Biology

Year 11 Knowledge Organisers

AQA GCSE Combined Science Foundation Homeostasis and Response **Knowledge Organiser**

Key Words

central nervous system (CNS)	The brain and spinal cord.
coordination centre	An area that receives and processes information from receptors. Includes the brain, spinal cord and pancreas.
effector	A muscle or gland that brings about a response to a stimulus.
gland	A group of cells which secrete hormones.
homeostasis	The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes.
hormone	A chemical substance secreted by an endocrine gland that regulates the activity of cells.
neurone	A nerve cell, a specialised cell that transmits electrical impulses around the body.
receptor	A specialised cell of the nervous or endocrine system that detects a stimulus.
reflex action	An automatic and rapid response to a stimulus that does not involve the conscious part of the brain.
response	The way the body reacts to a stimulus.
stimulus (plural: stimuli)	A change in the internal or external environment.
synapse	A gap between two neurones. Impulses pass across it by diffusion of chemical neurotransmitters.

Homeostasis

Homeostasis is the regulation of **internal conditions** of a cell or organism to maintain **optimum conditions** for function in response to internal and external changes. Homeostasis maintains optimum conditions for **enzyme action** and **cell functions**.

In humans, homeostasis regulates:

- blood glucose concentration;
- body temperature;
- water levels.

Homeostatic processes are controlled **automatically**. They involve either a **nervous response** controlled by the nervous system or a **chemical response** controlled by the endocrine system.

All control systems include the following key components:

A **receptor** that detects changes in the environment called **stimuli**. The skin contains cells that act as receptors to the stimulus of pressure, for example.

↓

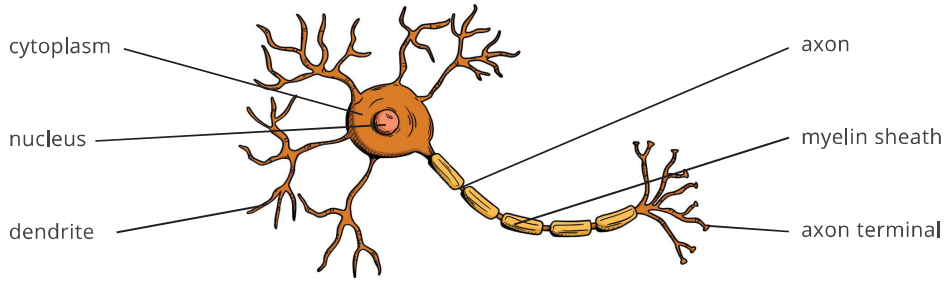
A **coordination centre** such as the brain, spinal cord or pancreas, which processes the information it receives from the receptors.

↓

An **effector** which carries out a **response**. The response restores internal conditions to optimal levels. Effectors are usually muscles or glands.

The Human Nervous System

In a nervous response, the key components of the control system are linked by nerve cells called **neurones**. Neurones are an example of **specialised cells**. They transmit electrical impulses through the nervous system to cause responses to occur.



Neurone Feature	Specialised Function
axon	A long, stretched-out fibre of cytoplasm which the electrical nerve impulse travels along.
axon terminal	Where chemicals called **neurotransmitters** are released. These pass across **synapses**, allowing the nerve impulse to pass between different neurones.
dendrite	Branches which receive neurotransmitter chemicals from other neurones. The dendrites convert these chemicals into electrical signals which travel down the body of the neurone.
myelin sheath	Layer of fatty tissue which surrounds the axon of some (but not all) neurones. It insulates the axon allowing the nerve impulse to be transmitted more efficiently.

There are three types of neurone:

1. **Sensory** neurones link the **receptor** to the **coordination centre**.
2. **Motor** neurones link the **coordination centre** to the **effector**.
3. **Relay** neurones are found within the coordination centre and connect the sensory and motor neurones.

Nerve impulses travel along the following pathway:

[stimulus] → receptor → sensory neurone → coordination centre → motor neurone → effector → [response]

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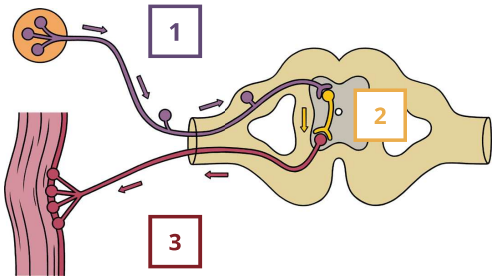
Reflex Arc

A reflex action occurs to prevent you from coming to harm. They do not require conscious thought: they are **rapid** and **automatic**.



