

Triple Science Biology

B1, B2 and B3

Core Questions and Keywords and Definitions

B1 Core Questions

| Topic 1 – Classification, variation & inheritance | Answers |
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| Name the five classification kingdoms | Animalia, Plantae, Fungi, Protostista, Prokaryotes |
| What is the name for a group of organisms that share common features? | Species |
| Starting with Kingdoms and ending with species, what are the 7 orders of classification | Kingdom, Phylum, Class, Order, Family, Genus, Species |
| Which of the five kingdoms is single cells, with a nucleus? | Protocista |
| Which is single celled without a nucleus? | Prokaryotes |
| Which is multicellular, has cell walls and chlorophyll and can make its own food? | Plantae |
| Which is multicellular, has no cell walls, no chlorophyll and feeds on dead organic matter? | Fungi |
| Which is multicellular, has no cell wall or chlorophyll and feeds on other living things? | Animalia |
| Why are viruses not regarded as living things? | They cannot survive outside of a host organism |
| What feature do animals in the phylum chordate share? | A supporting rod running through them |
| Give an example of this | The backbone in vertebrates |
| What ways can vertebrates absorb oxygen into their bodies? | Lungs, gills or through the skin |
| What does 'oviparous' mean? | Egg laying |
| What does 'viviparous' mean? | Gives birth to live young |
| What can homothermous animals do that poikilothermous animals can't? | Control their own body temperature |
| Why do we have to look at many characteristics before putting vertebrates into a group? | Because some species have characteristics which none others in the group share |
| What is the definition of a species? | Organisms that reproduce to produce fertile offspring |
| Why is this definition limited? | Some organisms don't always reproduce sexually and some hybrids are fertile |
| What is binomial classification? | Using genus and species name to name an organism |
| Why is binomial classification used to target conservation efforts | Scientists can communicate clearly about different species, whatever their language |
| How can classification be complicated by Variation within a species | All members of a species look different to one another |
| How does hybridization in ducks complicate classification | Mallard ducks can produce fertile hybrids with closely related species |
| What is a ring species? | A chain of populations where neighboring species can interbreed but organisms at opposite ends of the chain cannot |
| How can a ring species complicate classification? | Because neighboring species can produce fertile offspring |
| What do scientists use to help them identify members of particular species? | A key |
| How are organisms in deep sea hydrothermal vents adapted to their environment? | They are able to cope with high temperatures and pressures |
| How are Greenland sharks and polar bears adapted to their environment | They are able to cope with extreme cold through methods of insulating themselves. They also hunt prey that gives them lots of energy |
| What is variation? | All individuals in a population differ slightly from one another |
| What is over production? | Organisms produce more young than will survive into adulthood |
| What is the 'struggle for existence'? | Individuals in a specie competing for survival |
| Why do only some individuals survive to adulthood? | They have characteristics favourable for survival |
| Why do individual survivors produce offspring that are more likely to survive? | Because they pass on their favourable characteristics to their offspring |
| Over time, what will happens to characteristics that are favourable to survival in a population compared to characteristics that do not favour survival? | Favourable characteristics become more common and less favourable characteristics become less common. |
| What is continuous variation | Values can be any number in a range e.g. height |

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| What is discontinuous variation? | Variation has a fixed set of values e.g. eye colour |
| What does a normal distribution curve show? | That most results are in the middle part of the range in variation |
| What causes genetic variation? | Sexual reproduction and mutation of DNA |
| What causes environmental variation? | Characteristics acquired from an organisms environment |
| What is speciation? | The formation of new species |
| How can geographic isolation cause speciation? | Different environmental pressures at different locations mean that organisms adapt in different ways. |
| How do resistant organisms provide new evidence for Darwin's theory of natural selection? | They show how natural selection can happen in short periods of time |
| How does DNA research provide evidence for Darwin's theory of natural selection? | It confirms what Darwin predicted about the relatedness of organisms |
| What three ways can scientists share their ideas and findings? | Journals, peer review and conferences |
| What is contained in the nucleus of a cell? | DNA |
| What is DNA divided into? | Chromosomes |
| What is the name for a part of a chromosome that contains information for a particular characteristic or set of characteristics? | A Gene |
| What is the name for the alternative versions of the same gene? | Alleles |
| What is a dominant allele? | An allele that will be expressed if it is present in an organism (B) |
| What is a recessive allele? | An allele that must be present twice to be expressed in an organism (bb) |
| What does homozygous mean | An organism that has two copies of the same allele |
| What does heterozygous mean? | An organism that has two different alleles for a gene |
| What is a genotype? | The two alleles an organism has for a particular gene |
| What is a phenotype? | What an organism looks like as a result of having those genes |
| What are the symptoms of sickle cell disease? | Tiredness, shortness of breath and painful joints |
| What are the symptoms of cystic fibrosis? | Lungs clogged with mucus leads to difficulty breathing and risk of infection. Some enzymes blocked from reaching the small intestine causes poor digestion |
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| Topic 2 – Responses to a changing environment | |
| What is homeostasis? | The maintenance of a stable internal environment |
| What is the name for the regulation of temperature? | Thermoregulation |
| Why is this important? | Because enzymes have an optimum temperature |
| What is the name for the regulation of water concentration? | Osmoregulation |
| What parts of the dermis of the skin are involved in thermoregulation? | Sweat glands, blood vessels, nerve endings, hair, erector muscles and sebaceous glands |
| What part of the brain controls temperature regulation | The hypothalamus |
| What happens in vasoconstriction? | Blood vessels narrow near the skin resulting in less heat loss to the air |
| What happens in vasodilation? | Blood vessels widen near the skin resulting in more heat loss to the air |
| What is negative feedback? | When a change in the body happens in one direction, the body reacts in the opposite direction to maintain stability |
| Where are hormones produced? | Endocrine glands |
| How are hormones transported? | In the blood |
| How does insulin regulate blood glucose levels? | Causing excessive blood glucose to be converted to glycogen and stored in the liver |
| How does glucagon regulate blood glucose? | It causes glucagon in the liver to be converted into glucose |
| What causes type 1 diabetes? | Lack of insulin |
| How can type 1 diabetes be managed? | Control of diet and injection of insulin into subcutaneous fat |
| How does the level of physical activity and diet affect the level of insulin required? | More exercise and less sugar in diet both reduce blood glucose so less insulin (and vice versa) |
| What is type 2 diabetes? | A person becoming resistant to insulin |
| How can type 2 diabetics control their blood glucose using diet and physical activity | More exercise and less sugar in diet both reduce blood glucose |

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| Which type of diabetes is linked to obesity? | Type 2 |
| What is phototropism and what causes it | Plants respond to light using hormones |
| What is gravitropism and where does it happen | A plant responds to gravity in roots |
| How do auxins cause shoots to curve towards the sun? | Auxin moves to shaded side and causes elongation of cells in the shoot, this only happens on one side of the shoot causing shoot to curve |
| Name another plant hormone used in germination | Gibberellin |
| Name four uses of plant hormones | Selective weed killers Rooting powder Seedless fruit Fruit ripening |
| What does the Central Nervous System (CNS) consist of and how is it linked to the sense organs? | Brain Spinal cord Linked by nerves |
| What do dendrons and axons do? | Dendrons are found on neurones receive chemical signals from other neurones. An axon is the long section of neurone that transmits the electrical signal away from the cell body. It is insulated by a myelin sheath. |
| What triggers an electrical signal in a sensory neurone | A stimulation of a sense receptor |
| What are the steps in the reflex arc? | Stimulus> Receptor>Sensory neurone> relay neurone>motor neurone> effector > response |
| What do neurotransmitters do and where are they found? | Neurotransmitters are chemicals found at the synapse and they carry the impulse from one neurone to the next. |
| Topic 3 – problems of and solutions to and changing environment | |
| What is a 'drug'? | A chemical substance that affects the central nervous system causing changes in psychological behaviour and possible addiction |
| What do painkillers do? Name an example | Block nerve impulses Eg morphine |
| What do Hallucinogens do? Name an example | Distort sense perceptions e.g. LSD |
| What do Stimulants do? Name an example | Increase the speed of reactions and neurotransmission at the synapse e.g. caffeine |
| What do depressants do? Name an example | Slow down the activity of the brain e.g alcohol |
| Name two ways in which reaction times can be measured | Ruler drop test Computer programme where speed of on-screen events are timed using mouse clicks |
| Name three chemicals in cigarettes and their effects on the body | Nicotine- addictive, raises blood pressure Tar- a carcinogen (causes cancer) Carbon monoxide reduces the blood's ability to carry oxygen |
| Name three short term effects of alcohol abuse | Blurred vision Lowering of inhibitions Slowing of reactions |
| Name three long term effects of alcohol abuse | Liver cirrhosis Brain damage Liver cancer Fatty liver |
| Name three ethical issues surrounding organ transplants | - Liver transplants for alcoholics - Heart transplants for the clinically obese - The supply of organs |
| What are pathogens? | Microbes that cause infectious disease |
| Name six ways pathogens are spread with an example of each one | In water- cholera By food- Salmonella Airborne – flu Direct contact- athletes foot Body fluids- HIV Animal vectors –dysentery (housefly) |
| Name two physical barriers against pathogens | Skin, cilia, mucus |
| Name two of our body's chemical defences | Hydrochloric acid in stomach and lysozymes in tears |
| What is an antiseptic used for? | Killing microbes on surfaces or on the outside of the body |
| What do antibiotics treat and where do they originate? | Bacterial infections are treated with antibiotics. The first antibiotics to be discovered were in fungi |

