**Core questions – Biology - unit 1 – Cell biology**

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| **No.** | **Question** | **Answer** |
| 1 | What is the structure eukaryotic cell? | Have a cell membrane, cytoplasm and genetic material enclosed in a nucleus |
| 2 | What types of organisms contain eukaryotic cells? | Animal and plant cells |
| 3 | What is the structure of a prokaryotic cell? | Contain cytoplasm, cell membrane, cell wall, genetic material **not** enclosed in a nucleus, rings of DNA called plasmids |
| 4 | What types of organisms contain prokaryotic cells? | Bacteria |
| 5 | What is a sub-cellular structure? | Structures within the cell |
| 6 | What sub-cellular structures do animals cells have? | nucleus, cytoplasm, cell membrane, mitochondria, ribosomes |
| 7 | What additional sub-cellular structures do plants cells have that animal cells don’t? | cell wall, chloroplasts, permanent vacuole |
| 8 | What is the function of the nucleus? | Contains genetic material (DNA) which controls the cell’s activities |
| 9 | What is the function of the cytoplasm? | Jelly-like substance where most chemical reactions happen |
| 10 | What is the function of the cell membrane? | Surrounds the cell and controls movement of substances in and out |
| 11 | What is the function of the mitochondria? | Part of the cell where energy is **released** from glucose  |
| 12 | What is the function of the ribosomes? | Makes proteins |
| 13 | What is the cell wall made of? | Cellulose |
| 14 | What is the function of the cell wall? | Provides structure and support |
| 15 | What is the function of the chloroplasts? | Where photosynthesis occurs |
| 16 | What substance is contained in the chloroplasts that absorbs light? | Chlorophyll |
| 17 | What is the function of the vacuole? | Contain cell sap, a solution of sugar and salts |
| 18 | How do we observe cells? | Using a microscope |
| 19 | What is a light microscope? | A microscope that uses visible light and lenses |
| 20 | What are the key features of a light microscope? | Stage, objective lens, eye piece lens, focus adjustment, light source |
| 21 | What is an electron microscope? | A microscope that uses electrons and electron lenses |
| 22 | What is magnification? | How many times bigger than it actually is |
| 23 | What is resolution? | Minimum distance apart that two objects can be in order for them to be seen as separate objects |
| 24 | What are the advantages of using an electron microscope compared to a light microscope? | Higher magnification and resolution |
| 25 | How is magnification calculated? | magnification = image size / actual size |
| 26 | What does the prefix milli mean? | Thousandth of a metre (x 10-3m) |
| 27 | What does the prefix micro mean? | Millionth of a metre (x 10-6m) |
| 28 | What does the prefix nano mean? | Billionth of a metre (x 10-9m) |
| 29 | What is the relationship between the prefixes milli, micro and nano? | 1000 times smaller each time |
| 30 | Why do cells differentiate? | The process by which a cell changes to become specialised for a particular job |
| 31 | When does most cell differentiation happen in animals? | At an early stage of development (as a foetus) |
| 32 | What is cell division mainly used for in mature animals? | Repair and replace cells |
| 33 | When does cell differentiation occur in plants? | Most plant cells retain the ability to differentiate throughout the life of the plant |
| 34 | What is a specialised cell? | A cell that has a structural adaptation to perform a particular function |
| 35 | What are 3 examples of specialised cells in animals? | Sperm cells, nerve cells & muscle cells |
| 36 | How is a sperm cell specialised to carry out its function? | Long tail and streamlined head to swim; lots of mitochondria to provide it with energy |
| 37 | How is a nerve cell specialised to carry out its function? | They a very long with branched connections to connect to other nerve cells and form a network it the body |
| 38 | What are 3 examples of specialised cells in plants? | Root hair cells, xylem and phloem cells |
| 39T | How do bacteria divide? **(Triple only)** | By binary fission |
| 40T | How often can bacteria divide through binary fission? **(Triple only)** | Up to once every 20 minutes |
| 41T | How are bacteria grown in a lab? **(Triple only)** | On a nutrient broth solution or as colonies on an agar gel plate |
| 42T | What is the definition of ‘aseptic’? **(Triple only)** | ‘Free from contamination’ |
| 43T | Why is it important we can grow uncontaminated cultures of microorganisms? **(Triple only)** | To investigate the action of disinfectants and antibiotics |
| 44T | What steps are taken when preparing an uncontaminated culture using aseptic technique? **(Triple only)** | **STEP 1**: Petri dishes and culture media must be sterilised before use**STEP 2**: Inoculating loops used to transfer microorganisms to the media must be sterilised by passing them through a flame**STEP 3**: The lid of the Petri dish should be secured with adhesive tape and stored upside down |
| 45T | Why is it important equipment is sterilised before and during aseptic technique? **(Triple only)** | To prevent contamination of unwanted microorganisms |
| 46T | Why is the lid of the petri dish secured with adhesive tape? **(Triple only)** | To prevent microorganisms entering or leaving the petri dish  |
| 47T | Why are petri dishes stored upside down? **(Triple only)** | To stop condensation dripping on the agar |
| 48T | At what temperature should bacterial cultures be stored in school laboratories? **(Triple only)** | 25°C |
| 49T | Why do schools use a maximum temperature of 25°C when incubating cultures? **(Triple only)** | To avoid harmful bacteria growing |
| 50 | What is a chromosome? | Coiled up lengths of DNA that contain genes |
| 51 | What steps are involved in the cell cycle? | **STEP 1**: Cell grows and increases the number of sub-cellular structures like ribosomes and mitochondria**STEP 2**: The DNA replicates to form two copies of each chromosome**STEP 3**: MITOSIS – one set of chromosomes is pulled to each end of the cell and the nucleus divides**STEP 4**: The cytoplasm and cell membranes divide to form two identical cells  |
| 52 | Why do cells divide by mitosis? | For growth and repair |
| 53 | What is a stem cell? | An undifferentiated cell capable of giving rise to more cells of the same type |
| 54 | What can stem cells be used to treat? | Diabetes and paralysis |
| 55 | What can stem cells from human embryos be turned into? | Any kind of cell because they haven’t become specialised yet |
| 56 | Where are stem cells found in adults? | Bone marrow |
| 57 | Why are bone marrow stem cells not as good as embryo stem cells? | They can’t turn into any type of cell, only certain ones, like blood cell |
| 58 | What is therapeutic cloning? | Procedure where by an embryo is produced with the same genes as the patient. |
| 59 | Why is therapeutic cloning advantageous? | Any cells produced by it, wouldn’t be rejected by the patient because it contains their own genes |
| 60 | What are the risks associated with stem cells? | If they are contaminated, viral infections may transfer to the patient |
| 61 | Why are some people opposed to using stem cells from embryos? | They have ethical or religious objections about destroying a potential human life |
| 62 | What can stem cells from meristems be used for? | Protect rare species from extinction.Produce crops with disease resistance.  |
| 63 | What is diffusion? | The net movement of particles from an area of high concentration to an area of lower concentration |
| 64 | What do particles do during diffusion? | Spread out until their concentration is even |
| 65 | What factors affect the rate of diffusion? | Temperature, concentration gradient, the surface area of the membrane |
| 66 | What substances diffuse into/out of cells? | Oxygen & carbon dioxide in gas exchangeGlucose, amino acids, fatty acids and glycerol in digestionWater in the large intestineUrea in the kidney |
| 67 | How does surface area to volume ratio relate to the size of an organism? | The smaller the organism, the larger its surface area to volume ratioThe larger the organism, the smaller its surface area to volume ratio |
| 68 | What effect does surface area to volume ratio have on an organism’s ability to exchange substances with its surroundings? | Single celled organisms have a large enough surface area compared to its volume to absorb substances it needs from the environment Multicellular organisms need specialist surfaces and organ systems to be able to exchange substances with the environment |
| 69 | What are the features of a good exchange surface? | Large surface area; Good blood supply to maintain a big concentration gradient; Thin, to provide a short diffusion path;  |
| 70 | What are two specialist exchange surfaces in mammals? | Villi in the small intestine; alveoli in the lungs |
| 71 | What specialist exchange surface does a fish have to exchange gases? | Gills |
| 72 | What is osmosis? | Osmosis is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane |
| 73 | What is active transport? | Active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration. |
| 74 | Where and how does active transport take place in plants? | Root hairs; mineral ions are absorbed into the root hair cells from very dilute solutions in the soil |
| 75 | Why do plants require ions? | For healthy growth |
| 76 | Where does active transport take place in animals? | Sugar molecules are absorbed from lower concentrations in the gut to higher concentrations into the blood in the small intestine |
| 77 | What are sugar molecules used for? | Respiration |

**Core questions – Biology Unit 2 - Organisation**

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| **No** | **Question** | **Answer** |
| 1 | What are cells? | The basic building blocks of all living organisms |
| 2 | What is a tissue? | A group of cells with a similar structure and function |
| 3 | What is an organ? | Aggregations of tissues performing specific functions |
| 4 | What is an organ system? | A group of organs, which work together to form organisms |
| 5 | What is a muscular tissue? | A tissue that contracts to move whatever it’s attached to |
| 6 | What is a glandular tissue? | A tissue which makes and secrete chemicals like enzymes and hormones |
| 7 | What is an epithelial tissue? | A tissue which covers some parts of the body |
| 8 | What is a catalyst? | A substance which increases the speed of a reaction, without being changed or used up in the reaction |
| 9 | What is an enzyme? | A biological catalyst |
| 10 | What is the structure of an enzyme? | Large proteins made of chains of amino acids |
| 11 | What is the ‘active site’ on an enzyme? | A uniquely shaped section of the enzyme that only certain molecules will fit into |
| 12 | What is a ‘substrate’? | The substance involved with the chemical reaction that fits into the enzyme |
| 13 | What is the ‘lock and key’ theory? | A specific substrate (the key) fits into the active site (lock) of the enzyme, breaking the bonds in the substrate |
| 14 | What two conditions can affect how an enzyme works? | Temperature and pH |
| 15 | What happens as the temperature of an enzyme controlled reaction increases? | The rate of reaction will also increase, but only until a certain temperature |
| 16 | Why does the enzyme stop working past a certain temperature? | The enzyme has become ‘denatured’ |
| 17 | What happens when an enzyme becomes ‘denatured’? | The active changes shape, meaning it will no longer compliment the correct substrate |
| 18 | How does pH affect enzymes? | Enzymes have an optimum pH. Anything above or below this will cause it to become denatured |
| 19 | What enzymes are involved with digestion? | Carbohydrase, lipase, protease |
| 20 | Why are enzymes important in digestion? | They break large molecules, that can’t be absorbed into the blood stream, down into smaller molecules |
| 21 | What is the function of carbohydrases? | To break down carbohydrates to simple sugars |
| 22 | What is amylase? | A carbohydrase that breaks down starch |
| 23 | What is the function of protease? | To break down proteins into amino acids |
| 24 | What is the function of lipase? | To break down lipids (fats) into glycerol and fatty acids |
| 25 | Where is amylase produced? | Salivary glands (mouth), pancreas, small intestine |