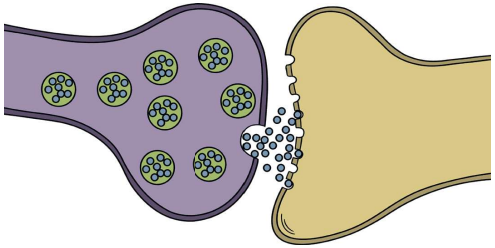
During a reflex action the nerve impulse travels along the following pathway:

1. The **receptor** detects a **stimulus** internally or from the environment. This causes a nerve impulse to travel along the **sensory neurone** to the closest part of the **central nervous system** (CNS). This is not always in the brain.
2. The CNS is the **coordination centre** for a reflex action and coordinates the response. This does not involve the conscious part of the brain to enable the response to be rapid. The **relay neurone** connects the **sensory neurone** to the **motor neurone**. The gaps between the neurones are called **synapses**.
3. The electrical impulse travels along the **motor neurone** to the **effector**. This causes a response to occur which prevents or reduces harm.

[stimulus] → receptor → sensory neurone → relay neurone → motor neurone → effector → [response]

Synapses

The small gaps between neurones are called **synapses**. The electrical nerve impulse cannot cross these gaps.



When the nerve impulse reaches the end of one neurone it causes chemicals called **neurotransmitters** to be released into the gap.

These **diffuse** across the gap and bind to receptor sites on the second neurone. This causes the second neurone to transmit an electrical nerve impulse.

Synapses account for a slight reduction in the speed of the transmission of nerve impulses.

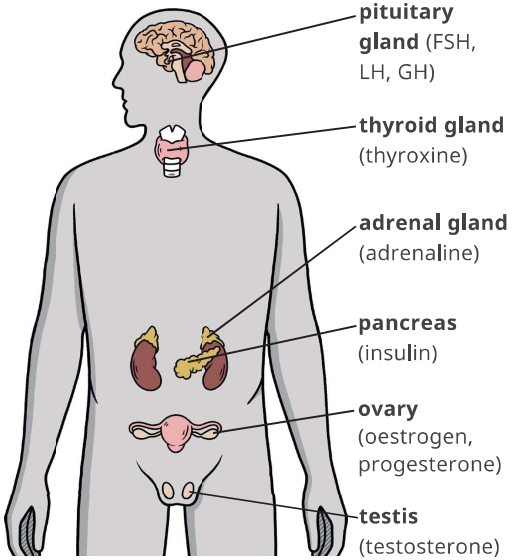
The Human Endocrine System

The endocrine system coordinates and controls the release of hormones from glands.

The **pituitary gland** is also known as the 'master gland' because it secretes many hormones which in turn control the function of other glands. These include follicle stimulating hormone (FSH), luteinising hormone (LH) and growth hormone (GH).

Nervous vs Chemical Responses

	Nervous	Chemical
signal type	electrical impulses	hormones
transmission medium	neurones	bloodstream
response speed	rapid	relatively slow
duration	relatively short (reflexes occur in less than a second)	relatively long (puberty occurs over many years)
target area	specific	large



Control of Blood Glucose

The **pancreas** is both the **coordination centre** and the **effector** for maintaining a normal blood glucose concentration.

The pancreas releases the hormone **insulin** when the concentration of glucose in the blood is too high.

Insulin causes the cells to absorb the excess glucose, and this is converted to another molecule called **glycogen** by the **liver** and **muscles**. The liver and muscles then store the glycogen. They can convert it back to glucose when blood glucose levels become too low.

normal blood glucose concentration → blood glucose concentration becomes **too high** → **pancreas** releases **insulin** which causes the cells to absorb **glucose** → **liver** and **muscle cells** convert the glucose into **glycogen** to be **stored** → normal blood glucose concentration

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Diabetes

There are two types of diabetes: **Type 1** and **Type 2**. Although both prevent the maintenance of blood glucose concentration, the risk factors and treatments for each are different.

Type 1 Diabetes:

- an autoimmune disorder;
- the cells in the pancreas which produce insulin are destroyed by the body;
- the body cannot produce enough insulin to regulate blood glucose concentration;
- treated using insulin injections;
- diet and exercise help to control blood glucose concentration;
- a lifelong condition;
- cause unknown but thought to be a combination of genetic and environmental factors.