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| What causes 'superbugs' like MRSA to arise? | Misuse of antibiotics- often by not taking the full course and 'selecting' for the most antibiotic resistant strains. |
| What does the term 'interdependence' mean? | 'The dynamic relationship between living things' or in other words how all animals and plants rely on each other (e.g. in a food web) |
| Why are food chains not usually longer than five steps? | Energy is lost at each stage (trophic level) in a food chain as it is transferred into less useful forms. This means that the length of an individual food chain is limited. |
| What does a pyramid of biomass show? | The amount of energy at each trophic level |
| What is a parasite? Give four examples | An organism whose survival depends on the presence of another species from which it takes food and other resources Fleas, head lice, tape worms, mistletoe |
| What does the term 'mutualism' mean? Give four examples. | Organisms that exist in a close, mutually beneficial relationship where both aid the survival of the other. Oxpeckers that clean other species Cleaner fish Nitrogen fixing bacteria Chemosynthetic bacteria in tube worms in deep sea vents |
| Increases in human populations lead to increases in pollution. Name three pollutants and explain why this is. | Carbon dioxide, Phosphates, nitrates and sulphur dioxide. Increased burning of fossil fuels and overuse of pesticides and fertilisers. |
| What triggers eutrophication and what problems does it cause in an aquatic environment? | Triggered by excess fertiliser/nitrates/waste being washed into bodies of water. Increased algal growth, leading to death of plant life. Increased biological oxygen demand in water from decomposer bacteria. This leads to scarcity of oxygen for fish and other aquatic life. |
| What is an indicator species? | A species whose health or presence indicates to an observer the health of the environment it lives in |
| Name three indicator species and the condition of the environment it is in? | Polluted water indicator- bloodworm, sludge worm Clean water indicator- stonefly, freshwater shrimps Air quality indicator- lichen species, black spot fungus on roses |
| List three commonly recycled materials and explain what problems recycling help solve? | Paper, plastics and metal Reduces demand for resources Problem of waste disposal |
| What is the equation for photosynthesis? | Carbon dioxide + Water → Glucose and Oxygen Light is used to do this |
| What is the word equation for respiration? | Glucose and Oxygen → Carbon dioxide + Water + (Energy) |
| Which common greenhouse gas is released in combustion that is also released in respiration? | Carbon dioxide |
| Which gas comprises nearly 80% of our atmosphere but cannot be used directly by plants and animals? | Nitrogen |
| Where do nitrogen fixing bacteria live and what do they do? | They live in the soil or root nodules and they can 'fix' nitrogen gas from the air |
| Which weather phenomenon can also convert nitrogen gas into nitrates? | Lightning |
| What is the role of decomposers? Give two examples. | Break down dead animals and plants Fungi, worms |
| What can nitrifying bacteria in the soil do? | Convert ammonia into nitrates |
| Why do plants need nitrates? | To make proteins for growth |
| What is the role of denitrifying bacteria? | Convert nitrates to nitrogen gas and return it to the atmosphere. |

B1 Keywords and Definitions

| Keywords | Definitions |
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| Adapted | Changed to suit the surroundings. |
| Amphibian | Animals with gills and lungs (in adults). |
| Autotrophically | Living things which make their own food (from the Sun). |
| Bacteria | Microbes with no nucleus (prokaryotae). |
| Binomial system | The system of two latin words for genus and species of an animal being used to name it. |
| Biodiversity | The total number of different species in an area. |
| Birds | Animals that often fly, lay hard eggs, have lungs and fertilise internally. Usually homeotherms (warm blooded). |
| Characteristics | What things look like. |
| Chordata | The phylum all vertebrates belong too as they have a supporting rod or bone in their back. |
| Classification | The process used to sort things into groups. |
| Continuous variation | Variation that can be any number on a scale. |
| Discontinuous variation | Variation that can only be certain values. |
| External fertilisation | Fertilisation that happens outside of the body (usually in water). |
| Family | The group for many different genera (plural of genus) that have similar characteristics. |
| Fertile | Able to have offspring/children. |
| Fish | Animals with gills that extract oxygen from water. |
| Genus | The group for different species that have many similar characteristics. |
| Habitat | The place where something lives. |
| Heterotrophically | The process of eating and digesting (inside the body) other organisms for energy. |
| Homeotherms | Keep their body at a constant temperature (warm blooded). |
| Hybrids | The result of different species being bred together. |
| Hydrothermal vents | Hot water vents found deep in the ocean. |
| Interbreed | The name given to the ability that species have to have young when they reproduce together. |
| Internal fertilisation | Fertilisation that happens in the body. |
| Invertebrates | Animals without backbones. |
| Key | A system for identifying a living thing using a series of questions. |
| Kingdom | Life is often divided into these 5 groups that consist of families with similarities. |
| Mammals | Animals that have lungs, are homeotherms (warm blooded) and fertilise internally. |
| Multicellular | Organisms that have many cells. |
| Nucleus | The part of a cell that controls the functions of the cell. |
| Oviparous | Something that lays eggs. |
| Photosynthesis | The process of making food using sunlight. |
| Poikilotherms | Body temperature changes with the surroundings (cold blooded). |
| Reptiles | Animals that have lungs, are poikilotherms (cold blooded) and lay leathery eggs. |
| Ring species | The shape of the breeding patterns when species breed with neighbouring populations but not those further away. |
| Saprophytically | The process of digesting foods outside of the body (usually found on dead/decomposing things). |
| Species | Organisms that have many things in common (can have fertilise offspring together). |
| Unicellular | Organisms that have one cell. |
| Variation | Differences in characteristics. |
| Vertebrae | The bones that back up the backbone. |
| Vertebrates | Animals with backbones. |
| Viruses | Microbes which scientists don't usually consider to be alive. |

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| Viviparous | Something that gives birth to live young. |
| 'Survival of the fittest' | Where the best adapted manages to survive. |
| Acquired characteristic | A characteristics that has an environmental cause and isn't due to genetics. |
| Alleles | A particular type of gene that causes a particular characteristic. |
| Cell membrane | The cell "covering" that holds everything inside and allows some particles to enter but not others. |
| Chromosome | The structure formed by a strand of DNA. |
| Competition | Trying to get food, water, space, mates etc. when there are lots of other individuals and not so many to be had. |
| Cystic fibrosis (CF) | A genetic disease affecting cells and resulting in mucus on the lungs and digestive issues. |
| Cytoplasm | The "gel" in a cell where everything is stored and reactions take place. |
| DNA | Long strands containing the genetic code. |
| Dominant | The more "powerful" allele that overrules the other in a heterozygous pair. |
| Egg cells | The female sex cell. |
| Environmental variation | Differences caused by the effects of the environment and not by genes. |
| Evolution | Gradual change over time. |
| Extinct | When all individuals in a species have died out. |
| Family pedigree chart | A chart showing the genes within a family tree. |
| Gametes | Sex cells. |
| Genes | A section of a chromosome (or stretch of DNA) that controls a particular characteristic. |
| Genetic cross diagram | A diagram used to show breeding patterns. |
| Genetic disorder | A disorder/illness caused by a genetic problem. |
| Genetic Variation | Differences in genetics between individuals. |
| Genotype | The type of genes something has. |
| Heterozygous | Two different alleles. |
| Homozygous | Two alleles the same. |
| Inherited Variation | Variation caused by genetics. |
| Natural selection | Another name for survival of the fittest. |
| Normal distribution curve | The graph shape found when studying how things vary - a "n" shape. |
| Nucleus | The control centre of the cell. |
| Pedigree analysis | The name given to analysing the genes passed on from parents. |
| Phenotype | The characteristics something has, caused by the genes. |
| Probability | The chance of something happening. |
| Punnett square | A grid used to work out genetic possibilities in offspring. |
| Recessive | The less "powerful" allele whose characteristics are dominated other by the other in a heterozygous pair. |
| Resistant | Unaffected by something. |
| Sickle cell disease | A genetic disorder affecting red blood cells. |
| Speciation | Where new species form from one original species. |
| Sperm cells | The male sex cell. |
| Auxins | A plant hormone that causes the plant shoot to elongate in light or not to elongate in response to gravity. |
| Axon | The part of a neurone which carries the signal away from the body of the neurone. |
| Blood glucose regulation | The control of glucose levels in the blood by the body. |
| Body mass index (BMI) | An estimate of how health a person's mass is for their height. |
| Central nervous system (CNS) | The brain and the spinal cord together are called this. |
| Concentration | How much of a solute is dissolved in a solvent (how much is dissolved). |

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| Cuttings | A part of a plant cut off to grow into a new clone of the original plant. |
| Dendrites | The branches off the dendron. |
| Dendron | The part of a neurone which carries the signal towards the body of the neurone (often has many branches). |
| Dermis | The layer of skin below the outer layer where blood vessels and nerve endings are found. |
| Diabetes | A disease where people's bodies cannot control glucose levels very well. |
| Effectors | Things that carry out actions (like muscles). |
| Endocrine glands | Glands that release hormones. |
| Erector muscles | The muscles which make hairs stand up on the body. |
| Geotropism | Growing towards gravity but not positive gravitropism which means the same thing. |
| Germinates | When a seed begins to grow into a young plant. |
| Gibberellins | The plant hormone which turns starch into sugars and stimulates flower and fruit production in some plants. |
| Glands | A part of the body that makes and releases substances. |
| Glucagon | A hormone that tells the body to convert glycogen into glucose. |
| Glucose | Digested simple sugar. |
| Glycogen | A store of glucose. |
| Homeostasis | Keeping internal body conditions constant. |
| Hormones | Chemical messengers that travel in the bloodstream (or around a plant). |
| Hypothalamus | The part of the brain that monitors temperature. |
| Impulses | Electrical signals in the nervous system. |
| Insulin | The hormone that triggers the body to turn glucose into glycogen for storage. |
| Internal environment | Conditions inside the body. |
| Kidneys | An organ that removes urea and excess water from your blood to produce urine. |
| Motor neurones | Neurones that take impulses to the effectors. |
| Myelin sheath | A fatty layer around the axon that acts as an insulator. |
| Negative feedback | This means that when something happens it triggers an effect which reduces it happening. |
| Negative tropism | Growing away from a stimulus light or gravity. |
| Nerves | Bundles of neurones together. |
| Neurones (nerve cells) | Cells that electrical impulses (signals) travel along. |
| Neurotransmission | The transmission (sending) of electrical impulses (signals). |
| Neurotransmitters | Chemicals that can cross the gap (synapse) between neurones. |
| Osmoregulation | The control of water by the body. |
| Pancreas | The organ that releases insulin. |
| Photosynthesis | The process by which plants use sunlight to make their food. |
| Phototropism | Growing towards or away from light. |
| Plant growth substance | Another name for plant hormone. |
| Positive gravitropism | Growing towards gravity but not geotropism which means the same thing. |
| Receptor cells | The part of a sense organ that detect a stimulus. |
| Reflex arcs | A pathway through the nerves that directly connect sensory neurones to motor neurones. |
| Reflexes | Automatic and extremely quick reactions that often protect the body. |
| Relay neurones | Neurones that link the motor and sensory neurones in the spinal cord (and also make up the brain). |
| Response | An action resulting from a stimulus. |
| Rooting powders | Powder which helps cuttings develop new roots using auxins. |
| Sebaceous glands | Glands that release oils at the base of hairs to help keep the skin lubricated. |
| Selective weedkiller | A weedkiller that only kills plants with broad leaves (using auxins). |
| Sense organs | Organs that detect change inside and outside of the body. |
| Sensory neurones | Neurones that receive signals from receptor cells. |
| Spinal cord | The organ that connects to the brain, consisting of many nerves. |

