



Knowledge Organiser

BIOLOGY

Biology



B1- Cells and Organisation	
Question:	Answer:
State the organelles are found in both animal and plant cells	Nucleus, Cell membrane, Cytoplasm, Mitochondria, Ribosome
State the organelles are found in a plant cell but not in an animal cell?	Cell wall, Vacuole, Chloroplast
Describe the formula used to calculate magnification	Magnification = size of image/ size of real object
Compare the main differences between a prokaryotic and eukaryotic cell?	Prokaryotes have no nucleus and so DNA is free-lying in cytoplasm. They have no membrane bound organelles. They are smaller in size. Eukaryotes have a nucleus which contains the DNA. They have membrane bound organelles. They are larger in size and more complex.
Define a specialised cell	A specialised cell is a cell that has a particular shape and function
Explain how the structure of the sperm cell helps it carry out its function	Sperm cell has: A tail to help it swim to the egg Lots of mitochondria (in its head) to create energy for the tail to move Enzymes (in its head) to break down the cell membrane of the egg DNA (in its head) - 23 chromosomes- to fertilise the egg
Explain how the structure of the nerve cell (neurone) helps it carry out its function	Nerve cell has: A long axon to carry nerve impulses Dendrites to carry the electrical impulses to the next neurone A cell body that contains the nucleus and lots of mitochondria for energy A myelin (fatty) sheath to insulate the electrical impulse and speed up the impulse
Explain how the structure of the red blood cell helps it carry out its function	Red blood cell has: No nucleus to increase surface area to carry more oxygen Biconcave shape to increase surface area
Explain how the structure of the root hair cell helps it carry out its function	Root hair cell: Extension of cytoplasm to increase surface area to absorb more minerals Lots of mitochondria to make energy to carry out active transport
Explain how the structure of the palisade cell helps it carry out its function	Palisade cell has: Lots of chloroplasts to trap sunlight Chloroplasts contain chlorophyll to trap sunlight and use it for photosynthesis
Define diffusion	Diffusion is the movement of particles from a high concentration to a low concentration, along the concentration gradient
Describe and explain in which state diffusion occurs best	Diffusion happens best in gases and liquids because their particles are able to move more freely. Diffusion cannot happen in solids, because particles are in a fixed position and vibrate on the spot.
Define osmosis	Osmosis is the movement of water particles from a high concentration to a low concentration, along the concentration gradient
Define active transport	Active transport is the movement of particles from a low concentration to a high concentration, against the concentration gradient
State two examples of where active transport occurs	1) In the root hair cell- minerals ions move into the root hair cell from the soil by active transport 2) Extra glucose moves into the capillary of the small intestine villi from the small intestine canal
Describe what happens in mitosis	Mitosis is a type of cell division in which two daughter cells are produced, each with 46 chromosomes. They are identical to the original cell.
State in which type of cells does mitosis happen	Body cells
Define a stem cell	An undifferentiated cell that has the ability to change into any type of cell
Define a clone	A genetically identical copy of a cell
Explain how you can clone a plant	Taking a cutting or taking a few cells from the plant and replanting them
Explain the difference between therapeutic and reproductive cloning	Therapeutic cloning is cloning body cells for medical needs e.g. producing skin grafts and organs Reproductive cloning is to create a whole identical organism e.g. Dolly the sheep

B2- Principles of Organisation	
State the correct order: Tissue, organ system, organs, cells	Cells, Tissues, Organ, Organ System
Describe where digestion take place	Mechanical digestion- in the mouth, teeth break down food, saliva contains enzymes to break down food and tongue mixes food with saliva Chemical digestion – in stomach and small intestine, enzymes produced by the pancreas break down large molecules to small molecules
State where bile is produced and stored. Describe what bile does	Produced in the liver and stored in the gall bladder. Breaks down fats into fatty acids and glycerol
State which enzymes are involved in digestion	Amylase, Lipase and Protease
Explain the function of these three enzymes	Amylase- breaks down carbohydrates into simple sugars Lipase- breaks down fats into fatty acids and glycerol Protease- breaks down proteins into amino acids
Describe is the structure of the heart	The heart is a double pump, pumping oxygenated blood on the left hand side and deoxygenated blood on the right hand side. The heart is made up of cardiac muscle and the cardiac muscle contains many mitochondria for aerobic respiration.
State the <u>main</u> blood vessels that goes into or out of the heart	The heart has four main blood vessels, two veins (vena cava and pulmonary vein) which supply blood to the heart and two arteries (aorta and pulmonary artery) which carry blood away from the heart.
State the name of the blood vessels that supply blood to the	Coronary blood vessels

