	BIOLOGY 4.2 ORGANISATION	NEED TO KNOW	REVISION
4.2.1.1	Organisational hierarchy Cells are the building blocks of living organisms. A tissue is a group of cells with a similar structure and function. Organs are groups of tissues working together. Organs are organised into organ systems. An organism is made up of several organ systems.	Explain the terms cell, tissue, organ, organ system and organism, and be able to give examples of each. Have an understanding of the size and scale of cells, tissues, organs, organ systems and organisms. Describe the main systems in the human body and their functions.	
4.2.2.1	The human digestive system The structure and functions of the digestive system.	Describe the functions of the digestive system to digest and absorb foods. Identify the positions of the main organs on a diagram of the digestive system. Know that food molecules must be small and soluble in order to be absorbed into the blood. Describe the functions of the organs in the system Explain how the small intestine is adapted for its function.	
4.2.2.1	Properties of enzymes Enzymes are biological catalysts. The properties of enzymes. The lock and key theory and collision theory can be used to explain enzyme action.	Define the terms 'catalyst' and 'enzyme'. Describe the properties of enzymes. Explain why enzymes are specific and are denatured by high temperatures and extremes of pH. Use the lock and key theory and collision theory to explain enzyme action.	
4.2.2.1	Required practical 2: investigate the effect of a factor on the rate of an enzyme-controlled reaction.	Carry out a safe, controlled investigation to measure the rate of the catalase under different conditions. Draw a diagram of the apparatus and write a method. Identify variables. Present and analyse the results: calculate rates of reaction using raw data and graphs. Draw conclusions and give explanations for the results.	
4.2.2.1	Human digestive enzymes Enzymes in the digestive system chemically digest food into small, soluble molecules that can be absorbed. Names of enzymes with substrates, products and sites of production. Bile is made by the liver and stored in the gall bladder. It helps in the digestion of fats by neutralising acid from the stomach and emulsifying fats. Different enzymes work best at different temperatures and pH values.	Explain why foods need to be digested into small, soluble molecules. Describe the three types of enzymes involved in digestion, including the names of the substrates, products and where the enzymes are produced. Explain how bile helps in the digestion of fats. Interpret graphs to determine the optimum temperature or pH for an enzyme. Carry out other enzyme controlled investigations as appropriate. Calculate the rate of enzyme controlled reactions.	

		Interpret the results from enzyme controlled reactions.	
4.2.2.2	The heart and blood vessels The heart is a double pump. How the heart is adapted for its function. The names of the blood vessels associated with the heart. Pacemaker cells regulate the beating of the heart. Artificial pacemakers correct irregularities in heart rate. How the lungs are adapted for efficient gas exchange.	Describe the functions of the heart and circulatory system Describe and label a diagram of the heart showing four chambers, vena cava, pulmonary artery, pulmonary vein and aorta. Describe the flow of blood from the body, through the heart and lungs and back to the body. Explain how the heart is adapted for its function. Describe the heart as a double pump and explain why this is efficient. Describe the function of the pacemaker cells and coronary arteries. Label the main structures in the gas exchange system – trachea, bronchi, alveoli and capillary network around alveoli. Explain how the alveoli are adapted for efficient gas exchange.	
4.2.2.2	Structure and function of arteries, veins and capillaries	Explain how the blood vessels are adapted for their function.	
4.2.2.4	Coronary heart disease Fatty material builds up in coronary arteries reducing blood flow to the heart muscle. Stents can be used to keep the coronary arteries open. Statins reduce cholesterol levels, so fatty material is deposited more slowly. Faulty heart valves can be replaced with biological or mechanical ones. Heart failure can be treated with a heart and lung transplant. Artificial hearts can be used whilst waiting for a transplant, or to allow the heart to rest and recover.	Describe problems associated with the heart and explain how they can be treated. Evaluate the use of drugs, mechanical devices and transplants to treat heart problems, including religious and ethical issues.	
4.2.2.3	Blood Blood is a tissue consisting of plasma, red blood cells, white blood cells and platelets. Plasma transports dissolved chemicals and proteins around the body. Red blood cells transport oxygen attached to haemoglobin. White blood cells help to protect the body against infection. Platelets are fragments of cells involved in blood clotting.	Describe the four main components of blood. Explain how each component is adapted for its function. Identify pictures of the different blood cells.	

4.2.2.5 4.2.2.6	Health issues and Effect of lifestyle on non-communicable diseases Health is the state of physical and mental well-being. Factors such as diet, stress and life situations can have a serious effect on physical and mental health. Diseases are major causes of ill health. Different diseases may interact: defects in the immune system increase the chance of catching an infectious disease. Viral infections can trigger cancers. Immune reactions can trigger allergies. Physical ill-health can lead to depression and mental illness. Various risk factors are linked to some non-communicable disease.	Explain how diet, stress and life situations can affect physical and mental health. Give examples of communicable and non-communicable diseases. Describe examples of how diseases may interact. Describe the effects of diet, smoking, alcohol and exercise on health. Explain how and why the Government encourages people to lead a healthy lifestyle. Give risk factors associated with cardiovascular disease, Type 2 diabetes, lung diseases and cancers.	
4.2.2.7	Cancers (malignant tumours) result from uncontrolled cell division. Cancer cells may invade neighbouring tissues, or break off and spread to other parts of the body in the blood, where they form secondary tumours.	Describe some causes of cancer, eg viruses, smoking, alcohol, carcinogens and ionising radiation. Describe the difference between benign and malignant tumours. Explain how cancer may spread from one site in the body to form a secondary tumour in another part of the body.	
4.2.3.1 4.2.3.2	Plant organs and Plant tissues. The leaf Plant organs include stems, roots and leaves. Organs are made up of different tissues, eg meristem tissue at growing tips. The leaf is the organ of photosynthesis. Examples of tissues in a leaf: epidermis, palisade and spongy mesophyll, xylem, phloem, guard cells and stomata. How these tissues are adapted for their function.	Label the main organs of a plant and describe their functions. Identify the tissues in a leaf and describe their functions. Relate the structure of each tissue to its function in photosynthesis. Explain why there are more stomata on the lower surface of a leaf. Describe the role of stomata and guard cells to control water loss and gas exchange. Calculate stomatal density.	
4.2.3.1 4.2.3.2	Plant transport systems The roots, stem and leaves form a plant transport system. Root hair cells absorb water by osmosis and mineral ions by diffusion and active transport. (See next lesson). Xylem tissue transports water and dissolved ions. The flow of water from the roots to leaves is called the transpiration stream. Xylem tissue is composed of hollow tubes strengthened with lignin.	Describe the organs that make up the plant transport system. Describe the role of xylem, phloem and root hair cells and explain how they are adapted for their functions. Define the terms ‘transpiration’ and ‘translocation’.	

	Phloem tissue transports dissolved sugars from the leaves to other parts of the plant. The movement of food through phloem is called translocation. Phloem cells have pores in their end walls for movement of cell sap.		
4.1.3.3	Active transport Active transport involves the movement of a substance against a concentration gradient and requires energy from respiration. Mineral ions can be absorbed by active transport into plant root hairs from very dilute solutions in the soil. Sugar can be absorbed by active transport from the gut into the blood.	Define the term 'active transport'. Describe where active transport occurs in humans and plants and what is transported. Explain why active transport requires energy. Explain how active transport enables cells to absorb ions from very dilute solutions. Explain the relationship between active transport and oxygen supply and numbers of mitochondria in cells.	