Thomas More Catholic Academy
FAITH | EXCELLENCE | RESPECT

Biology Curriculum Sequence – Key Stage 4

	KS3 National Curriculum prior learning	**By the end of the term, students can:**	Year 10 Term 1 B1 Cell Biology (Prokaryotes and Eukaryotes)	Year 10 Term 2 B2 Organisation of Organisms (Organ Systems)	Year 10 Term 3 B3 Infection and Response	Year 11 Term 1 B1 Cell Biology and B2 Organisation of Organisms	Year 11 Term 2 B5 Homeostasis and Response and B6 Inheritance, Variation and Evolution	Year 11 Term 3 Preparation for Exams
What we want our students to know and remember	The focus in KS4 continues with the process of building upon and deepening scientific knowledge and the understanding of ideas developed in earlier key stages in the subject discipline of Biology. Biology should be taught in ways that ensure students have the knowledge to enable them to develop curiosity about the natural world, insight into working scientifically, and appreciation of the relevance of science to their everyday lives, so that students: develop scientific knowledge and conceptual understanding, develop understanding of the nature, processes and methods of science, through different types of scientific enquiry that help them to answer scientific questions about the world around them; develop and learn to apply observational, practical, modelling, enquiry, problem-solving skills and mathematical skills, both in the laboratory, in the field and in other environments; develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions,	Define the key tier 3 **vocabulary**:	Eukaryotes and prokaryotes Animal and Plants cells Cell specialisation Cell differentiation Microscopy	Cell, Tissue, Organ, Organ System, Digestive System Biological Catalyst, Enzyme, Bile, pH, emulsify, Stomach carbohydrate, lipids, protein, Benedict's, Biuret, Iodine	Communicable Disease, Pathogen, Bacteria, Virus, Fungus, Protist, Symptoms, Medicine, Antibiotic, Resistance, Immunity, Phagocytes, Lymphocytes, Vaccination	Microscopes, resolution, magnification, mitosis, meiosis, stem cells, embryo, bone marrow, enzymes, biological catalyst, bile, temperature, pH, rate, communicable disease, vectors,	Endocrine System, hormones, chemicals, Adrenaline (HT), Thyroxine (HT), negative feedback (HT), LH, FSH, Genetic Engineering, Natural Selection, Evolution, Fossils	All Biology related key terms highlighted across years 7-11. Also scientific terminology, such as reproducible, repeatable, validity, accuracy, precision.
			Year 10 Term 1 B1 Cell Biology (Cell Division)	Year 10 Term 2 B2 Organisation of Organisms (Transport in Plants)	Year 10 Term 3 B4 Bioenergetics	Year 11 Term 1 B3 Infection and Response and B4 Bioenergetics	Year 11 Term 2 B7 Ecology	
			Chromosomes Mitosis Stem cells	Plant, meristem tissue, photosynthesis, stomata, epidermal tissues, palisade mesophyll, spongy mesophyll, xylem and phloem,	Photosynthesis, limiting factors, chemical reactions, respiration, oxygen debt, metabolism, Anaerobic respiration, fermentation	Protist, vector, resistance , Photosynthesis, Limiting factors, Respiration, lactic acid.	Quadrats, sampling, valid, reproducible, repeatable, mean, median, mode, deforestation, populations, global warming, peat bogs, biodiversity	
			Year 10 Term 1 B1 Cell Biology (Transport)					
			Diffusion Surface area to volume ratio Osmosis Active transport					

	both qualitatively and quantitatively.							
	For some students, studying Biology in KS4 provides the platform for more advanced studies, establishing the basis for a wide range of careers. For others, it will be their last formal study of subjects that provide the foundations for understanding the natural world and will enhance their lives in an increasingly technological society.	Recall the **knowledge**:	Year 10 Term 1 B1 Cell Biology (Prokaryotes and Eukaryotes)	Year 10 Term 2 B2 Organisation of Organisms (Organ Systems)	Year 10 Term 3 B3 Infection and Response	Year 11 Term 1 B1 Cell Biology and B2 Organisation of Organisms	Year 11 Term 2 B5 Homeostasis and Response and B6 Inheritance, Variation and Evolution	Year 11 Term 3 Preparation for Exams
			Eukaryotes and prokaryotes Plant and animal cells (eukaryotic cells) have a cell membrane, cytoplasm and genetic material enclosed in a nucleus. Bacterial cells (prokaryotic cells) are much smaller in comparison. They have cytoplasm and a cell membrane surrounded by a cell wall. The genetic material is not enclosed in a nucleus. It is a single DNA loop and there may be one or more small rings of DNA called plasmids. Students should be able to explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, chloroplasts in plant cells and plasmids in bacterial cells are related to their functions Most animal cells have the following parts: • a nucleus, which controls the activities of the cell • cytoplasm, in which most of the chemical reactions take place • a cell membrane, which controls the passage of substances into and out of the cell • mitochondria, which is where aerobic respiration takes place • ribosomes, which are where protein synthesis	The structure and functions of the digestive system Enzymes are biological catalysts The lock and key theory and collision theory can be used to explain enzyme action Enzymes in the digestive system chemically digest food into small, soluble molecules that can be absorbed 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. Required practical: Food tests Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. The heart is a double pump. It pumps blood to the lungs and to the rest of the body. Pacemaker cells regulate the beating of the heart. Artificial pacemakers correct irregularities in heart rate. Lungs are adapted for	Communicable diseases are infectious diseases caused by pathogens. Pathogens may be viruses, bacteria, protists or fungi. They may infect plants or animals. Pathogens can be spread by direct contact, by water or by air. The spread of diseases can be reduced or prevented by: · simple hygiene measures · destroying vectors · isolation of infected individuals · vaccination. Viral diseases include measles and AIDS, which is caused by the HIV. Viral disease cannot be treated with antibiotics. Bacterial diseases include salmonella food poisoning and the sexually transmitted disease gonorrhoea. Humans can also be infected with fungal diseases. Malaria is caused by a protist transmitted by mosquitos. Spread of malaria is controlled by preventing the vectors (mosquitos) from breeding and by using mosquito nets to avoid being bitten. The body defends itself against the entry of pathogens. Bacteria may produce	Most animal cells have a nucleus, cytoplasm, membrane, mitochondria and ribosomes. Plant and algal cells also have a cell wall and often have chloroplasts and a permanent vacuole. Organelles have functions and their structure is often related to this. Required practical: Microscopy. Chromosomes are found in the nucleus. They are made of DNA. Each chromosome carries a large number of genes. In body cells chromosomes are found in pairs. Mitosis occurs during growth or to produce replacement cells. During mitosis: · copies of the genetic material separate · the cell then divides once to form two genetically identical cells. Mitosis forms part of the cell cycle. Cells in reproductive organs divide by meiosis to form gametes. When a cell divides to form gametes: copies of the genetic information are made and the cell divides twice to form four gametes, each with a single set of chromosomes. All gametes are genetically different from each other.	The system is composed of endocrine glands that secrete hormones into the blood to be carried to a target organ where it has an effect. The positions of the pituitary, thyroid, adrenal glands, ovaries and testes. The pituitary is the master gland. It secretes many hormones that affect other glands. Hormones are chemical messengers. The effects of the endocrine system are slower, but longer acting than the nervous system.. Blood glucose concentration is monitored and controlled by the pancreas. It produces insulin, which causes glucose from the blood to enter cells. Glucose is converted to glycogen in liver and muscle cells for storage HT: Glucagon is also produced by the pancreas to convert stored glycogen back into glucose when blood glucose levels fall HT: The use of hormones to treat infertility. Women can be given a 'fertility drug' containing FSH and LH to stimulate ovulation. In IVF treatment FSH and LH are given to stimulate	Recall key concepts from topics B1-B7 bespoke revision lessons to meet the students' needs.