| 26 | Where is protease produced? | Stomach, pancreas, small intestine |
| 27 | Where is lipase produced? | Pancreas, small intestine |
| 28 | What is the order in which food passes through the digestive system? | Mouth->oesophagus-> stomach-> small intestine->large intestine->rectum->anus |
| 29 | What is the function of the mouth in digestion? | To mechanically break up food into smaller pieces to increase surface area |
| 30 | What are two functions of saliva in digestion? | 1. To moisten food to allow easier swallowing, 2. To start chemical digestion by containing salivary amylase |
| 31 | What is the function of stomach acid? | To kill potentially pathogenic microorganisms in food (**NOT** to digest food) |
| 32 | What is the function of the small intestine? | To absorb glucose, amino acids, vitamins and mineral ions from digested food |
| 33 | How are the small intestines adapted to carry out their function? | Small intestine has structures called **villi** which increase surface area  |
| 34 | How are villi adapted to carry out absorption? | Large surface area, wall is only one cell thick, large blood supply |
| 35 | What is the function of the large intestine? | To absorb water from digested food |
| 36 | What is the function of the liver in digestion? | To produce bile  |
| 37 | What is the function of the gall bladder? | To store bile until it can be released into the small intestine |
| 38 | What is the function of bile? | Neutralises hydrochloric acid from the stomach; Emulsifies (breaks down) fats to increase their surface area |
| 39 | What is the function of the rectum? | To store undigested material before excretion |
| 40 | What are the products of digestion used for? | Build new carbohydrates, lipids and proteins. Glucose is used for respiration |
| 41 | When practical steps are needed when testing for food molecules are present in different foods? | 1. Break the food up using a pestle and mortar
2. Transfer to a beaker and add some distilled water
3. Stir the mixture
4. Filter the solution using a filter funnel and filter paper to get rid of any solids left
 |
| 42 | What reagent is used to test for reducing sugars? | Benedict’s solution |
| 43 | What additional steps should be taken other than adding Benedict’s solution to the food sample when testing for reducing sugars? | Place the mixture of Benedict’s solution and food sample in a water bath set at about 75oC and leave for about 5 minutes |
| 44 | What is a positive result for reducing sugars? | Benedict’s solution turns a brick-red colour (could also turn green or yellow if there is less sugar) |
| 45 | What reagent is used to test for protein? | Biuret solution |
| 46 | What is a positive result for proteins? | Biuret solution turns pink or purple |
| 47 | What reagent is used to test for lipids? | Sudan III |
| 48 | What reagent is used to test for starch? | Iodine solution |
| 49 | What is a positive result for starch? | Iodine solution turns a blue-black colour |
| 50 | Label the main structures in the respiratory system? oxo_AQA16_B404_pr01_awfg01 | oxo_AQA16_B404_pt01_awfg01 |
| 51 | What is the function of the alveoli? | Increase surface area of the lung to maximise gas exchange |
| 52 | What is the function of the trachea? | Carries air to and from the lungs |
| 53 | What is the function of the bronchus? (plural = bronchi) | Carries air into and out of left or right lung |
| 54 | How are alveoli adapted to make gas exchange rapid and effective? | Spherical shape, very thin walls, lots of capillaries |
| 55 | Why does an alveolus have a spherical shape? | To give a large surface area |
| 56 | Why does an alveolus have very thin walls? | Gives a short diffusion distance for gas to travel in and out of the alveoli |
| 57 | Why are alveoli surrounded by lots of capillaries? | To provide a good blood supply to maintain a steep concentration gradient |
| 58 | What happens to the volume and pressure inside the chest when we breathe in? | Volume increases, pressure decreases |
| 59 | What happens to the volume and pressure inside the chest when we breathe out? | Volume decreases, pressure increases |
| 60 | Identify the structures of the heart?  | A = vena cava B = right atrium C = right ventricle D = left ventricle E = valves F = left atrium G = pulmonary vein H = aorta I = pulmonary artery |
| 61 | How many chambers does the heart have and what are they? | 4 chambers. Atria and Ventricles |
| 62 | Which side of the heart carries oxygenated blood? | Left |
| 63 | Which side of the heart carries deoxygenated blood? | Right  |
| 64 | Which blood vessel carries blood to the right atrium? | Vena cava  |
| 65 | Where does the vena cava carry blood from? | The body |
| 66 | Which blood vessel carries blood away from the left ventricle and where does it go to? | Aorta to the body |
| 67 | Which side of the heart is made from thicker muscle and why? | Left, to pump blood all of the way around the body at high pressure |
| 68 | Which blood vessel returns blood to the left atrium? | Pulmonary vein |
| 69 | Where does the pulmonary artery carry blood from? | The lungs |
| 70 | Why does the heart pump blood to the lungs? | For gas exchange |
| 71 | Which blood vessel carries blood from the right ventricle and where does it go to? | Pulmonary artery to the lungs |
| 72 | What are the coronary arteries? | Blood vessels that supply the heart muscle tissue with oxygen |
| 73 | Where is the hearts pacemaker found and what is its function? | Groups of cells in the right atrium controlling natural heart rate |
| 74 | What is the role of an **artificial** pacemaker? | To correct irregularities in the heart rate |
| 75 | What is the function of the valves in the heart? | To prevent the backflow of blood. |
| 76 | How do you calculate the rate of blood flow? | Rate of blood flow (ml/min) = volume of blood (ml) number of minutes (mins) |
| 77 | What are the 3 types of blood vessel? | Artery, vein and capillary |
| 78 | Which type of blood vessel carries blood away from the heart? | Artery |
| 79 | Which type of blood vessel carries blood towards the heart? | Vein |
| 80 | What is the lumen? | The inside space (in the blood vessels) |
| 81 | Describe the structure of a capillary? | The wall is only one cell thick; very small lumen |
| 82 | Why do capillaries have a small lumen and a wall that is one cell thick? | To allow substances to diffuse in and out very easily |
| 83 | Describe the structure of an artery? | Very thick walls made of smooth muscle with elastic fibres; small lumen |
| 84 | Why does an artery have thick muscular walls and elastic fibres? | Smooth muscle gives strength due to the high pressure of the blood and elastic fibres allow the artery to stretch and spring back. |
| 85 | Describe the structure of a vein? | Thinner, less muscular walls than arteries; large lumen; contain valves |
| 86 | Why do veins have thin walls with a large lumen? | Pressure of the blood is lower so thick walls are not needed and the larger lumen helps the blood to flow. |
| 87 | Why do veins have valves? | To stop blood flowing in the wrong direction |
| 88 | What is blood? | A tissue consisting of plasma, red blood cells, white blood cells & platelets |
| 89 | What is the function of the red blood cell? | Carries oxygen from the lungs to every cell in the body |
| 90 | How are red blood cells adapted to their function? | Large surface area; have no nucleus; contains haemoglobin which oxygen binds to easily |
| 91 | Why does a red blood cell not have a nucleus? | More space for more haemoglobin to carry more oxygen. |
| 92 | What is haemoglobin called when it is joined to oxygen? | Oxyhaemoglobin |
| 93 | What is the function of the white blood cells? | To defend us against pathogens |
| 94 | What are the 2 different types of white blood cell? | Lymphocytes & phagocytes |
| 95 | Which type of white blood cell engulfs microbes? | Phagocyte. |
| 96 | Which do Lymphocytes produce to defend us against infection? | Anti-bodies and anti-toxins. |
| 97 | What is the function of platelets? | Help blood clot around a wound to prevent microorganisms getting in |
| 98 | Which component of blood carries cells and other dissolved substances? | Plasma |
| 99 | What substances are carried in the blood plasma? (8) | Carbon dioxide, hormones, glucose, amino acids, urea, proteins, antibodies, antitoxins |
| 100 | What is cardiovascular disease? | Diseases of the heart and blood vessels |
| 101 | What is coronary heart disease? | Layers of fatty material build up inside the coronary arteries, narrowing them |
| 102 | Why is blocking the coronary artery a problem? | Blood flow is reduced to the heart therefore reduces the supply of oxygen for the heart muscle |
| 103 | How can CHD be treated? | Stent, statins |
| 104 | How do stents treat CHD? | Reopens the blocked coronary artery restoring blood flow |
| 105 | What are the advantages of using stents to treat CHD? | Effective for a long time and quick recovery time after surgery |
| 106 | What are the disadvantages of using stents to treat CHD? | Risk of complication or infection during the operation. Possible risk of blood clots near the stent |
| 107 | What can happen to heart valves if they become faulty? | Not open fully or develop a leak |
| 108 | What are the consequences of a faulty heart valve? | Blood may flow in both directions in the heart meaning blood doesn’t circulate as effectively |
| 109 | Name 2 sources of replacement heart valves? | Mechanical or biological (e.g. pigs or sheep) |
| 110 | Name a treatment used in the case of total heart failure? | Heart transplant |
| 111 | Name a risk associated with surgical intervention in treating heart disease? | Infection, complications e.g. a heart attack and development of a blood clot. |
| 112 | When would an artificial heart be used? | To allow the heart to rest and recover and keep the patient alive whilst they wait for a transplant. |
| 113 | What are the advantages of having an artificial heart transplanted? | Less likely to be rejected |
| 114 | What are the disadvantages of using an artificial heart to treat CHD? | Parts could wear out, the electric motor could fail, blood moves through less smoothly leading to blood clots and strokes |
| 115 | How do statins treat CHD? | Decreases blood concentration of cholesterol, which reduces the build-up of fatty deposits in the coronary arteries |
| 116 | What are the advantages of using drugs (statins) to treat cardiovascular disease? | Reduces risk of strokes and heart attacks; increases good cholesterol and decreases bad cholesterol so reduces fatty deposit formation |
| 117 | What are the disadvantages of using drugs (statins) to treat cardiovascular disease? | Could forget to take them long term; side effects e.g. headaches, kidney failure, liver damage and memory loss; not an instant effect |
| 118 | What is “health”? | The state of physical and mental well-being |
| 119 | What are the two types of disease? | Communicable and non-communicable |
| 120 | What is a communicable disease? | A disease caused by a pathogen and can be spread |
| 121 | What is a non-communicable disease? | Any disease not caused by a pathogen, and can’t be spread between organisms |
| 122 | Give examples of how communicable and non-communicable diseases can interact? | • Defects in the immune system mean that an individual is more likely to suffer from infectious (communicable) diseases.• Viruses (communicable) living in cells can be the trigger for cancers (non-communicable)• Immune reactions initially caused by a pathogen (communicable) can trigger allergies such as skin rashes and asthma (non-communicable)• Severe physical ill health can lead to depression and other mental illness. |
| 123 | What other factors, other than pathogens, influence health? | 1. Diet2. Stress3. Life situations |
| 124 | What is epidemiology? | Study of the incidence, distribution, and possible control of diseases and other factors relating to health |
| 125 | What is a risk factor? | A factor linked to an increased risk of disease |
| 126 | Give two general examples of a risk factor. | 1. The lifestyle of a person2. Substances in the person’s body or environment |
| 127 | What is a correlation? | Where a change in one of two variables is reflected by a change in the other variable e.g increases in alcohol consumption = increase in incidence of breast cancer |