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| Stimulus | Something that a sense organ is sensitive to. |
| Subcutaneous fat | The fat layer found beneath the skin. |
| Sweat glands | Glands that release sweat. |
| Synapse | The gap between connected neurones. |
| Thermoregulation | The control of temperature of the body. |
| Tropism | Growing towards or away from a stimulus. |
| Type 1 diabetes | The type of diabetes where the pancreas does not produce enough insulin. |
| Type 2 diabetes | The type of diabetes where a person's body responds less well to insulin. |
| Urine | A fluid produced by the kidneys containing urea and other things dissolved in water. |
| Vasoconstriction | The narrowing of blood vessels. |
| Vasodilation | The opening up of blood vessels. |
| Addictive | Something which the body can become dependent on and not function properly without it. |
| Carbon monoxide | A poisonous gas caused by incomplete combustion (burning without enough oxygen). |
| Carcinogens | A substance which is linked to causing cancer. |
| Cirrhosis | Disease of the liver. |
| Clinically obese | Very overweight. |
| Criteria | A list of things that must be met. |
| Depressants | A drug which slows down the activity of neurones in the brain and can lead to relaxation. |
| Donor | Someone who gives something, such as an organ. |
| Drug | A chemical substance which changes the way the body works. |
| Ethical decision | A decision based on what is right or wrong. |
| Hallucinogens | Drugs that change the way the brain works to distort how we perceive things around us. |
| Illegal | Not allowed by law. |
| Inhibitions | The feeling that you should or shouldn't do something. |
| Legal | Allowed by law. |
| Narcotic | A drug that makes us feel sleepy. |
| Nicotine | A drug found in tobacco that causes people to become addicted to smoking. |
| Painkillers | A drug which blocks some nerve signals so that we don't feel stimuli as much. |
| Reaction times | How quickly the body responds to external stimuli. |
| Stimulants | A drug which speeds up neurotransmission (nerve signals). |
| Tar | A sticky substance found in tobacco and also used on roads and roofs as waterproofing and bonding. |
| Transplant | Taking an organ from one person and placing it another. |
| Antibacterial | Substances plants used to protect themselves from microbes (bacteria). |
| Antibiotics | Chemical substances that kill bacteria and some fungi but not human cells. |
| Antifungals | Chemical substances that only kill fungi. |
| Antiseptics | Chemical substances that can kill microbes. |
| Bacteria | A microbe with no nucleus that can cause illness. |
| Biomass | The mass of substances that form tissue. |
| Blackspot fungus | A fungus which grows on roses where the air is free of sulphur dioxide. |
| Bloodworms | A worm that indicates very polluted water. |
| Carbon cycle | The movement of carbon through living things, remains, the ground and atmosphere etc. |
| Chemical defences | A way of stopping microbes entering the body using substances like tears. |
| Chemosynthetic bacteria | Bacteria that get their energy from chemical substances, rather than light. |
| Cleaner fish | Fish which eat dead skin off other fish or animals. |
| Combustion | The reaction between oxygen in the air and other substances, such as fossil fuels. |
| Decay | The breakdown of something, like a dead body or plant. |
| Decomposer | Something which breaks down dead living things. |
| Denitrifying bacteria | Bacteria which convert nitrates to nitrites back to nitrogen gas. |
| Eutrophication | The process that leads to plant overgrowth, decay and fish death in water courses. |

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| Faeces | Waste from the body. |
| Feeding relationships | The way in which living things are connected by what they eat or what eats them. |
| Fertiliser | Something containing nitrates and phosphates which is added to soil to help things grow. |
| Food chains | A diagram that shows what eats what. |
| Food web | A diagram showing how organisms are connected by feeding in an ecosystem. |
| Fossil fuels | Fuels made from the remains of living things from millions of years ago. |
| Freshwater Shrimps | An aquatic species that indicates clean water. |
| Fungi | Organisms that feed on decaying material. |
| Host | Something which has a parasite living off it. |
| Indicator species | Species which show how polluted or clean an area is. |
| Infectious diseases | A disease which can be passed from person to person. |
| Interdependent | When things depend on each other. |
| Legumes | Plants that produce pods. |
| Lichens | Fungus and alga that live on rocks and can be an indicator species. |
| MRSA | A bacterium often resistant to many antibiotics, a "superbug". |
| Mutualism | A feeding relationship which has benefits for both living things. |
| Nitrifying bacteria | Bacteria which convert ammonia to nitrates. |
| Nitrogen-fixing bacteria | Bacteria which produce nitrogen compounds in the soil. |
| Nitrogen-fixing bacteria | Bacteria which fix nitrogen gas into ammonia in the soil. |
| Parasite | Something which feeds off another living thing. |
| Parasitism | The process of feeding on another living thing. |
| Pathogens | Microbes that cause infectious disease. |
| Physical barriers | Something that stops microbes physically entering the body. |
| Pollutants | Something which is harmful to the environment and present in levels higher than normal. |
| Population growth | The increase in population. |
| Predator | Something which kills and eats its prey. |
| Prey | Something which is killed for food by a predator. |
| Primary consumers | Something which eats plants for food. |
| Producers | Something which produces its own food, usually from sunlight. |
| Protoctists | Single celled organisms with nucleuses. |
| Protozoan | A one celled organism that cannot produce its own food. |
| Pyramid of biomass | A diagram showing the biomass at each level of a foodchain. |
| Recycling | Reusing materials. |
| Resistant | Able to withstand something. |
| Respiration | The release of energy by a reaction between oxygen and glucose. |
| Root nodules | Structures on a root where bacteria can live. |
| Secondary consumers | Something which eats other living things for food. |
| Sludgeworms | A type of worm that lives in sludge in polluted water. |
| Stonefly larvae | An insect that only lives in very clean water. |
| Trophic level | A level in a food chain. |
| Urea | A nitrogen rich substance found in urine. |
| Viruses | A microbe that is not thought to be living and is very small (it exists inside cells). |

B2 Core Questions

Topic 1a – The Building Blocks of Cells

| Question | Answer |
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| In a plant cell, what is the role of a) chloroplast b) large vacuole c) cell wall d) mitochondria e) cytoplasm f) nucleus | a) Contains chlorophyll; where photosynthesis occurs b) Stores water and nutrients for plant c) Provides structural support for plant, made of cellulose d) Site of respiration e) Where all cell organelles are found f) Stores genetic information |
| In an animal cell, what is the role of: a) cell membrane b) cytoplasm | a) Controls what goes in and out of the cell b) Where all cell organelles are found |
| Which cell component supplies energy? | Mitochondria |
| State the function of DNA in cells. | It gives instructions to make proteins. |
| How does a light microscope enable us to better see cells? | Allows us to see more detail, such as bacterial cells have cell walls that are not made of cellulose and do not have nucleuses but have chromosomal DNA and a plasmid loop. |
| How have microscopes changed? | As they have improved from light to electron microscopes we have been able to see more detail and clearer images of cells |
| In a bacterial cell, what is the role of a) chromosomal DNA b) plasmid DNA c) flagella d) cell wall | a) Is the bacteria's DNA- it contains genetic information b) Contains additional genetic information c) Allows the bacteria cell to move d) Provide structure and support |
| Name the two types of DNA found in a bacterial cell. | 1. chromosomal (DNA) 2. plasmid(s) (DNA) |
| If an object was viewed using an objective lens of X and another lens of Y- how much has the object been magnified? | I would use the calculation Length of object = length of magnified object/ the magnification E.g. For an object which was measure to be 1mm in length under a microscope with a magnification of 10x you would do this: Length of object = 1/10 Length of object = 0.1mm |
| What does the section of DNA called a gene codes for? | A single protein. |
| Describe how the two strands of a DNA molecule are linked together. | Weak hydrogen bonds between complementary base pairs. |
| What is a gene? What does it do? | It is a section of a molecule of DNA. It codes for a specific protein |
| What is the complimentary base for Adenine? | Thymine |
| What is the complimentary base for Cytosine? | Guanine |
| Who discovered the structure of DNA? | Watson, Crick, Franklin, Wilkins |
| Explain how the Human Genome Project has contributed to advances in medicine. | <ul style="list-style-type: none"> • genes / base sequence on human chromosome were identified which has allowed scientists to: • identify of faulty / mutated genes • test people for a genetic disorders • develop gene therapy • appropriate /early /personalised / genomic medication / counseling. |
| Who collaborated on this project? | It was an international effort involving 18 countries |
| Suggest how maize is genetically modified. | A new gene / DNA is located and inserted into the plant DNA by genetic engineering. |
| What are the advantages and disadvantages of golden rice production | Advantages: Prevent people from suffering from a lack of vitamin A and so can prevent death from a poor immune system and prevent blindness Disadvantages: May cross-breed with wild rice plants and contaminate the wild rice DNA Worries that eating GM organisms may harm people (no evidence of this) |

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| | Expensive to buy Do not produce fertile seed so new plants need to be brought by farmers every year |
| What are the advantages and disadvantages of the production of human insulin by bacteria | Advantages: Can now be used by vegans as it is not extracted from dead cattle anymore Not affected by disease in cattle Can be made in large quantities Made more cheaply Disadvantages: The insulin produced by the bacteria is slightly different and may not suit everyone |
| Explain how a human insulin gene and a plasmid are used to genetically modify a bacterium. | Cutting enzymes are used to remove the human insulin gene from the human chromosome and to cut open the plasmid. Sticking enzymes are used to insert the human gene into the plasmid. Then the plasmid containing human insulin gene inserted into a bacterium. |
| Explain how growing herbicide-resistant plants may damage the environment. | It may encourage the overuse of herbicide which may affect / contaminate food chains / webs and affect or kill larger organisms. OR cross fertilisation with weeds may lead to weeds become herbicide resistant. |
| What is mitosis? | The production of two genetically identical daughter cells that are diploid |
| What is the purpose of mitosis in human cells? | To produce diploid body cells during growth or to replace damaged cells. |
| What is meiosis? | Cell division to form four cells with half the number of chromosomes (haploid). These cells are not genetically identical |
| Where and when does meiosis occur? | In sex organs (ovaries and testes) to produce gametes (eggs and sperm) |

Topic 1b – Using Genetics

| Question | Answer |
|---|--|
| What is cloning | Asexual reproduction that produces genetically identical cells |
| What are the stages in cloning a mammal? | Remove diploid nucleus from body cell. Take nucleus from egg cell, insert diploid nucleus into empty egg. Stimulate the new cell to divide by mitosis. Implant developing embryo into surrogate mammal. |
| What are the advantages of cloning mammals? | Able to make new organisms genetically identical to an adult organism that has desirable characteristics. |
| What are the disadvantages of cloning mammals? | Cloned animals seem to age more quickly and die young. If a clone is susceptible to disease or changes in environment, then all the clones will be susceptible. It will lead to less variation, and less opportunity to create new varieties in the future. |
| What are stem cells? | Cells that are able to differentiate into any type of cell. They have no hayflick limit and can therefore divide a limitless amount of times. |
| What is special about embryonic stem cells? | They can differentiate into any type of cell. |
| Why do we study embryonic stem cells | Adult organisms have very few stem cells as cells lose their ability to be stem cells as they age. |
| What are the advantages and disadvantages of using embryonic stem cells in scientific research? | A: They can differentiate into any type of cell and so they can be used to grow or repair tissues, organs or limbs, which can be used for transplants. D: Embryos are destroyed and some people feel that embryo has a right to life and that they can become cancerous |
| Name the first stage of protein synthesis. | Transcription. |
| Describe how proteins are made in the body | A complimentary strand mRNA is formed in the nucleus. The mRNA attaches to the ribosome. The code is read in triplets (codons), coding for specific amino acids. tRNA transfers amino acids into the right order in the ribosome. Amino acids form peptide bonds and link to form a chain. |
| Name the structure where translation occurs. | Ribosome(s) / polysome(s) |
| What is produced during the second stage of | A polypeptide made of amino acids. |