			occurs. In addition to the parts found in animal cells, plant cells often have: • chloroplasts, which absorb light to make food by photosynthesis • a permanent vacuole filled with cell sap Plant and algal cells also have a cell wall made of cellulose, which strengthens the cell Students should be able to, when provided with appropriate information, explain how the structure of different types of cells relate to their function in a tissue, an organ or organ system, or the whole organism Cells may be specialised to carry out a particular function: • sperm cells, nerve cells and muscle cells in animals • root hair cells, xylem and phloem cells in plants As an organism develops, cells differentiate to form different types of cells. Most types of animal cell differentiate at an early stage whereas many types of plant cells retain the ability to differentiate throughout life. In mature animals, cell division is mainly restricted to repair and replacement. As a cell differentiates it acquires different sub-cellular structures to enable it to carry out a certain function. It has become a specialised cell An electron microscope has much higher magnification and resolving power than a light microscope. This means that it can be used to study cells in much finer detail. This has enabled biologists to see and understand many more sub-cellular	efficient gas exchange. Arteries, veins and capillaries have specific structures depending on their function. 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. 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. 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	toxins that make us feel ill and damage tissues. Viruses live and reproduce inside cells, causing damage. The immune system tries to destroy pathogens that enter the body. White blood cells help to defend against pathogens by: · phagocytosis · antibody production · antitoxin production. A vaccine contains a small amount of dead or inactive pathogens. These stimulate white blood cells to produce antibodies. Immunity allows a person to produce specific antibodies quickly to prevent infection. If a large proportion of the population is immune to a pathogen, the spread of the pathogen is very much reduced. Antibiotics, e.g. penicillin, are used to kill infective bacteria inside the body. Specific bacteria should be treated with specific antibiotics. The emergence of strains resistant to antibiotics is of great concern. Antibiotics cannot kill viral pathogens. Painkillers and other medicines are used to treat the symptoms of disease but do not kill pathogens. Alexander Fleming discovered penicillin from the Penicillium mould. Traditionally drugs were extracted from plants and microorganisms. Most new drugs are synthesised by chemists; the starting point may still be a chemical extracted from a plant. New drugs are tested for toxicity, efficacy and dose. Preclinical testing in the	Gametes join at fertilisation to restore the normal number of chromosomes. The new cell divides by mitosis, and as the embryo develops cells differentiate. Stem cells are unspecialised cells that can differentiate to form many different types of cells. Stem cells from human embryos and adult bone marrow can be cloned and made to differentiate into different cells, e.g. nerve cells. Stem cells may be used to treat paralysis and diabetes in the future. In therapeutic cloning an embryo with the same genes as the patient is produced. Cells from this embryo will not be rejected by the patient. Risks e.g. transfer of viruses, associated with the use of stem cells in medicine. Stem cells from meristems in plants are used to produce clones quickly and cheaply. Enzymes are biological catalysts. The properties of enzymes. The lock and key theory and collision theory can be used to explain enzyme action. 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.	many eggs to mature. These are collected and fertilised by sperm in a lab. Embryos form, and some are inserted into the woman's uterus. The advantages and disadvantages of fertility treatment, e.g. stress, success rate and multiple births Genetic engineering involves modifying the genome of an organism to introduce a desired characteristic. Genes can be cut from the chromosome of a human or other organism and transferred into the cells of other organisms. HT: enzymes are used to cut the gene from a chromosome; gene is inserted into a vector, e.g. bacterial plasmid or virus; vector is used to insert gene into cell; cell then makes a new protein to produce the desired characteristic. Define the term genetic engineering. Describe the process of genetic engineering and its advantages. HT: Describe in detail the process of genetic engineering. Evaluate the use of genetic engineering in medicine, e.g. in gene therapy and production of hormones and some vaccines. Interpret information about genetic engineering techniques. Make informed judgements about the economic, social and ethical issues concerning genetic engineering and GM crops Explain advantages and disadvantages of genetic engineering Concerns about GM crops, e.g. effect on	