| 128 | What is a “causal mechanism”? | Where there is evidence from an investigation that links the risk factor to causing a particular disease. |
| 129 | What examples are there where a causal mechanism has been proven for some risk factors? | • The effects of diet, smoking and exercise on cardiovascular disease;• Obesity as a risk factor for Type 2 diabetes;• The effect of alcohol on the liver and brain function;• Carcinogens, including ionising radiation, as risk factors in cancer;• The effects of smoking and alcohol on unborn babies;• The effect of smoking on lung disease and lung cancer; |
| 130 | Most diseases are termed “multi-factorial”. What does this mean? | Multiple risk factors contributing to the person developing the disease |
| 131 | What is the human cost of non-communicable disease? | Tens of millions of people die from non-communicable diseases each year |
| 132 | What is the financial cost of non-communicable disease? | * Researching and treating non-communicable disease costs the NHS millions of pounds
* Families may have to move or adapt their homes if a family member gets ill
* People may have to give up work which effects the countries economy
 |
| 133 | What is cancer? | The uncontrolled growth and division of cells |
| 134 | How do cancers develop? | DNA in cells is changed |
| 135 | What is a benign tumour? | A growth of abnormal cells which is contained in one area within the body and will not invade other body parts |
| 136 | What is a malignant tumour? | A growth of abnormal cells which invade neighbouring tissues and spread to different parts of the body in the blood where they form secondary tumours. Malignant tumour cells are cancers |
| 137 | What are the main lifestyle risk factors for cancer? | 1. Smoking (lung cancer)2. UV exposure (skin cancer)3. Obesity (bowel, liver and kidney cancer)4. Viral infection can increase risk of certain cancers |
| 138 | Name another risk factor in the development of cancer. | Genetic |
| 139 | What are the main tissues of a plant?  | Epidermal tissues, palisade mesophyll, spongy mesophyll, xylem and phloem, meristem |
| 140 | What is the function of epidermal tissues? | Covers the surfaces of the leaf and provides protection |
| 141 | How are epidermal tissues adapted to carry out their function? | Secretes a waxy substance that waterproofs the surface of the leaf |
| 142 | What is the function of palisade mesophyll tissues? | Main site of photosynthesis |
| 143 | How are palisade mesophyll tissues adapted to carry out their function? | Contains lots of chloroplasts in palisade cells |
| 144 | What is the function of spongy mesophyll tissues? | Allows the diffusion of gases |
| 145 | How are spongy mesophyll adapted to carry out their function? | Has large air spaces and a large surface area to make the diffusion of gases easier |
| 146 | What 3 organs for the plant transport system | Leaves, stems and roots. |
| 147 | What is the function of xylem? | Transports water and dissolved mineral ions |
| 148 | How are xylem adapted to carry out their function? | They are composed of hollow tubes strengthened by lignin |
| 149 | What is translocation? | The movement of sugars from the leaves to the rest of the plant. |
| 150 | What is the function of phloem? | Transports dissolved food from the leaves around the plant |
| 151 | How are phloem adapted to carry out their function? | Elongated cells with pores in the end cell walls to allow cell sap to move from one phloem cell to the next |
| 152 | What is the function of a root hair cell? | To absorb water by osmosis and minerals by active transport |
| 153 | How are root hair cells adapted to carry out their function? | Increases the surface area of the root  |
| 154 | What is the role of stomata and guard cells? | To control gas exchange and water loss |
| 155 | When do the stomata open? | When the plant has lots of water |
| 156 | When do the stomata close? | When the plant is short of water |
| 157 | What is transpiration? | The movement of water from the roots to the leaves, eventually leaving the leaves via evaporation. |
| 158 | What are the four factors which affect the rate of transpiration in plants? | 1. Temperature2. Humidity3. Air movement4. Light intensity |
| 159 | How does temperature effect the rate of transpiration in a plant? | The warmer it is, the faster transpiration happens. When it’s warm the water particles have more energy to evaporate out of the stomata |
| 160 | How does humidity effect the rate of transpiration in a plant? | The drier the air around a leaf, the faster transpiration happens. Humidity increases the amount of water outside the leaf, so the concertation gradient between inside and outside the leaf is smaller. |
| 161 | How does air movement effect the rate of transpiration in a plant? | The stronger the wind, the greater the transpiration rate. Wind moves water particles away from the leaf, maintaining a steep concentration gradient for diffusion. |
| 162 | How does light intensity effect the rate of transpiration in a plant? | The brighter it is, the greater the transpiration rate. Photosynthesis doesn’t happen in the dark so stomata close, meaning less water escapes. |
| 163 | What is a potometer? | A piece of apparatus to measure the rate of transpiration |

**Core questions – Biology unit 3 - Infection and Response**

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| **No.** | **Question** | **Answer** |
| 1 | What is a pathogen? | A microorganism that causes infectious disease. |
| 2 | Name four ways in which diseases caused by pathogens can be spread. | Through air, through water, direct contact (e.g. STDs), vectors. |
| 3 | Name four ways in which the spread of diseases can be reduced or prevented. | Hand-washing, safer sex practices, vaccination, eradication of vectors. |
| 4 | Name the four classes of pathogens. | Viruses, bacteria, protists, fungi. |
| 5 | Why does is there a short delay between infection by a pathogen and feeling ill from the infection?  | Bacteria and viruses may reproduce rapidly inside the body. |
| 6 | How do bacteria make us ill? | May produce poisons (toxins) that damage tissues  |
| 8 | How do viruses make us ill? | Live and reproduce inside cells, causing cell damage |
| 9 | What type of pathogen is the measles? | A virus |
| 10 | What are the symptoms of the measles virus? | Fever and a red skin rash. |
| 11 | How is the measles virus spread? | Inhalation of droplets from sneezes and coughs. |
| 12 | Why are children vaccinated against the measles virus? | Measles is a serious illness that can be fatal if complications arise. |
| 13 | What type of pathogen is HIV? | A virus |
| 14 | What are the initial symptoms of HIV infection? | HIV initially causes a flu-like illness. |
| 15 | What is the aim of antiretroviral drugs? | To stop the virus from replicating. |
| 16 | How does HIV lead to AIDS? | When the body's immune system becomes so badly damaged it can no longer deal with other infections or cancers.  |
| 17 | How is HIV spread? | Sexual contact or exchange of body fluids such as blood which occurs when drug users share needles. |
| 18 | What type of virus is TMV? | A virus |
| 19 | What is TMV and what type of organism does it affect? | A widespread plant pathogen affecting many species of plants including tomatoes.  |
| 20 | What are the symptoms of TMV? | A distinctive ‘mosaic’ pattern of discolouration on the leaves  |
| 21 | How does TMV affect the plant? | Reduces the growth of the plant due to lack of photosynthesis |
| 22 | What type of pathogen is salmonella? | Bacteria |
| 23 | How is salmonella food poisoning spread? | By the bacteria being ingested in food, or on food prepared in unhygienic conditions.  |
| 24 | What are the symptoms of salmonella? | Fever, abdominal cramps, vomiting and diarrhoea  |
| 25 | How are the symptoms of salmonella caused? | By the toxins that the bacteria release |
| 26 | How is the spread of Salmonella controlled in the UK? | In the UK, poultry are vaccinated against Salmonella.  |
| 27 | What type of pathogen is Gonorrhoea? | Bacteria |
| 28 | How is the bacterial disease Gonorrhoea spread? | Gonorrhoea is spread by sexual contact.  |
| 29 | How can the spread of the bacterial disease Gonorrhoea be controlled? | Treatment with antibiotics or use of a barrier method of contraception e.g. condoms. |
| 30 | What are the symptoms of Gonorrhoea? | Thick yellow or green discharge from the vagina or penis and pain on urination. |
| 31 | What issues are there with the treatment for Gonorrhoea? | Lots of antibiotic resistant strains have now appeared. |
| 32 | What type of pathogen is rose black spot? | Fungal |
| 33 | What are the symptoms of rose black spot disease? | Purple or black spots develop on leaves, which often turn yellow and drop early.  |
| 34 | How is rose black spot spread? | It is spread in the environment by water or wind. |
| 35 | How does rose black spot affect a plant? | It affects the growth of the plant as photosynthesis is affected due to discolouration & destruction of the leaves. |
| 36 | How can rose black spot be treated? | Using fungicides and/or removing and destroying the affected leaves. |
| 37 | What causes malaria? | A protist |
| 38 | What is a protist? | Often a parasite that lives on or inside other organisms |
| 39 | What is a vector? | An organism that carries and transfers a protist to other organisms without becoming ill itself |
| 40 | How is malaria spread? | Spread via mosquitos (the vector) transferring the malarial parasite (protist) into other organisms |
| 41 | What are the symptoms of malaria? | Recurrent episodes of fever and can be fatal |
| 42 | How is malaria treated? | Anti-malarial drugs. |
| 43 | How is the spread of malaria controlled? | Eradication of vectors such as mosquitos and/or use of mosquito nets at night to avoid being bitten. |
| 44 | What are the four first line non-specific defence systems of the human body against pathogens? | Skin, nose, trachea and bronchi, stomach. |
| 45 | How does the nose, trachea and bronchi act as a first line of defence? | Cells secrete mucus that traps pathogens, and cilia cells have hair like structures that remove trapped pathogens |
| 46 | What is present in the stomach to kill pathogens? | Hydrochloric acid |
| 47 | What is the role of the immune system? | If a pathogen enters the body the immune system tries to destroy the pathogen. |
| 48  | Name three ways in which white blood cells help to defend against pathogens. | Phagocytosis (engulfs the pathogens), antibody production, antitoxin production |
| 49  | What is an antibody? | A **specific** protein that attaches to the pathogen, destroying it |
| 50  | What is an antigen? | A **specific** molecule on the surface of each pathogen, that antibodies can attach to |
| 51  | What is the purpose of vaccination programmes? | Can prevent illness in an individual and reduces spread of the pathogen in a population. |
| 52  | What does a vaccination contain? | A small quantity of dead or inactive forms of a pathogen. |
| 54  | How does the contents of a vaccine prevent future infection? | It stimulates the white blood cells to produce antibodies.  |
| 55  | What happens if a person who has been vaccinated against a particular pathogen is infected with that pathogen? | The white blood cells respond quickly to produce the correct antibodies **quickly**, preventing illness |
| 56  | What is an antibiotic? | A drug that kills only bacteria |
| 57  | How do antibiotics work? | Prevent the cell wall from forming or prevent the DNA from being replicated |
| 58  | What are the current concerns around antibiotic treatment? | The emergence of bacterial strains resistant to antibiotics means many antibiotics no longer work |
| 59  | What are painkillers? | Drugs that treat the symptoms of disease, but don’t kill the pathogens |
| 60  | What are the issues with treating viral diseases? | Antibiotics cannot kill viral pathogens. It is difficult to develop drugs that kill viruses without also damaging the body’s tissues. |
| 61  | Name three examples of drugs extracted from plants and microorganisms and state what they are used for. | 1.      The heart drug digitalis originates from foxglove plants2.      The painkiller aspirin originates from willow trees3.      Penicillin was discovered by Alexander Fleming from the *Penicillium* mould |
| 62  | What is the starting point of some new medicines? | Chemicals extracted from a plant |