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heart	
Explain the function of the pacemaker	Pacemaker cells regulate the beating of the heart. The heart has its own natural pacemaker within its muscle wall. Artificial pacemakers correct irregularities in heart rate.
Describe what blood is made up of	Blood has 4 main components – plasma (liquid part, transports dissolved chemicals and proteins around the body), red blood cell (carries oxygen and carbon dioxide), white blood cell (fights infections) and platelets (helps with blood clotting)
Describe what type of blood the three blood vessels carry	The three types of blood vessels: - Arteries- carries oxygenated blood away from the heart - Vein- carries deoxygenated blood away from the heart - Capillaries- thin blood vessel, which connects arteries to veins and is where exchange of substances occurs between the blood and cell
State the main cause of heart disease	Fatty material builds up in coronary arteries reducing blood flow to the heart muscle.
Explain how can heart disease be treated	Stents can be used to keep the coronary arteries open. Statins reduce cholesterol levels, so fatty material is deposited more slowly. Faulty heart valves can be replaced with biological or mechanical ones. Heart failure can be treated with a heart and lung transplant. Artificial hearts can be used whilst waiting for a transplant, or to allow the heart to rest and recover.
Describe the main parts of the lung	The lung is made up of a trachea; bronchi; bronchiole and alveoli Surrounding the lung is the ribcage. Intercostal muscles control the movement of the ribcage.
Explain how the lungs are adapted for efficient gas exchange	The alveoli is the main site of gas exchange Oxygen diffuses from the alveoli to capillary (into red blood cell) Carbon dioxide diffuses from the capillary to the alveoli (from the red blood cell)

Define health	Health is the state of physical and mental well-being. Factors such as diet, stress and life situations can have a serious effect on physical and mental health.
Describe the two categories of disease	Communicable diseases are diseases that can be passed on from one person to another (caused by microbes). Non communicable disease are diseases that are caused by lifestyle choices and behaviours (e.g. eg smoking, alcohol, diet or lack of exercise).
Describe what cancerous cells are	Cancers (malignant tumours) result from uncontrolled cell division. Cancer cells may invade neighbouring tissues, or break off and spread to other parts of the body in the blood, where they form secondary tumours.

State the organs of the plant	Plant organs include stems, roots and leaves. Organs are made up of different tissues, eg meristem tissue at growing tips.
Describe the main function of the leaf and explain why	The leaf is the organ of photosynthesis because it contains a layer of palisade cells that have numerous chloroplasts for photosynthesis and a layer of spongy mesophyll cells for gas exchange to take place (CO ₂ into the leaf and O ₂ is released from the leaf via the stomata).
Describe the tissues that can be found in a leaf	Epidermis, palisade and spongy mesophyll, xylem, phloem, guard cells and stomata.
Define active transport	Active transport involves the movement of a substance against a concentration gradient and requires energy from respiration.
Describe how active transport occurs in the root of a plant	Mineral ions can be absorbed by active transport into plant root hairs from very dilute solutions in the soil.
Describe how substances transported from the root to the stem of a plant	The roots, stem and leaves form a plant transport system. Root hair cells absorb water by osmosis and mineral ions by diffusion and active transport.
Explain the how the xylem is adapted to carry out its function	Xylem tissue transports water and dissolved ions. The flow of water from the roots to leaves is called the transpiration stream. Xylem tissue is composed of hollow tubes strengthened with lignin.
Explain the how the phloem is adapted to carry out its function	Phloem tissue transports dissolved sugars from the leaves to other parts of the plant. The movement of food through phloem is called translocation. Phloem cells have pores in their end walls for movement of cell sap.

B3- Infection and Response	
Question:	Answer:
Describe what is meant by a communicable disease	A disease caused by a micro-organism and can be spread
Describe what is meant by a non-communicable disease	A disease caused not caused by micro-organisms and cannot be spread. Diseases caused by genetics or lifestyle.
State the four types of micro-organisms	Bacteria, Fungi, Virus, Protocist
Name the type of microorganism that causes Measles, AIDs and Tobacco Mosaic Virus	Virus
Name the type of microorganism that causes Salmonella	Bacteria
Name the type of microorganism that has chitin in its cell walls and does not photosynthesise (but was once thought to be a type of plant)	Fungi
Name the type of microorganism that is a single-celled organism and can carry out all seven life processes within that	Protocist