Type 2 Diabetes:

- a metabolic disorder;
- body cells stop responding to the insulin produced by the pancreas, causing blood glucose concentration to increase;
- treated by following a carbohydrate-controlled diet, avoiding sources of dietary sugar, and exercising;
- can be reversed with a healthy lifestyle;
- risk factors include: being overweight or obese, having a high carbohydrate or sugar diet, not exercising, smoking and having high blood pressure.

Hormones in Human Reproduction

During **puberty**, secondary sex characteristics such as the development of breasts in females and the growth of facial hair in males are triggered by the release of reproductive hormones.

Hormone	Gland	Primary Function
follicle stimulating hormone (FSH)	pituitary gland	causes maturation of an egg in the ovary
luteinising hormone (LH)	pituitary gland	stimulates the release of the egg (ovulation)
oestrogen	ovary	thickens and maintains the lining of the uterus
progesterone	ovary	maintains the lining of the uterus
testosterone	testis	controls the production of sperm

The **menstrual cycle** occurs in females approximately every **28 days**, although this varies between women. It involves the process of building the lining of the **uterus** in preparation for it accommodating the egg cell released from the **ovary** during **ovulation**.

If the egg cell is not **fertilised** by a sperm cell then the lining breaks down, causing **menstruation** to occur. This is commonly called 'having a period.'

Required Practical: Human Reaction Time

Aim: To investigate how handedness affects human reaction time.

Independent Variable: which hand is used

Dependent Variable: reaction time

Control Variables:

- starting position of the ruler
- use of cues (physical and verbal)
- practice
- starting position of thumb and first finger

Equipment:

- metre ruler
- table
- chair
- reaction time conversion table

Method:

1. Ask your partner to sit at a table with their dominant (writing) arm outstretched so their entire hand is hanging from the edge of the table.
2. Hold the metre ruler vertically between your partner's thumb and first finger. Their thumb and first finger should be held as far apart as possible.
3. Ensure that the 0cm mark on the ruler is pointing downwards and in line with the thumb.
4. Check that the person sitting is ready. Remind them that the aim is to catch the ruler as quickly as possible after it is dropped using their thumb and first finger.
5. Drop the metre ruler without warning your partner it is about to happen.
6. Read the measurement on the metre ruler from the top of your partner's thumb and record this in a results table.
7. Repeat this nine more times to get ten results in total for their dominant hand.
8. Repeat the investigation using your partner's non-dominant hand.
9. Use a reaction time conversion table to convert the measurement on the ruler to a reaction time.
10. Calculate the average reaction time for each hand, remembering to discount any anomalous results.

You can use a similar method when investigating how different independent variables affect human reaction time. For example, whether your partner has consumed caffeine.

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Contraception

Method	Type	How It Works	Advantages	Disadvantages
oral contraceptives (the pill or the mini pill)	hormonal	Contains hormones that inhibit the production of FSH. This prevents eggs from maturing. The combined pill contains synthetic oestrogen and progesterone. The mini pill contains progesterone only. Contraceptive pills also work by thickening the cervical mucus, making it harder for the sperm to enter the uterus.	• easy to administer yourself • can reduce period pain • free and widely available • highly effective at preventing pregnancy when taken correctly	• have to remember to take it daily • does not protect against STIs • can have some side effects like headaches and nausea
contraceptive injection, implant or skin patch	hormonal	Contain the hormone progesterone which inhibits the maturation and release of eggs in the same way as the contraceptive pill. A new contraceptive patch is placed on the skin weekly. A contraceptive injection is carried out approximately every three months. The implant remains inserted for around three years.	• as above with the contraceptive pill • you do not have to remember to take it every day • highly effective at preventing pregnancy	• can have some side effects • does not protect against STIs • the implant may need minor surgery to remove
barrier methods including condoms and diaphragms	non-hormonal	When used correctly, barrier methods prevent the sperm from coming into contact with an egg. Condoms are placed over the penis to catch the semen released following ejaculation. Diaphragms are worn inside the vagina to prevent sperm passing through the cervix.	• protect against STIs when used correctly • no hormonal side effects • can be used by males and females • widely available and free from clinics	• can split or tear if used incorrectly • commonly made from latex which some people have allergies to (latex-free condoms are also available)
intrauterine devices and systems (IUD/IUS) (the coil)	both	A small T-shaped device containing copper (IUD) or a hormone similar to progesterone (IUS) which is placed into the uterus by a medical professional. Both make it difficult for sperm to reach the egg, and for a fertilised egg to implant into the lining of the uterus.	• lasts for up to ten years depending on the type • one of the most effective forms of contraception • suitable for women who cannot have oestrogen • can make periods lighter and less painful	• does not protect against STIs • has to be inserted and removed by a medical professional which can be uncomfortable • there is a risk of infections when the device is fitted
spermicidal agents	non-hormonal	A cream, foam or gel which kills or immobilises sperm. Condoms are often coated in a layer of spermicide to increase their effectiveness. Spermicide is rarely used as the sole method of contraception.	• effective when used with a barrier method like a condom or diaphragm • no hormonal side effects • easy to apply yourself	• not very effective at preventing pregnancy when used on its own • does not protect against STIs • not as widely available as other methods
abstaining from sexual intercourse (natural family planning)	non-hormonal	Partners abstain from sexual intercourse near and during ovulation. Fertility is tracked by keeping a record of the menstrual cycle, body temperature and cervical secretions in order to avoid pregnancy.	• does not cause any side effects • acceptable to all faiths and cultures • increases self-awareness of fertility, which can be useful for people who plan to get pregnant in the future	• does not protect against STIs • requires the commitment of daily monitoring of the menstrual cycle • fertility signs can be affected by stress and illness making this method less effective
surgical methods (sterilisation)	non-hormonal	In females, the oviducts are blocked using clips, tied or are cut. They can also be removed. This prevents sperm from coming into contact with an egg. In males, the tubes which carry the sperm to the penis, are cut, tied or sealed. This means there is no sperm present in the ejaculate.	• highly effective at preventing pregnancy • does not affect hormone levels or sex drive • it is very rare to have any long-term health effects after surgery	• does not protect against STIs • usually impossible to reverse so should be considered a permanent treatment • risk of surgical complications and infection