| 63  | How are most drugs manufactured now? | Synthesised by chemists in the pharmaceutical industry.  |
| 64  | What does efficacy mean? | Whether the drug works to treat the illness |
| 65  | Why do new drugs need to be tested and trialled? | For toxicity, efficacy and dose to check that they are safe and effective. |
| 66 | What is preclinical testing? | Preclinical testing is done in a laboratory using cells, tissues and live animals. |
| 67 | What is involved in the first phase of a clinical trial? | A small number of healthy volunteers are given very low doses of the drug  |
| 68 | What is the purpose of the first phase of a clinical trial? | To check for side effects, toxicity & safety |
| 69 | What happens in the second phase of a clinical trial? | Drug is tested **on patients** |
| 70 | What is the purpose of the second phase of a clinical trial? | To test for side effects, and effectiveness |
| 71 | What happens in the third phase of a clinical trial? | Larger numbers of patients used |
| 72 | What is the purpose of the third phase of a clinical trial? | To determine the correct dose, and test for effectiveness |
| 73 | What is a placebo? | A fake drug that looks and tastes the same as the real drug |
| 74 | What is a double blind trial? | Patients are split into two groups with some given the real drug, and some the placebo. Neither the doctor nor patient know whether they have been given a placebo, only the scientist running the trial |
| 75 | Why do scientists run double blind trials? | To avoid bias from the patient or the doctor |
| 76 | What happens after all the phases of a drug trial have been completed? | Scientists analyse the results and give conclusions as to whether the drug is safe to be given a license |
| 77 | What is a peer review? | When other scientists look at the results of the trial to see if they agree with the conclusions |
| 78 | Why is it important drug trial results are peer reviewed? | To avoid bias, and prevent false claims |
| 79T | How are antibodies made? **(Triple only)** | By B-lymphocyte (B-cell) cells, which is a type of white blood cell |
| 80T | How does a monoclonal antibody work? **(Triple only)** | It binds to the antigen of a specific chemical or cell |
| 81T | How are monoclonal antibodies made? **(Triple only)** | * Stimulate mouse lymphocytes to make a particular antibody by injecting it with a particular antigen
* Combine the antibody producing lymphocytes with a tumour cell to make a hybridoma cell
* The hybridoma cell divides and makes the antibody
* The hybridoma is cloned to produce many cells
* The antibody is then collected and purified
 |
| 82T | Why are antibodies specific to one type of antigen? **(Triple only)** | They have a special shaped binding site that only fits with specific antigens |
| 83T | What is a hybridoma cell? **(Triple only)** | The combination of a lymphocyte and a tumour cell |
| 84T | Why are hybridoma cells created? **(Triple only)** | They have the ability to create the required antibody and divide quicker than the lymphocyte on its own |
| 85T | Name 4 possible uses of monoclonal antibodies. **(Triple only)** | 1.       For pregnancy tests/diagnosis2.       Measurement of hormone/chemical/pathogen levels in the blood3.       Research to identify specific molecules in cells or tissues by binding with fluorescent dyes4.       Treatment of some diseases like cancer |
| 86T | How can antibodies be used to treat conditions such as cancer? **(Triple only)** | Bind to a radioactive/toxic substance that are able to stop cells growing and dividing.  |
| 87T | What is the advantage of using monoclonal antibodies over traditional treatments such as chemotherapy and radiotherapy? **(Triple only)** | They only bind to very specific cells (cancer cells), meaning other body cells aren’t damaged |
| 88T | What are the disadvantages of using monoclonal antibodies? **(Triple only)** | Cause more side effects than were originally expected |
| 89T | Name three ways of visually detecting a plant disease. **(Triple only)** | Stunted growth; spots on leaves; areas of decay (rot); growths on part of the plant; malformed stems or leaves; discolouration; the presence of pests. |
| 90T | Name three ways to identify a plant disease. **(Triple only)** | 1. Look symptoms up in a gardening manual or website2. Taking the infected plant to a laboratory to identify the pathogen3. Using a testing kits that contains monoclonal antibodies |
| 91T | Name four possible causes of plant diseases. **(Triple only)** | Viruses; bacteria; fungi; insects (e.g. aphids) |
| 92T | How do aphids damage plants? **(Triple only)** | Pierce stems with their mouthparts to drink sugary liquid in phloem, introduce pathogens and deprive plants of sugars. |
| 93T | What are two problems caused in plants by an ion deficiency? **(Triple only)** | Stunted growth caused by nitrate deficiency AND **chlorosis** caused by magnesium deficiency. |
| 94T | Why does a lack of nitrate ions affect plant growth? **(Triple only)** | Nitrate ions are used to make proteins and therefore growth |
| 95T | Why does a lack of magnesium ions affect plant growth? **(Triple only)** | Magnesium ions are used to make chlorophyll. |
| 96T | Name three physical defences of plants. **(Triple only)** | Cellulose cell walls, tough waxy cuticle on leaves, layers of dead cells around stems (bark on trees) which fall off. |
| 97T | Name two chemical defences of plants. **(Triple only)** | Antibacterial chemicals, poisons to deter herbivores  |
| 98T | Name three mechanical defences of plants. **(Triple only)** | Thorns and hairs deter animals, leaves which droop or curl when touched, mimicry to trick animals |

**Core questions – Biology - Unit 4 - Bioenergetics**

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| --- | --- | --- |
| **No.** | **Question** | **Answer** |
| 1 | What is the word equation for photosynthesis? | Carbon dioxide + water (+light)🡪 glucose + oxygen  |
| 2 | What is the balanced chemical symbol equation for photosynthesis? | 6CO2 + 6H2O 🡪 C6H12O6 + 6O2 |
| 3 | Is photosynthesis an endo- or exothermic reaction? | Endothermic |
| 4 | What energy transfer occurs in photosynthesis? | Light energy to chemical energy |
| 5 | Where does photosynthesis occur in a plant or algal cell? | Chloroplasts |
| 6 | What are pigment are chloroplasts filled with? | Chlorophyll |
| 7 | What is the function of chlorophyll? | Captures light energy |
| 8 | What are the four factors which affect the rate of photosynthesis? | Temperature, light intensity, carbon dioxide concentration, amount of chlorophyll |
| 9 | What do the sketch graphs of limiting factors look like? | mage result for sketch graphs of limiting factors for photosynthesis |
| 10 | Why does increasing light intensity increase the rate of photosynthesis? | Light provides the energy the plants need to photosynthesise |
| 11 | Why does increasing temperature increase the rate of photosynthesis? | A higher temperature increases the rate of the chemical reactions |
| 12 | Why does increasing the temperature too far stop photosynthesis? | The enzymes in the plant become denatured and stop working |
| 13 | Why does increasing the concentration of carbon dioxide increase the rate of photosynthesis? | Carbon dioxide is a raw material that is needed for photosynthesis |
| 14 | How can we investigate the effect of light intensity on the rate of photosynthesis? | 1. Place pondweed in a test tube with water
2. Place a light source 10cm away from it
3. Turn light source on a measure the number of bubbles produced in 1 min
4. Move the light source back to 20cm and repeat
5. Repeat until there is a big enough range of results to see a pattern
 |
| 15 | What can be done to stop temperature affecting the rate of photosynthesis? | Use an LED light, or place the boiling tube into a beaker of water |
| 16H | What is the inverse square law? **(HT only)** | Light intensity  1/d2 |
| 17H | How does the inverse square law apply to photosynthesis? **(HT only)** | The intensity of light is inversely proportional to the square of the distance from the light source. |
| 18H | What does the inverse square law mean in practice when considering how plants grow? **(HT only)** | When the light is moved twice as far from the plant it will receive a quarter of the energy |
| 19H | Why can’t a commercial grower of plants just increase all three limiting factors of PHS to maximum levels to obtain optimum growth? **(HT only)** | Light, temperature and CO2 all cost money to supply – a balance between expenditure and income must be struck for a profit to be made. |
| 20 | Name three ways glucose produced in photosynthesis is used in plants. | * Respiration
* Converted into insoluble starch for storage
* To produce fat or oil for storage
* To produce cellulose, which strengthens the cell wall
* To produce amino acids for protein synthesis.
 |
| 21 | What else, other than glucose, do plants need to produce proteins? | Nitrate ions |
| 22 | Where are mineral ions absorbed from and through which plant organ? | From the soil, through the roots. |
| 23 | What is aerobic respiration and where does it occur in cells? | Respiration WITH oxygen, in the mitochondria |
| 24 | What is produced during aerobic respiration? | Carbon dioxide and water |
| 25 | What is anaerobic respiration and where does it occur in cells? | Respiration WITHOUT oxygen, in the cytoplasm |
| 26 | What is produced during anaerobic respiration in animals/humans? | Lactic acid |
| 27 | What is produced during anaerobic respiration in pants? | Ethanol and carbon dioxide |
| 28 | Is respiration an endo- or exothermic reaction? | Exothermic |
| 29 | What is the balanced chemical equation for aerobic respiration? | C6H12O6 + 6O2 🡪 6CO2 + 6H2O  |
| 30 | What is the word equation for anaerobic respiration in animal cells? | Glucose 🡪 lactic acid |
| 31 | What is the word equation for anaerobic respiration in plant and yeast cells? | Glucose 🡪 ethanol + carbon dioxide |
| 32 | In which type of respiration is more energy released? | Aerobic |
| 33 | Why does anaerobic respiration release less energy than aerobic respiration? | The oxidation of glucose is incomplete in anaerobic respiration |
| 34 | What do organisms need energy for? | * Chemical reactions to build larger molecules
* Movement (by enabling muscles to contract)
* Keeping warm
 |
| 35 | What do humans manufacture, using anaerobic respiration in yeast? | Bread and alcoholic drinks |
| 36 | Why is anaerobic respiration in yeast used when making bread? | The carbon dioxide makes the bread rise |
| 37 | Why is anaerobic respiration in yeast used when making alcoholic drinks? | Carbon dioxide can make the drinks fizzy, ethanol is what makes it alcoholic |
| 38 | How does the human body react to an increased demand for energy? | Heart rate, breathing rate and breath volume increase |
| 39 | Why does the breathing rate and breath volume increase during exercise? | To take in more oxygen |
| 40 | Why does heart rate increase during exercise? | To supply the muscles with more oxygen and glucose in the blood To remove carbon dioxideTo remove lactic acidTo remove heat |
| 41 | Why do muscles need more oxygen and glucose during exercise? | There is an increased rate of respiration |
| 42 | What does a build-up of lactic acid cause in muscles? | Muscle fatigue |
| 43H | What is an oxygen debt? **(HT only)** | The amount of extra oxygen the body needs after exercise to react with the accumulated lactic acid and remove it from the cells |
| 44H | Where is lactic acid converted back into glucose? **(HT only)** | The liver |
| 45H | How is lactic acid transported to the liver? **(HT only)** | By the blood |
| 46 | What is produced when enzymes chemically break down carbohydrates? | Glucose (simple sugars) |
| 47 | What is produced when enzymes chemically break down lipids? | Fatty acids and glycerol |
| 48 | What is produced when enzymes chemically break down proteins? | Amino acids |
| 49 | What is “metabolism”? | The sum of all the reactions in a cell or the body |
| 50 | What is the energy released via respiration used for in cells? | The continual enzyme controlled processes of metabolism that synthesise new molecules. |
| 51 | Name three cellular reactions, which could be included under the term “metabolism”.  | * 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 are used to synthesise proteins
* Respiration
* Breakdown of excess proteins to form urea for excretion.