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one cell	
Describe the similarities and differences between bacteria and virus	Bacteria and viruses may reproduce rapidly inside the body. Bacteria may produce poisons (toxins) that damage tissues and make us feel ill. Viruses live and reproduce inside cells, causing cell damage.
Define what binary fission is	When a bacterium divides from one into two every 20 minutes
Describe the ideal conditions that bacteria need to survive	Warmth, moisture and nutrients
Define a pathogen	Pathogens are microorganisms that cause infectious disease. Pathogens may be viruses, bacteria, protists or fungi. They may infect plants or animals and can be spread by direct contact, by water or by air
Define a vector	An insect that carries the microorganism and spreads it from one organism to another
Describe what measles is	Measles is a viral disease showing symptoms of fever and a red skin rash. Measles is a serious illness that can be fatal if complications arise. For this reason most young children are vaccinated against measles. The measles virus is spread by inhalation of droplets from sneezes and coughs
Describe what HIV is and how it can be controlled	HIV initially causes a flu-like illness. Unless successfully controlled with antiretroviral drugs the virus attacks the body's immune cells. Late stage HIV infection, or AIDS, occurs when the body's immune system becomes so badly damaged it can no longer deal with other infections or cancers. HIV is spread by sexual contact or exchange of body fluids such as blood which occurs when drug users share needles.
Describe what Tobacco Mosaic Virus is; it's symptoms and how the spread can be controlled	Tobacco mosaic virus (TMV) is a widespread plant pathogen affecting many species of plants including tomatoes. It gives a distinctive 'mosaic' pattern of discolouration on the leaves which affects the growth of the plant due to lack of photosynthesis
Describe what Salmonella is; it's symptoms and how the spread can be controlled	Salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions. In the UK, poultry are vaccinated against Salmonella to control the spread. Fever, abdominal cramps, vomiting and diarrhoea are caused by the bacteria and the toxins they secrete.
Describe what Salmonella is; it's symptoms; and how it can be controlled	Gonorrhoea is a sexually transmitted disease (STD) with symptoms of a thick yellow or green discharge from the vagina or penis and pain on urinating. It is caused by a bacterium and was easily treated with the antibiotic penicillin until many resistant strains appeared. Gonorrhoea is spread by sexual contact. The spread can be controlled by treatment with antibiotics or the use of a barrier method of contraception such as a condom.
Describe what Rose Black Spot is; how it effects the plant and how it can be controlled	Rose black spot is a fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early. It affects the growth of the plant as photosynthesis is reduced. It is spread in the environment by water or wind. Rose black spot can be treated by using fungicides and/or removing and destroying the affected leaves.
Describe what causes Malaria; it's symptoms and how the spread can be controlled	The pathogens that cause malaria are protists. The malarial protist has a life cycle that includes the mosquito. Malaria causes recurrent episodes of fever and can be fatal. The spread of malaria is controlled by preventing the vectors, mosquitoes, from breeding and by using mosquito nets to avoid being bitten.
Compare the difference between an antigen, antibody and antibiotic	Antigen- marker on the surface of the microorganism Antibody- chemical markers that are produced by white blood cells which tag the microorganism Antibiotic- Medicine that can kill bacteria and fungi
State the non-specific defences of a human body	• skin • nose • trachea and bronchi • stomach.
Describe how white blood defend against pathogens	White blood cells help to defend against pathogens by: • phagocytosis by phagocytes • antibody production by lymphocytes • antitoxin production.
Describe what a vaccine made of	A dead, weakened or inactive form of a microorganism
Explain how a vaccination works	Vaccination involves introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies. If the same pathogen re-enters the body the white blood cells respond quickly to produce the correct antibodies, preventing infection.
Explain the function of an antibiotic	Antibiotics, such as penicillin, are medicines that help to cure bacterial disease by killing infective bacteria inside the body. It is important that specific bacteria should be treated by specific antibiotics. Antibiotics only kill bacteria.
Compare the difference between primary and secondary immunity	Primary immunity is when the body first encounters a microorganism and produces antibodies to fight against it. Secondary immunity is when the body encounters a microorganism for a second time and memory cells produce antibodies to fight it.
Describe what a herd immunity is	When a large population/ group is vaccinated against a disease to prevent the spreading of a disease
Describe the stages of testing for a new drug	1) Test cells in a lab with new drug 2) Test drug on 2 animals, with similar tissue type 3) Test drug on healthy human volunteers 4) Test drug on patients whom drug is supposed to treat
Compare the differences between an open, blind and double-blind trial	Open trial – doctors and volunteers know who is taking the drug Blind trial – Doctor knows, but volunteers do not know who is taking the drug or placebo Double blind trial – Neither doctor nor volunteers know who is taking drug (only the company who makes the drug knows)
State what a placebo is and explain why is it given in a human drug trial	Placebo is a fake drug and it is given to prevent any psychological effects of taking a drug

