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

| No. | Question | My answer | My answer | Answer |
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| 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 |

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| 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 $10^{-3}$m) |
| 27 | What does the prefix micro mean? | | | Millionth of a metre (x $10^{-6}$m) |
| 28 | What does the prefix nano mean? | | | Billionth of a metre (x $10^{-9}$m) |
| 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 |
| 50 | What is a chromosome? | | | Coiled up lengths of DNA that contain genes |

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| 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<br><br>**STEP 2**: The DNA replicates to form two copies of each chromosome<br><br>**STEP 3**: MITOSIS – one set of chromosomes is pulled to each end of the cell and the nucleus divides<br><br>**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.<br>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 |

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| 66 | What substances diffuse into/out of cells? | | | Oxygen & carbon dioxide in gas exchange<br>Glucose, amino acids, fatty acids and glycerol in digestion<br>Water in the large intestine<br>Urea 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 ratio<br>The 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<br>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;<br>Good blood supply to maintain a big concentration gradient;<br>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**

| No | Question | My answer | My answer | Answer |
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| 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 |

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| 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,<br>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 |

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| 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;<br>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.<br>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<br>2. Transfer to a beaker and add some distilled water<br>3. Stir the mixture<br>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 75$^{o}$C 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 |

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| 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 |

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

| No. | Question | My answer | My answer | Answer |
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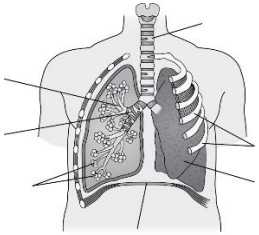
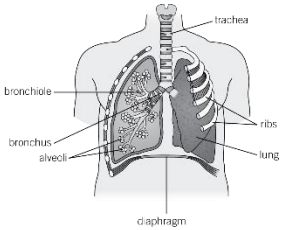
| 1 | Label the main structures in the respiratory system?  | | |   |
| 2 | What is the function of the alveoli? | | | Increase surface area of the lung to maximise gas exchange |
| 3 | What is the function of the trachea? | | | Carries air to and from the lungs |
| 4 | What is the function of the bronchus? (plural = bronchi) | | | Carries air into and out of left or right lung |
| 5 | How are alveoli adapted to make gas exchange rapid and effective? | | | Spherical shape, very thin walls, lots of capillaries |
| 6 | Why does an alveolus have a spherical shape? | | | To give a large surface area |
| 7 | Why does an alveolus have very thin walls? | | | Gives a short diffusion distance for gas to travel in and out of the alveoli |

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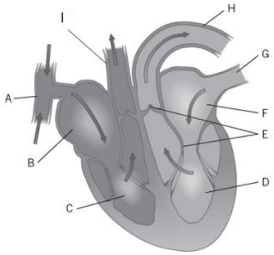
| 8 | Why are alveoli surrounded by lots of capillaries? | | | To provide a good blood supply to maintain a steep concentration gradient |
| 9 | What happens to the volume and pressure inside the chest when we breathe in? | | | Volume increases, pressure decreases |
| 10 | What happens to the volume and pressure inside the chest when we breathe out? | | | Volume decreases, pressure increases |
| 11 | Identify the structures of the   heart? | | | A = vena cava<br>B = right atrium<br>C = right ventricle<br>D = left ventricle<br>E = valves<br>F = left atrium<br>G = pulmonary vein<br>H = aorta<br>I = pulmonary artery |
| 12 | How many chambers does the heart have and what are they? | | | 4 chambers. Atria and Ventricles |
| 13 | Which side of the heart carries oxygenated blood? | | | Left |
| 14 | Which side of the heart carries deoxygenated blood? | | | Right |
| 15 | Which blood vessel carries blood to the right atrium? | | | Vena cava |
| 16 | Where does the vena cava carry blood from? | | | The body |