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**Core questions – Unit 5 Biology – Homeostasis and response**

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| **No.** | **Question** | **Answer** |
| 1 | What is homeostasis? | The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes |
| 2 | Why is homeostasis important for enzyme function? | It maintains optimum conditions for enzyme action |
| 3 | Give 2 examples of automatic control systems? | Nervous response or chemical response  |
| 4 | What is the nervous system? | A system that enables humans to react to their surroundings and to coordinate their behaviour |
| 5 | What parts make up the nervous system? | Receptors, neurones, spinal cord/brain, effectors |
| 6 | What is a receptor? | Cells that detect a stimuli |
| 7 | What is a sensory neurone? | Neurones that carry electrical impulses from the receptors to the central nervous system |
| 8 | What is the central nervous system (CNS)? | The brain and the spinal cord |
| 9 | What is a motor neurone? | Neurones that carry electrical impulses from the CNS to effectors |
| 10 | What is an effector? | Muscles or glands, which bring about responses  |
| 11 | What does a muscle do when stimulated? | Contract |
| 12 | What does a gland do when stimulated? | Secretes a hormone |
| 13 | What is a reflex action? | Automatic and rapid response to a stimuli that does not involve the conscious part of the brain |
| 14 | What is a reflex arc (list the order)? | Stimulus 🡪 receptor 🡪 coordinator 🡪 effector 🡪 response |
| 15 | What is a synapse? | The connection between two neurones |
| 16 | How is a nerve signal transferred across a synapse? | Chemicals diffuse across the gap |
| 17 | What can be used to measure human reaction time? | The ruler drop test |
| 18 | Why is it better to use a computer programme to measure human reaction time? | It removes human error making it more accurate and precise |
| 19 | What is the brain made of? **(Triple only)** | Billions of interconnected neurones and has different regions that carry out different functions |
| 20 | What are the different regions of the brain? **(Triple only)** | Cerebral cortex, cerebellum, medulla |
| 21 | What is the function of the cerebral cortex? **(Triple only)** | Controls consciousness, intelligence, memory & language |
| 22 | What is the function of the medulla? **(Triple only)** | Controls unconscious activities like breathing and your heartbeat |
| 23 | What is the function of the cerebellum? **(Triple only)** | Controls muscle coordination |
| 24 | What range of methods do scientists use to investigate the brain? **(Triple only)** | Study patients with brain damage already; electrically stimulate parts of the brain; use MRI scans |
| 25 | Why is it difficult to investigate brain function? **(Triple only)** | It is complex and delicate meaning it can be easily damaged, leading to problems with brain function |
| 26 | What is the eye? **(Triple only)** | A sense organ containing receptors sensitive to light intensity and colour |
| 27 | Image result for label the eye aqa gcseLabel this picture of the eye **(Triple only)** |  |
| 28 | What is accommodation? **(Triple only)** | The process of changing the shape of the lens to focus on near or distant objects |
| 29 | Describe the process of focussing on a near object? **(Triple only)** | * The ciliary muscles contract
* The suspensory ligaments loosen
* The lens is then thicker and refracts light rays strongly
 |
| 30 | Describe the process of focussing on a distant object? **(Triple only)** | * The ciliary muscles relax
* The suspensory ligaments are pulled tight
* The lens is then pulled thin and only slightly refracts light rays
 |
| 31 | What is myopia? **(Triple only)** | Short sightedness |
| 32 | What is hyperopia? **(Triple only)** | Long sightedness |
| 33 | How are vision defects corrected? **(Triple only)** | Spectacle lenses which refract the light rays so that they do focus on the retina; laser eye surgery |
| 34 | How does the iris react to bright light? **(Triple only)** | Circular muscles in the iris contract and radial muscles relax, making the pupil smaller |
| 35 | How does the iris react to dim light? **(Triple only)** | Radial muscles in the iris contract and circular muscles relax, making the pupil larger |
| 36 | How is body temperature monitored and controlled? **(Triple only)** | By the thermoregulatory centre in the brain |
| 37 | How are temperature changes detected in the body? **(Triple only)** | Receptors in the thermoregulatory centre detect changes in blood temperature;Temperature receptors in the skin send electrical impulses to the thermoregulatory centre |
| 38 | How does the body respond when temperature is too high? **(Triple only)** | Blood vessels supplying skin capillaries dilate (vasodilation)Sweat is produced from the sweat glands |
| 39 | How does the body respond when temperature is too low? **(Triple only)** | * Blood vessels supplying skin capillaries constrict (vasoconstriction)
* Sweating stops
* Skeletal muscles contract rapidly (shivering)
 |
| 40 | Why does shivering warm us up? **(Triple only)** | When muscles contract, respiration increases, releasing more energy (some as heat) |
| 41 | What is the endocrine system? | Composed of glands which secrete chemicals called hormones directly into the blood stream |
| 42 | How are hormones transported in the body? | In the blood |
| 43 | What is a hormone? | A chemical molecule, released from glands, affecting a target organ |
| 44 | What are the main glands in the body? | Pituitary gland, thyroid, ovaries, testes, pancreas, adrenal gland |
| 45 | What is the function of the pituitary gland? | Produces several hormones (known as the ‘master gland’) |
| 46 | What is the function of the ovaries? | Produces oestrogen |
| 47 | What is the function of the testes? | Produces testosterone |
| 48 | What is the function of the thyroid? | Produces thyroxine |
| 49 | What is the function of the adrenal gland? | Produces adrenaline |
| 50 | What is the function of the pancreas? | Produces insulin |
| 51 | What are the differences between nerves and hormones? | * Nerves act fast, hormones act slow
* Nerves act for short period of time, hormones can act for long periods of time
* Nerves act on a very precise area, hormones act in a more general way
 |
| 52 | How is blood glucose levels monitored and controlled? | Through blood flow in the pancreas |
| 53 | Describe what happens when the blood glucose level is too high?  | * Blood glucose level detected by the pancreas
* Pancreas releases insulin into the blood
* Glucose is removed from the blood and stored as glycogen in the liver and muscles
 |
| 54 | Describe what happens when the blood glucose level is too low? **(HT only)** | * Blood glucose level detected by the pancreas
* Pancreas releases glucagon into the blood
* Glycogen is converted into glucose and released into the blood stream
 |
| 55 | What is Type 1 diabetes? | A disorder in which the pancreas fails to produce sufficient insulin |
| 56 | What are the symptoms of Type 1 diabetes? | Uncontrolled high blood glucose levels |
| 57 | How is Type 1 diabetes treated? | Insulin injections |
| 58 | What is Type 2 diabetes? | When the body cells no longer respond to insulin produced by the pancreas |
| 59 | How is Type 2 diabetes treated? | A carbohydrate controlled diet and an exercise regime |
| 60 | What is a major risk factor for Type 2 diabetes? | Obesity |
| 61 | What substances in the body will affect the function of cells through osmotic changes? **(Triple only)** | Ions and water |
| 62 | Why does an imbalance of ions or wa**(Triple only)**ter in the body negatively affect cells? | Too much water can enter or leave the cells through osmosis |
| 63 | How do ions and water leave the body? **(Triple only)** | Water leaves via the lungs through exhalationWater and ions are lost from the skin in sweat |
| 64 | What is the job of the kidneys? **(Triple only)** | To remove excess water, ions and urea in the urine |
| 65 | How is urea formed in the body? **(Triple only) (HT Only)** | * Protein is broken down into amino acids
* Amino acids are deaminated to form ammonia
* Ammonia is toxic so is converted to urea
 |
| 66 | Describe how the kidneys work? **(Triple only)** | Kidneys filter the blood (everything is removed, except proteins)Selective reabsorption – useful substances like glucose, ions and some water are absorbed back into the bloodUrea is excreted in the urine |
| 67 | What is anti-diuretic hormones? **(Triple only) (HT only)** | Controls how much water is reabsorbed back into the blood |
| 68 | How is the water level in the body monitored and controlled? **(Triple only) (HT only)** | It is monitored in blood flow through the brain and controlled by ADH which is released by the pituitary gland |
| 69 | Describe what happens when water content in the body is too low? **(Triple only) (HT only)** | * Receptor in the brain detects that the water content is too low
* Pituitary gland releases more ADH
* ADH makes the kidney tubules more permeable so more water is reabsorbed back into the blood
 |
| 70 | Describe what happens when water content in the body is too high? **(Triple only)** | * Receptor in the brain detects that the water content is too high
* Pituitary gland releases less ADH
* ADH makes the kidney tubules less permeable so less water is reabsorbed back into the blood
 |
| 71 | What treatments can be offered to people with kidney failure? **(Triple only)** | Regular dialysisTransplant |
| 72 | How does a dialysis machine work? **(Triple only)** | * Persons blood flows between partially permeable membranes surrounded by dialysis fluid
* Dialysis fluid has the same concentration of dissolved ions and glucose as healthy blood
* Waste substances like urea leave the persons blood through diffusion into the dialysis fluid
 |
| 73 | Why do useful substances not leave the blood through dialysis? **(Triple only)** | The dialysis fluid contains the same concentration of useful substances as human blood |
| 74 | How often do dialysis sessions take place? **(Triple only)** | Three times a week, 3-4 hours each session |
| 75 | What are the disadvantages of kidney dialysis? **(Triple only)** | * May cause blood clots or infections
* Takes a long time
* It is expensive
 |
| 76 | What are the disadvantages of a kidney transplant? **(Triple only)** | * It could be rejected by the recipients body
* There are long waiting lists
 |
| 77 | What are the stages of the menstrual cycle? | Stage 1 – MenstruationStage 2 – The uterus lining builds upStage 3 – The egg is released (ovulation)Stage 4 – The wall is maintained until menstruation |
| 78 | What is menstruation? | The uterus lining breaks down |
| 79 | What hormones are involved in the menstrual cycle? | Oestrogen, progesterone, FSH, LH |
| 80 | What reproductive hormones are produced in the ovaries? | Oestrogen and progesterone |
| 81 | What productive hormones are produced in the pituitary gland? | FSH & LH |
| 82 | What is the function of oestrogen? | * Causes the lining of the uterus to grow
* Stimulates the release of LH
* Inhibits the release of FSH
 |
| 83 | What is the function of progesterone? | * Maintains lining of the uterus after an egg is released
* When levels of progesterone fall the lining of the uterus breaks down
* Inhibits the release of LH and FSH
 |
| 84 | What is the function of LH? | Stimulates the release of an egg |
| 85 | What is the function of FSH? | * Causes an egg to mature in one of the ovaries
* Stimulates the ovaries to produce oestrogen
 |
| 86 | What is hormonal contraception? | Use of hormones to prevent release of an egg |
| 87 | How can oestrogen be used as a contraceptive? | If taken regularly, it inhibits the production of FSH so egg development stops |
| 88 | How can progesterone be used as a contraceptive? | Stimulate the production of a thick mucus which prevents any sperm getting through to the egg |
| 89 | Describe how an oral contraceptive works? | Contains hormones to inhibit FSH production  |
| 90 | Describe how an injection, implant or skin patch work? | Contains slow release progesterone to inhibit the maturation and release of eggs for a number of months or years |
| 91 | What is a barrier method of contraception? | Prevents the sperm reaching an egg |
| 92 | Name some barrier methods of contraception? | Condom, diaphragm |
| 93 | What is an intrauterine device (IUD)? | Prevents the implantation of an embryo. They can also release hormones. |
| 94 | What is a spermicide? | Something that kills of disables sperm |
| 95 | What is abstinence? | Not having sexual intercourse |
| 96 | What is sterilisation?  | Cutting or tying the fallopian tubes in females, or the sperm duct in males |
| 97 | How can FSH and LH be used to increase fertility? **(HT only)** | By encouraging the maturation and release of an egg in females that have low levels of these hormones |
| 98 | Describe the process of In Vitro Fertilisation (IVF)? **(HT only)** | Give the mother FSH and LH to stimulate the maturation of several eggsCollect the eggs and fertilise them artificially with sperm outside the wombAllow the fertilised egg to develop into embryosInsert one or two embryos back into the mother’s uterus (womb) |
