to solve a quadratic equation $ax^2 + bx + c = 0$.

EXAMPLE

Solve the quadratic equation $3x^2 - 5x = 1$.
Give your answers to 3 sf.

$$\begin{array}{l} 3x^2 - 5x = 1 \\ 3x^2 - 5x - 1 = 0 \\ \text{In the formula: } a = 3, b = -5 \text{ and } c = -1 \\ x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times (-1)}}{2 \times 3} \\ x = \frac{5 \pm \sqrt{25 + 12}}{6} \\ x = \frac{5 \pm \sqrt{37}}{6} \\ \text{Or } x = \frac{5 - \sqrt{37}}{6} \end{array}$$

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

$$x = \frac{5 + \sqrt{37}}{6} = 1.847127088... = 1.85 \text{ (to 3 sf)}$$

$$\text{Or } x = \frac{5 - \sqrt{37}}{6} = -0.180460421... = -0.180 \text{ (to 3 sf)}$$

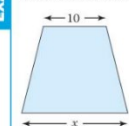
Solving Quadratic Equations

HOW TO

- Use the information in the question to form a quadratic equation.
- Rearrange the quadratic so that it equals zero.
- Solve the quadratic by factorising, completing the square or using the quadratic formula.
- Check that your answers make sense. You may need to reject one solution, depending on the context.

EXAMPLE

If the area of the trapezium is 400 cm^2 , show that $x^2 + 10x = 400$ and find the value of x correct to 3 dp.



- Area of trapezium = $\frac{(a+b)h}{2}$
 $A = \frac{1}{2}(x+10) \times 2x = x(x+10)$
 $400 = x(x+10)$
- $x^2 + 10x = 400$ (as required)
- $x^2 + 10x - 400 = 0$
- The equation does not factorise, so use
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $x = \frac{-10 \pm \sqrt{10^2 - 4 \times 1 \times -400}}{2}$
 $= \frac{-10 \pm \sqrt{10^2 + 1600}}{2}$
 $= \frac{-10 \pm \sqrt{1700}}{2}$
 $= 15.41552... \text{ or } -25.41552...$
- Since x is a length, it must be positive, so $x = 15.416$ to 3 dp.

Hegarty Maths Links

Completing the Square: 235 – 239
Solving Quadratic Equations: 230 – 234
Factorising Quadratic Expressions: 223 – 228
Quadratic Formula: 241 – 242
Expanding Brackets: 160 – 166

Year 10 Higher - Topic 2 – Cumulative Frequency – Student Knowledge Organiser

Key words and definitions

Population- Every person in a certain place (eg. school, town , country.)

Sampling- A method to select a smaller a group of people from a certain population, done to be more time efficient.

Bias- A method of sampling which is not fair, favouring one particular group of people.

Random- A selection process where there is no conscientious method applied, to try to ensure fairness.

Cumulative Frequency- The running total of all the frequencies, a C.F table is used to draw a Cumulative Frequency Graph.

Quartiles- The values (UQ/LQ) which are the middle of all values above/below the median.

Inter Quartile Range- Calculated by UQ-LQ. This value shows how spread out the dataset ignoring the outliers.

Sampling

We select a sample from a population to be more time efficient. It is important though that the people selected in a sample are chosen fairly and represent the full population as accurately as possible. There are several different methods of Sampling, the common ones are:

Random: A sample which is chosen using a method which eliminates potential bias. E.g Drawing names from a hat, or using a random number/name generator on a calculator or computer.

Systematic: A sample where people are selected from a list at pre-planned regular intervals (eg. Selecting every 10th Person from the list).

Stratified: A method which ensures that the sample represents the same proportions as the initial population. Eg. If 15% of the initial population are women aged between 30 and 40 years, then 15% of the sample need to be women aged between 30 and 40 years. Once the grouping has been selected on a stratified sample then the people can be selected randomly or systematically,

Stratified sample model answer

2. There are 180 employees in a school.
The table shows the number of each type of employee in the school.

Teachers	Teaching Assistants	Admin	Other
94	16	41	29

- (a) A stratified sample of size 50 is required.
Calculate the number of each type of employee that should be chosen.

$$\frac{94}{180} \times 50 = 26.1$$

$$\frac{16}{180} \times 50 = 4.4 \dots$$

$$\frac{41}{180} \times 50 = 11.388 \dots$$

$$\frac{29}{180} \times 50 = 8.055 \dots$$

Teachers 26
Teaching Assistants 5
Admin 11
Other 8
(3)

Cumulative frequency Table example

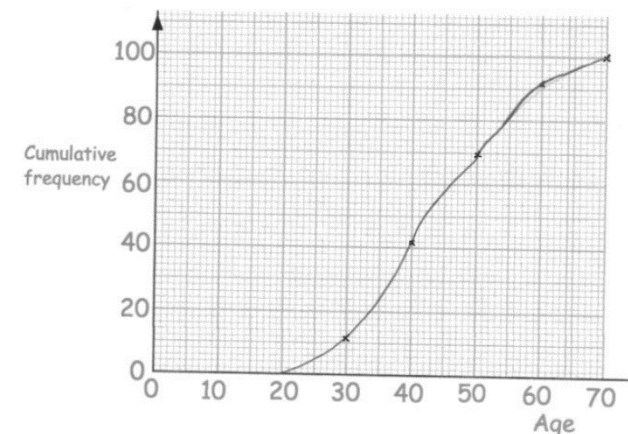
2. The ages of 100 teachers were recorded.
The table below shows this information.