Inheritance, Variation and Evolution Knowledge Organiser

Keywords

allele – An alternative form of a gene.

asexual reproduction – The production of offspring from a single parent by mitosis. The offspring are clones of the parent.

chromosome – Structures that contain the DNA of an organism and are found in the nucleus.

cystic fibrosis – A disorder of cell membranes that is caused by a recessive allele.

DNA - A polymer that is made up of two strands that form a double helix.

dominant – An allele that is always expressed, even if only one copy is present.

fertilisation – The fusion of male and female gametes.

gamete – Sperm cell and egg cell in animals; pollen and egg cell in plants.

gene – A small section of DNA that codes for a specific protein.

genome – The entire genetic material of an organism.

genotype – The combination of alleles.

heterozygous – A genotype that has two different alleles, one dominant and one recessive.

homozygous – A genotype that has two of the same alleles. Either two dominant alleles or two recessive alleles.

meiosis – The two-stage process of cell division that reduces the chromosome number of the daughter cells. It makes gametes for sexual reproduction.

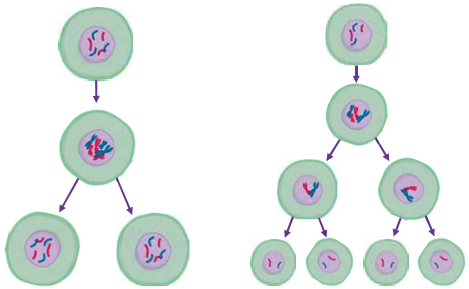
mutation – A change in DNA.

phenotype – The characteristic expressed because of the combination of alleles.

polydactyly – Having extra fingers or toes. It is caused by a dominant allele.

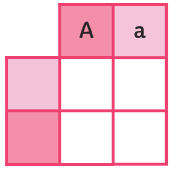
recessive – An allele that is only expressed if two copies of it are present.

sexual reproduction – The production of offspring by combining genetic information from the gametes of two parents. Leads to variation in the offspring.



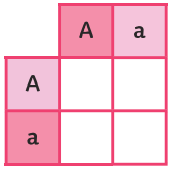
Mitosis	Meiosis
Produces two daughter cells.	Produces four daughter cells.
Daughter cells are genetically identical.	Daughter cells are not genetically identical.
The cell divides once.	The cell divides twice.
The chromosome number of the daughter cells is the same as the parent cells. In humans, this is 46 chromosomes.	The chromosome number is reduced by half. In humans, this is 23 chromosomes.
Used for growth and repair, and asexual reproduction.	Produces gametes for sexual reproduction.

How to Complete a Punnet Square



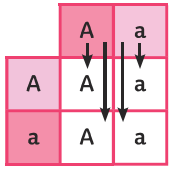
Step 1:

Put the two alleles from one parent into the boxes at the top. This parent is a heterozygote. This means they have one dominant and one recessive allele.