			structures. Limited to the differences in magnification and resolution	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. 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.	lab, then clinical trials involving healthy volunteers and then patients In a double blind trial, some patients are given a placebo; neither the doctors nor the patients know who has received a placebo and who has received the drug.		populations of wild flowers and insects, and uncertainty about safety of eating them. The genes present, or genotype, operate at a molecular level to develop characteristics that are expressed as a phenotype. A dominant allele is expressed if only present on one chromosome. A recessive allele is only expressed if present on both chromosomes. If the two alleles present are the same the person is homozygous for that trait, but if the alleles are different they are heterozygous. Most characteristics are a result of multiple genes interacting. Some disorders are inherited, e.g. polydactyly and cystic fibrosis. A Punnett square can be constructed to predict the outcome of a monohybrid cross. HT: Negative feedback. Adrenaline is produced by the adrenal glands in times of stress. It increases heart rate so oxygen and glucose are supplied to the brain and muscles faster. Thyroxine is produced by the thyroid gland. It stimulates BMR and plays an important role in physical and mental development. Adrenaline and thyroxine secretions are controlled by negative feedback mechanisms.. Darwin's theory of evolution by natural selection states that all species evolved from simple life forms that first developed more than three billion years ago. The main stages of natural selection.	

							Mutations are changes in the DNA code. They may lead to more rapid evolution, although mutations that result in a new phenotype are rare. Organisms of the same species can interbreed to produce fertile offspring Evidence for Evolution is provided by fossils and antibiotic resistance.	
			Year 10 Term 1 B1 Cell Biology (Cell Division)	Year 10 Term 2 B2 Organisation of Organisms (Transport in Plants)	Year 10 Term 3 B4 Bioenergetics	Year 11 Term 1 B3 Infection and Response and B4 Bioenergetics	Year 11 Term 2 B7 Ecology	
			The nucleus of a cell contains chromosomes made of DNA molecules Most of the cells in our bodies have identical nuclei Each chromosome carries a large number of genes. In body cells the chromosomes are normally found in pairs Cells divide in a series of stages called the cell cycle One of these stages is mitosis where the DNA, which has already been copied, divides During the cell cycle the genetic material is doubled and then divided into two identical cells Before a cell can divide it needs to grow and increase the number of sub-cellular structures such as ribosomes and mitochondria The DNA replicates to form two copies of each chromosome. One set of chromosomes is pulled to each end of the cell and the nucleus divides. Finally the cytoplasm and cell membranes divide to form two identical cells Cell division by mitosis is important in the growth	The leaf Plant organs include stems, roots and leaves. Organs are made up of different tissues, e.g. 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. 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. 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. Phloem tissue transports dissolved sugars from the leaves to other parts of the plant. The movement of food through phloem is called translocation.	Photosynthesis can be represented with Word and symbol equations. The rate of photosynthesis may be limited by: · low temperature · shortage of CO2 · shortage of light · shortage of chlorophyll. Factors that can limit the rate of photosynthesis are called limiting factors. HT Limiting factors are important economically in greenhouses. Glucose produced in photosynthesis may be: · used for respiration· converted into starch for storage · used to produce fats and oils for storage or cellulose to strengthen cell walls · used to produce amino acids for protein synthesis. To produce proteins plants also use nitrate ions from the soil Respiration can take place aerobically or anaerobically to transfer energy. Respiration is an exothermic reaction. Organisms need energy for chemical reactions, movement and to keep warm. During aerobic respiration	Pathogens can be spread by direct contact, by water or by air. The spread of diseases can be reduced or prevented by: · simple hygiene measures · destroying vectors · isolation of infected individuals · vaccination. Malaria is caused by a protist transmitted by mosquitos. Spread of malaria is controlled by preventing the vectors (mosquitos) from breeding and by using mosquito nets to avoid being bitten. The emergence of strains resistant to antibiotics is of great concern. Antibiotics cannot kill viral pathogens. The leaf is adapted to maximise photosynthesis. The Inverse square law (HT) (HT) Limiting factors are important economically in greenhouses. During exercise the heart and breathing rates increase and breath volume increases to supply oxygen to muscle cells faster. Muscle cells can respire anaerobically if there is	Quantitative data on the distribution and abundance of organisms can be obtained by: · random sampling with quadrats · sampling along a transect. Required practical: Field investigations Rapid growth in the human population means more resources are used and more wastes are produced, which could lead to more pollution. Pollution kills plants and animals which can reduce biodiversity. Waste may pollute water with sewage, fertilisers or toxic chemicals. Waste may pollute air with smoke and gases such as sulfur dioxide, which contributes to acid rain Waste may pollute land with toxic chemicals such as pesticides and herbicides, which may be washed from the land into water Humans reduce the amount of land available for other plants and animals by building, quarrying, farming and dumping waste. The destruction of peat	