Age, x years	Frequency	Cumulative frequency
$20 < x \leq 30$	12	12
$30 < x \leq 40$	30	42
$40 < x \leq 50$	28	70
$50 < x \leq 60$	22	92
$60 < x \leq 70$	8	100

Cumulative frequency Graph: Key points

- Plot C.F on the y-axis.
- Ensure you plot each point on your graph at the upper bounds of each category.
- Once you have plotted your graph you can draw on it to find Median Lower and Upper Quartiles. You can also calculate how many people scored under or over a certain mark.

C.F Graph example.



(b) Draw a cumulative frequency graph for this information.

(2)

Boxplots (Use the C.F Graph to calculate Median, LQ and UQ)



Hegarty Maths Links

Sampling- Tasks 394, 395(Random) 396-398 (stratified)

Cumulative frequency – Tasks 437-439 & 441

Box plots – Tasks 434-436 & 440

Year 10 Higher - Topic 3 – Sequences– Student Knowledge Organiser

Key words and definitions

Sequence-terms or numbers put in a set order.

Term-the numbers/diagrams/letters in the sequence.

Arithmetic-a sequence where the difference between the terms is constant.

Geometric- a sequence where each term is found by multiplying the previous one by a fixed number.

Nth term- the rule of the sequence.

Finding the nth term of a linear sequence

5 8 11 14 17...

+3 +3 +3 +3

This number goes here **3** $n +$

5 8 11 14 17...

+3

The difference between these numbers goes here

3 $n +$ **2**

See how you get from the 3 times table to the sequence to find the end number.

Finding the nth term of a quadratic sequence

"Worked Example"

n: 1 2 3 4 5 6
Seq: 11, 17, 25, 35, 47, 61

+6 +8 +10 +12 +14

+2 +2 +2 +2

2nd Difference
 $+2 = n^2$
 $+4 = 2n^2$
 $+6 = 3n^2$
and so on...

n²: 1 4 9 16 25 36

Amount needed to map to original seq: +10 +13 +16 +19 +22 +25

+3 +3 +3 +3 +3

+3n: 3 6 9 12 15 18

+3n + 7: 10 13 16 19 22 25

n²: 1 4 9 16 25 36

n² + 3n + 7: 11, 17, 25, 35, 47, 61

nth term = $n^2 + 3n + 7$

This line is a new linear sequence for you to find the nth term of.

Re-write n^2 here and add to find the full nth term

Fibonacci sequences

A Fibonacci sequence is found by adding the two previous terms:

1, 1, 2, 3, 5, 8, 13, 21, 34, 55...

Add together to get the next number

Iteration

Iteration is when you put a starting value into a formula, complete the calculation and put that answer back in until you get the answer you need.

Substitute x_0 into the equation to find x_1 .	$x_1 = \sqrt[3]{7 - 2(2)}$	$x_1 = 1.44224957...$
Put x_1 back into the equation to find x_2 .	$x_2 = \sqrt[3]{7 - 2(1.44224957...)}$	$x_2 = 1.602535155...$
Repeat until two consecutive terms round to the same number to 1 d.p.	$x_3 = \sqrt[3]{7 - 2(1.602535155...)}$	$x_3 = 1.559796392...$
x_2 and x_3 both round to 1.6 to 1 d.p. so a solution is $x = 1.6$.		

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

Needs to be $x^3 = \frac{7-2x}{2}$

leave x^3 all last as cube root

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

$2x^3 + 2x = 7$

$2x^3 = 7 - 2x$

$x^3 = \frac{7-2x}{2}$

$x = \sqrt[3]{\frac{7-2x}{2}}$

You may also be asked to rearrange a formula in iteration.

This one said to show that the top equation could be wrote as the second.

Hegarty Maths Links

198-Linear sequences (nth term)

248- Find the nth term of a quadratic sequence

927-Finding the nth term of a cubic sequence

263-Fibonacci sequences

264- Geometric sequences

322-Iteration

Year 10 Higher - Topic 4 – Linear Graphs – Student Knowledge Organiser

Key words and definitions

Parallel: Lines that have the same gradient and never meet.

Perpendicular: Lines that meet at a 90 degree angle.

Gradient: Steepness of a line.

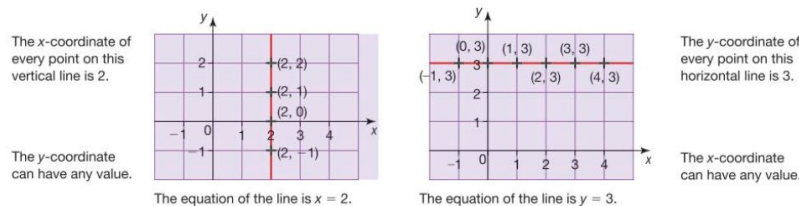
y-intercept: Where a line crosses the y-axis.