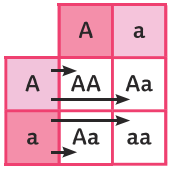
Step 2:

Put the two alleles from the second parent into the boxes on the left. This parent is also a heterozygote.



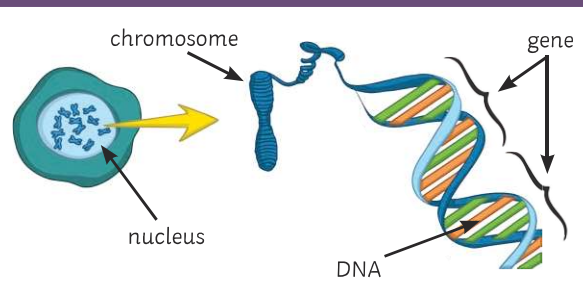
Step 3:

Put the alleles from the first parent into the two boxes underneath them.

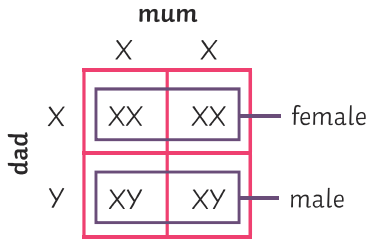


Step 4:

Put the alleles from the second parent into the two boxes to the right of them.



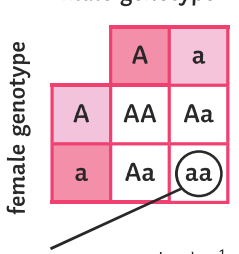
Sex Determination



Females carry two X chromosomes.
Males carry one X and one Y chromosome.

Probability

There are four possible combinations of gametes that offspring can inherit.



One of these four has the genotype aa – that's $\frac{1}{4}$, 25% or 0.25.

The recessive phenotype has a ratio of 1:3 because only one combination will show the phenotype while the other three will not.

Inheritance, Variation and Evolution Knowledge Organiser

Keywords

embryo screening – Genetic tests carried out on an embryo to see whether it carries a faulty allele.

evolution – A change in the inherited characteristics of a population over time through a process of natural selection.

evolutionary tree – A method used to show how scientists believe organisms are related.

extinction – The permanent loss of all members of a species.

fossils – The remains of organisms from millions of years ago which are found in rocks.

genetic engineering – The process by which scientists manipulate and change the genotype of an organism.

natural selection – The process by which organisms that are better suited to an environment are more likely to survive and reproduce.

selective breeding – Humans selecting animals or plants, that have a required characteristic, for breeding.

speciation – The process by which two species evolve from a single original species by natural selection. The two populations have become so different that they can no longer interbreed to produce fertile offspring.

variation - Differences in characteristics of individuals in a population.

Variation

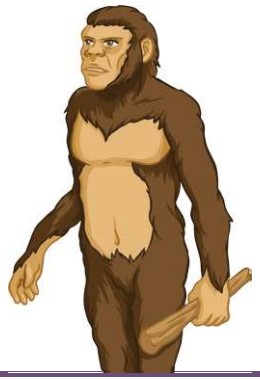
Variation maybe be due to differences in:

- the genes that have been inherited (genetic causes);
- the conditions in which they have developed (environmental causes);
- a combination of genes and the environment.

Evolution

All species of living things have evolved from simple life forms by natural selection.

- If a variant/characteristic is advantageous in an environment, then the individual will be better able to compete.
- This means they are more likely to survive and reproduce.
- Their offspring will inherit the advantageous allele.



Fossils

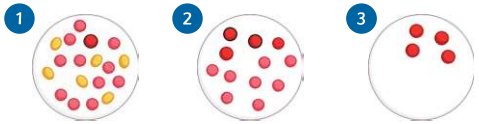
Fossils could be:

- the actual remains of an organism that has not decayed;
- mineralised forms of the harder parts of an organism, such as bones;
- traces of organisms such as footprints or burrows.

Many early life forms were soft-bodied so have left few traces behind.

Fossils help us understand how much or little organisms have changed as life developed on earth.

Resistant Bacteria



There is variation in the bacterial population. One bacterium develops a mutation by chance that means it is resistant to an antibiotic.

The antibiotic kills some of the bacteria, the resistant bacterium survives and reproduces.