			and development of multicellular organisms A stem cell is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type, and from which certain other cells can arise from differentiation Stem cells from human embryos and adult bone marrow can be cloned and made to differentiate into many different types of human cells Treatment with stem cells may be able to help conditions such as diabetes and paralysis In therapeutic cloning an embryo is produced with the same genes as the patient. Stem cells from the embryo are not rejected by the patient's body so they may be used for medical treatment The use of stem cells has potential risks such as transfer of viral infection, and some people have ethical or religious objections. Stem cells from meristems in plants can be used to produce clones of plants quickly and economically. Rare species can be cloned to protect from extinction. Large numbers of identical crop plants with special features such as disease resistance	Phloem cells have pores in their end walls for movement of cell sap. 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.	glucose and oxygen react to release energy. Word and symbol equations can be used to represent aerobic respiration. Anaerobic respiration is the incomplete oxidation of glucose so less energy is released than in aerobic respiration. A Word equation can be used to represent anaerobic respiration in muscle cells. Word and symbol equations are used to represent anaerobic respiration in some plant and yeast cells. Anaerobic respiration in yeast cells is called fermentation and has economic importance in the manufacture of bread and alcoholic drinks During exercise the heart and breathing rates increase and breath volume increases to supply oxygen to muscle cells faster. Muscle cells can respire anaerobically if there is insufficient oxygen. This produces lactic acid and creates an oxygen debt. Lactic acid can cause muscle fatigue. The cells stop contracting efficiently. When exercise stops, the oxygen debt must be repaid by continuing to breathe deeply. Blood transports lactic acid to the liver where it is converted back into glucose. The oxygen debt is the amount of oxygen needed to oxidise lactic acid. Metabolism means all the chemical reactions happening in a living organism. Metabolism includes: ·	insufficient oxygen. This produces lactic acid and creates an oxygen debt. Lactic acid can cause muscle fatigue. The cells stop contracting efficiently. When exercise stops, the oxygen debt must be repaid by continuing to breathe deeply. Blood transports lactic acid to the liver where it is converted back into glucose. The oxygen debt is the amount of oxygen needed to oxidise lactic acid.	bogs to produce compost releases carbon dioxide into the atmosphere. It destroys habitats and reduces biodiversity. Large scale deforestation occurred to: · provide land for cattle and rice fields to provide more food · grow crops from which biofuel can be produced.. This destruction of large areas of trees has: · increased the release of carbon dioxide by burning and microbial activity · reduced the rate at which carbon dioxide is removed from the atmosphere by photosynthesis to be 'locked up' in wood · led to a reduction in biodiversity Levels of carbon dioxide and methane in the atmosphere are increasing and contribute to 'global warming'. Consequences of global warming include: · loss of habitat when low lying areas flood · changes in the distribution of species where temperature of rainfall changes · changes in migration patterns.	

					the conversion of glucose to starch, glycogen and cellulose · the formation of lipids · the formation of amino-acids and proteins · respiration · the breakdown of excess proteins to form urea for excretion.			
			Year 10 Term 1 B1 Cell Biology (Transport)					
			Substances may move into and out of cells across the cell membranes via diffusion Diffusion is the spreading of the particles of any substance in solution, or particles of a gas, resulting in a net movement from an area of higher concentration to an area of lower concentration Some of the substances transported in and out of cells by diffusion are oxygen and carbon dioxide in gas exchange, and of the waste product urea from cells into the blood plasma for excretion in the kidney Factors which affect the rate of diffusion are: • the difference in concentrations (concentration gradient) • the temperature, • the surface area of the membrane A single-celled organism has a relatively large surface area to volume ratio. This allows sufficient transport of molecules into and out of the cell to meet the needs of the organism In multicellular organisms the smaller surface area to volume ratio means surfaces and organ systems are specialised for exchanging materials. This is to allow sufficient molecules to be					

			transported into and out of cells for the organism's needs The effectiveness of an exchange surface is increased by: • having a large surface area • a membrane that is thin, to provide a short diffusion path • (in animals) having an efficient blood supply • (in animals, for gaseous exchange) being ventilated Water may move across cell membranes via osmosis Osmosis is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane Active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration. Plants require ions for healthy growth. It also allows sugar molecules to be absorbed from lower concentrations in the gut into the blood which has a higher sugar concentration. Sugar molecules are used for cell respiration					
What we want our students to do	Science is changing our lives and is vital to the world's future prosperity, and all students should be taught essential aspects of the knowledge, methods, processes and uses of science. They should be helped to appreciate the achievements of science in showing how the complex and diverse phenomena of the natural world can be described in terms of a number of key ideas relating to the sciences	Demonstrate excellence in these **skills**:	Year 10 Term 1 B1 Cell Biology (Prokaryotes and Eukaryotes)	Year 10 Term 2 B2 Organisation of Organisms (Organ Systems)	Year 10 Term 3 B3 Infection and Response	Year 11 Term 1 B1 Cell Biology and B2 Organisation of Organisms	Year 11 Term 2 B5 Homeostasis and Response and B6 Inheritance, Variation and Evolution	Year 11 Term 3 Preparation for Exams
			Discuss the composition of the objects and how they are made of even smaller structures called cells Draw and label a generalised animal cell and describe the functions of the various parts. Pupils can illustrate their drawings of cells	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. State that food molecules must be small and soluble in order to be absorbed into the blood.	Define the term pathogen and state the four main groups of pathogen. Explain how pathogens can be spread to plants or animals and cause infection. Describe the main differences between bacteria and viruses. Explain how the spread	Label diagrams of animal and plant cells. Describe the function of the main organelles. Prepare slides of plant and animal cells and describe the procedure. Correctly use a microscope to observe cells under different magnifications.	Describe the endocrine system and define the term hormone. Relate hormone release and hormone action to the control system model. Label a diagram of the organs in the endocrine system. Explain why the pituitary gland is often called the	Apply knowledge and understanding to exam questions. Develop good exam technique by practising past exam questions.