| 99 | What are the advantages of IVF? **(HT only)** | Allows infertile couples to have a child |
| 100 | What are the disadvantages of IVF? **(HT only)** | Multiple births (more likely to have twins/triplets)Success rate is low, making it emotionally stressfulIt can be physically stressful to the mother if they react to the hormones |
| 101 | What is negative feedback? **(HT only)** | An automatic control system in the body that brings about changes when a set level (water, glucose) becomes too high or too low |
| 102 | What is adrenaline? **(HT only)** | A hormone produced by the adrenal glands in times of fear or stress |
| 103 | What is the function of adrenaline? **(HT only)** | Increases heart rate and boosts the delivery of oxygen and glucose to the brain and muscles |
| 104 | What is thyroxine? **(HT only)** | A hormones released by the thyroid glands that stimulates the basal metabolic rate |
| 105 | What is the basal metabolic rate? **(HT only)** | The speed at which chemical reactions in the body occur while the body is at rest |
| 106 | How are thyroxine levels controlled? **(HT only)** | Thyroxine is released in response to thyroid stimulating hormone (TSH) is released from the pituitary gland |
| 107 | Describe what happens when levels of thyroxine in the blood are higher than normal? **(HT only)** | TSH release from the pituitary gland in inhibited. This reduces the amount of thyroxine released from the thyroid gland |
| 108 | Describe what happens when levels of thyroxine in the blood are lower than normal? **(HT only)** | TSH release from the pituitary gland in stimulatedThis increases the amount of thyroxine released from the thyroid gland |
| 109 | What is auxin? **(Triple only)** | A plant hormone that controls growth near the tips of shoots and roots |
| 110 | What stimuli do plants respond too? **(Triple only)** | Light (phototropism), gravity (gravitropism or geotropism)  |
| 111 | How does auxin respond to light in the shoots? **(Triple only)** | More auxin accumulates on the side that’s in the shadeThe cells in the shade grow faster, so the shoot bends towards the light |
| 112 | How does auxin respond to gravity in the shoots? **(Triple only)** | When shoots grow sideways, auxin accumulates on the lower side of the tipThe cells on the lower side to grow faster, so the shoot bends upwards |
| 113 | How does auxin respond to gravity in the roots? **(Triple only)** | What roots grow sideways, auxin accumulates on the lower side of the rootThe cells on the lower side grow **slower**, so the root bends downwards |
| 114 | What are Gibberellins? **(Triple only) (HT only)** | Plant hormones important in initiating seed germination |
| 115 | What is Ethene? **(Triple only) (HT only)** | A gas produced by aging parts of plants – it controls cell division and ripening of fruits |
| 116 | How are auxins used in agriculture and horticulture? **(Triple only) (HT only)** | As weed killers – by disrupting normal growth patternsAs rooting powdersFor promoting growth in tissue culture |
| 117 | How is Ethene used in the food industry? **(Triple only) (HT only)** | To control ripening of fruit during storage and transport |
| 118 | How are Gibberellins used in agriculture and horticulture? **(Triple only) (HT only)** | To end seed dormancy – make seed germinate at times of the year that they wouldn’t usuallyPromote floweringIncrease fruit size |

**Core questions – Biology Unit 6 - Inheritance**

|  |  |  |
| --- | --- | --- |
| **No.** | **Question** | **Answer** |
| 1 | What is sexual reproduction? | Involves the joining (fusion) of male and female gametes |
| 2 | What is a gamete? | A sex cell |
| 3 | What are animal gametes called? | Sperm and egg |
| 4 | What are plant gametes called? | Pollen and egg |
| 5 | How many chromosomes are in a human gamete? | 23 |
| 6 | Why is there variation in sexual reproduced organisms? | The genetic information from the male and female is mixed when gametes fuse |
| 7 | How many parents are involved in asexual reproduction? | One parent |
| 8 | Why is the no variation in asexual reproduction? | There is no mixing of genetic information, so the offspring is genetically identical |
| 9 | What is a genetically identical offspring called? | A clone |
| 10 | What is meiosis? | When cells divide to produce cells with half the number of chromosomes as a normal cell |
| 11 | Where does meiosis happen? | In the reproductive organs of an organism |
| 12 | Describe what happens when a cell divides by meiosis? | 1. Copies of the genetic information are made
2. The cell divides twice to form four gametes, each with a single set of chromosomes
3. All the gametes are genetically different from each other
 |
| 13 | Why do gametes only have half the number of chromosomes as a normal cell? | So when two gametes fuse during fertilisation the total number of chromosomes is restored to normal |
| 14 | What are the advantages of sexual reproduction? **(Triple only)** | * Provides variation in the offspring
* Variation gives a survival advantage if the environment changes
* We can use selective breeding to speed up natural selection
 |
| 15 | What are the advantages of asexual reproduction?**(Triple only)** | * Only one parent is needed
* More time and energy efficient not needing to find mate
* Faster than sexual reproduction
* Many identical offspring can be produced in favourable conditions
 |
| 16 | What organisms can reproduce using both methods? **(Triple only)** | Parasites, fungi, plants |
| 17 | How do parasites reproduce both asexually and sexually? **(Triple only)** | They reproduce sexually in the mosquito, but asexually in the human host |
| 18 | How do fungi reproduce asexually? **(Triple only)** | They reproduce asexually by producing spores |
| 19 | How do plants reproduce asexually? **(Triple only)** | Strawberry plants produce runnersPlants can grow bulbs |
| 20 | How do plants reproduce sexually? **(Triple only)** | By producing seeds |
| 21 | What is a chromosome? | A long molecule of DNA |
| 22 | Describe the structure of DNA? | DNA is a polymer made up of two strands coiled together in the shape of double helix |
| 23 | What is a gene? | A small section of DNA that codes for a particular sequence of amino acids to make a protein |
| 24 | What is a genome? | The entire genetic material of an organism |
| 25 | Why is it important for scientists to understand the human genome? | * Scientists can search for genes linked to different types of disease
* Can help us to understand and treat inherited disorders better
* They are used in tracing human migration patterns from the past
 |
| 26 | What is the structure of a nucleotide? **(Triple only)** | One sugar molecule, one phosphate molecule and one ‘base’ |
| 27 | How many bases does DNA contain and what are they? **(Triple only)** | Four: A, C, G and T |
| 28 | What are the complementary base pairings? **(Triple only)** | A – G; T – C  |
| 29 | What do the order of bases on the DNA control? **(Triple only)** | The order of amino acids in a protein |
| 30 | How are amino acids coded for? **(Triple only)**  | By a sequence of 3 bases |
| 31 | Where are proteins made? **(Triple only)** | On ribosomes, in the cytoplasm of the cell |
| 32 | Why can’t DNA leave the nucleus? **(Triple only) (HT)** | It is too big |
| 33 | What is mRNA? **(Triple only) (HT)** | Messenger RNA |
| 34 | What is the function of mRNA? **(Triple only) (HT)** | It copies code from the DNA and carries the code to the ribosomes |
| 35 | How are amino acids brought to the ribosomes? **(Triple only) (HT)** | By carrier molecules |
| 36 | What happens to the protein when it is completed? **(Triple only) (HT)** | It folds up to form a unique shape |
| 37 | What different functions do proteins carry out in the body? **(Triple only) (HT)** | * Enzymes – biological catalysts
* Hormones – used to carry messages around the body
* Structural proteins – physically strong (e.g. collagen)
 |
| 38 | What is a mutation? **(Triple only) (HT)** | When the sequence of DNA bases are changed randomly |
| 39 | What affect can a mutation have on a protein? **(Triple only) (HT)** | * It could change the shape of an enzyme, meaning the substrate may no longer fit the active site
* A structural protein could lose its strength
 |
| 40 | What happens if a mutation occurs in the non-coding DNA? **(Triple only) (HT)** | It can alter how genes are expressed (if they are switched on or off) |
| 41 | What types of mutation are there? **(Triple only) (HT)** | Insertions, deletions, substitutions |
| 42 | What is an insertion mutation? **(Triple only) (HT)** | Where a new base is inserted into the DNA base sequence |
| 43 | What is a deletion mutation? **(Triple only) (HT)** | When a random base is deleted from the DNA base sequence |
| 44 | What is a substitution mutation? **(Triple only) (HT)** | When a random base in the DNA base sequence is changed to a different base |
| 45 | What is an allele? | A different version of the same gene |
| 46 | Why do animals have two copies of each gene? | Because there are two of each chromosome – one from each parent |
| 47 | What is a dominant allele? | An allele that is always expressed, even if only one copy is present |
| 48 | What is a recessive allele? | An allele that is only expressed if two copies are present (so no dominant allele present) |
| 49 | What is a homozygous pair of alleles? | When the two alleles present are the same |
| 50 | What is a heterozygous pair of alleles? | Where the two alleles present are different |
| 51 | What is a genotype? | The combination of alleles that you have (e.g Bb) |
| 52 | What is a phenotype? | The characteristics that are expressed (e.g. Blue eyes) |
| 53 | What diagram do we use to predict the probability of having offspring with specific characteristics? | Punnett Square |
| 54 | What is polydactyly? | A condition in which you have extra fingers and toes |
| 55 | What type of allele is the inherited disorder Polydactyly caused by? | Dominant allele |
| 56 | What is cystic fibrosis? | A disorder of cell membranes |
| 57 | What type of allele is the inherited disorder Cystic fibrosis caused by? | Recessive allele |
| 58 | What is embryo screening? | Removing a cell from an embryo and analysing its genes for inherited disorders |
| 59 | What are the arguments for genetic screening? | * Helps stop people suffering
* Could save money for expensive treatments
* There are currently strict laws for what it can be used for
 |
| 60 | What are the arguments against genetic screening? | * It implies that people with genetic problems are ‘undesirable’
* Screening is expensive
* It could lead to people wanting ‘designer babies’
 |
| 61 | What are the sex chromosomes in a female? | XX |
| 62 | What are the sex chromosomes in a male? | XY |
| 63 | What does a genetic diagram look like for the probability of getting a boy or a girl? | Image result for punnett square male female |
| 64 | What is variation? | The differences in the characteristics of individuals in a population |
| 65 | What is genetic variation? | Variation due to the genes they have inherited |
| 66 | What examples are there of characteristics that are only controlled by genes? | Blood group, eye colour, inherited disorders |
| 67 | What is environmental variation? | Variation due to the conditions in which they have developed |
| 68 | What examples are there of characteristics that are only controlled by environment? | Losing a toe, suntans, tattoos |
| 69 | Where does all genetic variation arise from? | Mutations |
| 70 | What happens if a mutation occurs that causes a new phenotype? | It may lead to a rapid change in the species, if it is advantageous |
| 71 | What is evolution? | A change in the inherited characteristics of a population over time through a process of natural selection which may result in the formation of a new species |
| 72 | What is the theory of evolution by natural selection? | All species of living things have evolved from simple life forms that first developed more than three billion years ago |
| 73 | Describe the process of natural selection? | 1. All species show wide **variation**
2. Organisms **compete** for limited resources
3. The organisms with the most suitable characteristics for the environment will **survive**
4. These organisms survive and **reproduce**, passing on the successful alleles to the offspring
5. Over time the beneficial characteristics become more common in a population
 |
| 74 | What is a species? | A group of similar organisms that can reproduce to give fertile offspring |
| 75 | What is speciation? | The development of a new species – when populations of the same species become too different |
| 76 | Who proposed the theory of evolution by natural selection?  | Charles Darwin |
| 77 | What evidence can be used to support Darwin’s theory of evolution? | * Fossils show how changes in organisms have developed over time
* The recent discovery of how bacteria are able to evolve to become resistant to antibiotics
 |
| 78 | What evidence did Charles Darwin have for his theory of evolution by natural selection? **(Triple only)** | From observations on a round the world expedition and knowledge of geology and fossils |