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Describe what a monoclonal antibody is (Triple Biology only)	Monoclonal antibodies are produced from a single clone of cells. The antibodies are specific to one binding site on one protein antigen and so are able to target a specific chemical or specific cells in the body.
Explain how a monoclonal antibody is produced (Triple Biology only)	They are produced by stimulating mouse lymphocytes to make a particular antibody. The lymphocytes are combined with a particular kind of tumour cell to make a cell called a hybridoma cell. The hybridoma cell can both divide and make the antibody. Single hybridoma cells are cloned to produce many identical cells that all produce the same antibody. A large amount of the antibody can be collected and purified.
Describe the uses of monoclonal antibodies (Triple Biology only)	Some examples include: <ul style="list-style-type: none"> • for diagnosis such as in pregnancy tests • in laboratories to measure the levels of hormones and other chemicals in blood, or to detect pathogens • in research to locate or identify specific molecules in a cell or tissue by binding to them with a fluorescent dye • to treat some diseases: for cancer the monoclonal antibody can be bound to a radioactive substance, a toxic drug or a chemical which stops cells growing and dividing. It delivers the substance to the cancer cells without harming other cells in the body.
State how plant diseases can be detected (Triple Biology only)	Plant diseases can be detected by: <ul style="list-style-type: none"> • stunted growth • spots on leaves • areas of decay (rot) • growths • malformed stems or leaves • discolouration • the presence of pests.
State how identification of plant disease can be made (Triple Biology only)	Identification can be made by: <ul style="list-style-type: none"> • reference to a gardening manual or website • taking infected plants to a laboratory to identify the pathogen • using testing kits that contain monoclonal antibodies.
State the symptoms of ion deficiency in plants (Triple Biology only)	Plants can be damaged by a range of ion deficiency conditions: <ul style="list-style-type: none"> • stunted growth caused by nitrate deficiency • chlorosis caused by magnesium deficiency.

B4- Bioenergetics	
Question:	Answer:
State the word equation for photosynthesis	carbon dioxide + water --> glucose + oxygen
Describe the uses of glucose that is made by photosynthesis	The glucose produced in photosynthesis may be: <ul style="list-style-type: none"> • used for respiration • converted into insoluble starch for storage • used to produce fat or oil for storage • used to produce cellulose, which strengthens the cell wall • used to produce amino acids for protein synthesis.
State what nitrates are used for by a plant	To produce proteins, plants also use nitrate ions that are absorbed from the soil.
State whether cellular respiration is an exothermic or endothermic process	Cellular respiration as an exothermic reaction which is continuously occurring in living cells
Compare the difference between aerobic and anaerobic respiration	Respiration in cells can take place aerobically (using oxygen) or anaerobically (without oxygen), to transfer energy.
State why organisms need energy	Organisms need energy for: <ul style="list-style-type: none"> • chemical reactions to build larger molecules • movement • keeping warm.
State the word equation for aerobic respiration	glucose + oxygen --> carbon dioxide + water + 36 ATP
State the word equation for anaerobic respiration in animals	Glucose --> lactic acid + 2 ATP
State the word equation for anaerobic respiration in plants and yeast cells	glucose --> ethanol + carbon dioxide Anaerobic respiration in yeast cells is called fermentation and has economic importance in the manufacture of bread and alcoholic drinks.
Describe and explain how the body responds to exercise	During exercise the human body reacts to the increased demand for energy. The heart rate, breathing rate and breath volume increase during exercise to supply the muscles with more oxygenated blood. If insufficient oxygen is supplied anaerobic respiration takes place in muscles. The incomplete oxidation of glucose causes a build up of lactic acid and creates an oxygen debt. During long periods of vigorous activity muscles become fatigued and stop contracting efficiently.
Explain what happens to lactic acid and what oxygen debt is	Blood flowing through the muscles transports the lactic acid to the liver where it is converted back into glucose. Oxygen debt is the amount of extra oxygen the body needs after exercise to react with the accumulated lactic acid and remove it from the cells.
State examples of metabolism in the human body	Metabolism includes: <ul style="list-style-type: none"> • conversion of glucose to starch, glycogen and cellulose • the formation of lipid molecules from a molecule of glycerol and three molecules of fatty acids • the use of glucose and nitrate ions to form amino acids which in turn are used to synthesise proteins • respiration • breakdown of excess proteins to form urea for excretion.