	which are inter-linked, and which are of universal application. These key ideas include: the use of conceptual models and theories to make sense of the observed diversity of natural phenomena; the assumption that every effect has one or more cause that change is driven by interactions between different objects and systems; that many such interactions occur over a distance and over time; that science progresses through a cycle of hypothesis, practical experimentation, observation, theory development and review; that quantitative analysis is a central element both of many theories and of scientific methods of inquiry.		with a scale bar (multiplying the object's size by 10 or 20x) State that an average animal cell is around 10 – 100 µm Discuss what micrometres are in relation to cm State that structures inside the cell are measured in nanometres, which are one billionth of a metre Determine that bacteria are everywhere and are around 0.2 micrometres so completely invisible even under a microscope, unless they are growing in colonies. Draw and label the structure of a bacterial cell and relate the sub-structures to their function Determine that some bacteria cause disease, but many are useful and most are harmless Draw and label an animal cell including the cell organelles State the function of ribosomes and mitochondria in relation to the survival of the whole animal Determine that cell structures in different animals are alike and perform similar functions. Draw and label a plant cell including the cell organelles. State the function of chloroplasts, ribosomes and mitochondria in relation to the survival of the whole plant. Discuss what part of the plant cell gives us fibre in our diet and what function it plays in plants. Draw and label the structure and function of different specialised cells. Describe how the number of mitochondria might be different in different cells,	Describe the functions of the organs in the system Explain how the small intestine is adapted for its function. 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. Iodine reagent is to be used to test for starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater. 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. 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	of disease can be reduced or prevented. Describe the symptoms, mode of transmission, prevention and treatment for measles, HIV and AIDS, salmonella and gonorrhoea. Describe colds and flu as viral diseases. Describe athlete's foot as a fungal disease. Describe the life cycle of the malarial protist. Describe the symptoms, mode of transmission, prevention and treatment for malaria. Describe the body's first line defences Explain how microbes make us feel ill and how viruses damage cells. Explain how the immune system defends against disease Describe what white blood cells do. Explain why antibodies are specific for one pathogen/ antigen. Describe what a vaccine contains. Explain how vaccines prevent disease. Explain the idea of 'herd immunity'. Explain how antibiotics treat only bacterial diseases and how this has saved lives. Describe the problems associated with antibiotic resistance. Explain the difficulty in developing drugs that kill viruses without damaging body tissues. Give examples of painkillers and other medicines used to treat symptoms. Interpret data about painkillers and other medicines. Describe Fleming's discovery and explain its importance. State which drugs come	Describe the order of size of: cell, nucleus, chromosome and gene. Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included. Describe what a chromosome is and where chromosomes are found in the cell. Describe simply how and why body cells divide by. Draw simple diagrams to describe mitosis. Draw a simple diagram to describe the cell cycle in terms of: · cell growth, when the number of organelles increases · replication of chromosomes, so the genetic material is doubled · separation of the chromosomes: division of the nucleus · division of the cell to form two identical cells. Explain the term gametes and describe their genetic material. Explain why sexual reproduction results in variety. Draw diagrams to explain how gametes are formed in meiosis. Explain the number of chromosomes in the gametes during meiosis and fertilisation. Describe how an embryo is formed. Compare mitosis and meiosis. Define the term 'stem cell'. Describe where stem cells can be found in animals and plants. Describe in simple terms how nerve cells genetically identical to a patient could be obtained. Describe how stem cells could be used to help	master gland. Compare the actions of the nervous and endocrine systems. Describe how blood glucose concentration is monitored and controlled. Explain when insulin is produced and how it helps to control blood glucose levels. Describe glycogen as a stored carbohydrate. HT: Explain when glucagon is produced by the pancreas and its effect on blood glucose levels. Explain how insulin and glucagon work together to control blood glucose levels Describe where and when adrenaline is released and its target organs. Describe the effects of adrenaline on the body. Draw a diagram to explain how levels of adrenaline are controlled by a negative feedback system. Describe where thyroxine is produced and its effects on the body. Draw a diagram to explain how its release is stimulated by thyroid stimulating hormone and the levels of these two hormones are controlled by a negative feedback system Interpret the results of a genetic cross diagram and use direct proportion and simple ratios to express the outcomes. Describe the genotypes and phenotypes of the offspring. Describe the inherited disorders polydactyly and cystic fibrosis. Use genetic cross diagrams to explain inheritance and carriers. Make informed judgements about the economic, social and	

			depending on their function. Pupils can write job descriptions for different cells and interview non-specialised cells for the role. Determine that plant cells can change their job, but animal cells must remain doing the same job. Required practical: Microscopy Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included. Carry out calculations involving magnification, real size and image size using the formula $\frac{size\ of\ image}{size\ of\ real\ object}$ Describe how electron microscopy has increased understanding of subcellular structures. HT Rearrange the equation to calculate a different unknown..	results from enzyme controlled reactions. 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. Explain how the blood vessels are adapted for their function. 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. Describe the four main components of blood. Explain how each component is adapted for its function. Identify pictures of the different blood cells. Explain how diet, stress and life situations can affect physical and menta health Give examples of communicable and non-	from plants and microorganisms. Explain why drugs need to be tested before they can be prescribed. Describe the main steps in the development and testing of a new drug. Give reasons for the different stages in drug testing. Explain the terms placebo and double-blind trial.	treat some medical conditions. Evaluate risks and benefits, as well as the social and ethical issues concerning the use of stem cells from embryos in medical research and treatments. 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. 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.	ethical issues concerning embryo screening Interpret the results of a genetic cross diagram and use direct proportion and simple ratios to express the outcomes. Describe the genotypes and phenotypes of the offspring. Describe the inherited disorders polydactyly and cystic fibrosis. Use genetic cross diagrams to explain inheritance and carriers. Make informed judgements about the economic, social and ethical issues concerning embryo screening... Describe the use of fertility drugs in women with low FSH levels. Use a model, e.g. a flow diagram to explain the process of In Vitro Fertilisation (IVF). Evaluate the use of fertility treatments Describe Darwin's theory of evolution by natural selection. Describe the main stages of natural selection as: · individual organisms within a particular species may show a wide range of phenotype variation because of differences in their genes · individuals with characteristics most suited to the environment are more likely to survive to breed successfully · the genes that have enabled these individuals to survive are then passed on to the next generation. Define the term mutation. Explain why mutation may lead to more rapid change in a species. Define the term species. Identify organisms that are of different species. Interpret evolutionary	

