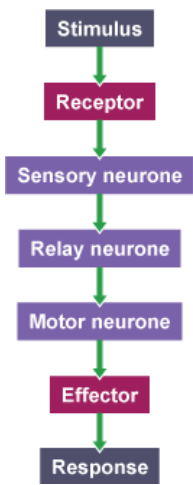
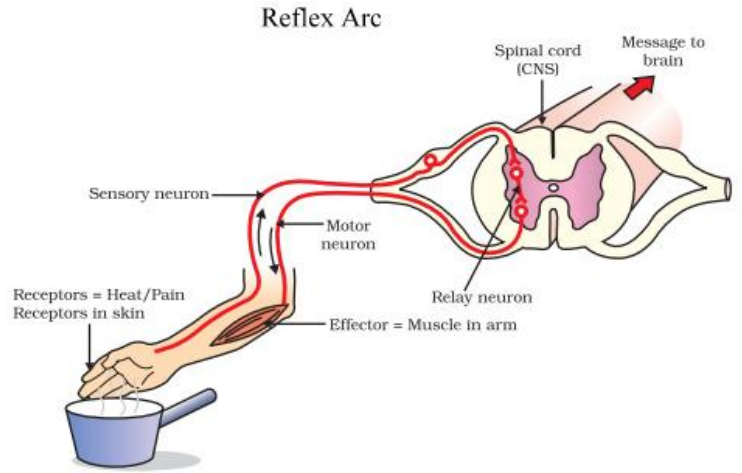
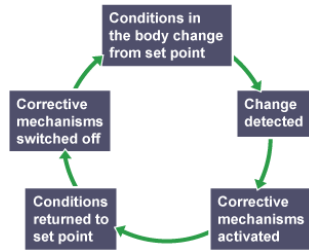


Biology Paper 2 On A Page

Homeostasis is the maintenance of a constant internal environment to maintain optimum conditions for the functions, especially enzymes, of an organism. In humans, blood glucose, temperature and water levels need to be controlled.



Receptors detect a stimulus (change), coordination centres (brain, spinal cord) process information, effectors (muscles or glands) bring about a response to return to optimum conditions.

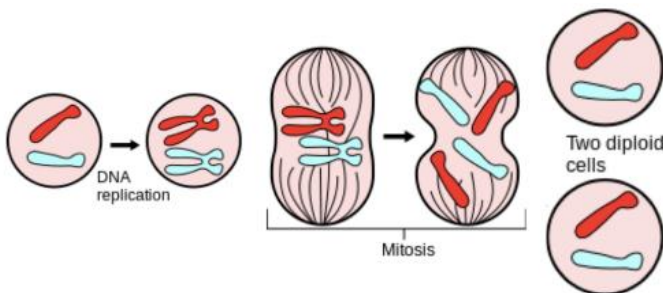


Required practical: You will have carried out a practical investigation looking at how different factors, such as caffeine, affect reaction times. You might have done the 'ruler drop test', the person catches the ruler by closing their hand and the length from the ruler is converted into a reaction time.

The endocrine system is composed of glands which secrete hormones directly into the bloodstream to travel round the body and act on a target organ. These signals are slower than the nervous system but last for longer. The pituitary gland in the brain is the 'master gland', helping homeostasis. The pancreas monitors and controls blood glucose concentration. If too high, insulin is produced which causes glucose to move from the blood into cells (the liver and muscle cells store excess glucose as glycogen).

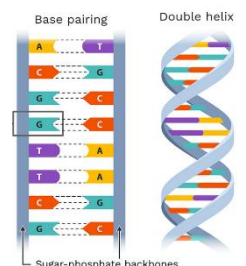
Diabetes is a condition where blood glucose concentration is hard to maintain due to insulin problems. Type 1 diabetes is when the pancreas fails to produce sufficient insulin, so sufferers need to inject themselves with insulin. Type 2 is when the body cells no longer respond to insulin, even though it's produced, often due to obesity, their blood glucose is controlled through diet and exercise.

Hormones are involved in human reproduction, causing the development of secondary sex characteristics during puberty. Testosterone is the main male reproductive hormone, produced in the testes, which stimulates sperm production. Oestrogen is the main female reproductive hormone, produced in the ovaries. After puberty, eggs mature and one is released roughly every 28 days (ovulation). Other hormones are involved in the menstrual cycle –FSH matures eggs in the ovaries, LH stimulates egg release. Oestrogen and Progesterone maintain the uterus lining. Contraception is used in the control of fertility. **Contraception** can be hormonal (the pill, the injection, implant, IUD or patch) which limits maturation, release or implantation of embryos. They can be non-hormonal (barrier – condoms and diaphragms, spermicidal agents, copper IUD) which prevent sperm reaching egg cells.



Mitosis produces identical daughter cells, meiosis produces non-identical gametes. In asexual reproduction, only one parent produces genetically identical offspring (clones) through mitosis.