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| protein synthesis? | |
| How are proteins different from each other? | They each have their own specific number and sequence of amino acids; this results in different shaped molecules that have different functions. Enzymes are proteins |
| What is a mutation? | A change in the sequence of a DNA strand, meaning that different proteins are made at protein synthesis |
| What result will a gene mutation have on an organism? | It may be harmful, beneficial or have no effect at all |
| Explain how a gene mutation can affect the structure of a protein. | Protein may have: <ul style="list-style-type: none"> • different amino acids • different order of amino acids • a different shape/structure • a different function/not function correctly |
| What type of chemical are enzymes? | Proteins. |
| What is an enzyme? | A biological catalyst that speeds up a chemical reaction. |
| List three reactions that enzymes catalyse | DNA replication, protein synthesis and digestion. |
| State two factors, other than temperature, that affect enzyme activity. | Substrate concentration and pH. |
| What is the lock and key model? | Enzymes have an active site, which only a substrate molecule can fit in to. Enzymes are specific as they will only work with certain substrates |
| What is denaturing and how does it work? | Denaturing is the process of damaging an enzyme so the active site is different / blocked / changed and the substrate cannot bind with the enzyme. This is often done at high temperatures. |

Topic 2a – Organisms and Respiration

| Question | Answer |
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| What is respiration? | A chemical reaction that releases energy from food (organic matter) |
| What is the word equation for respiration? | Glucose + Oxygen → Carbon dioxide + water +(energy) |
| What is diffusion? | The random net movement of particles from an area of high concentration to areas of low concentration. |
| Which type of respiration releases most energy? | Aerobic. Anaerobic respiration does not release as much energy from glucose. |
| How does the human circulatory system help respiration work? | It removes carbon dioxide by diffusion into the lungs. It brings oxygen and glucose from blood capillaries into respiring cells. |
| Why do heart and breathing rate increase with exercise? | Higher oxygen demand by the cells, because of an increased rate of respiration, the heart rate and breathing rate is increased to supply enough oxygen |
| Why do heart and breathing rate remain high after exercise? | To circulate enough oxygen to break down lactic acid built up in muscles. |
| How do you calculate cardiac output? | Cardiac output=stroke volume x heart rate |
| Why do cells respire anaerobically during lots of exercise? | Not enough oxygen available to cells that respire very quickly |
| What is the word equation for anaerobic respiration? | Glucose → lactic acid |
| What is EPOC? | Excessive post-exercise oxygen consumption. |
| Why does EPOC occur? | Oxygen is needed after exercise to break down lactic acid into carbon dioxide and water. Lactic acid damages cells. |

Topic 2b – Photosynthesis

| Question | Answer |
|--|---|
| What is the word equation for photosynthesis? | Carbon dioxide + Water →Glucose + Oxygen (light on the arrow) |
| Describe the process that takes place in the leaf to produce oxygen. | <ul style="list-style-type: none"> • By photosynthesis (1) • in the chloroplast (chlorophyll) (1) • light, carbon dioxide and water are needed • to produce glucose |

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| How is the leaf adapted for photosynthesis? | Large surface area. Contains chlorophyll to absorb light. Have stomata for gas exchange. |
| Describe how carbon dioxide enters the leaf. | <ul style="list-style-type: none"> • by diffusion (1) • from an area of high concentration to an area of low concentration (down a concentration gradient) (1) • through the stomata (1) |
| What factors could limit the rate of photosynthesis in a plant cell? | <ul style="list-style-type: none"> • light intensity • CO₂ concentration • temperature |
| Explain how limiting factors affect the rate of photosynthesis. | The maximum rate of photosynthesis is controlled by the factor that is in the shortest supply. |
| What is the role of the xylem vessels? | To transport water |
| What is the role of the phloem vessels? | To transport sugars and other plant chemicals, including hormones |
| How are root hair cells adapted for taking up water? | Large surface area, thin cell walls, low water concentration in cells due to transpiration |
| What process do root hair cells use to absorb water? | osmosis |
| What is osmosis? | The movement of water molecules from an area of higher concentration to an area of low concentration through a partially permeable membrane |
| What drives transpiration? | Water loss from leaves due to evaporation |
| How are minerals taken up by the plant? | Active transport at the roots |
| Describe how a plant takes in water from the soil. | <ul style="list-style-type: none"> • Into the root hairs (1) • Through a partially permeable membrane • by osmosis • down a concentration gradient |
| How are root hairs adapted to take up water? | Long thin extensions reach into the soil – this gives a large surface area for substances to enter the root. |
| What does the term biodiversity mean? | The variety of all living things. |
| What does the term distribution mean? | Where a particular organism is found. |
| What does the term population mean? | How many of a particular organism is found in an ecosystem or habitat. |
| List four techniques for sampling a population. | Pooters; sweep nets; pitfall traps; quadrats. |
| What environmental factors affect the distribution and population size of living things? | Temperature; light intensity; pH. |

Topic 3a – Growth and the Circulatory System

| Question | Answer |
|--|--|
| What evidence do we use to back up the theory of evolution? | The fossil record |
| Fossils can provide evidence for evolution. Explain why the fossil record is incomplete. | <ul style="list-style-type: none"> • soft tissue of organisms does not form fossils (1) • some fossils are yet to be found (1) • fossils may be damaged (1) • conditions not correct for fossil formation (1) • fossils may only be fragments / not whole organisms (1) |
| What is growth? | An increase in size, length or mass |
| Plant growth occurs when cells do three things...what are they? | Plant cells divide, elongate and then differentiate. |
| What are meristems in plants? | Special areas just behind the tip of roots and shoots where the cells keep dividing. |
| How does growth in animals differ from growth in plants? | Animals stop growing when they become adults. |
| What do red blood cells do? | Transport oxygen |
| How are red blood cells adapted? | <ul style="list-style-type: none"> • biconcave disc shape gives it a large surface area to volume ratio for oxygen to diffuse into and out of the cell • has no nucleus – this makes as much room for haemoglobin and oxygen as possible |
| What does the haemoglobin in red blood cells do? | <ul style="list-style-type: none"> • combines reversibly with oxygen • combines with oxygen in the lungs to become oxyhaemoglobin • releases oxygen to the tissue cells for aerobic respiration |
| What do white blood cells do? | <ul style="list-style-type: none"> • fight infection by microorganisms and other foreign cells • some make antibodies which bind to microorganisms • some surround the foreign cells |
| What does plasma do? | Liquid part of blood that transports glucose, hormones, waste and dissolved CO ₂ around the body (amongst other things) |
| What do platelets do? | <ul style="list-style-type: none"> • Cause blood to clot • scab is formed over the wound • this prevents blood loss and stops microorganisms getting into the body |
| Put these words in order of smallest to largest- Organ, organism, organ system, cell, tissue | Cell-tissue-organ-organ system- organism |
| List the four main blood vessels associated with the heart | Pulmonary artery, pulmonary vein, aorta and vena cava |
| What do the left atrium and ventricle do? | Pump oxygenated blood around the body |
| What do the right atrium and ventricle do? | Pump deoxygenated blood to the lungs |
| What do the valves do? | Prevent backflow |
| Which ventricle has the thicker muscle | Left |
| What is the role of the arteries? | Transport blood from the heart to organs that need it |
| What is the role of the veins? | Transport blood to the heart |
| What is the role of the capillaries? | Exchange materials with tissues |
| Suggest why the heart can be referred to as a 'double-pump'. | <ul style="list-style-type: none"> • the heart has two sides/left and right side (1) • destination of blood from one side e.g. left side pumps to body (1) • type of blood from one side e.g. right side pumps deoxygenated blood(1) |
| Describe how the circulatory system transports substances around the body. | <ul style="list-style-type: none"> • arteries / aorta transport blood away from heart (1) • veins / vena cava transport blood to the heart (1) • capillaries exchange / pass materials / named substance with tissues / cells (1) • substances carried in plasma / oxygen carried in red blood cells (1) • credit correct description of passage of blood through heart (1) |

Topic 3b – The Digestive System

| Question | Answer |
|---|--|
| What is the alimentary canal? | A muscular tube running from the mouth to the anus. |
| List the parts of the alimentary canal. | <ul style="list-style-type: none"> • Mouth • Oesophagus • Stomach • Small intestine • Large intestine • Anus |
| By what process is food moved through the digestive system? | peristalsis |
| Where is digested food absorbed into the blood vessels? | Through villi in the small intestine. |
| How are villi adapted to absorb the products of digestion? | <ul style="list-style-type: none"> • Large surface area, • single layer of cells • good capillary network. |
| What are the functions of the liver? | To process food molecules To produce bile |
| State where bile is stored. | In the gall bladder |
| State two roles of bile in digestion. | <ul style="list-style-type: none"> • neutralisation (of stomach acid) / raise pH (1) • emulsification / break down of fats (1) |
| What does carbohydrase do? | Digests starch into simple sugars |
| What substrate does amylase work on? | Starch |
| What is the role of lipase? | Digests fats into fatty acids and glycerol |
| What molecules are proteins broken down to form? | amino acids |
| Where is the enzyme which digests starch into simple sugars in the small intestine is produced? | pancreas |
| Lipase and bile are involved in the digestion of fat. Give the names of the two products of fat digestion by lipase. | <ul style="list-style-type: none"> • fatty acid(s) (1) • glycerol (1) |
| Name three functional foods that some claim may benefit health if eaten as part of a healthy diet | Probiotics Prebiotic oligosaccharides Plant stanol esters |
| The active ingredients in prebiotics are | oligosaccharides |

B2 Keywords and Definitions

| Keyword | Definition |
|---------------------|---|
| Cell membrane | The semi-permeable "container" that holds a cells contents together and controls what enters and leaves a cell. |
| Cell wall | Made of cellulose this tough outer layer surrounds some cells and can control the shape of the cell. |
| Cells | The smallest unit of life, many of these make up an organism. |
| Cellulose | The compound which makes up the cell wall in plant cells. |
| Chlorophyll | The green substance in some plant cells that absorbs sunlight. |
| Chloroplasts | These contain chlorophyll to absorb sunlight for photosynthesis. |
| Chromosomal DNA | The double-helix shapes DNA structure found in many cells, including human cells. |
| Cytoplasm | The gel-like substance which holds all of a cells contents. |
| Direct proportion | Where two things both increase at the same ratio to each other. |
| DNA | A molecule containing the genetic code. |
| Electron microscope | A special type of telescope for looking at objects smaller than a light microscope can magnify sufficiently. |