				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. Describe some causes of cancer, e.g. 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.			trees Describe the evidence for the theory of evolution by natural selection.	
			Year 10 Term 1 B1 Cell Biology (Cell Division)	Year 10 Term 2 B2 Organisation of Organisms (Transport in Plants)	Year 10 Term 3 B4 Bioenergetics	Year 11 Term 1 B3 Infection and Response and B4 Bioenergetics	Year 11 Term 2 B7 Ecology	
			State that humans start off as a single fertilised cell State that cells divide to form identical daughter cells from the original fertilised egg .Describe the different situation where mitosis occurs in plants and animals Describe the process of cell division Describe a stem cell and where they can be found State some uses of stem cells State that cloned plants are genetically identical to their parents. Describe reasons for cloning plants	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. Describe the organs that make up the plant transport system. Describe the role of xylem, phloem and root hair cells and explain how	Write the word and symbol equation for photosynthesis Explain why photosynthesis is important for the survival of other organisms. Investigate the need for light, carbon dioxide and chlorophyll to make glucose. Explain why plants should be de-starched before photosynthesis experiments and describe how this is done. Describe experiments to show that plants produce oxygen in the light. Test to see if a leaf contains starch. Explain why the leaves are tested for starch and not for sugar.	Explain how pathogens can be spread to plants or animals and cause infection. Describe the main differences between bacteria and viruses. Explain how the spread of disease can be reduced or prevented. Describe the life cycle of the malarial protist. Describe the symptoms, mode of transmission, prevention and treatment for malaria. Describe the problems associated with antibiotic resistance. Identify the tissues in a leaf and describe their functions. Relate the structure of each tissue to its function	Describe how to carry out random sampling of organisms using a quadrat. Describe when and how a transect should be used. Evaluate data gathered by using a quadrat and transect. Calculate area, mean, median, mode and range. Explain why sample size is important to obtain valid results Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species Describe the problems associated with an	

				they are adapted for their functions. Define the terms 'transpiration' and 'translocation. 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.'	Describe the test for oxygen. Interpret results and relate to photosynthesis equation. State factors that can limit the rate of photosynthesis. Interpret data showing how factors affect the rate of photosynthesis. Required practical: plan a method, Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed. Calculate the rate using numerical information or graphs. Interpret graphs to decide which factor is limiting the rate. HT Explain how conditions in greenhouses can be controlled to optimise the growth of plants. HT Relate limiting factors to the cost effectiveness of adding heat, light or carbon dioxide to greenhouses, HT Evaluate the benefits of artificially manipulating the environment in which plants are grown. List ways in which glucose is used by a plant. Describe functions of fats, oils, cellulose, starch and proteins in a plant. Explain how plants obtain nitrate ions and what they are needed for State that all animals and plants produce carbon dioxide and water all the time as a by-product of aerobic respiration. Write the word equation for aerobic respiration. Define the term 'aerobic'. Describe what organisms need energy for. Describe tests for carbon dioxide and water. State the site of aerobic	in photosynthesis. HT Understand and use inverse proportion - the inverse square law and light intensity in the context of photosynthesis. State factors that can limit the rate of photosynthesis. Interpret data showing how factors affect the rate of photosynthesis. Describe and explain the changes that occur in the body during exercise. Design and carry out an investigation about the effects of exercise on the body. Present and interpret data about heart rate, breathing rate and breath volume. Interpret data relating to the effects of exercise on the body, e.g. spirometer tracings. Describe the effects of long periods of vigorous exercise on the body. Define the term 'oxygen debt'. Explain what happens to lactic acid once exercise stops.	increasing human population. Interpret graphs showing human population growth Describe how water can be polluted with sewage, fertiliser or toxic chemicals. Analyse and interpret data about water pollution. Describe examples of air pollutants and where they come from. Describe the effects of smoke on buildings, humans and plant photosynthesis Describe how acid rain is formed and the effects of acid rain on living organisms. Analyse and interpret data about air pollution. Evaluate the use of fertiliser on plant growth and oxygen levels. Describe what herbicides and pesticides are used for Explain what peat is and why it is important to preserve areas of peat. Explain why peat should not be burnt Define the term deforestation. Explain why vast tropical areas have been cleared of trees. Explain how deforestation increases the amount of carbon dioxide in the atmosphere and leads to a reduction in biodiversity Explain the terms greenhouse effect and global warming. Explain with the aid of a diagram how levels of carbon dioxide and methane contribute to global warming. Describe the possible effects of global warming.	

					respiration and be able to give examples of cells that contain a lot of mitochondria Define the term 'anaerobic'. Explain why anaerobic respiration is less efficient than aerobic respiration. Write the word equation for anaerobic respiration in animal cells. Write the word and symbol equation for anaerobic respiration in yeast cells. State that anaerobic respiration in yeast is called fermentation. Explain why yeast is used to make bread and alcoholic drinks. Interpret data from yeast investigation. Describe and explain the changes that occur in the body during exercise. Design and carry out an investigation about the effects of exercise on the body. Present and interpret data about heart rate, breathing rate and breath volume. Interpret data relating to the effects of exercise on the body, e.g. spirometer tracings. Describe the effects of long periods of vigorous exercise on the body. Define the term 'oxygen debt'. Explain what happens to lactic acid once exercise stops. Define the term 'metabolism'. Give examples of reactions in metabolism. Name some chemicals formed from glucose molecules. Describe lipid formation from a molecule of glycerol and three molecules of fatty acids. Describe the use of			