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B5- Homeostasis	
Question:	Answer:
Define homeostasis	Homeostasis is the regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes.
State examples of homeostasis in the body	In the human body, these include control of: <ul style="list-style-type: none"> • blood glucose concentration • body temperature • water levels.
Describe the series of actions for all homeostatic controls	All control systems include: <ul style="list-style-type: none"> • cells called receptors, which detect stimuli (changes in the environment) • coordination centres (such as the brain, spinal cord and pancreas) that receive and process information from receptors • effectors, muscles or glands, which bring about responses which restore optimum levels
Describe the function of the nervous system	The nervous system enables humans to react to their surroundings and to coordinate their behaviour.
Describe the series of actions that happens in a nervous system	Information from receptors passes along cells (neurons) as electrical impulses to the central nervous system (CNS). The CNS is the brain and spinal cord. The CNS coordinates the response of effectors which may be muscles contracting or glands secreting hormones. Stimulus --> receptor --> coordinator --> effector --> response
Describe what a reflex action is	Reflex actions are automatic and rapid; they do not involve the conscious part of the brain.
Describe the function of the brain (Triple Biology only)	The brain controls complex behaviour. It is made of billions of interconnected neurones and has different regions that carry out different functions.
Describe how the brain can map regions of the brain (Triple Biology only)	Neuroscientists have been able to map the regions of the brain to particular functions by studying patients with brain damage, electrically stimulating different parts of the brain and using MRI scanning techniques. The complexity and delicacy of the brain makes investigating and treating brain disorders very difficult.
Name the parts of the eye (Triple Biology only)	<ul style="list-style-type: none"> • retina • optic nerve • sclera • cornea • iris • ciliary muscles • suspensory ligaments.
Explain what accommodation is and compare the actions that the eyes do to help focus on near and distant objects (Triple Biology only)	Accommodation is the process of changing the shape of the lens to focus on near or distant objects. To focus on a near object: <ul style="list-style-type: none"> • the ciliary muscles contract • the suspensory ligaments loosen • the lens is then thicker and refracts light rays strongly. To focus on a distant object: <ul style="list-style-type: none"> • the ciliary muscles relax • the suspensory ligaments are pulled tight • the lens is then pulled thin and only slightly refracts light rays
State two common defects of the eye and how they are treated (Triple Biology only)	Two common defects of the eyes are myopia (short sightedness) and hyperopia (long sightedness) in which rays of light do not focus on the retina. <ul style="list-style-type: none"> • Generally these defects are treated with spectacle lenses which refract the light rays so that they do focus on the retina. • New technologies now include hard and soft contact lenses, laser surgery to change the shape of the cornea and a replacement lens in the eye.
Describe how body temperature is controlled (Triple Biology only)	Body temperature is monitored and controlled by the thermoregulatory centre in the brain. The thermoregulatory centre contains receptors sensitive to the temperature of the blood. The skin contains temperature receptors and sends nervous impulses to the thermoregulatory centre.
Compare the physiological (body) responses to being too hot or too cold (Triple Biology only)	If the body temperature is too high, blood vessels dilate (vasodilation) and sweat is produced from the sweat glands. Both these mechanisms cause a transfer of energy from the skin to the environment. If the body temperature is too low, blood vessels constrict (vasoconstriction), sweating stops and skeletal muscles contract (shiver).
Describe the function of the endocrine system	The endocrine system is composed of glands which secrete chemicals called hormones directly into the bloodstream. The blood carries the hormone to a target organ where it produces an effect.
State whether the endocrine system is faster or slower than the nervous system	Compared to the nervous system the effects of the endocrine system are slower but act for longer.
Describe the function of the pituitary gland and what they produce	The pituitary gland in the brain is a 'master gland' which secretes several hormones into the blood in response to body conditions. These hormones in turn act on other glands to stimulate other hormones to be released to bring about effects.
Describe the function of the pancreas in relation to blood glucose levels	Blood glucose concentration is monitored and controlled by the pancreas. If the blood glucose concentration is too high, the pancreas produces the hormone insulin that causes glucose to move from the blood into the cells.

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	In liver and muscle cells excess glucose is converted to glycogen for storage.
Compare the differences in Type 1 and Type 2 diabetes	Type 1 diabetes is a disorder in which the pancreas fails to produce sufficient insulin. It is characterised by uncontrolled high blood glucose levels and is normally treated with insulin injections. In Type 2 diabetes the body cells no longer respond to insulin produced by the pancreas. A carbohydrate controlled diet and an exercise regime are common treatments. Obesity is a risk factor for Type 2 diabetes.
Describe what happens if blood glucose levels fall too low	If the blood glucose concentration is too low, the pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.
Explain the effect on cells of osmotic changes in body fluids.	Water leaves the body via the lungs during exhalation. Water, ions and urea are lost from the skin in sweat. There is no control over water, ion or urea loss by the lungs or skin. Excess water, ions and urea are removed via the kidneys in the urine. If body cells lose or gain too much water by osmosis they do not function efficiently.
Explain how the kidneys produce urine	The kidneys produce urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water.
Explain the function of the hormone ADH	The water level in the body is controlled by the hormone ADH which acts on the kidney tubules. ADH is released by the pituitary gland when the blood is too concentrated and it causes more water to be reabsorbed back into the blood from the kidney tubules. This is controlled by negative feedback.
Describe how people who have kidney failure are treated	Treated by organ transplant or by using kidney dialysis.