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| Flagella | Long thread-like parts of some cells that help them move. |
| Light microscopes | A device which uses lenses to magnify small things. |
| Magnification | The act of making something appear bigger (using a lens). |
| Mitochondria | The place in a cell where respiration occurs. |
| Nucleus | The part of a cell which controls its activities. |
| Organelles | A part of a cell with a specific function. |
| Plasmid DNA | A ring of DNA capable of replicating itself. Found in bacteria commonly. |
| Vacuole | A space in a cell which may contain water or solution. Plant cells often have one large vacuole. |
| Adenine (A) | The base that pairs with thymine. |
| Adult stem cells | A stem cell that comes from an adult, as opposed to an embryo. |
| Alleles | A particular form of a gene. |
| Amino acids | The building blocks which form proteins and which proteins break down in to during digestion. |
| Asexual reproduction | Reproduction involving mitosis to form identical off-spring. |
| Base triplets | The method used to read the RNA code in sections of three. |
| Bases | The building blocks of DNA that can be adenine, thymine, cytosine and guanine. |
| Beta-carotene | The substance that makes carrots orange and is important for vitamin A. |
| Biodiversity | The range of different biological life. |
| Chromosomes | The structures made up of DNA. Found in cells nuclei in animals. |
| Clones | Identical genetic copies. |
| Codons | Segments of three of the genetic code. |
| Complementary base pairs | Adenine and thymine or cytosine and guanine - pairs of bases that bond together. |
| Cytosine (C) | The base that pairs with cytosine. |
| Daughter cells | The cells that form after the first stage of mitosis or meiosis. |
| Differentiated | A cell which has become more specialised. |
| Double helix | The shape of the DNA molecule. |
| Embryo | The ball of many cells in the initial stages of pregnancy. |
| Embryonic stem cells | Stem cells found in the embryo. |
| Enucleated | A cell with the nucleus removed. |
| Fertilisation | The fusion of gametes (sex cells) to make a new cell, e.g. sperm and egg. |
| Gametes | Sex cells. |
| Genes | The name given to a section of DNA that controls a particular characteristic. |
| Genetic code | The code formed by genes / DNA. |
| Genetic engineering | Manipulating (altering) an organisms genes using technology. |
| Genetically modified organisms (GMOs) | AN organism that has genes altered intentionally by humans. |
| Genome | All of organism's genetic information. |
| Golden rice | A genetically modified rice designed to contain more beta-carotene (to produce vitamin A). |
| Guanine (G) | The base that pairs with guanine. |
| Haploid | Containing half the number of normal chromosomes. |
| Herbicide | Something designed to kill particular plants. |
| Human Genome Project (HGP) | The research project to map all human genes. |
| Hydrogen bonds | The weak bonds holding the double helix together. |
| Implanted | When something is inserted into something else. |

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| Meiosis | Cell replication that involves the formation of daughter cells with different (and half the number of) chromosomes. |
| Messenger RNA (mRNA) | The RNA which moves from the nucleus to the ribosomes. |
| Mutation | An alteration to the genetic code. |
| Parent cell | The original cell that undertakes mitosis or meiosis. |
| Polypeptide | A chain of amino acids. |
| Protein synthesis | The building of new proteins. |
| Ribosome | The place in a cell where protein synthesis occurs. |
| Sexual reproduction | Reproduction involving meiosis to give variation in offspring. |
| Stem cell | An unspecialised cell which can become other types of cell. |
| Surrogate mother | A mother who has been artificially inseminated (has had a donor embryo that is not her own). |
| Thymine (T) | The base that pairs with adenine. |
| Transcription | DNA being copied into RNA. |
| Transfer RNA (tRNA) | The RNA that brings amino acids to the ribosomes to be built into proteins. |
| Uracil (U) | Part of the RNA code that replace thiamine. |
| Uterus | The womb. |
| Zygote | The initial cell formed after fertilisation. |
| 'Lock and key' hypothesis | The idea that an enzyme's active site fits particular molecules. |
| Active site | The place on an enzyme where the reaction occurs. |
| Catalyst | Something which speeds up the rate of reaction but is not part of the reaction. |
| Denatured | The permanent damage of an enzyme. |
| Digestion | The breakdown of larger molecules of food into smaller ones. |
| Enzymes | A biological catalyst. It helps control the rate of a reaction. |
| Specific | Relating to one in particular. |
| Substrate | The molecule an enzyme acts on. |
| Aerobic respiration | Respiration that requires oxygen. |
| Anaerobic respiration | Respiration without oxygen that leads to lactic acid build up. |
| Capillaries | The blood vessels that carry blood to cells. |
| Cardiac output | The amount of blood pumped by the heart (from a ventricle) in one minute. |
| Concentration gradient | The difference between two areas of concentration. |
| Diffusion | The net movement of particles from an area of high concentration to low concentration. |
| Excess post-exercise oxygen consumption (EPOC) | The oxygen required to break down lactic acid after anaerobic respiration. |
| Gas exchange | The exchange of different gases (e.g. carbon dioxide and oxygen). |
| Glucose | Simple sugar. |
| Lactic acid | The acid that builds up as a product of anaerobic respiration. |
| Respiration | The release of energy from glucose. |
| Stroke volume | The amount of blood pumped from one ventricle in a heartbeat. |
| Active transport | The uptake of minerals against the concentration gradient (from low to high) that requires energy. |
| Distribution | How something is spread out. |
| Ecosystem | A system of living things that are interact with each other. |
| Environment | A particular place or surroundings. |

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|------------------------------|--|
| Habitat | An environment occupied by a particular species. |
| Limiting factor | A factor which causes a limit to something (e.g. limits photosynthesis). |
| Osmosis | The net movement of water molecules from an area of high concentration to low concentration across a partially permeable membrane. |
| Partially permeable membrane | A membrane that only lets some (smaller) molecules pass through it. |
| Phloem | The (tubes) in a plant that carry sugar solution and some minerals around the plant. |
| Photometer | An instrument for measuring light intensity. |
| Photosynthesis | The release of energy from the reaction between carbon dioxide and water. |
| Pitfall traps | A hole dug to catch some species for sampling. |
| Pond net | A net for catching some species from ponds. |
| Pooter | A device used to collect insects. |
| Population size | The number of individuals. |
| Quadrats | A square used to identify an area for sampling. |
| Random sampling | Sampling by using a method that gives random individuals or areas of study. |
| Representative | Something that is an example that represents the bigger population. |
| Root hair cells | The long thin cells on roots that give a large surface area for diffusion to occur. |
| Sampling | A method of selecting a smaller set of individuals from a population. |
| Starch | A carbohydrate (large molecule). |
| Stomata | The tiny pores on the epidermis of land plants. |
| Surface area to volume ratio | The ratio of something's surface area to its overall volume. |
| Sweep net | A net for catching some species. |
| Systematic sampling | Sampling using a logical/mathematical way of working out where to sample from. |
| Transpiration | The process by which moisture is carried through plants. |
| Xylem | The (tubes) in a plant that transport water (and some minerals). |
| Antibodies | Proteins that identify and neutralise foreign bodies in the blood. |
| Aorta | The blood vessel which carries oxygenated blood from the heart to the body. |
| Arteries | Blood vessels which carry blood away from the heart. |
| Blood vessels | "Tubes" which carry blood. |
| Circulatory system | The system that transports blood etc. around the body. |
| Deoxygenated | Without oxygen. |
| Elongation | To become longer. |
| Evolution | The theory that species change over time due to survival of the fittest. |
| Fossil record | The overall record of fossils found. |
| Fossils | The preserved remains or traces of animals or plants. |
| Growth | An increase in size or quantity over time. |
| Haemoglobin | The iron compound in red blood cells that reacts with oxygen etc. in order to carry it from the lungs. |
| Left atrium | The entrance chamber to the heart for oxygenated blood from the lungs. |
| Left ventricle | The second chamber for oxygenated blood which pumps the blood to the body. |
| Organ | A collection of tissues working together. |
| Organ systems | Organs working together to perform a function. |
| Oxygenated | With oxygen. |
| Pentadactyl | Five toes or fingers on a limb. |
| Percentile | A value below which a certain percentage of individuals fall (e.g. 20% fall below the 20th percentile). |
| Plasma | The pale yellow part of blood that holds the blood cells etc. in suspension. |
| Platelets | The part of the blood that leads to clotting. |

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|---------------------|---|
| Pulmonary artery | The blood vessel that carries deoxygenated blood to the lungs. |
| Pulmonary vein | The blood vessel that carries oxygenated blood from the lungs to the left atrium. |
| Red blood cells | The blood cells that carry oxygen (and have no nucleus). |
| Right atrium | The entrance chamber to the heart for deoxygenated blood. |
| Right Ventricle | The second chamber in the heart for deoxygenated blood that pumps it to the lungs. |
| Septum | A wall dividing something into two parts (as in the heart, lungs and nose). |
| Tissue | A collection of cells working together. |
| Valves | A "flap" that opens to allow blood to flow in the correct direction and closes to prevent backflow. |
| Veins | Blood vessels that carry blood towards the heart. |
| Vena cava | The blood vessel that carries deoxygenated blood to the heart. |
| White blood cells | The blood cells that fight infection. |
| Alimentary canal | The gut (tubes of the digestive system). |
| Amino acids | The small molecules that make up proteins. |
| Amylase | The enzyme that breaks carbohydrates down into maltose (or glucose/simple sugars). |
| Anus | The opening at the end of the digestive system. |
| Bifidobacteria | A "good bacteria" that helps with digestive health. |
| Bile | The substance which neutralises stomach acid and helps to emulsify fats. |
| Bolus | The ball of food swallowed down the oesophagus. |
| Carbohydrases | Enzymes that break down carbohydrates into simpler sugars (e.g. glucose or maltose). |
| Carbohydrates | Complex sugar molecules. |
| Cholesterol | A waxy substance from fats needed by the body but which can block arteries if too much is present in the blood. |
| Digestive system | The system that breaks down food into smaller molecules for absorption. |
| Emulsifies | Something that allows two liquids that will not mix well to intersperse. |
| Emulsion | A mixture of two or more liquids that will not mix well normally. |
| Faeces | The waste from digestion. |
| Fats | Food molecules that are broken down into glycerol and fatty acids. |
| Fatty acids | An acid that make up fats. |
| Functional foods | A food with an ingredient that has an additional purpose (such as promoting health of the digestive system). |
| Gall Bladder | The place where bile is stored. |
| Glycerol | A liquid that make up fats. |
| Lactobacillus | A bacteria that helps break down lactose. |
| Large Intestine | The part of the digestive system where water is mainly absorbed. |
| Lipases | The enzymes that break down fats into fatty acids and glycerol. |
| Liver | The organ with many jobs including bile production. |
| Oesophagus | The tube that carries out peristalsis to carry a bolus of food from the mouth to the stomach. |
| Oligosaccharides | A type of sugar that may act as a prebiotic. |
| Pancreas | The organ that releases enzymes into the digestive system. |
| Pepsin | The enzyme found in the stomach that breaks down proteins and works in acidic conditions. |
| Peristalsis | The action of moving a bolus of food through the oesophagus. |
| Plant stanol esters | Plant extracts that reduce certain cholesterol levels. |
| Prebiotics | Foods that help promote growth of good bacteria. |
| Probiotics | Live microorganisms that may benefit the host. |
| Proteases | The enzymes that break proteins down into amino acids. |
| Proteins | Complex molecules built from amino acids. |
| Saliva | A watery substance found in the mouth that contains amylase. |
| Small intestine | The part of the digestive system where digestion and absorption occurs of all food groups. |
| Stomach | The part of the digestive system containing acid and pepsin. |