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| 17 | Which blood vessel carries blood away from the left ventricle and where does it go to? | | | Aorta to the body |
| 18 | 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 |
| 19 | Which blood vessel returns blood to the left atrium? | | | Pulmonary vein |
| 20 | Where does the pulmonary artery carry blood from? | | | The lungs |
| 21 | Why does the heart pump blood to the lungs? | | | For gas exchange |
| 22 | Which blood vessel carries blood from the right ventricle and where does it go to? | | | Pulmonary artery to the lungs |
| 23 | What are the coronary arteries? | | | Blood vessels that supply the heart muscle tissue with oxygen |
| 24 | Where is the hearts pacemaker found and what is its function? | | | Groups of cells in the right atrium controlling natural heart rate |
| 25 | What is the role of an **artificial** pacemaker? | | | To correct irregularities in the heart rate |
| 26 | What is the function of the valves in the heart? | | | To prevent the backflow of blood. |
| 27 | How do you calculate the rate of blood flow? | | | Rate of blood flow (ml/min) = <u>volume of blood (ml)</u><br><br>number of minutes (mins) |

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| 28 | What are the 3 types of blood vessel? | | | Artery, vein and capillary |
| 29 | Which type of blood vessel carries blood away from the heart? | | | Artery |
| 30 | Which type of blood vessel carries blood towards the heart? | | | Vein |
| 31 | What is the lumen? | | | The inside space (in the blood vessels) |
| 32 | Describe the structure of a capillary? | | | The wall is only one cell thick; very small lumen |
| 33 | 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 |
| 34 | Describe the structure of an artery? | | | Very thick walls made of smooth muscle with elastic fibres; small lumen |
| 35 | 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. |
| 36 | Describe the structure of a vein? | | | Thinner, less muscular walls than arteries; large lumen; contain valves |
| 37 | 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. |
| 38 | Why do veins have valves? | | | To stop blood flowing in the wrong direction |
| 39 | What is blood? | | | A tissue consisting of plasma, red blood cells, white blood cells & platelets |

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| 40 | What is the function of the red blood cell? | | | Carries oxygen from the lungs to every cell in the body |
| 41 | How are red blood cells adapted to their function? | | | Large surface area; have no nucleus; contains haemoglobin which oxygen binds to easily |
| 42 | Why does a red blood cell not have a nucleus? | | | More space for more haemoglobin to carry more oxygen. |
| 43 | What is haemoglobin called when it is joined to oxygen? | | | Oxyhaemoglobin |
| 44 | What is the function of the white blood cells? | | | To defend us against pathogens |
| 45 | What are the 2 different types of white blood cell? | | | Lymphocytes & phagocytes |
| 46 | Which type of white blood cell engulfs microbes? | | | Phagocyte. |
| 47 | Which do Lymphocytes produce to defend us against infection? | | | Anti-bodies and anti-toxins. |
| 48 | What is the function of platelets? | | | Help blood clot around a wound to prevent microorganisms getting in |
| 49 | Which component of blood carries cells and other dissolved substances? | | | Plasma |
| 50 | What substances are carried in the blood plasma? (8) | | | Carbon dioxide, hormones, glucose, amino acids, urea, proteins, antibodies, antitoxins |
| 51 | What is cardiovascular disease? | | | Diseases of the heart and blood vessels |
| 52 | What is coronary heart disease? | | | Layers of fatty material build up inside the coronary arteries, narrowing them |

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| 53 | 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 |
| 54 | How can CHD be treated? | | | Stent, statins |
| 55 | How do stents treat CHD? | | | Reopens the blocked coronary artery restoring blood flow |
| 56 | What are the advantages of using stents to treat CHD? | | | Effective for a long time and quick recovery time after surgery |
| 57 | What are the disadvantages of using stents to treat CHD? | | | Risk of complication or infection during the operation.<br><br>Possible risk of blood clots near the stent |
| 58 | What can happen to heart valves if they become faulty? | | | Not open fully or develop a leak |
| 59 | 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 |
| 60 | Name 2 sources of replacement heart valves? | | | Mechanical or biological (e.g. pigs or sheep) |
| 61 | Name a treatment used in the case of total heart failure? | | | Heart transplant |
| 62 | Name a risk associated with surgical intervention in treating heart disease? | | | Infection, complications e.g. a heart attack and development of a blood clot. |
| 63 | 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. |
| 64 | What are the advantages of having an artificial heart transplanted? | | | Less likely to be rejected |