Describe the function of oestrogen in women	Oestrogen is the main female reproductive hormone produced in the ovary. At puberty eggs begin to mature and one is released approximately every 28 days. This is called ovulation.
Describe the function of testosterone in males	Testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.
Explain the function of each hormone involved in the menstrual cycle	Several hormones are involved in the menstrual cycle of a woman. <ul style="list-style-type: none"> • Follicle stimulating hormone (FSH) causes maturation of an egg in the ovary. • Luteinising hormone (LH) stimulates the release of the egg. • Oestrogen and progesterone are involved in maintaining the uterus lining.
Describe all the types of contraceptive methods	Fertility can be controlled by a variety of hormonal and non-hormonal methods of contraception. These include: <ul style="list-style-type: none"> • oral contraceptives that contain hormones to inhibit FSH production so that no eggs mature • injection, implant or skin patch of slow release progesterone to inhibit the maturation and release of eggs for a number of months or years • barrier methods such as condoms and diaphragms which prevent the sperm reaching an egg • spermicidal agents which kill or disable sperm • abstaining from intercourse when an egg may be in the oviduct • surgical methods of male and female sterilisation.
Describe the stages of IVF	In Vitro Fertilisation (IVF) treatment. <ul style="list-style-type: none"> • IVF involves giving a mother FSH and LH to stimulate the maturation of several eggs. • The eggs are collected from the mother and fertilised by sperm from the father in the laboratory. • The fertilised eggs develop into embryos. • At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb).
Describe the function of adrenaline	Adrenaline is produced by the adrenal glands in times of fear or stress. It increases the heart rate and boosts the delivery of oxygen and glucose to the brain and muscles, preparing the body for 'flight or fight'.
Explain why plants produce hormones	Plants produce hormones to coordinate and control growth and responses to light (phototropism) and gravity (gravitropism or geotropism). Unequal distributions of auxin cause unequal growth rates in plant roots and shoots.
Compare the function of ethene and gibberellin	Gibberellins are important in initiating seed germination. Ethene controls cell division and ripening of fruits.
Describe what auxin is used for	Auxins are used: <ul style="list-style-type: none"> • as weed killers • as rooting powders • for promoting growth in tissue culture.
Describe what ethene is used for	Ethene is used in the food industry to control ripening of fruit during storage and transport.
Describe what gibberellin is used for	Gibberellins can be used to: <ul style="list-style-type: none"> • end seed dormancy • promote flowering • increase fruit size.

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B6- Inheritance, Variation and Evolution	
Question:	Answer:
Describe what sexual reproduction is	Sexual reproduction involves the joining (fusion) of male and female gametes: <ul style="list-style-type: none"> • sperm and egg cells in animals • pollen and egg cells in flowering plants.
Compare the difference between sexual and asexual reproduction	In sexual reproduction there is mixing of genetic information which leads to variety in the offspring. The formation of gametes involves meiosis. <p>Asexual reproduction involves only one parent and no fusion of gametes. There is no mixing of genetic information. This leads to genetically identical offspring (clones). Only mitosis is involved.</p>
Explain the importance of meiosis	Cells in reproductive organs divide by meiosis to form gametes. When a cell divides to form gametes: <ul style="list-style-type: none"> • copies of the genetic information are made • the cell divides twice to form four gametes, each with a single set of chromosomes • all gametes are genetically different from each other. <p>Gametes join at fertilisation to restore the normal number of chromosomes. The new cell divides by mitosis. The number of cells increases. As the embryo develops cells differentiate.</p>
Compare the advantages of sexual and asexual reproduction	Advantages of sexual reproduction: <ul style="list-style-type: none"> • produces variation in the offspring • if the environment changes variation gives a survival advantage by natural selection • natural selection can be speeded up by humans in selective breeding to increase food production. <p>Advantages of asexual reproduction:</p> <ul style="list-style-type: none"> • only one parent needed • more time and energy efficient as do not need to find a mate • faster than sexual reproduction • many identical offspring can be produced when conditions are favourable.
Describe the difference between DNA, gene and genome	The genetic material in the nucleus of a cell is composed of a chemical called DNA. DNA is a polymer made up of two strands forming a double helix. The DNA is contained in structures called chromosomes. A gene is a small section of DNA on a chromosome. Each gene codes for a particular sequence of amino acids, to make a specific protein.
Explain why the human genome is important	The importance of understanding the human genome. <ul style="list-style-type: none"> • search for genes linked to different types of disease • understanding and treatment of inherited disorders • use in tracing human migration patterns from the past.
Describe the structure of DNA (Triple Biology only)	DNA as a polymer made from four different nucleotides. Each nucleotide consists of a common sugar and phosphate group with one of four different bases attached to the sugar. DNA contains four bases, A, C, G and T. A sequence of three bases is the code for a particular amino acid. <p>The order of bases controls the order in which amino acids are assembled to produce a particular protein.</p>
Explain where and what happens in protein synthesis	Proteins are synthesised on ribosomes, according to a template. Carrier molecules bring specific amino acids to add to the growing protein chain in the correct order.
Explain what a mutation is and why a mutation can have a negative effect on the body	Mutations occur continuously. Most do not alter the protein, or only alter it slightly so that its appearance or function is not changed. A few mutations code for an altered protein with a different shape. An enzyme may no longer fit the substrate binding site or a structural protein may lose its strength.
Compare the difference between a dominant and recessive allele	A dominant allele is always expressed, even if only one copy is present. A recessive allele is only expressed if two copies are present (therefore no dominant allele present).
Compare the difference between homozygous and heterozygous alleles	If the two alleles present are the same the organism is homozygous for that trait, but if the alleles are different they are heterozygous.
State the allele which causes polydactyly	Polydactyly (having extra fingers or toes) is caused by a dominant allele.
State the allele which causes cystic fibrosis	Cystic fibrosis (a disorder of cell membranes) is caused by a recessive allele.
Describe the sex chromosomes in males and females	Ordinary human body cells contain 23 pairs of chromosomes. 22 pairs control characteristics only, but one of the pairs carries the genes that determine sex. <ul style="list-style-type: none"> • In females the sex chromosomes are the same (XX). • In males the chromosomes are different (XY).
Define variation and explain what causes it	Differences in the characteristics of individuals in a population is called variation and may be due to differences in: <ul style="list-style-type: none"> • the genes they have inherited (genetic causes) • the conditions in which they have developed (environmental causes) • a combination of genes and the environment.
Define evolution	Gradual change in an organism to adapt to the surrounding environments
Explain what causes speciation	If two populations of one species become so different in phenotype that they can no longer interbreed to produce fertile offspring they have formed two new species.

