Recognise cell structures as seen with a light microscope and with an electron microscope. Describe the functions of cell structures including the nucleus, cytoplasm, cell membrane, mitochondria, endoplasmic reticulum, and ribosomes.

Nucleus – Controls cell activity

Cytoplasm – jelly-like substance where chemical reactions take place. Contains enzymes that control these chemical reactions

Cell membrane – controls what enters and leaves the cells and holds cell together

Mitochondria – (sausages) these are where most of the reactions for respiration take place. Respiration releases energy that the cell needs to work

Endoplasmic reticulum - Provides mechanical support to the cell. Rough ET synthesises protein, and smooth ET synthesises lipids (a type of fat). It acts as an intracellular transport system.

Ribosomes – (circle) these are where proteins are made

Describe a DNA molecule as two strands coiled to form a double helix, the strands being linked by a series of paired bases: adenine (angel) with thymine (call), and cytosine (coffee) with guanine (G).

A-T

G-C

DNA is made up of two strands of mononucleotides running opposite directions (anti-parallel)

Understand the multiplication of cells with a simple outline description of the four stages of mitosis. Understand that division of a diploid cell by mitosis produces two cells that contain identical sets of chromosomes. Understand that mitosis occurs during growth, repair, cloning and asexual reproduction.

DNA is made up of two strands of mononucleotides running in opposite directions (anti-parallel). Mitosis is for growth and repair. When a cell goes through mitosis it produces two genetically identical daughter cells & these are genetically identical to the parent cells. They continue this process with 4 stages prophase (chromosomes condense this means they thicken & become visible with a light microscope), Metaphase – micro tubules grow from the centrioles and attach to the centromeres. Anaphase – the centromeres break and the homologous chromosomes separate. Cytokinesis begins. Telophase: chromosomes de-condense cytokinesis. Mitosis occurs during the cell replacement.

Dietary fibre keeps the bowels functioning well. The process of peristalsis is where the muscles contract and force a mouthful of food down and the muscles after it relax to let the food through peristalsis occurs throughout the whole system and not just the oesophagus.

Understand the role of digestive enzymes to include the digestion of starch to glucose by amylase and maltase, the digestion of proteins to amino acids by proteases (pepsin, trypsin) and the digestion of lipids to fatty acids and glycerol by lipases.

Amylase digests starch from the food in your mouth to maltose. Amylase converts starch maltose and the enzyme maltase converts maltose to glucose. Proteins are digested into amino acids via the enzymes protease. The enzyme pepsin is found in the stomach and trypsin (pH level is 2-3 because stomach is acidic) is found in the small intestine. Lipids are digested into fatty acids and glycerol by lipases. The pancreas secretes juices into the small intestine which includes lipase.

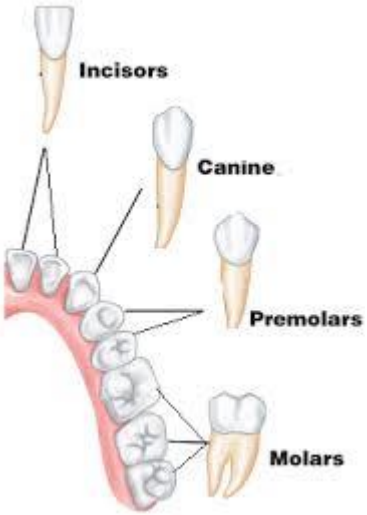
Recall that bile is produced by the liver and stored in the gall bladder, and understand the role of bile in neutralising stomach acid and emulsifying lipids.

Food is acidic after being in the stomach and bile is alkaline so it can neutralise the stomach acid that's surpassing the liver. Enzymes in the small intestine work best in alkaline conditions when bile is released in the small intestine this causes the enzymes to work. Bile emulsifies fats, which gives them a larger surface area, making it easier for the lipases to work.

Understand how the structure of the villus helps absorption of the products of digestion in the small intestine.

The villi on the lining in the small intestine have very thin walls which enables the molecules to pass through easily. The villi have very thin walls making it easier for molecules to pass through. They also increase the surface area of the small intestine wall, increasing the rate of diffusion. There are capillaries on the outside of the villi to pick up the diffused molecules. The capillaries allow transport of nutrients to the live.

Recall the types, structure and functions of teeth. Understand the factors which affect their growth. Explain how to care for teeth and gums.



The job of the teeth is to cut, tear and grind food. They mechanically digest the food.
* **Incisors** act as a blade to cut food, they are quite sharp.
Canines are pointed and cut food as well; they are longer n sharper in carnivores.
Premolars are used to cut and grind food.
Molars also cut and grind food.
-Tooth decay is when bacteria in our mouth feed on the bits of food leftover.
They respire anaerobically and produce lactic acid which dissolves the enamel to prevent tooth decay.
Reduce sugar intake to prevent the bacteria respiring brush

teeth regularly to remove plaque which is layer of bacteria. Fluoride in toothpaste is absorbed by teeth and helps stop the attack by acid.

Describe how to carry out a simple experiment to determine the energy content in a food sample.

Place 20ml water in test tube. Then, record the mass of water and record mass of food sample. Heat the food, close to burning it. Hold it at the base of the test tube and when the food is fully burnt, record the temp of water. The energy is calculated by using the change in temperature per gram. Energy (joules) = mass of water x change in temp x 4.2. All of this over the mass of the food sample.