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| Sugars | Carbon, hydrogen and oxygen molecules found in food (i.e. a type of carbohydrate). |
| Villi | The small structures on the intestines that increase surface area and allow absorption to happen. |

B3 Core Questions

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|---------------------|--|--|
| B3.1 Rhythms | 1. What is a circadian rhythm? | A biological rhythm which happens over a 24 hour period |
| | 2. Name how plants demonstrate circadian rhythms | By opening their flowers when it is sunny, producing nectar when it is sunny |
| | 3. Describe how humans demonstrate circadian rhythms | Producing melatonin, a hormone which makes us sleepy |
| | 4. What is photoperiodism? | Responding to changing day lengths |
| | 5. State an example of photoperiodism | The germination of seeds, the blossoming of flowers, leaves falling off of the trees according to changing day length |
| B3.2 Plant Defences | 6. Name a scientist who discovered the process pasteurisation | Louis Pasteur |
| | 7. What are the methods called to kill or prevent microbes getting into contact with our food or items | Aseptic techniques |
| | 8. State 4 ways plants defend themselves from attacks | Thorns, producing poisons, producing smells and surviving in extreme locations where competition or attack is less likely |
| | 9. Name 3 uses of plant poisons and where they are extracted from | -Aspirin as a painkiller obtained from willow trees -Quinine prevents malaria from Cinchona tree -Digoxin to treat heart problems from foxgloves |
| | 10. Name an example of pathogens attack plants | Potato blight destroys the potato leaves killing the plant |
| B3.4 Vaccines | 11. What is an antigen? | A protein found on pathogens |
| | 12. What is an antibody? | A protein produced by lymphocytes that attaches to a specific antigen |
| | 13. What are the 4 stages of vaccinations? | 1. A weakened pathogen is injected into the body 2. A lymphocyte with an antibody that fits the antigen is activated 3. The lymphocyte divides to produce identical copies 4. Lymphocytes secrete large amounts of antibodies, which stick to the antigens and destroy pathogens. Memory lymphocytes remain in the blood in case of another infection |
| | 14. Name 3 advantages of immunisation | -Person becomes immune to the disease without suffering from it - Chances of long-lasting harm are reduced than if the person actually get the disease - If enough people get the disease it can be eradicated |
| | 15. Name 3 disadvantages of immunisation | -Swelling/redness around the site of injection -Mild form of the disease may be shown -Very rarely an allergic reaction may occur |
| B3.5 Antibodies | 16. What is meant by primary response? | When the pathogen first enters the body only 1-2 lymphocytes will be able to produce the suitable antibodies. It takes a long time to multiply and destroy all pathogens |
| | 17. What is meant by secondary response? | The second time the body is infected with a pathogen a memory lymphocyte will be able to produce many antibodies destroying the pathogen very quickly perhaps even without the person becoming ill |
| | 18. What is a hybridoma? | A cell made by fusing a lymphocyte with a cancer cell |
| | 19. Describe how monoclonal antibodies are made | -an antigen is injected into a mouse, which produces antibodies for that particular pathogen -the lymphocyte from the mouse is fused with a cancer cell, forming a hybridoma -The hybridoma multiplies making monoclonal antibodies |

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| | 20. Name 2 uses of monoclonal antibodies | -Pregnancy tests use monoclonal antibodies to detect a hormone called HGH. When identified the monoclonal antibodies binds to the HGH hormone causing a colour change -Identifying cancerous cells by making monoclonal antibodies radioactive so they can be traced when they've binded to a cancer cell. They can also carry drugs to treat the cancer cell which minimises damage to the healthy cells. |
| B3.6 The Kidneys | 21. How are carbon dioxide and urea made in the body? | Carbon dioxide is a product of respiration and urea is made from the breakdown of amino acids in the liver |
| | 22. Name 5 parts of the urinary system | Renal arteries and veins; kidneys; ureters; bladder and urethra |
| | 23. Describe the function of the kidneys | The kidneys removes substances from the blood to make urine |
| | 24. How is kidney failure treated? | Kidneys need to be replaced once they are damaged and can't work. Until a suitable organ donor is found the blood is filtered on a dialysis machine |
| | 25. Describe problems with organ donation | Antigens on organs may cause the body to attack a donated organ, so an organ that is donated needs t have the same or similar antigens on it to prevent he body refusing it. Relative are usually a good match. |
| B3.7 Inside the Kidneys | 26. What is a nephron? | A microscopic tubule found in the kidney |
| | 27. Name 3 parts of a nephron | Bowman's capsule, Convolted tubules; Loop of Henle and Collecting Ducts |
| | 28. What is the function of the Bowman's capsule? | To filter the blood to separate small molecules like water, urea and glucose from big molecules such as proteins and blood cells |
| | 29. What is ADH? | Antidiuretic hormone which controls the water levels in blood |
| | 30. Describe negative feedback | A change in a factor leads to the opposite change happening e.g. keeping the levels of water in blood constant |
| B3.8 The Menstrual Cycle | 31. What are the two hormones that control the menstrual cycle? | Oestrogen and progesterone |
| | 32. What is FSH and LH | FSH is follicle stimulating hormone and LH is luteinising hormone |
| | 33. Where is FSH and LH released from? | The pituitary gland |
| | 34. How does oestrogen and progesterone control the menstrual cycle? | Oestrogen cause an increase in the uterus lining thickness and increases the levels of LH Progesterone is released by the corpus luteum after an egg is released and causes the uterus lining to stay thick and inhibits the levels of FSH and LH Decreasing levels of oestrogen and progesterone causes menstruation |
| | 35. How do FSH and LH levels affect the menstrual cycle? | FSH stimulates the growth and maturation of a growth follicle in an ovary stimulating oestrogen production An increase in LH levels causes ovulation |
| B3.9 Fertilisation | 36. Explain how an egg cell is adapted to its function | Cytoplasm contains nutrients and lipids Haploid nucleus has one set of genetic material |
| | 37. Explain how a sperm cell is adapted to its function | Haploid nucleus has one set of genetic materials Acrosome contains enzymes which digest the egg membrane Middle section contains lots of mitochondria for energy release by respiration Tail is used for movement |
| | 38. Name 4 fertility treatments | IVF, Egg donation, Surrogate mother and Hormone treatment |
| | 39. Describe IVF | A woman's eggs are taken from the ovaries and fertilised in a dish with her partners' sperm. Then it is implanted into her uterus. |
| | 40. Name disadvantages of some fertility treatments | IVF may cause multiple births if more than one egg is implanted; Egg donation and hormone treatment can cause bad reactions to the high levels of hormones used; Surrogate mothers may bond strongly with the baby and not want to hand it over |

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| B3.10 Sex Determination | 41. What is phenotype and genotype? | Genotype: the alleles an individual has (e.g. XX) Phenotype: the characteristic expressed (e.g. female) |
| | 42. What are the genotypes of a female and male? | Female: XX Male: XY |
| | 43. Name two possible sex linked inherited diseases | Haemophilia and colour blindness |
| | 44. State the genotype of a haemophiliac male | X^hY |
| | 45. State the genotype of a haemophiliac carrier female | X^HX^h |
| B3.11 Courtship and Parenting | 46. What is behaviour? | Ways an animal responds to external stimuli |
| | 47. Describe some courtship behaviours | Males displaying to females using brightly coloured feathers or skin, calls and dances |
| | 48. Describe 3 mating strategies | -Mating for life -Pairing up for a breeding season -Harems for breeding seasons -Harems where dominant males change over time |
| | 49. Why may animals drive away their offspring they are old enough? | Prevent competition for local resources |
| | 50. What is meant by an evolutionary strategy? | A process that affects how a species changes over time and spreads |
| B3.12 Innate Behaviour and Imprinting | 51. Name an example of innate behaviour | A startle reflex |
| | 52. What is the purpose of innate behaviour and how does it exist? | Improve the chances of animal surviving and it is controlled by genes |
| | 53. What did Tinbergen study? | Herring gulls and their innate ability to peck at the red spot on a parents beak to cause the parent to regurgitate food to eat |
| | 54. What is imprinting? | Imprinting can only occur in a short window of time shortly after birth and is when animals will assume the first thing they see is their parent and will follow their behaviour |
| | 55. What did Lorenz discover? | Birds learn behaviour from the first thing they see after they are born and will become attached to it |
| B3.14 Learned Behaviour | 56. What is habituation? | Learning to adapt behaviour to different circumstances, for example switching off from a repeated stimulus |
| | 57. What is classical conditioning? | Starting with an innate reflex and encouraging the animal to respond to a new stimulus in the same way |
| | 58. What is operant conditioning? | An animal identifying that a behaviour can makes something good or bad happen and associating the behaviour with reward/sanction |
| | 59. What are the uses of training animals? | Sniffer dog being trained to react to a particular scent; Police horses exposed to smoke and noise so it doesn't respond to it ; Dolphins trained to locate mines |
| | 60. Describe an example of habituation | Touching a snails antennae's until they no longer withdraw them; Pupils no longer responding to nagging about their rapidly approaching exams |
| B3.15 Animal Communication | 61. How do animals communicate? | Using visual signals like facial expressions and body language; sound like birdsong and calls; chemical substances such as pheromones |
| | 62. Why is it an advantage to use body and facial expression to convey a mood? | To attract females, to show submissions and to show dominance |
| | 63. What did Fossey study? | Fossey studied gorillas and found that they were very gentle and was able to identify meanings of their calls |
| | 64. What did Goodall study? | Goodall studied chimpanzees and found that they had complex societies; they also hunted in groups and used tools for hunting and eating. |