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Explain what selective breeding is	Selective breeding involves choosing parents with the desired characteristic from a mixed population. They are bred together. From the offspring those with the desired characteristic are bred together. This continues over many generations until all the offspring show the desired characteristic.
State some uses of selective breeding	<ul style="list-style-type: none"> • Disease resistance in food crops. • Animals which produce more meat or milk. • Domestic dogs with a gentle nature. • Large or unusual flowers.
Describe what genetic engineering is	Genetic engineering as a process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic.
Describe the stages of genetic engineering	In genetic engineering: <ul style="list-style-type: none"> • enzymes are used to isolate the required gene; this gene is inserted into a vector, usually a bacterial plasmid or a virus • the vector is used to insert the gene into the required cells • genes are transferred to the cells of animals, plants or microorganisms at an early stage in their development so that they develop with desired characteristics
Describe what a GM crop is	Crops that have had their genes modified in this way are called genetically modified (GM) crops. GM crops include ones that are resistant to insect attack or to herbicides. GM crops generally show increased yields.
Compare the difference between the process of tissue culture and cuttings to produce plant clones	Tissue culture: using small groups of cells from part of a plant to grow identical new plants. Cuttings: an older, but simple, method used by gardeners to produce many identical new plants from a parent plant.
Explain what an embryo transplants is	Embryo transplants: splitting apart cells from a developing animal embryo before they become specialised, then transplanting the identical embryos into host mothers
Describe the process of adult cloning	Adult cell cloning: <ul style="list-style-type: none"> • The nucleus is removed from an unfertilised egg cell. • The nucleus from an adult body cell, such as a skin cell, is inserted into the egg cell. • An electric shock stimulates the egg cell to divide to form an embryo. • These embryo cells contain the same genetic information as the adult skin cell. • When the embryo has developed into a ball of cells, it is inserted into the womb of an adult female to continue its development.
Describe the process of how fossils are formed	Fossils may be formed: <ul style="list-style-type: none"> • from parts of organisms that have not decayed because one or more of the conditions needed for decay are absent • when parts of the organism are replaced by minerals as they decay • as preserved traces of organisms, such as footprints, burrows and rootlet traces.
Explain how we can reduce the rate of development of antibiotic resistant strains	<ul style="list-style-type: none"> • doctors should not prescribe antibiotics inappropriately, such as treating non-serious or viral infections • patients should complete their course of antibiotics so all bacteria are killed and none survive to mutate and form resistant strains • the agricultural use of antibiotics should be restricted.