Coordinate: How far along an axis a point is. In 2D space, a point will have two coordinates written as (x, y) .

Plot: Draw points on a coordinate grid. When asked to plot a graph, you need to plot the points from the table of values and then join them together with a straight line.

Horizontal and Vertical Lines

A straight line can be **diagonal**, **vertical** or **horizontal**.



- Horizontal lines have equations of the form $y = c$.
- Vertical lines have equations of the form $x = c$.

c stands for a number.

Equation of a Straight Line

- The equation of a straight line is of the form $y = mx + c$, where m is the **gradient** and c is the **y-intercept**.

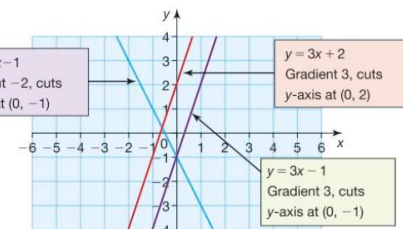
The y-intercept is the y-value where the graph cuts the y-axis.

The **gradient** of a line segment is calculated as

$$\frac{\text{Change in the y-direction}}{\text{Change in the x-direction}}$$

- Parallel** lines have the same gradient.

- If line A has gradient m , any line perpendicular to line A has gradient $-\frac{1}{m}$.



Plotting Straight Line Graphs

- The graphs of linear equations such as $y = 2x + 3$ are straight lines.

To plot a graph of a function:

- Draw up a table of values
- Calculate the value of y for each value of x
- Draw a suitable grid
- Plot the (x, y) pairs and join them with a straight line.

If you plot three points, you can tell if you have made a mistake.

One point must be wrong.

- EXAMPLE**
- Draw the graph of $y = 2x + 3$.
 - Use the graph to find
 - the value of x when $y = 7$
 - the value of y when $x = \frac{1}{2}$

Construct a table of values.

Choose four or five values, including negative values and zero.

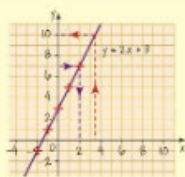
x	-2	-1	0	1	2
y	-1	1	3	5	7

$(-2, -1)$ $(-1, 1)$ $(0, 3)$ $(1, 5)$ $(2, 7)$

Then plot the points and draw the line.

Make sure that your grid includes the smallest and largest y -values.

- Find $y = 7$ on the y-axis. Draw a horizontal line to the graph line. Draw a vertical line to the x-axis. Read off the value of x .
 $x = 2$
 - Find $x = \frac{1}{2}$ on the x-axis. Draw a vertical line to the graph line. Draw a horizontal line to the y-axis. Read off the value of y .
 $y = 10$



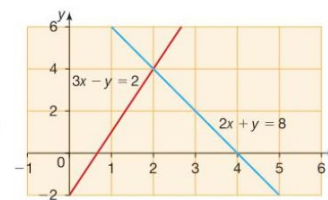
Solving Simultaneous Equations

You can solve **simultaneous** equations graphically.

A solution is at a point of **intersection**.

For example, for the equations $3x - y = 2$ and $2x + y = 8$, the lines intersect at $(2, 4)$ so the solution is $x = 2$ and $y = 4$.

- HOW TO**
- Use the information in the question to form a pair of simultaneous equations.
 - Solve the simultaneous equations using elimination, substitution or by drawing a graph.
 - Give your answers and check that they make sense.



Equation of a Straight Line Example

EXAMPLE Find the equation of the line perpendicular to $y = 2x - 1$ that passes through $(4, 5)$.

$y = 2x - 1$ has gradient 2, so a line perpendicular to it has gradient $-\frac{1}{2}$.

$$y = -\frac{1}{2}x + c$$

$$\text{At } (4, 5): 5 = \left(-\frac{1}{2}\right) \times 4 + c$$

$$c = 7$$

$$\text{The equation is } y = -\frac{1}{2}x + 7.$$

If the equation is not in the form $y = \dots$, rearrange it first, for example

$$3x + 2y = 12 \Rightarrow 2y = -3x + 12 \Rightarrow y = -\frac{3}{2}x + 6$$

Now you can see that the gradient is $-\frac{3}{2}$ and the intercept is 6.

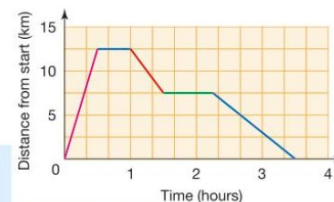
Distance-Time Graphs and Velocity-Time Graphs

A distance-time graph shows information about a journey.

The gradient of a straight line in a distance-time graph is the speed of the object.

Velocity-time graphs also give information about a journey.

- The gradient of a straight line in a velocity-time graph is the **acceleration** of the object.
- The area under a line in a velocity-time graph is the distance travelled by the object.



Velocity is speed in a certain direction.