| 79 | When was Darwin’s theory published? **(Triple only)** | In *‘On the Origin of Species’* in 1859 |
| 80 | Why did it take such a long time for Darwin’s theory to be accepted? **(Triple only)** | * The theory challenged the idea that God made all the animals and plants that live on Earth
* There was insufficient evidence at the time the theory was published to convince many scientists
* The mechanism of inheritance and variation (genes) was not known until 50 years after publication
 |
| 81 | What other theories of evolution were there other than Darwin’s? **(Triple only)** | Jean-Baptiste Lamarck |
| 82 | What was Jean-Baptiste Lamarck’s theory? **(Triple only)** | That changes an organism acquires during its lifetime will be passed on to its offspring |
| 83 | Why was Lamarck’s hypothesis eventually rejected? **(Triple only)** | Experiments didn’t support his hypothesis |
| 84 | Describe the process of speciation? **(Triple only)** | 1. A population of the same species become **isolated**
2. Isolation can happen due to a **physical barrier** (e.g. Earthquakes, floods)
3. **Conditions** on each side of the barrier are slightly **different**
4. **Natural selection** in each population will act differently
5. Eventually individuals in each population will have changed so much, they will be **unable to breed successfully**
 |
| 85 | Who was Alfred Russel Wallace? **(Triple only)** | Wallace independently proposed the theory of evolution by natural selection. He published joint writings with Darwin in 1858 (the year before Darwin published *‘On the Origin of Species’*) |
| 86 | What is Alfred Russel Wallace most famous for? **(Triple only)** | His work on warning colouration in animals and his theory of speciation |
| 87 | Who was Gregor Mendel? **(Triple only)** | An Austrian monk who trained in maths and natural history |
| 88 | What did Mendel investigate? **(Triple only)** | He carried out breeding experiments on plants |
| 89 | When did Mendel do his experiments on pea plants? **(Triple only)** | Mid-19th Century |
| 90 | What conclusions did Gregor Mendel make? **(Triple only)** | * Characteristics in plants are determined by ‘hereditary units’
* One unit from each parent is passed on to descendants unchanged
* ‘Hereditary units’ can be dominant or recessive
 |
| 91 | Why was the significance of Mendel’s work not recognised until after his death? **(Triple only)** | They didn’t have the background knowledge about genes, DNA and chromosomes |
| 92 | What discovery was made in the late 1800s using Mendel’s work as a starting point? **(Triple only)** | Scientists became familiar with chromosomes and were able to observe how they behaved during cell division |
| 93 | When was it discovered that Mendel’s ‘hereditary units’ were actually genes? **(Triple only)** | Early 20th Century |
| 94 | When was the structure of DNA determined? **(Triple only)** | 1953 |
| 95 | What is selective breeding? | When humans artificially select the plants or animals that are going to breed so that the genes for particular characteristics remain in the population |
| 96 | What characteristics may be selected for in plants? | * Crops with disease resistance
* Plants with big or unusual flowers
 |
| 97 | What characteristics may be selected for in animals? | * Animals that produce more milk or meat
* Pets with a gentle temperament
 |
| 98 | Describe the process of selective breeding? | 1. Select characteristics you want from the animals/plants you already have
2. Breed them with each other
3. Select the best offspring and breed them together
4. Repeat this process over several generations until all offspring have the correct characteristics
 |
| 99 | What are the disadvantages of selective breeding? | It reduces the gene pools, leading to ‘inbreeding’ which can cause health problems |
| 100 | What is genetic engineering? | A process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic |
| 101 | Describe the process of genetic engineering? **(HT only)** | 1. A useful gene is isolated and cut out of the chromosome using enzymes
2. The gene is inserted into a vector
3. The vector is usually a bacterial plasmid or a virus
4. The vector is introduced to the target organism (plant, animal or microorganism) and the useful gene is inserted into its cells
 |
| 102 | What examples of genetic modification are there? | * Bacteria used to produce human insulin
* Crops have been genetically modified to improve size or quality of fruit, or make them resistant to disease, insects and herbicides
* Sheep have been genetically engineered to produce drugs in their milk
 |
| 103 | What is gene therapy? | When faulty genes, caused by inherited diseases, are replaced with working genes |
| 104 | What concerns are there about genetic modification? | * GM crops may have health effects on human health and cause more allergies to food
* Transplanted genes may get out into the natural environment, (e.g. herbicide resistant weeds)
 |
| 105 | What is a clone? | A genetically identical offspring  |
| 106 | What methods can be used to clone plants? **(Triple only)** | Tissue culture; cuttings |
| 107 | What is a ‘tissue culture’? **(Triple only)** | Using small groups of cells from part of a plant to grow identical new plants |
| 108 | What is the advantage of tissue culture? **(Triple only)** | Lots of new plants can be made quickly, meaning rare plant species can be preserved |
| 109 | What is a plant ‘cutting’? **(Triple only)** | A method used by gardeners to produce many identical new plants from a parent plant |
| 110 | What methods can be used to clone animals? **(Triple only)** | Embryo transplants; adult cell cloning |
| 111 | Describe the process of an ‘embryo transplant’? **(Triple only)** | 1. An egg is fertilised outside the womb
2. The developing embryo is then split may time before cells become specialised
3. The embryos are implanted into lots of other cows
4. The offspring are identical to each other, but not the surrogate mother
 |
| 112 | Describe the process of ‘adult cell cloning’? **(Triple only)** | 1. The nucleus is removed from an unfertilised egg cell
2. The nucleus from an adult body cell, such as a skin cell, is inserted into the egg cell
3. An electric shock stimulates the egg cell to divide to form an embryo
4. The embryo cells contain the same genetic information as the adult skin cell
5. When the embryo has developed into a ball of cells, it is implanted into the womb of a surrogate mother
 |
| 113 | What is a fossil? | The ‘remains’ of organisms from millions of years ago, which are found in rocks |
| 114 | Describe 3 ways that fossils may be formed? | 1. From parts of organisms that have not decayed because one of more of the conditions needed for decay are absent
2. When parts of the organism are replaced by minerals as they decay
3. As preserved traces of organisms, such as footprints, burrow and rootlet traces
 |
| 115 | Why is it difficult to use fossils to prove how life began and evolved? | * Many of the early forms of life were soft-bodied, meaning they left few traces behind
* Lots of fossils that formed have been destroyed by geological activity
 |
| 116 | What is extinction? | When there are no remaining individuals of a species alive |
| 117 | What factors can lead to the extinction of an individual species? | * The environment changes too quickly
* A new predator kills them
* A new disease kills them
* A new competitor outcompetes them for resources (e.g. food)
 |
| 118 | What can lead to the mass extinction of many species? | A catastrophic event such as a volcano, or asteroid collision |
| 119 | What is antibiotic resistance? | When bacteria evolve and become resistant to antibiotics |
| 120 | Describe how bacteria become resistant to antibiotics? | 1. Mutations of bacterial pathogens produce a new strain
2. Some strains are resistant to antibiotics so are not killed
3. They survive and reproduce so the population of the resistant strain increases
4. The resistant strain can then spread because people are not immune to it
 |
| 121 | What is MRSA? | A bacteria that is resistant to many types of antibiotic |
| 122 | What steps should be taken to reduce the rate of development of antibiotic resistant strains? | * Doctors should not prescribe antibiotics inappropriately
* Patients should complete their course of antibiotics so all bacteria are killed and can’t mutate
* Agricultural use (farming) of antibiotics should be restricted
 |
| 123 | How are living organisms classified? | By their structure and characteristics in a system developed by Carl Linnaeus |
| 124 | What are organisms sub divided into in the Linnaean system? | Kingdom, phylum, class, order, family, genus, species |
| 125 | How are organisms named? | Through a binomial system of genus and species (e.g. *Homo sapiens*) Homo – genus, Sapiens – species |
| 126 | Why have systems of classification improved? | As improvements in microscopes and the understanding of biochemical processes progressed, which helped us better understand the internal structures of organisms |
| 127 | What system did Carl Woese develop? | The ‘three-domain system’ |
| 128 | What are organisms divided into in the three domain system? | Archaea, Bacteria and Eukaryota |
| 129 | What is an ‘archaea’ domain? | Primitive bacteria (a type of prokaryotic cell) usually living in extreme conditions |
| 130 | What is a ‘bacteria’ domain? | This domain contains true bacteria |
| 131 | What is a ‘eukaryota’ domain? | This domain includes a broad range of organisms including fungi, plants, animals and protists |
| 132 | What is an evolutionary tree? | A method used by scientists to show how they believe organisms are related |

**Core questions – Unit 7 Biology - Ecology**

|  |  |  |
| --- | --- | --- |
| **No.** | **Question** | **Answer** |
| 1 | What is a habitat? | The place where an organism lives |
| 2 | What is a ‘population’? | All the organisms of one species living in a habitat |
| 3 | What is a ‘community? | The populations of different species living in a habitat |
| 4 | What is an ‘abiotic factor’? | A non-living factor of the environment  |
| 5 | What are examples of abiotic factors? | Light intensity; temperature; moisture levels; soil pH; soil mineral content; wind intensity; carbon dioxide levels for plants; oxygen levels for aquatic animals |
| 6 | What is a ‘biotic factor’? | Living factors of the environment |
| 7 | What are examples of biotic factors? | Availability of food; new predators; new pathogens; one species outcompeting another |
| 8 | What is an ‘ecosystem’? | The interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment |
| 9 | What is ‘interdependence’? | Each species depends on other species for things such as food, shelter, pollination and seed dispersal |
| 10 | What is a ‘stable community’? | Where all the species and environmental factors are in balance so that population sizes remain fairly constant |
| 11 | What is ‘competition’? | Where organisms compete with their own species or other species for the same resources |
| 12 | What do plants ‘compete’ for? | Light, space, water, mineral ions |
| 13 | What do animals ‘compete’ for? | Space, food, water, mates |
| 14 | What is an ‘adaptation’? | Features or characteristics of an organism that allow them to survive in the conditions in which they normally live |
| 15 | What is a ‘structural’ adaptation? | Features of an animals body structure |
| 16 | What are examples of ‘structural’ adaptations? | White fur for camouflage; thick layer of fat to retain heat; large surface area to volume ratio |
| 17 | What is a ‘behavioural’ adaptation? | Ways in which animals behave |
| 18 | What is an example of ‘behavioural’ adaptations? | Birds migrating to warmer climates in the winter |
| 19 | What is a ‘functional’ adaptation? | Things that go on inside an organism’s body that can be related to processes like reproduction or metabolism |
| 20 | What are examples of ‘functional’ adaptations? | Desert animals conserve water by producing very little sweat and urine; Brown bears low metabolism while hibernating to conserve energy |
| 21 | What is an extremophile? | A microorganism that is adapted to live in extreme conditions |
| 22 | What are examples of conditions that extremophiles live? | High temperature, high pressure, high salt concentration |
| 23 | What is a food chain? | Something that represents the feeding relationships within a community |
| 24 | What is a photosynthetic organisms? | Producers of all biomass for life on Earth using light from the Sun |
| 25 | What do food chains always start with? | A producer |
| 26 | What type of organism is a producer? | Green plants or algae |
| 27 | What is the job of a producer in the food chain? | To make glucose by photosynthesis |
| 28 | What is ‘biomass’? | The living material of an organism |
| 29 | How is energy transferred through a food chain? | When organisms eat other organisms |
| 30 | What is a primary consumer? | An organism that eats a producer |
| 31 | What is a secondary consumer? | An organism that eats a primary consumer |
| 32 | What is a tertiary consumer? | An organism that east a secondary consumer |