B7- Ecology	
Define ecosystem	An ecosystem is the interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment
Describe how plants and animals compete within a community	Plants in a community or habitat often compete with each other for light and space, and for water and mineral ions from the soil. Animals often compete with each other for food, mates and territory.
Describe what interdependence is	Within a community each species depends on other species for food, shelter, pollination, seed dispersal etc. If one species is removed it can affect the whole community. This is called interdependence.
Define a stable community	A stable community is one where all the species and environmental factors are in balance so that population sizes remain fairly constant
State the abiotic factors within a community	Abiotic (non-living) factors which can affect a community are: <ul style="list-style-type: none"> • light intensity • temperature • moisture levels • soil pH and mineral content • wind intensity and direction • carbon dioxide levels for plants • oxygen levels for aquatic animals.
State the biotic factors within a community	Biotic (living) factors which can affect a community are: <ul style="list-style-type: none"> • availability of food • new predators arriving • new pathogens • one species outcompeting another so the numbers are no longer sufficient to breed.
Describe what adaptation means	Organisms have features that enable them to survive in the conditions in which they normally live. These adaptations may be structural, behavioural or functional.
Define extremophiles	Organisms live in environments that are very extreme, such as at high temperature, pressure, or salt concentration.
Describe what a food chain shows	Feeding relationships within a community can be represented by food

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	chains. All food chains begin with a producer which synthesises molecules. This is usually a green plant or alga which makes glucose by photosynthesis.
Compare the carbon and water cycle	The carbon cycle returns carbon from organisms to the atmosphere as carbon dioxide to be used by plants in photosynthesis. The water cycle provides fresh water for plants and animals on land before draining into the seas. Water is continuously evaporated and precipitated.
Explain how gardeners and farmers try to provide optimum conditions for rapid decay of waste biological material (Triple Biology only)	The compost produced is used as a natural fertiliser for growing garden plants or crops. Anaerobic decay produces methane gas. Biogas generators can be used to produce methane gas as a fuel.
Define biodiversity	Biodiversity is the variety of all the different species of organisms on earth, or within an ecosystem.
Explain why biodiversity is important	A great biodiversity ensures the stability of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment.
Describe some causes of pollution	Pollution can occur: <ul style="list-style-type: none"> • in water, from sewage, fertiliser or toxic chemicals • in air, from smoke and acidic gases • on land, from landfill and from toxic chemicals
Explain how humans reduce the amount of land available for animals and plants	Building, quarrying, farming and dumping waste.
Explain why large-scale deforestation in tropical areas is important	provide land for cattle and rice fields <ul style="list-style-type: none"> • grow crops for biofuels.
State what three gases cause global warming	Levels of carbon dioxide, water and methane in the atmosphere are increasing and contribute to 'global warming'.
Explain the programmes that scientists have put in place to reduce the negative effects of humans on ecosystems and biodiversity	. These include: <ul style="list-style-type: none"> • breeding programmes for endangered species • protection and regeneration of rare habitats • reintroduction of field margins and hedgerows in agricultural areas where farmers grow only one type of crop • reduction of deforestation and carbon dioxide emissions by some governments • recycling resources rather than dumping waste in landfill
Describe the levels of a food chain	Level 1: Plants and algae make their own food and are called producers. Level 2: Herbivores eat plants/algae and are called primary consumers. Level 3: Carnivores that eat herbivores are called secondary consumers. Level 4: Carnivores that eat other carnivores are called tertiary consumers. Apex predators are carnivores with no predators.
Describe the function of a decomposer	Decomposers break down dead plant and animal matter by secreting enzymes into the environment. Small soluble food molecules then diffuse into the microorganism.
Describe the importance of a pyramid of biomass	Pyramids of biomass can be constructed to represent the relative amount of biomass in each level of a food chain
Describe the causes of biomass loss	Losses of biomass are due to: <ul style="list-style-type: none"> • not all the ingested material is absorbed, some is egested as faeces • some absorbed material is lost as waste, such as carbon dioxide and water in respiration and water and urea in urine.
State the biological factors, which are threatening food security	<ul style="list-style-type: none"> • the increasing birth rate has threatened food security in some countries • changing diets in developed countries means scarce food resources are transported around the world • new pests and pathogens that affect farming • environmental changes that affect food production, such as widespread famine occurring in some countries if rains fail • the cost of agricultural inputs • conflicts that have arisen in some parts of the world which affect the availability of water or food.
Describe two methods of solving the problem of over-fishing	Control of net size and the introduction of fishing quotas
Describe how Fusarium, GM bacterium and GM crops are important	<p>The fungus Fusarium is useful for producing mycoprotein, a protein-rich food suitable for vegetarians. The fungus is grown on glucose syrup, in aerobic conditions, and the biomass is harvested and purified.</p> <p>A genetically modified bacterium produces human insulin. When harvested and purified this is used to treat people with diabetes.</p> <p>GM crops could provide more food or food with an improved nutritional value such as golden rice.</p>