Describe how to carry out simple experiments with digestive enzymes.

Digestive enzymes work in the body so you know they work best around body temperature so if doing a design then put all the tubes in a water bath at around 37 degrees. Measure the amount of time it takes for the enzyme to break down the substrate. Know where in the digestive system the enzyme is normally found so pepsin is in stomach so works best at an acid pH. Enzymes from the small intestine work best around an alkali pH. Make sure you know the end products of what the enzyme breaks down i.e. amylase are glucose, protease is amino acids, and lipase is fatty acids and glycerol. Make sure you add equal amounts of enzymes and substrate to each tube to make experiment valid and always do repeats to make it reliable. Record the time it takes for substrate to be completely broken down. Record the temperature of the test tubes. Compare the times to work out the optimum temperature of the enzyme, use same enzyme to make this a fair test. Also same test tube size and same amount of water. The only different thing is the temperature.

Recall that the process of respiration releases energy in living organisms.

Respiration breaks down glucose to release energy. Plants and humans respire aerobically; they need a lot of energy. The energy is used for processes such as cell division, muscular contractions and active transport.

Explain the differences between aerobic and anaerobic respiration.

Aerobic uses oxygen and anaerobic is without oxygen. Aerobic respiration is a multi-step reaction and is catalysed by enzymes in the mitochondria. Aerobic respiration releases more energy, but takes longer to release its energy than anaerobic. Anaerobic respiration is instant and provides a quick burst of energy and it leads to the production of lactic acid which builds up in your muscles. This high concentration of lactic acid causes muscular pains and cramps.

Recall the word equation and the balanced chemical symbol equation for aerobic respiration in living organisms.

Glucose + Oxygen → Carbon Dioxide + Water (+energy) – in the form of ATP

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ (+ ATP)

Describe how to carry out simple controlled experiments to demonstrate the evolution of carbon dioxide in respiration.

Describe the breakdown and regeneration of ATP.

ATP can be released as heat energy or can be used as a power source to drive different type of chemical reactions. ATP is hydrolysed (process called hydrolysis – this is when ATP reacts with water) the reaction is: ATP → ADP & Pi (+energy). This reaction uses an enzyme using ATPase. The region ration of ATP from ADP requires energy. This is obtained in the process of oxidation.

Explain the formation of lactic acid in anaerobic respiration.

In anaerobic respiration, not enough oxygen is reaching the muscles. So energy is needed, and this energy is provided by the incomplete breakdown of glucose. Glucose forms lactic acid and a small amount of energy. Lactic acid builds up in the muscles and this causes the muscles to stop contracting efficiently. The lactic acid is removed from the muscles by blood flowing through them. This reaction happens when there is insufficient oxygen available.

Recall the structure of the thorax, including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes.

Google pictures

Explain the role of the intercostal muscles and the diaphragm in ventilation.

When you breathe in, the intercostal muscles contract. The ribs move up and out and the diaphragm contracts and moves down. The trachea carries the air towards the lungs; this is taken to the bronchioles which end at alveoli where gas exchange takes place. When we breathe out, our intercostal muscles relax, the ribs drop down and the diaphragm also relaxes and moves upwards. All of this reduces the space inside the lungs, pushing the air out.

Explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries.

The alveoli have think walls which allows gases to diffuse through them easily. They are small and have a large SA; this means a lot of gas can diffuse at once. There is a lot of

acute disease. Schistosoma has a problem about reaching a new host. It makes use of a secondary host in its life cycle. Eggs are passed out in host's urine & faeces & infect freshwater snails living in lakes/rivers. Immature forms called larvae are released by the snails, swim in the water & burrow through the skins of people bathing in water, something eggs themselves wouldn't be able to do. IMAGE OF LIFE CYCLE

Recall the worldwide effects of the disease schistosomiasis (Blizariha), icnuding methods of preventing its spread

Treatment is by drugs to kill the worms inside the body. Transmission is reduced by improved sanitation so hat urine and the faeces do not contaminate freshwater lakes and rivers. The snails in these may be killed using chemicals/ introduced predators.

Understand the role of non-pathogenic bacteria and fungi useful to humans in the decomposition of organic matter

Fungi play an important role in many aspects of human life, including medicine, food and farming. The majority of grasses and trees require a mutualistic relationship with fungi to survive. Yeast is used in production of beer, wine and bread. Some fungi attack insects and can be used as natural pesticides. Decomposers are non-pathogenic bacteria. They recycle nutrients in dead organisms and their waste. They are also important in bio-technology, genetic engineering and waste disposal. An example is the nitrogen cycle, the sulphur cycle. Organic matter – nitrogen, sulphur phosphorus.

Understand the relationship between humans and their environment

Important characteristics of human social systems are population size, social organisation, values, technology and wealth. Values and knowledge influence people's views of life and define the way humans act. People modify the environment for the purposes and obtain benefits. Example: provision of resources like water, food energy, land for farming etc. By using these resources, humans effect the environment in a lot of ways. They reorganise existing eco-systems to achieve new ones that seem more effective for example; knocking down a forest for new building projects. As a species, we are completely dependent on our environment for three things; a supply of energy and materials, the removal of rendering harmless of our wastes and providing us with physical and chemical conditions (temp, oxygen concentration pH etc) that our bodies can cope with.

Explain the dependence on green plants for supplies of food and oxygen