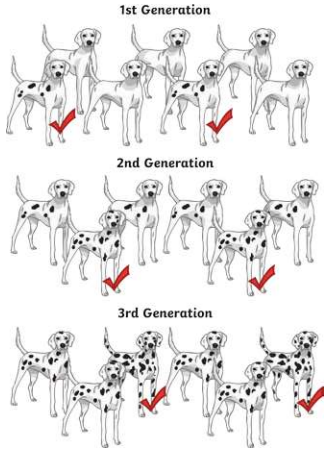
The antibiotic kills the rest of the non-resistant bacteria so the person may start to feel a little better. The resistant bacterium has survived the antibiotic and continues to multiply.

To reduce the rate at which antibiotic-resistant strains appear:

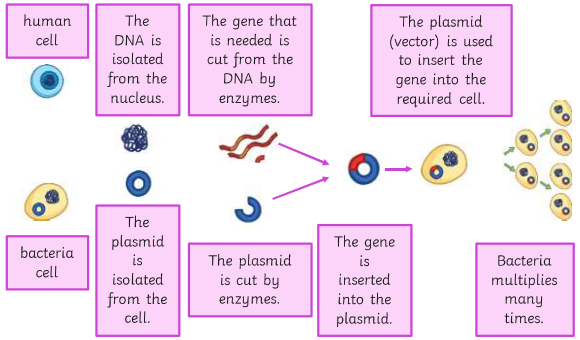
- Antibiotics should only be used when they are really needed, not for treating non-serious or viral infections.
- Patients should complete their courses of antibiotics, even if they start to feel better.
- The agricultural use of antibiotics should be restricted.

Selective Breeding

1. Choose parents who have the desired characteristic.
2. Select the best offspring and breed these to make the next generation.
3. These offspring are then bred again and again, over many generations, until a desired result is achieved.



Genetic Engineering



Classification

Linnaeus classified living things into kingdom, phylum, class, order, family, genus and species.

Organisms are named by the binomial system of genus and species.

Due to evidence from chemical analysis, there is now a 'three-domain system' developed by Carl Woese.

Domain	bacteria	archaea	eukaryota			
Kingdom	eubacteria	archaebacteria	protista	fungi	plantae	animalia

AQA Biology (Combined Science) Unit 7: Ecology Knowledge Organiser

Keywords

Biodiversity - the variety of living organisms.

Carrion - decaying flesh and tissue of dead animals.

Community - made up of the populations of different species living in a habitat.

Competition - the negative interaction between two or more organisms which require the same limited resource.

Consumers - feed on other organisms for their energy. Can be primary, secondary or tertiary.

Decomposers - organisms which feed on dead and decaying organisms. They break down the biomass and release nutrients into the soil.

Deforestation - the removal and destruction of trees in forest and woodland.

Ecosystem - the interaction between the living organisms and the different factors of the environment.

Global warming - the increase of the average global temperature.

Habitat - where a living organism lives.

Interdependence - the interaction between two or more organisms, where it is mutually beneficial.

Population - the number of individual organisms of a single species living in a habitat.

Predators - organisms which kill for food.

Prey - the animals which are eaten by the predators.

Producers - convert the sun's energy into useful compounds through photosynthesis. They are green plants or algae.

Scavengers - organisms which feed on dead animals (carrion).

Species - organisms of similar morphology which can interbreed to produce fertile offspring.

Abiotic and Biotic Factors

Abiotic factors are the non-living factors of an environment. E.g. moisture, light, temperature, CO_2, wind, O_2 or pH.

Biotic factors are the living factors of an environment. E.g. predators, competition, pathogens, availability of food.

Adaptations

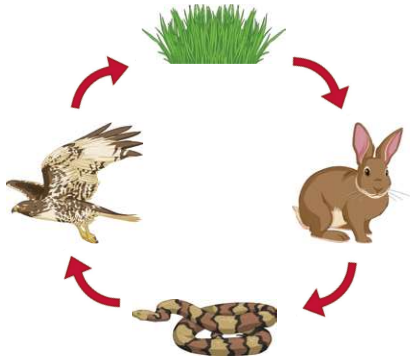
Adaptations are specific features of an organism which enable them to survive in the conditions of their habitat.
Adaptations can be structural, behavioural or functional:

- **Structural adaptations** are features of the organism's body e.g. colour for camouflage.
- **Behavioural adaptations** are how the organism behaves e.g. migration to a warmer climate during colder seasons.
- **Functional adaptations** are the ways the physiological processes work in the organism e.g. lower metabolism during hibernation to preserve energy.