| 33 | What is a predator? | A consumer that hunts and kills other animals |
| 34 | What is prey? | The animal that a predator hunts and kills |
| 35 | What happens to the number of predators and prey in a stable community? | The numbers will rise and fall |
| 36 | How can we study the distribution of an organism? | 1. Measure how common an organism is in two sample areas and compare them
2. Study how the distribution changes across an area using a transect
 |
| 37 | What is a quadrat? | A square frame enclosing a known area e.g. 1m2 |
| 38 | How can we compare how common an organism is in two sample areas? | 1. Place a 1m2 quadrat on the ground at a **random point** within the first sample area
2. Count all the organisms within the quadrat
3. Repeat steps 1 and 2 as many time as you can (minimum 10)
4. Work out the mean number of organisms per quadrat with the first sample area
5. Repeat the process in the second sample area and compare
 |
| 39 | How do you calculate the mean number of organisms in an area? | Mean = TOTAL number of organisms NUMBER of quadrats |
| 40 | How do you ensure where you’re placing the quadrat is totally random? | Split the area into a grid and use a random number generator to pick coordinates |
| 41 | How do you calculate the **total** number of organisms in a known area? | 1. Work out the mean number of organisms per metre squared
2. Multiply the mean by the total area of the habitat
 |
| 42 | What is a transect? | A line used to help find how organisms are distributed from one place to another |
| 43 | How do you carry out a transect? | 1. Mark out a line in the area you want to study with a tape measure
2. Place a quadrat down at the first point
3. Count the number of organisms in the quadrat
4. Place the quadrat at regular intervals along the tape measure, repeating steps 2 and 3
5. Repeat the transect at least 3 times at random places in the same area
 |
| 44 | What environmental changes can affect the distribution of a species? **(Triple only) (HT only)** | Temperature; availability of water; composition of atmospheric gases |
| 45 | What factors may affect environmental changes? **(Triple only) (HT only)** | Seasonal factors (wet/dry seasons), geographic factors, human interaction (global warming due to human activity) |
| 46 | What are the stages of the water cycle? | Evaporation (or transpiration from plants); condensation; precipitation |
| 47 | Why is the water cycle important? | It provides fresh water for plants and animals on land before draining into the seas |
| 48 | What is the carbon cycle? | Carbon from organisms is returned to the atmosphere as carbon dioxide to be used by plants in photosynthesis |
| 49 | How is carbon dioxide removed from the atmosphere? | Photosynthesis; creation of carbonate compounds |
| 50 | How is carbon returned to the atmosphere? | Respiration by plants, animals and microorganisms; combustion; decay |
| 51 | What role do microorganisms play in cycling materials through an ecosystem? | They respire to return carbon back to the atmosphere as carbon dioxideBreak down dead organisms and return mineral ions to the soil |
| 52 | What is decomposition? **(Triple only)** | Bacteria and fungi breaking down dead organisms |
| 53 | What factors affect the rate of decay? **(Triple only)** | Temperature, oxygen availability, water availability, number of decay organisms |
| 54 | Explain how temperature affects the rate of decay? **(Triple only)** | Warmer temperatures increase enzyme activity so speed up decay.If the temperature is too hot, enzymes will denature and the organism will die |
| 55 | Explain how oxygen availability affects the rate of decay? **(Triple only)** | Most microorganisms need oxygen to respire, so the more oxygen, the higher the rate of decay |
| 56 | Explain how water availability affect the rate of decay? **(Triple only)** | Decay takes faster in moist environments because the organisms involved in decay need water to carry out biological processes |
| 57 | What is compost? **(Triple only)** | Decomposed organic matter that is used as a natural fertiliser for crops and garden plants |
| 58 | What is biogas? **(Triple only)** | Mainly methane gas made by the anaerobic decay of waste material |
| 59 | Where is biogas made? **(Triple only)** | In a fermenter called a digester or generator |
| 60 | What is a batch biogas generator? **(Triple only)** | A generator that makes biogas in small batches. They are manually loaded up and left to digest |
| 61 | What is a continuous biogas generator? **(Triple only)** | A generator that makes biogas all the time. Waste is continually fed in and biogas is produced at a steady rate |
| 62 | What is ‘biodiversity’? | The variety of different species of organisms on Earth, or within an ecosystem |
| 63 | Why is high biodiversity important? | To ensure the stability of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment |
| 64 | What human activities are reducing biodiversity? | Waste production; deforestation; global warming |
| 65 | Why are more resources being used and more waste produced? | There has been a rapid growth in the human population and an increase in the standard of living |
| 66 | How does pollution in water occur? | From sewage, fertiliser or toxic chemicals from industry can wash into lake, rivers and oceans |
| 67 | How does pollution on land occur? | From landfill; toxic chemicals used for farming; radioactive materials;  |
| 68 | How does pollution in air occur? | From smoke and acidic gases released into the atmosphere |
| 69 | What purposes do humans use land for? | Building, quarrying, farming, dumping waste |
| 70 | What is deforestation? | Cutting down forests |
| 71 | What do humans cut down forests? | To clear land for cattle and rice fields; to grow crops from which biofuel based on ethanol can be produced |
| 72 | What problems are associated with deforestation? | Less carbon dioxide taken in by trees so there is more carbon dioxide in the atmosphereLess biodiversity, as forests can contain a huge number of different species of plants and animals |
| 73 | What is a peat bog? | Areas of land that are acidic and waterlogged |
| 74 | How is peat formed? | When plants don’t fully decay due to lack of oxygen, they build up forming peat |
| 75 | Why are peat bogs destroyed? | Peat can be dried and used as fuel, or sold to gardeners as compost |
| 76 | Why is the destruction of peat bogs harmful to the environment? | Reduces the area of habitat for many species of plants, animals and microorganisms reducing biodiversityThe decay or burning of peat releases carbon dioxide into the atmosphere |
| 77 | What is global warming? | When too much carbon dioxide and methane are trapped in the Earth’s atmosphere acting as an insulating, warming the Earth up too much |
| 78 | What are the biological consequences of global warming? | Seawater rising causes flooding of low lying areasDistribution of wild animal and plant species may change as temperature and rainfall changesMigration patterns might changeBiodiversity could be reduced if some species are unable to survive a change in climate |
| 79 | What different programmes have been put in place to reduce the negative effects of humans on ecosystems and biodiversity? | Breeding programmes for endangered speciesProtection and regeneration of rare habitatsReintroduction of field margins and hedgerowsReduction of deforestation and carbon dioxide emissionsRecycling resources rather than dumping waste in landfill |
| 80 | What is a trophic level? **(Triple only)** | The different stages of a food chain |
| 81 | How are trophic levels numbered? **(Triple only)** | According to how far the organism is along the food chain, the first level is 1 |
| 82 | What does trophic level 1 always contain? **(Triple only)** | Plants and algae – they make their own food and are called producers |
| 83 | What does trophic level 2 contain? **(Triple only)** | Primary consumers that eat plants and algae |
| 84 | What is an herbivore? **(Triple only)** | Eat plants/algae |
| 85 | What does trophic level 3 contain? **(Triple only)** | Secondary consumers |
| 86 | What is a carnivore? **(Triple only)** | An animal that eats meat |
| 87 | What does tropic level 4 contain? **(Triple only)** | Tertiary consumers – carnivores that eat other carnivores |
| 88 | What is an apex predator? **(Triple only)** | Carnivores with no predators |
| 89 | How do decomposers break down dead plant and animal matter? **(Triple only)** | By secreting enzymes into the environment. Small soluble food molecules then diffuse into the microorganism |
| 90 | What is a pyramid of biomass? **(Triple only)** | They represent the relative amount of biomass in each level of a food chain |
| 91 | How are pyramids of biomass constructed? **(Triple only)** | Using a scale drawing to represent the biomass in g/m2 |
| 92 | What percentage of light that hits producers is transferred for photosynthesis? **(Triple only)** | 1% |
| 93 | What percentage of biomass is usually transferred along to the next level? **(Triple only)** | 10% |
| 94 | What are the reasons biomass is lost at each stage of the pyramid? **(Triple only)** | * Not all ingested material is absorbed, some is egested as faeces
* Some absorbed material is lost as waste, such as carbon dioxide, water & urea
* Large amounts of glucose are used in respiration
 |
| 95 | How is efficiency of biomass transfer between trophic levels calculated? **(Triple only)** | Efficiency = biomass transferred to the next level Biomass available at the previous level x100 |
| 96 | What is ‘food security’? **(Triple only)** | Having enough food to feed a population |
| 97 | What are the biological factors which are threatening food security? **(Triple only)** | * Increasing birth rate
* Changing diets means scarce food resources are transported to other places
* New pests and pathogens affect farming
* Environmental changes such as lack of rainfall
* High input costs of farming
* Conflicts (war) which affect the availability of water or food
 |
| 98 | Why does the high input costs of farming affect food security? **(Triple only)** | It is too expensive for some people in some countries to start or maintain food production, meaning not enough people are producing food |
| 99 | Why are fish stocks in the oceans declining? **(Triple only)** | Due to overfishing |
| 100 | Why is it important to maintain fish stocks at a level where breeding continues? **(Triple only)** | Certain species may disappear in some areas |
| 101 | How are fish stocks maintained? **(Triple only)** | Fishing quotas; net size |
| 102 | How does a fishing quota help maintain fish stocks? **(Triple only)** | There are limits on the number and size of fish that can be caught |
| 103 | How does the control of net size help maintain fish stocks? **(Triple only)** | * Using a bigger mesh size lets ‘unwanted’ fish escape.
* Young fish can escape allowing them to reach breeding age
 |
| 104 | How can food production be made more efficient? **(Triple only)** | By restricting energy transfer from food animals to the environment |
| 105 | What farming techniques are used to reduce energy transfer from food animals to the environment? **(Triple only)** | By limiting movement Controlling the temperature of the surroundingsFeeding them high protein foods to increase growth |
| 106 | Why does limiting movement and controlling the temperature improve the efficiency of food production? **(Triple only)** | Reduces the amount of energy released in respiration for moving around or maintaining their body temperature. Therefore there is more energy for growth |
| 107 | What is factor farming? **(Triple only)** | Where animals are kept in small cages so their movement is restricted |
| 108 | What are the disadvantages of factory farming? **(Triple only)** | Disease spreads quicklyIt’s cruel |
| 109 | What is mycoprotein? **(Triple only)** | Food produced from fungi |
| 110 | What fungus is used to make mycoprotein? **(Triple only)** | *Fusarium* |
| 111 | What is mycoprotein used to make? **(Triple only)** | High protein meat substitutes for vegetarian meals (Quorn) |
| 112 | What conditions are needed to make mycoprotein? **(Triple only)** | Fusarium is grown in aerobic conditions on glucose syrup which is then harvested and purified |
| 113 | What is genetic engineering? **(Triple only)** | Transferring a useful gene from one organism to another |
| 114 | How can bacteria be genetically engineered to make human insulin? **(Triple only)** | 1. Plasmid removed from a bacterium
2. Insulin gene cut out of a human chromosome using a restriction enzyme
3. The plasmid is cut open using the **same** restriction enzyme
4. The plasmid and gene are mixed together
5. Ligase enzyme is used to stick the two pieces of DNA together (recombinant DNA)
6. Recombinant DNA is placed back into the bacterium
7. Bacteria is left to multiply
8. Insulin is harvested and purified
 |
| 115 | What are the advantages of biotechnology? **(Triple only)** | Crops can be developed that are resistant to pestsCrops can be developed that are resistant to droughtsCrops can be modified to provide more nutritional value (golden rice) |