					glucose and nitrate ions to form amino acids, which form proteins. Describe the formation of urea..			
			Year 10 Term 1 B1 Cell Biology (Transport)					
			Define diffusion Describe the factors that can influence diffusion Demonstrate surface area by using models Describe how different substances are diffused in the human body including oxygen and carbon dioxide in the lungs and urea in the kidney Explain how the small intestine and lungs in mammals, gills in fish, and the roots and leaves in plants, are adapted for exchanging materials Label a diagram of a plant leaf and root to describe how the tissues and cells are adapted to increase the rate of diffusion of different substances into and out of a plant. Label a diagram to show the surfaces of gas exchange in an alveolus Compare the structure of the lung to the gills of a fish. Describe the similarities and differences between them Label a diagram of the villi in the small intestine to show how substances can diffuse into the blood stream Describe and explain how all these organs are adapted to allow an increased rate of diffusion Define osmosis. Label diagrams to show the movement of water through partially permeable membranes.					

			Describe where osmosis takes place in plants and animals Required practical: Osmosis Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue Define active transport Link the structure of a root hair cell to its function. Active transport allows mineral ions to be absorbed into plant root hairs from very dilute solutions in the soil Define isotonic Describe why people drink isotonic drinks and high energy drinks in sport Compare the similarities and differences between diffusion, osmosis and active transport					
Key assessment questions:			Year 10 Term 1 B1 Cell Biology (Prokaryotes and Eukaryotes)	Year 10 Term 2 B2 Organisation of Organisms (Organ Systems)	Year 10 Term 3 B3 Infection and Response	Year 11 Term 1 B1 Cell Biology and B2 Organisation of Organisms	Year 11 Term 2 B5 Homeostasis and Response and B6 Inheritance, Variation and Evolution	Year 11 Term 3 Preparation for Exams
			Exchange scale diagrams and determine the size of the original object using the scale Use estimations and explain when they should be used to judge the relative size or area of sub-cellular structures Carry out calculations and express answers in standard form	Describe the nature of enzyme molecules and relate their activity to temperature and pH. Evaluate the use of models to represent blocked arteries. Relate the structure of blood vessels to their function Give ways that we might be able to reduce the risk of heart disease Give ways that we might be able to reduce the risk of cancer When treating cancer, why would it be important to know whether the tumour found was a primary or secondary tumour	Evaluate the global use of vaccination schedules and side effects associated with specific vaccines. Explain the use of antibiotics and other medicines in treating disease. Discuss the ethics of drug trials in the development of medicines.	Compare and contrast Mitosis and Meiosis. Describe the roles of mitosis and meiosis in animals. What would happen if…? e.g.: a) ….DNA did not replicate? b) …..chromosomes did not line up down the middle? c) …..organelles did not replicate? Evaluate the use of stem cells from embryos and adult bone marrow. How are stem cells beneficial in medicine. Describe the nature of enzyme molecules and relate their activity to temperature and pH. Explain how bile helps in the digestion of fats..	Evaluate the use of genetic screening. Describe how blood glucose levels are controlled Evaluate the use of genetic engineering Suggest the kinds of characteristics that might be chosen to modify Discuss the evidence we have to support Darwin's theory and present in a suitable format.	Use of past exam questions.

			Year 10 Term 1 B1 Cell Biology (Cell Division)	Year 10 Term 2 B2 Organisation of Organisms (Transport in Plants)	Year 10 Term 3 B4 Bioenergetics	Year 11 Term 1 B3 Infection and Response and B4 Bioenergetics	Year 11 Term 2 B7 Ecology	
			Recognise and describe situations in given contexts where mitosis is occurring? Why do cells undergo mitosis What is the problem if cells begin to undergo cell division in an uncontrollable way Evaluate the use of stem cells from embryos and adult bone marrow How are stem cells beneficial in medicine	Explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration. Describe the role of different tissues in plants. Explain how water is absorbed by root hairs and how mineral ions are absorbed by root hairs.	HT How can farmers maximise crop yield? Explain the effect of limiting factors on the rate of photosynthesis. Compare aerobic and anaerobic respiration. Compare anaerobic respiration in plants and animals. Explain why long periods of vigorous activity leads to muscles becoming fatigued.	Explain application of science and personal, social, economic and environmental implications related to malaria. Evaluate personal, social and economic implications of antibiotics. Explain how farmers can use their understanding of photosynthesis in order to maximise crop yield. Explain what happens to lactic acid once exercise stops (HT only)	Evaluate method to estimate cover and modify to estimate a plant population on the school field How can the validity of sampling investigations be improved Discuss the sources and effects of toxic chemicals; what pesticides and herbicides are used for Explain why the destruction of peat bogs is harmful to the environment Discuss the effects deforestation has on the environment Describe the possible effects of global warming.	
			Year 10 Term 1 B1 Cell Biology (Transport)					
			Why do organisms like bacteria not need a complex exchange system Explain the differences between diffusion, osmosis and active transport Suggest how exchange surfaces are adapted for their function Explain why root hair hairs contain large numbers of mitochondria					
Disciplinary Rigour		What makes your subject different to other subjects? What are the expectations for students in your subject area in	Year 10 Term 1 B1 Cell Biology (Prokaryotes and Eukaryotes)	Year 10 Term 2 B2 Organisation of Organisms (Organ Systems)	Year 10 Term 3 B3 Infection and Response	Year 11 Term 1 B1 Cell Biology and B2 Organisation of Organisms	Year 11 Term 2 B5 Homeostasis and Response and B6 Inheritance, Variation and Evolution	Year 11 Term 3 Preparation for Exams