A plant or animal will not physically change to adapt to its environment in its lifetime. Instead, there is natural variation within the species and only organisms whose features are more advantageous in the environment survive. The survivors then go on to reproduce and pass on their features to some of their offspring. The offspring who inherit these advantageous features are better equipped to survive. Charles Darwin described this process as 'survival of the fittest'.

Food Chains

The source of all energy in a food chain is the sun's radiation. It is made useful by plants and algae which produce organic compounds through photosynthesis.

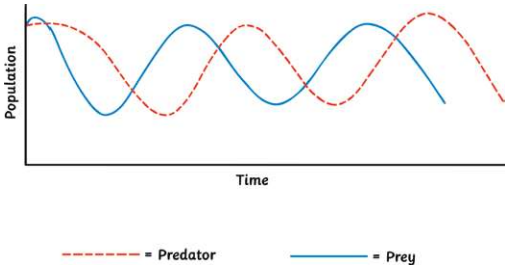


The living organisms use the energy to produce biomass and grow.

When a living organism is consumed, some of the biomass and energy is transferred. Some of the energy is lost.

Remember: the arrow in a food chain indicates the direction of the flow of energy.

Populations of predators and prey increase and decrease in cycles. The size of the predator population depends on the size of the prey population and vice versa. Overall, there is a stable community.



Competition

Species will compete with one another and also within their own species to survive and to reproduce.

Mutualism occurs when both species benefit from a relationship.

Parasitism occurs when a parasite only benefits from living on the host.

Animals compete for resources such as food, water and space/shelter. They may also compete within their own species for mates.

Plants compete for resources including light, water, space and minerals. All these resources are needed for photosynthesis so the plant can make its own food. Plants do not need to compete for food.

Deforestation and Land Use

Humans use land for buildings, quarrying, mining, agriculture and landfill. As the human population increases and we take more land, there is less space for other organisms to live.

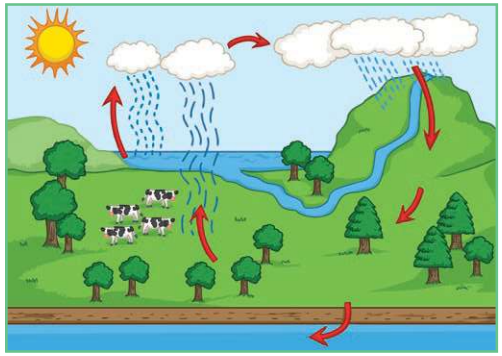
Deforestation (to use wood as a fuel/material or to clear space for other uses) destroys habitats where other organisms live.

Peat bogs are produced when decomposition occurs over a very long time. Peat stores a lot of carbon and can be extracted for use by gardeners or as an energy source. Burning peat releases a lot of carbon dioxide into the atmosphere which contributes to the greenhouse effect.

Trees absorb carbon dioxide for photosynthesis, so as they are cut down and removed, less carbon dioxide is taken from the atmosphere. Furthermore, when the trees are burned, they release carbon dioxide back into the atmosphere. The excess carbon dioxide can lead to global warming and the changes to the ecosystem cause reduced biodiversity.

AQA Biology (Combined Science) Unit 7: Ecology Knowledge Organiser

Water Cycle



Convection is the movement caused within a fluid as the hotter, less dense material rises and colder, denser material sinks under the influence of gravity. This results in the transfer of heat.

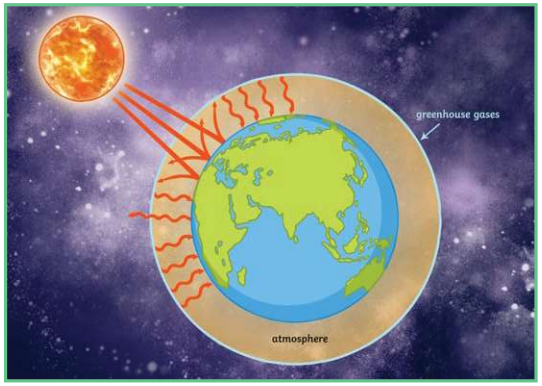
Evaporation occurs when heat energy from the surroundings (or a heat source) is transferred to water particles as kinetic energy. The particles begin to move more rapidly and can turn from a liquid into a gas.

Condensation occurs when moving particles transfer kinetic energy to the surroundings. The particles begin to move even more slowly and can turn from a gas into a liquid.

Precipitation occurs when rain, snow, sleet, or hail falls to (or **condenses** on) the ground.