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| | 65. What re the advantages of animals living in social groups? | It improves survival chances and enables many tasks to be completed at once- defending a territory, hunting and raising young at the same time |
| B3.16 Plant Communication | 66. How do plants communicate with animals? | Using bright colours and scents to encourage pollination |
| | 67. How do plants communicate with other plants? | Using chemicals to warn other plants of an attack so the other plants can defend themselves |
| | 68. Describe co-evolution | Co-evolution is where two species change together overtime |
| | 69. State an example of co-evolution | Orchid flowers evolve to look like wasps so they can spread their pollen, as the wasp changes its appearance the orchid with the same appearance survives- is able to pollinate and pass on tis successful genes |
| | 70. What are the benefits of co-evolution? | Plants may evolve to only produce poisons in areas where they experience attacks, in Australia areas with large numbers of kangaroos the plants will produce poison but the same species in areas with little or no kangaroos will not produce as much or any poison |
| B3.17 Evidence for Human Evolution | 71. Describe evidence for human evolution | Fossils that are similar too but not exactly the same as humans discovered over time. |
| | 72. Describe how tools have developed over time | Tools have become sharper and changed shapes as humans evolved, more modern tools have become more sophisticated |
| | 73. What has happened to the humans overtime | Humans have become taller, larger skulls and shorter arms |
| | 74. Name how we can date fossils found | Fossils and tools are found and can be dated using carbon dating, comparing to other samples already dated and by using the age of the rock formation that the tool or fossil was found in |
| | 75. Describe differences between early human ancestors and modern day humans | Early ancestors didn't stand upright, had significantly smaller volume brain and had longer limbs |
| B3.18 Human Migration | 76. What is mtDNA? | Mitochondrial DNA, the DNA found in mitochondria which his different from nucleus DNA as it is genetically identical to the mothers DNA |
| | 77. How would climate affect human migration patterns? | As the environment became colder water froze and provided areas to cross continents. When sea levels were lower straits between continents were accessible and allowed people to migrate. |
| | 78. Why is mtDNA used as evidence for African Eve? | mtDNA mutates faster than nuclear DNA which means that over the past 50 000 years many more mutations have happened , also it is genetically identical to the mothers DNA |
| | 79. Why is mtDNA more useful than nuclear DNA? | There are many more of them found in the cell, less likely to be degraded over time |
| | 80. Why did people start to settle down 11000 years ago? | The climate become more stable and so people did not have to move from changing environments and grow crops in different locations but could settle down |
| B3.19 Biotechnology | 81. What is the use of biotechnology? | The alteration of natural biomolecules for science and engineering uses |
| | 82. What is a fermenter? | A steel vessel used to grow microorganisms |
| | 83. What are the four optimum conditions in a fermenter? | Nutrients; optimum temperature; optimum pH and agitation |
| | 84. How is optimum temperature and pH ensured? | Using a water bath around the fermenter keeps the temperature consistent, a pH and temperature probe monitors the temperature and pH and adjusts the internal conditions accordingly |
| | 85. Why is a stirrer required in a fermenter? | A stirrer causes agitation the mix the oxygen and nutrients evenly into the liquid |
| B3.21 Microorganism | 86. Name a microorganisms used for food production | Mycoprotein such as Fusarium, which is commonly known as quorn |
| | 87. Explain 4 advantages of using microorganisms in food production | Fast growth of a food source; easy to handle and manipulate; can be grown in any part of the world; can be grown from waste materials |

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| | 88. How can eating mycoprotein be better for people's health than eating meat? | Mycoproteins do not contain saturated fats unlike meat. The high fibre content of mycoproteins slows the rate in which glucose is absorbed from food that in turn means insulin isn't secreted as much or as quickly. Surges of insulin or lots of insulin are thought to contribute to the risk of type 2 diabetes. |
| | 89. How is a mycoprotein fermenter different to a normal fermenter? | It doesn't contain a stirrer which would break the hyphae of the mycoprotein |
| | 90. Name the 4 stages of making mycoprotein? | Fusarium is multiplied in a fermenter without a stirrer. When enough has grown it is collected and heat-treated to remove a bitter taste. The yare dried and pressed to form a fibrous substance similar to meat. |
| B3.23 Enzyme Technology | 91. Name 3 types of enzymes used in food manufacturing | Invertase; proteases; lipases and chymosin |
| | 92. Describe how sweets are manufactured | Invertase is manufactured from a yeast called <i>Saccharomyce cerevisiae</i> in fermenters. It breaks down sucrose into glucose and fructose which is sweeter than sucrose so less sugar is needed to make food sweet. It also breaks down the centres of soft centred chocolates. |
| | 93. Describe how washing powders use enzymes | Proteases are added to break down proteins like blood; lipases are used to break down fats like oil and grease |
| | 94. Describe how cheese is manufactured | Chymosin is added to milk. It affects the proteins causing the milk to separate into curds and whey. The curds are pressed to produce chees. |
| | 95. How is chymosin multiplied using genetic modification? | DNA from a cell is cut into pieces using restriction enzymes leaving staggered ends that are called sticky ends. The same restriction enzymes open up a plasmid DNA in a bacteria cell. Insulin genes are added to the plasmid DNA and bases in the sticky ends pair up. An enzyme called DNA ligase is added which links the DNA back into a loop. The plasmid is reinserted into bacteria and is grown in huge fermenters making lots of human insulin. |
| B3.26 Global food security | 96. How has human population impacted food security? | As human population grows, there may not be enough food on Earth to feed everyone |
| | 97. Describe a conventional breeding programme | High yield crops are selectively bred together. Of their offspring the highest yielding crops are bred together, this is repeated for 20 generations. Then a high yielding variety is produced, named and sold. |
| | 98. Describe pest management strategies | Developing plant varieties which are less likely to be infected with viruses; grow plants in environments which encourage natural predators to their pests which will reduce damage; Spray plants with pesticides; Chemicals produced by plants placed into traps luring pests which are then drowned in soap solution; rotating crops every 3-4 years to prevent build-up of soil pests for particular crops |
| | 99. Name advantages of replacing fossil fuels with biofuels | It is renewable; it is carbon neutral so the amount of carbon dioxide produced when burnt is equal to the amount of carbon dioxide absorbed when the plant grows and photosynthesis takes place; doesn't take long to produce them |
| | 100. Name disadvantage of replacing fossil fuels with biofuels | Take up space that could be used to grow crops |
| B3.27 A GM Future | 101. Explain how agrobacterium tumefaciens is used a vector in creating transgenic plants | A transgenic organism contains genes transferred from another organism. Usually a useful gene is inserted into A.T. that is then allowed to infect plants. This introduces the gene into the plant. The AT acts as a vector. |
| | 102. Name advantages to introducing genes for insect resistant <i>Bacillus Thuringiensis</i> into crop plants | It kills insects eating plant cells which means less insecticide need to be used, this in turn means less damage to the environment as less pesticide to harm all local organisms; higher yields will be produced too |
| | 103. Name disadvantages to introducing genes for insect resistant <i>Bacillus Thuringiensis</i> into crop plants | BT could kill other local organisms which are harmless; the plant containing the BT gene could also reproduce with a normal plant, cross |

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| | | breeding such as this can cause limitation in biodiversity; insects could evolve resistance to BT toxin |
| | 104. What are the costs of genetic modification of crops plants? | More expensive so developing countries may not be able to afford them, they may even have to borrow money to obtain the GM seeds. GM crops may not produce as high a yield in different climates |
| | 105. What are the benefits of genetic modification of crop plants? | Plants can be modified to include useful genes such as flavonoids which can extend the life of cancer sufferers. |

B3 Keywords and Definitions

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| acrosome Cap-like structure on the head of a sperm cell that produces enzymes to penetrate an egg |
| action potential Change in voltage across a neurone or the membrane of a cardiac muscle cell when an electrical impulse travels along it |
| ADH (antidiuretic hormone) a hormone made by the pituitary gland that causes the kidneys to retain water in the body |
| aerobic a process that takes place with oxygen |
| African Eve A woman who lived in Africa between 130,000 and 200,000 years ago, and passed on mtDNA to all living humans today |
| agitation mixing the contents of a liquid, such as by stirring |
| agrobacterium tumefaciens a bacterium used as a vector in genetic modification |
| allele different forms of a gene |
| anaerobic a process that doesn't use oxygen |
| antibody a protein produced by lymphocytes. It attaches to a specific antigen on a microorganism and helps destroy it or neutralise it |
| antidiuretic hormone see ADH |
| antigen a protein that white blood cells recognise as foreign, for example, on the surface of a bacterium |
| Ardi the name given to the individual of a human-like species that lived 4.4 million years ago, whose fossil bones were discovered in Ethiopia |
| aseptic free from microorganisms |
| aseptic precaution see aseptic technique |
| aseptic technique any method to ensure that living microorganisms do not come into contact with something |
| B lymphocytes a type of lymphocyte that produces antibodies |
| bacillus thuringiensis a bacterium that produces a substance that is toxic to insects that destroy crop plants. Some crop plants have been genetically modified with a gene from this bacterium |
| behaviour the responses of an animal to what is going on around them |
| biofuel a fuel made from plants or microorganisms |
| biological clock a timing mechanism in the body that helps to control various rhythms, such as sleeping and walking |
| biomolecule a substance made by living organisms |
| biotechnology the alteration of natural biomolecules using science and engineering to provide goods and services |
| bladder the organ where urine is stored |
| body language body positions and gestures that give observers information about the way an animal is feeling |
| Bowman's capsule The part of the kidney tubule where blood is filtered |
| Bt Toxin a poison produced by a bacterium (bacillus thuringiensis) when eaten by insects. The gene for the toxin has been transferred to some crop plants to reduce damage by insects pests |
| carbohydrate a compound made up of carbon, hydrogen and oxygen |
| carrier an individual with one copy of a recessive allele; they are not affected by the allele but can pass it on to their offspring |
| Choice chamber a device that offers small invertebrates such as woodlice 2 or more contrasting environments. The different conditions provide a stimulus to which the invertebrates respond |
| chymosin a protein-digesting enzyme used to make cheese that can be produced by genetically modified bacteria or yeast |
| ciliary muscles muscles that relax or contract to change the shape of the lens of the eye |
| circadian rhythm a daily rhythm |
| classic conditioning a process in which learning causes a reflex action to happen in response to a different stimulus |