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| 65 | 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 |
| 66 | How do statins treat CHD? | | | Decreases blood concentration of cholesterol, which reduces the build-up of fatty deposits in the coronary arteries |
| 67 | 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 |
| 68 | 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 |
| 69 | What is “health”? | | | The state of physical and mental well-being |
| 70 | What are the two types of disease? | | | Communicable and non-communicable |
| 71 | What is a communicable disease? | | | A disease caused by a pathogen and can be spread |
| 72 | What is a non-communicable disease? | | | Any disease not caused by a pathogen, and can’t be spread between organisms |
| 73 | 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.<br>• Viruses (communicable) living in cells can be the trigger for cancers (non-communicable)<br>• Immune reactions initially caused by a pathogen (communicable) can trigger allergies such as skin rashes and asthma (non-communicable)<br>• Severe physical ill health can lead to depression and other mental illness. |

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| 74 | What other factors, other than pathogens, influence health? | | | 1. Diet<br>2. Stress<br>3. Life situations |
| 75 | What is epidemiology? | | | Study of the incidence, distribution, and possible control of diseases and other factors relating to health |
| 76 | What is a risk factor? | | | A factor linked to an increased risk of disease |
| 77 | Give two general examples of a risk factor. | | | 1. The lifestyle of a person<br>2. Substances in the person's body or environment |
| 78 | 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 |
| 79 | What is a "causal mechanism"? | | | Where there is evidence from an investigation that links the risk factor to causing a particular disease. |
| 80 | 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;<br>• Obesity as a risk factor for Type 2 diabetes;<br>• The effect of alcohol on the liver and brain function;<br>• Carcinogens, including ionising radiation, as risk factors in cancer;<br>• The effects of smoking and alcohol on unborn babies;<br>• The effect of smoking on lung disease and lung cancer; |

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| 81 | Most diseases are termed “multi-factorial”. What does this mean? | | | Multiple risk factors contributing to the person developing the disease |
| 82 | What is the human cost of non-communicable disease? | | | Tens of millions of people die from non-communicable diseases each year |
| 83 | What is the financial cost of non-communicable disease? | | | • Researching and treating non-communicable disease costs the NHS millions of pounds<br>• Families may have to move or adapt their homes if a family member gets ill<br>• People may have to give up work which effects the countries economy |
| 84 | What is cancer? | | | The uncontrolled growth and division of cells |
| 85 | How do cancers develop? | | | DNA in cells is changed |
| 86 | 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 |
| 87 | 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 |
| 88 | What are the main <u>lifestyle</u> risk factors for cancer? | | | 1. Smoking (lung cancer)<br>2. UV exposure (skin cancer)<br>3. Obesity (bowel, liver and kidney cancer)<br><br>4. Viral infection can increase risk of certain cancers |
| 89 | Name another risk factor in the development of cancer. | | | Genetic |

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| 90 | What are the main tissues of a plant? | | | Epidermal tissues, palisade mesophyll, spongy mesophyll, xylem and phloem, meristem |
| 91 | What is the function of epidermal tissues? | | | Covers the surfaces of the leaf and provides protection |
| 92 | How are epidermal tissues adapted to carry out their function? | | | Secretes a waxy substance that waterproofs the surface of the leaf |
| 93 | What is the function of palisade mesophyll tissues? | | | Main site of photosynthesis |
| 94 | How are palisade mesophyll tissues adapted to carry out their function? | | | Contains lots of chloroplasts in palisade cells |
| 95 | What is the function of spongy mesophyll tissues? | | | Allows the diffusion of gases |
| 96 | 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 |
| 97 | What 3 organs for the plant transport system | | | Leaves, stems and roots. |
| 98 | What is the function of xylem? | | | Transports water and dissolved mineral ions |
| 99 | How are xylem adapted to carry out their function? | | | They are composed of hollow tubes strengthened by lignin |
| 100 | What is translocation? | | | The movement of sugars from the leaves to the rest of the plant. |
| 101 | What is the function of phloem? | | | Transports dissolved food from the leaves around the plant |