Transpiration is the process by which water is carried through plants from roots to the stomata on the underside of leaves and it evaporates into the surroundings.

Global Warming



The **greenhouse effect** is the natural process where some of the Sun's radiation is trapped within the insulating layer of the atmosphere. This maintains a temperature suitable to support life on Earth.

Most of the radiation from the Sun is absorbed by the Earth when it reaches the surface. The rest of the infrared radiation is reflected from the surface and absorbed by the greenhouse gases and clouds in the atmosphere. This is then re-emitted in all directions.

However, due to many contributing factors, the global temperature is gradually increasing. Several gases, called greenhouse gases, trap the heat around the Earth; the most concerning is carbon dioxide. Human activities contribute to the excess amount of carbon dioxide in the atmosphere and so are a cause of global warming.

Global warming leads to the melting of ice caps, rising sea levels, flooding, changes to climate, changes in migration patterns, changes in species distribution and reduction in biodiversity.

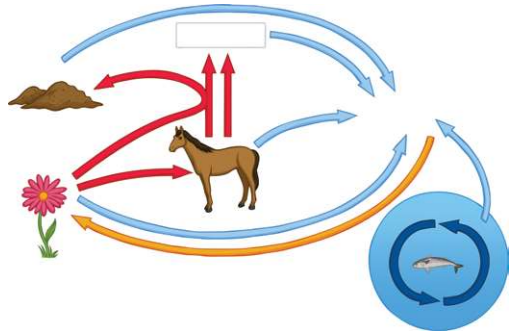
RPI: Field Techniques Quadrats and Transects

The distribution of an organism is affected by the environment and abiotic factors.
Quadrats can be used to measure the frequency of an organism in a given area e.g. the school field. You could count the individual organisms or estimate the percentage cover. You must collect data from at least two areas to make a comparison. Quadrats should always be placed randomly.

Transects are used to measure the change of distribution across an area e.g. from the edge of a river and moving further from the water's edge. You could either count the number of organisms touching the transect at regular intervals or use a quadrat placed at regular intervals along the transect.

$$\text{mean} = \frac{\text{total number of organisms}}{\text{number of quadrats}}$$

Carbon Cycle

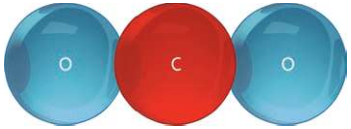


The main focus on the carbon cycle is its transfer to and from the atmosphere. When carbon is in the atmosphere, it combines with oxygen to form carbon dioxide, a greenhouse gas.

Carbon is transferred from the atmosphere when plants absorb carbon dioxide for photosynthesis and when the gas is dissolved into oceans.

Carbon is transferred to the atmosphere through respiration by animals, plants and bacteria and by combustion of fossil fuels (coal, oil and natural gas).

Dead animals and plants are decomposed and their matter is broken down by microbes and fungi. These organisms are collectively called decomposers. When the organisms are broken down, the microbes and fungi release carbon dioxide into the atmosphere through respiration.



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Biodiversity and Waste Management

Biodiversity is the variety of living organisms on the earth or in an ecosystem. It is important in helping to maintain stable ecosystems. Organisms are often interdependent, relying on others as food sources, or to create suitable environmental conditions to survive. Human survival is also dependent on this biodiversity.

The global human population has exceeded 7 billion.
Human population has increased due to modern medicine and farming methods, reducing famine and death from disease.
This means a greater demand for food, resources and water.
It also means more waste and emissions are created.

Sewage, toxic chemicals, household waste and gas emissions pollute the water, land and air, killing plants and animals and reducing biodiversity.

Maintaining Ecosystems and Biodiversity

There are many ways that biodiversity and ecosystems are maintained:

- Breeding programmes can help to protect endangered species from extinction.
- Conservation programmes can help to protect and preserve specialised ecosystems and habitats such as peat bogs and coral reefs.
- Reintroduction of hedgerows and field margins on agricultural land can help improve biodiversity by breaking up the monoculture crops.
- Sustainable forestry programmes help to manage the woodlands and reduce the deforestation to a sustainable rate.
- Societies actively encourage recycling and reusing of products and packaging to reduce the household waste going to landfill sites.

Unfortunately these programmes can be difficult to manage. They are often expensive and are difficult to regulate. People who are employed in certain areas, e.g. tree felling, cannot always transfer their skills to an environmentally friendly role and so become unemployed. It is difficult to maintain biodiversity whilst preventing crops being overrun with pests and weeds, which would affect food security for the human population.