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| clone a cell or organism that is genetically identical to the parent cell or organism |
| co-evolution the way in which two different species affect each other's evolution |
| collecting duct the final part of a kidney tubule, where water is reabsorbed |
| communication the exchange of information between organisms |
| conventional breeding producing offspring the natural technique of cross-breeding |
| convoluted tubule a part of the kidney tubule where glucose and other useful substances are reabsorbed into the blood |
| corpus luteum a structure that develops in an ovary after an egg has been released, which secretes progesterone |
| courtship behaviour actions that help male and female organisms attract one another, and to maintain the bond between them |
| crop rotation where a different crop is planted in the same field each year in a 3 or 4 year cycle, such as potatoes, oats, beans and cabbages. This helps to control the build up of soil pests for each crop |
| cytoplasm The liquid gel which makes up a lot of the body of a cell and is where many chemical reactions take place |
| decompose the breakdown of the bodies of dead plants and animals by microorganisms called decomposers |
| dialysis process used to clean the blood of people with kidney failure, using membranes to filter out waste products |
| diploid a cell that has 2 set of chromosomes. In humans, almost all cells except the sperm and egg, are diploid cells |
| DNA ligase an enzyme that joins 2 DNA molecules together |
| egg donation using an egg from one woman to produce an embryo that can be implanted into another woman |
| Endothermic a type of reaction that takes in heat energy, e.g. photosynthesis. |
| Enzyme a protein produced by living organisms that acts as a catalyst to speed up the rate of a reaction. |
| Ethology the study of animal behaviour. |
| Eutrophication the build-up of nitrates and phosphates in water which encourages excessive plant growth, leading to the depletion of light and oxygen supplies. This in turn leads to other organisms in the water dying off. |
| Evolution the development of new species over time through a process of natural selection. |
| Evolutionary strategy a process that affects how a species changes over time and spreads, such as |
| Parental care that helps more offspring to survive for longer. |
| Exponential growth when the growth rate of a population is proportional to the population's Current value. |
| Fermentation when microorganisms break down large molecules, using enzymes to produce different substances, including foodstuffs and drugs. For example, the conversion of glucose into ethanol (alcohol), using enzymes found in yeast. |
| Fermenter a container in which microorganisms are cultured to produce a useful substance on a large scale – the product is collected from the solution in which the microorganisms have grown. |
| Fertilisation the joining together of the nuclei of two gametes, e.g. a sperm and an egg. |
| Fertiliser substance containing minerals that is added to the ground to increase plant growth. |
| Flavonoid a coloured substance found in plant flowers and leaves. |
| Follicle fluid-filled sac in the ovary that contains the egg. |
| Follicle stimulating hormone see FSH. |
| FSH (follicle stimulating hormone) a hormone produced by the pituitary gland, which causes eggs to mature in the ovaries. |
| Fusarium a type of fungus that is grown in fermenters to produce mycoprotein as a food source. |
| Gamete a sex cell (egg or a sperm cell). |
| Gamma (γ) radiation ionising radiation in the form of pulses of electromagnetic radiation with very short wavelengths. |
| Genetic modification adding a gene for a particular characteristic from one organism into another so that the second organism shows the characteristic. |
| Genotype the alleles of a particular gene (or genes) possessed by an organism. |
| Germinate a process in which a seed begins to grow into a young plant. |
| Global food security the ability to produce enough food in the future to feed everyone in the world. |
| Glomerulus a network of blood capillaries in a kidney. |
| Habituation a process in which an animal learns not to respond to a repeated stimulus. |
| Haemophilia a disorder of blood clotting, caused by a recessive allele on the x chromosome. |
| Haploid containing a single set of chromosomes, as in gametes. |

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| Hormone chemical messengers that are made in one part of the body and are carried in the blood to other parts which they affect, such as melatonin which changes the actions of parts of the body so we feel sleepy. |
| Hybridoma a cell made by fusing a lymphocyte with a cancer cell. |
| Immune response the response of the body to attack by invading pathogens. |
| Immunisation making someone immune, for example by vaccinating them. |
| Imprinting the process in which young animals bond with or become attached to animals (including humans) or moving objects they see immediately after hatching or birth. |
| Infection the entry of a pathogen into the body; an illness caused by a pathogen. |
| Infertile unable to reproduce. |
| Innate inborn ; innate behaviour is behaviour that does not have to be learnt and is automatic, not thought about. |
| Insulin the hormone which decreases blood glucose concentration. Used in treatment of type i diabetes. |
| Integrated pest management reducing the populations of insects and other pests by a coordinated treatment of different pest control strategies. |
| Invertase an enzyme (also known as sucrase) that catalyses conversion of sucrose into glucose and fructose. |
| Ivf (<i>in vitro</i> fertilisation) fertilising an egg by placing it in a sterile container and then adding sperm. |
| Kidney one of the organs in the abdomen that removes urea and extra water from the blood, by producing urine. |
| Kidney transplant taking a healthy kidney from one person and putting it into the body of another person. |
| Kinetic theory the theory that explains the different states of matter in terms of the movement of particles. |
| Lactase an enzyme that catalyses the breakdown of lactose (milk sugar). The enzyme is produced by the digestive system and by bacteria used in yogurt manufacture. Lactose-intolerant individuals do not produce this enzyme and cannot digest lactose. |
| Lactic acid the substance that gives the sour taste to yogurt, produced when certain bacteria ferment the sugar lactose in the absence of oxygen. |
| Learning behaviour which changes as a result of previous experience. |
| Lipase an enzyme that catalyses the breakdown of lipids (fats and oils). |
| Liver cirrhosis a disease of the liver which is linked to excess consumption of alcohol. |
| Loop of henlé part of a kidney nephron that loops down and then sharply upwards; helps with osmoregulation. |
| Lucy the name given to the individual of a humanlike species that lived 3.2 million years ago, whose fossil bones were discovered in Ethiopia. |
| Lymphocyte a type of white blood cell that produces antibodies. |
| Memory lymphocyte a lymphocyte that remains in the blood for a long time after an infection or vaccination. |
| Menstrual cycle a monthly cycle involving the reproductive organs in women. |
| Menstruation the breakdown and loss of the lining of the uterus, at the start of a woman's Menstrual cycle. |
| Metabolic reaction a chemical reaction that takes place in a living organism. |
| Middle section part of a sperm cell immediately behind the head, which contains mitochondria. |
| Mitochondrial DNA the DNA found inside mitochondria, which is passed by the mother to all offspring without any mixing; sons do not pass down their mother's mtDNA to their children. |
| Mitochondrion (plural mitochondria) the site of cellular respiration where glucose is broken down using oxygen to release energy, which is needed for reactions in the cell. |
| Monoclonal antibodies many identical antibodies. |
| Mutation a change in the base sequence of DNA. |
| Mycoprotein a protein-rich food made from fungi, sold as quorn™. |
| Negative feedback a control mechanism in which a change in a factor causes an action that reverses the change. |
| Nephron a kidney tubule. |
| Nuclear DNA the DNA found in the nucleus of a cell. |
| Nutrient a substance required by an organism for growth or energy. |
| Oestrogen a hormone produced by the ovaries, important in the menstrual cycle. |
| Operant conditioning a process in which an animal changes its behaviour as a result of experiencing rewards or unpleasant consequences. |
| Optimum pH the pH at which an enzyme's rate of reaction is greatest, or at which a population of microorganisms grows most rapidly. |

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| Optimum temperature the temperature at which an enzyme's rate of reaction is greatest, or at which a population of microorganisms grows most rapidly. |
| Osmoregulation the maintenance of an organism's water content and dissolved salt concentration; a function performed by the kidneys. |
| Ovulation the release of an egg from an ovary. |
| Pasteurisation when foods, such as milk, are heated briefly to kill the bacteria in them. |
| Pathogen an organism (usually a microorganism such as a bacterium or virus) that causes disease. |
| Pest animals such as insects or larger herbivores that eat and damage crop plants. |
| Phenotype the characteristics of an organism. |
| Pheromone a substance produced by one organism that diffuses into the environment and causes responses in another organism (a chemical signal). |
| Photoperiodism the way in which living organisms respond to changes in day length. |
| Pituitary gland gland at the base of the brain that secretes many different hormones, including FSH and LH. |
| Plant chemical defence some plants have evolved to defend themselves against attack from herbivores by producing toxic compounds; some insects have co-evolved an adaptation to allow them to eat the plant. |
| Pollination transfer of pollen (the male gamete in plants) from one flower to another, enabling fertilisation. |
| Primary response the way in which the immune system responds on the first occasion that a particular pathogen enters the body. |
| Progesterone a hormone produced by the ovaries and placenta, which helps to maintain the thick lining of the uterus. |
| Protease an enzyme that catalyses the breakdown of proteins. |
| Punnett square a chart used in genetic diagrams to show the possible genotypes (and sometimes phenotypes) that can result from the fusion of the gametes involved. |
| Recessive version of a gene (allele) that will only have an effect if the other allele is also recessive. |
| Recombinant DNA technology genetic modification; the addition of new DNA to an organism's cells. |
| Red-green colour blindness a sex-linked genetic disorder in humans where the affected individual cannot distinguish the colours red and green, much more common in men than women. |
| Reflex an automatic reaction to a stimulus. |
| Reject to refuse or get rid of, such as when the body reacts to the foreign tissue of a transplant and kills it. |
| Renal artery an artery that delivers blood to the kidneys. |
| Renal vein a vein that carries blood away from the kidneys. |
| Reproductive quality the ability of an individual to produce healthy offspring. |
| Resazurin dye dye used as a qualitative test for the presence of significant numbers of bacteria in milk, thereby checking whether it is fit for sale. |
| Restriction enzyme an enzyme that cuts DNA molecules into pieces. |
| Retina tissue at the back of the eye that contains light receptors. |
| <i>Saccharomyces cerevisiae</i> a species of yeast, a single-celled fungus, used in biotechnology, for example, to cultivate the enzyme invertase. |
| Secondary response the way in which the immune system responds on the second occasion that a particular pathogen enters the body. |
| Selective reabsorption taking back useful substances into the blood, from the fluid inside a nephron. |
| Sex cell a gamete; a cell such as egg or a sperm. |
| Sex chromosome one of the chromosomes that helps to determine an organism's sex; in humans, these are the x and y chromosomes. Sex-linked genetic disorder a condition caused by an allele of a gene carried on either the x or y chromosome. |
| Sticky end a length of DNA with only one strand that will easily join with other pieces. |
| Surrogate mother a female organism that has had the embryo of a different female placed in her uterus. |
| Symptom the visible effects of a disease, such as a fever or rash. |
| Training changing an animal's behaviour by giving it rewards or punishments. |
| Transgenic plant a plant containing genes that have been taken from another species. |
| Urea a waste product produced in the liver from excess amino acids. |
| Ureter one of the tubes that carry urine from the kidneys to the bladder. |
| Urethra the tube that carries urine from the bladder to the outside of the body. |

Urinary system the body system that produces and removes urine, including the kidneys, ureters, bladder and urethra.

Urine a fluid produced by the kidneys, containing urea and other waste substances dissolved in water.

Uterus the organ in which a foetus develops (womb).

Vaccine a substance containing dead or weakened pathogens (or parts of them), introduced into the body to make a person immune to that pathogen.

Vector a 'go-between' that is used in genetic modification, to transfer genes from the cells of one organism to another.