		the KS4 National Curriculum if applicable / KS4 qualification specification?	AT skills covered by this practical activity: biology AT 1 and 7 Working Scientifically (1.1) Recognise, draw and interpret images of cells Working Scientifically (4.4) Use prefixes centi, milli, micro and nano	Students should be able to develop an understanding of size and scale in relation to cells, tissues, organs and systems. Maths Skills; rate calculations Maths Skills; use simple compound measures such as rate and carry out rate calculations for blood flow AT 7 Observing and drawing blood cells seen under a microscope. Working Scientifically (1.5) Evaluate risks related to blood products. Working Scientifically (1.2) Be able to use other models to explain enzyme action. Maths Skills Be able to translate disease incidence information between graphical and numerical forms, construct and interpret frequency tables and diagrams, bar charts and histograms, and use a scatter diagram to identify a correlation between two variables. Working Scientifically (1.4), (1.3) Evaluate methods of treatment bearing in mind the benefits and risks associated with the treatment Use food tests to investigate which nutrients can be found in different food samples Investigate the effect of changing pH on enzyme action.	Working Scientifically 1.4 Evaluate the global use of vaccination in the prevention of disease Working Scientifically Understand that the results of testing and trials are published only after scrutiny by peer review.	Working Scientifically (1.2) Modelling behaviour of chromosomes during meiosis. Working Scientifically (1.2) Use models and analogies to develop explanations of how cells divide Maths Skills rate calculations Working Scientifically (1.2) Be able to use other models to explain enzyme action. .	Maths Skills Students should be able to extract information and interpret data from graphs that show the effect of insulin in blood glucose levels in both people with diabetes and people without diabetes Working Scientifically 1.4 Evaluate from the perspective of patients and doctors the methods of treating infertility. HT Working Scientifically 1.2 Maths Skills Interpret and explain simple diagrams of negative feedback control Working Scientifically 1.2 Use the theory of evolution by natural selection in an explanation. Maths Skills Extract and interpret from charts, graphs and tables Working Scientifically 1.3 Appreciate why the fossil record is incomplete Working Scientifically 1.1 Understand how scientific methods and theories develop over time HT Working Scientifically 1.4 Interpret information about genetic engineering techniques and to make informed judgements about issues concerning cloning and genetic engineering including GM crops. Working Scientifically 1.3 Data is now available to support the theory of evolution.	The complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas in biology. These key ideas are of universal application, and we have embedded them throughout the subject content. They underpin many aspects of the science assessment • life processes depend on molecules whose structure is related to their function • the fundamental units of living organisms are cells, which may be part of highly adapted structures including tissues, organs and organ systems, enabling living processes to be performed effectively • living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many different ways • living organisms are interdependent and show adaptations to their environment • life on Earth is dependent on photosynthesis in which green plants and algae trap light from the Sun to fix carbon dioxide and combine it with hydrogen from water to make organic compounds and oxygen • organic compounds are used as fuels in cellular respiration to allow the other chemical reactions necessary for life • the chemicals in ecosystems are continually cycling

								through the natural world • the characteristics of a living organism are influenced by its genome and its interaction with the environment • evolution occurs by a process of natural selection and accounts both for biodiversity and how organisms are all related to varying degrees.
			Year 10 Term 1 B1 Cell Biology (Cell Division)	Year 10 Term 2 B2 Organisation of Organisms (Transport in Plants)	Year 10 Term 3 B4 Bioenergetics	Year 11 Term 1 B3 Infection and Response and B4 Bioenergetics	Year 11 Term 2 B7 Ecology	
			Working Scientifically (1.1) Understand how microscopy techniques have developed over time Working Scientifically (1.2) Use models and analogies to develop explanations of how cells divide Working Scientifically (1.3) Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments	AT 7 Observation and drawing of a transverse section of a leaf AT 3, 4, 5 Measure the rate of transpiration by the uptake of water AT 6,7 Investigate the distribution of stomata and guard cells Maths Skills Process data from investigations involving stomata and transpiration rates to find arithmetic means, understand the principles of sampling and calculate surface areas and volumes	Maths Skills Solve simple algebraic equations. Maths Skills and Working Scientifically 1.4 HT only - use data to relate limiting factors to the cost effectiveness of adding heat, light or carbon dioxide to greenhouses. AT 1, 2, 3, 4,5 Investigating the effect of light on the rate of photosynthesis Maths Skills (HT) – understand and use inverse proportion: the inverse square law and light intensity in the context of photosynthesis. AT 1, 2, 3 Investigations into the effect of exercise on the body.	Working Scientifically (1.4) Evaluate the global use of vaccination in the prevention of disease. AT 7 Observation and drawing of a transverse section of a leaf . Maths Skills, Working Scientifically 1.4 (HT only) Use data to relate limiting factors to the cost effectiveness of adding heat, light or carbon dioxide to greenhouses. AT 1, 2, 3 Investigations into the effect of exercise on the body.	Working Scientifically 1.4, 1.5 Understand the conflict between the need for cheap available compost to increase food production and the need to conserve peat bogs and peatlands as habitats for biodiversity and to reduce carbon dioxide emissions Working Scientifically 1.4 Evaluate the environmental implications of deforestation Working Scientifically 1.6 Understand the scientific consensus about global warming and climate change is based on systematic reviews of thousands or peer reviewed publications Working Scientifically 1.3 Explain why evidence is uncertain or incomplete in a complex context	
			Year 10 Term 1 B1 Cell Biology (Transport)					

			Working scientifically (1.2) Recognise, draw and interpret diagrams that model diffusion. Working Scientifically (1.2) Recognise, draw and interpret diagrams that model osmosis Plot, draw and interpret appropriate graphs Working Scientifically (1.5) use of isotonic drinks and high energy drinks in sport Calculate and compare surface area to volume ratios Investigate the effect of changing concentration of solution on potato tissue. Draw a table, record results, draw a suitable graph (calibration curve), draw conclusions and evaluate the data obtained					