In sexual reproduction, gametes (Sex cells – Sperm and eggs in animals, pollen and eggs in flowering plants) have half the amount of DNA made in **meiosis** because two gametes fuse during fertilisation to produce offspring with normal amount of DNA.



Biology Paper 2 On A Page

The genetic material in the nucleus of a cell is composed of a chemical called DNA. DNA is a polymer made up of two strands forming a double helix. The DNA is contained in structures called chromosomes. A gene is a small section of DNA on a chromosome. Each gene codes for a particular sequence. Humans have 23 pairs of chromosomes, with pair number 23 being the 'sex chromosomes'. XX determines female sex, XY determines male sex. You should be able to carry out a cross to determine the 50:50 ratio.

Dominant and Recessive
(T = Tall & t = short
Cross: Tt x Tt

	T	t
T	TT	Tt
t	Tt	tt

Genotypic ratio: 1 : 2 : 1 (TT=25% Tt=50% tt=25%)
Phenotypic ratio: 3 : 1 (Tall=75% Short=25%)

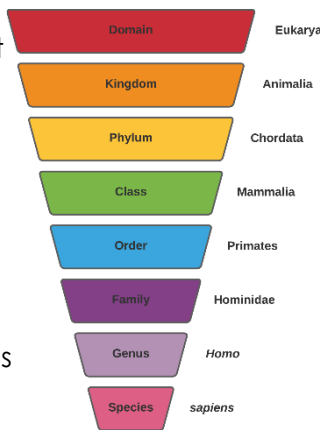
Characteristics (phenotypes) are controlled by genes (genotypes) and/or by the environment. Alleles are different versions of genes. You have two alleles for every gene (one from mother, one from father). A dominant allele is always expressed, even if you only have 1 copy. A recessive allele is only expressed when both copies are present. If you have two of the same allele it is known as homozygous, two different versions is called heterozygous. A Punnett square can be used to predict offspring. Some disorders (polydactyly and cystic fibrosis) are inherited conditions.

Differences in characteristics is called **variation**. There is usually extensive genetic variation within a species. Variants in genetics arise from mutations. Most mutations don't lead to a new phenotype. If a new phenotype is advantageous, it can lead to change in a species (**EVOLUTION**) through natural selection. Evidence for evolution includes fossils and antibiotic resistance in bacteria. Early life was soft-bodied so there is an incomplete fossil record, but later life has left behind footprints or preserved body parts. Extinction occurs when there are no remaining individuals of a species still alive, which can be caused by many factors but especially human activities.

Selective breeding is the process by which human breed plants or animals for a particular characteristic, choosing parents with a desired characteristic and then choosing their offspring with desired characteristics to continue breeding.

Genetic engineering is a process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic e.g bacteria that can produce human insulin

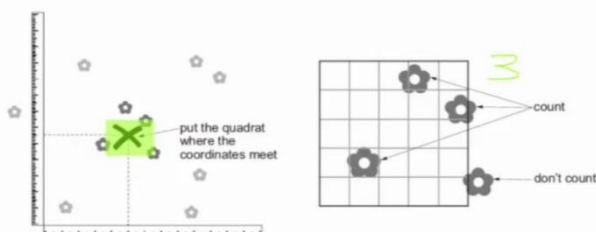
Organisms are classified into different systems, originally based on their characteristics but then later by their genetic analysis. The 5 kingdom system (Carl Linnaeus) was replaced by the 3 domains (Carl Woese). The sequence is domain, kingdom, phylum, class, order, family, genus and species. The binomial name (i.e. *Homo sapiens*) comes from the genus and species.



Ecosystems are made up of groups of organisms interacting with the environment around them. They are influenced by living factors (biotic – predators, pathogens, competition) and non-living factors (abiotic factors – light intensity, temperature, pH, wind intensity, etc.)

Organisms require a supply of materials from their surroundings and will often compete/interact with each other for resources (interdependence).

Organisms are adapted to survive in their environment. Some organisms (extremophiles) live in extreme environments e.g. the Arctic or desert. Plants are producers at the start of a food chain. They can then be eaten by primary consumers, which are then eaten by secondary consumers, etc. Organisms that eat other animals (carnivores) are predators, those that are eaten are prey. There are relationships between the number of predators and prey in an environment. which rise and fall in cycles.



Biology Paper 2 On A Page

Required Practical: You will have used **random** sampling techniques (quadrats and transects) to measure the population size of species in a habitat.

Materials are recycled in an ecosystem. The carbon cycle returns carbon from organisms to the atmosphere as carbon dioxide to be used by plants in photosynthesis. The water cycle (evaporation and precipitation) provides fresh water for plants and animals on land before draining into the seas. Microbes recycle minerals in soil. Growth in human population has led to more resource and land use but also more waste produced, leading to pollution. Humans take up land with activities which reduces natural habitats and biodiversity. Deforestation of trees has cleared space for farming. Humans have contributed to global warming.