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| 102 | 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 |
| 103 | What is the function of a root hair cell? | | | To absorb water by osmosis and minerals by active transport |
| 104 | How are root hair cells adapted to carry out their function? | | | Increases the surface area of the root |
| 105 | What is the role of stomata and guard cells? | | | To control gas exchange and water loss |
| 106 | When do the stomata open? | | | When the plant has lots of water |
| 107 | When do the stomata close? | | | When the plant is short of water |
| 108 | What is transpiration? | | | The movement of water from the roots to the leaves, eventually leaving the leaves via evaporation. |
| 109 | What are the four factors which affect the rate of transpiration in plants? | | | 1. Temperature<br>2. Humidity<br>3. Air movement<br>4. Light intensity |
| 110 | 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 |
| 111 | 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. |

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| 112 | 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. |
| 113 | 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. |
| 114 | What is a potometer? | | | A piece of apparatus to measure the rate of transpiration |

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

| No. | Question | My answer | My answer | Answer |
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| 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. |

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| 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 |

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| 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 |

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| 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. |

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| 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 plants<br>2. The painkiller aspirin originates from willow trees<br>3. 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 |

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| 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 |

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| 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 |

## Core questions – Biology - Unit 4 - Bioenergetics

| No. | Question | My answer | My answer | Answer |
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| 1 | What is the word equation for photosynthesis? | | | Carbon dioxide + water (+light)→ glucose + oxygen |
| 2 | What is the balanced chemical symbol equation for photosynthesis? | | | $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ |
| 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 |

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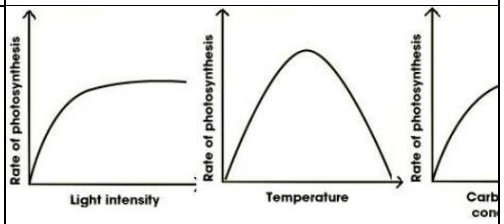
| 8 | What are the four factors which affect the rate of photosynthesis? | | | Temperature, light intensity, carbon dioxide concentration, amount of chlorophyll |
| 9 | What do the sketch graphs of limiting factors look like? | | |  |
| 10 | Why does increasing light intensity increase the rate of photosynthesis? | | | 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 |

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| 14 | How can we investigate the effect of light intensity on the rate of photosynthesis? | | | 1. Place pondweed in a test tube with water<br>2. Place a light source 10cm away from it<br>3. Turn light source on a measure the number of bubbles produced in 1 min<br>4. Move the light source back to 20cm and repeat<br>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 |
| 20 | Name three ways glucose produced in photosynthesis is used in plants. | | | • Respiration<br>• Converted into insoluble starch for storage<br>• To produce fat or oil for storage<br>• To produce cellulose, which strengthens the cell wall<br>• 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 |

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| 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? | | | $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ |
| 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 |

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| 34 | What do organisms need energy for? | | | • Chemical reactions to build larger molecules<br>• Movement (by enabling muscles to contract)<br>• 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<br>To remove carbon dioxide<br>To remove lactic acid<br>To remove heat |
| 41 | Why do muscles need more oxygen and glucose during exercise? | | | There is an increased rate of respiration |

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| 42 | What does a build-up of lactic acid cause in muscles? | | | Muscle fatigue |
| 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<br>• The formation of lipid molecules from a molecule of glycerol and three molecules of fatty acids<br>• The use of glucose and nitrate ions to form amino acids which are used to synthesise proteins<br>• Respiration<br>• Breakdown of excess proteins to form urea for excretion. |