



SCIENCE

YEAR 8

	Topic	Knowledge & understanding		Key Vocabulary
Autumn	Nutrition	Know that a balanced diet includes a range of specific nutrients from food in specific quantities, and that this is required for our bodies to function effectively. Know the content of a healthy diet includes carbohydrates for energy, lipids for energy and producing cell membranes, proteins for growth and repair, vitamins in small quantities to help cells to function effectively, minerals in small quantities to make new chemicals within the body, dietary fibre to ensure movement of food through the small intestine and water for transport and chemical reactions. Know that having imbalances within a diet can lead to starvation, obesity or deficiency diseases. Know that digestion is the process that breaks down large, insoluble molecules into smaller, soluble ones within the body. Know the names of the parts of the digestive system and their roles, to <u>include</u>: mouth to moisten and grind food and add digestive enzymes, oesophagus to allow food to pass to the stomach, stomach to churn food, add acid to kill bacteria and add enzymes to break down proteins, small intestine to add digestive enzymes and absorb food into the bloodstream, large intestine to absorb water. Know the difference between physical and chemical digestion. Know that the small intestine is adapted for efficient absorption of food (villi that provide a <u>large combined</u> surface area, close blood supply, surface one cell thick). Know that enzymes are biological catalysts that speed up the rate at which substances are broken down within the digestive system. Know that bacteria play an important role in digestion by preventing harmful bacteria from forming colonies and by digesting food the body cannot.	Know how to use food labels to compare the nutritional values of different foods. Know how to calculate the energy requirements in a healthy diet. Know how to apply knowledge of a range of techniques, apparatus, and materials to carry out food tests successfully. Know how to use food tests to compare the nutritional values of different foods to include: Benedict's test for reducing sugars, Biuret test for protein, iodine test for starch, filter paper test for lipids. Know how to carry out <u>a</u> investigation into absorption in the small intestine using a model gut made from <u>visking</u> tubing.	Tier 2: Absorb Balanced Technique Consume Deficiency Starvation Elimination Lubricant Surface area Tier 3: Carbohydrate Lipid Protein Vitamin Mineral Fibre Nutrition Diet Nutrient Egestion Digestion Obesity Malnutrition Microorganism Bacteria Small intestine Oesophagus Faeces Rectum Saliva Absorption Enzyme Catalyst



		Know that the ventilation system allows oxygen to be breathed into our lungs, and carbon dioxide to be removed from our bodies. Know that the ventilation system consists of the trachea, lungs (containing bronchi, bronchioles, and alveoli), the ribs, intercostal muscles, and the diaphragm. Know that during inhalation the diaphragm contracts and pulls downwards, the intercostal muscles contract drawing the ribs upwards and the volume of the lung increases, decreasing the pressure and drawing oxygen in from the air. Know that during exhalation the diaphragm relaxes, the intercostal muscles contract causing the ribs to move downwards and the volume of the lung decreases, increasing the pressure inside the lungs and expelling oxygen out into the air. Know that gas exchange takes place in the alveoli within the lung, as oxygen diffuses from the alveolus into the capillaries and carbon dioxide diffuses from the capillaries into the alveolus. Know that the alveolus is adapted to its function by: being moist, having a large combined surface area, having a close network of capillaries, and having a thin (one cell thick) wall. Know that smoking can impact the human gas exchange system: nicotine is addictive and can increase heart rate, tar is a carcinogen and carbon monoxide can reduce the amount of oxygen that red blood cells can carry. Know that asthma can cause bronchioles within the lungs to become narrower and fill with mucus, causing shortness of breath. Know that short term effects of exercise include an increase in breathing rate and depth and an increase in heart rate. Know that long term benefits of cardiovascular exercise include increased heart muscle strength, increased lung capacity and reduced heart rate. Know that aerobic respiration is an exothermic reaction which takes place in the mitochondria and releases energy to enable the cellular processes necessary for life to take place. Know the word equation for aerobic respiration: glucose + oxygen → carbon dioxide + water Know that anaerobic respiration takes place in the cytoplasm, does not require oxygen and transfers less energy than aerobic respiration. Know the word equation for anaerobic respiration: glucose → lactic acid. Know that anaerobic respiration produces lactic acid, which is toxic and can damage muscles. Know that lactic acid produced during anaerobic respiration is broken down after exercise using oxygen, and that the excess oxygen consumed during this time is called EPOC. Know the differences between aerobic and anaerobic respiration, including: the difference in energy transfer, the use	Know how the bell jar model can be used to show how ventilation takes place. Know how to make simple measurements of lung volume. Know how the effects of smoking can be modelled using a smoking machine in a fume cupboard. Know how to investigate the effect of exercise on heart rate.	Tier 2: Absorb Transfer Surface area Ventilation Tier 3: Diffusion Oxygen Glucose Aerobic Anaerobic Carbon dioxide Lung Trachea Bronchi Bronchiole Alveolus Diaphragm Mucus Cilia Intercostal muscle Capillary Asthma Carbon monoxide Mitochondria Cytoplasm Haemoglobin
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Respiration



		of oxygen, where the processes take place and the products formed.		
	Atoms, Molecules and compounds	Know that air is not pure; it is a mixture of different elements that are not chemically bonded together. Know that the air that we breathe consists of 78% nitrogen, 21% oxygen, 0.9% argon and 0.04% carbon dioxide. Know that the simplest particles of matter that exist are called atoms. Know that molecules are two or more atoms that are chemically bonded together. Know that elements are substances that are made from only one type of atom. Know that compounds are molecules that contain different types of atoms. Know that elements can be found in the periodic table of elements; metals are found on the left-hand side and non-metals on the right. Know that the periodic table has been updated and improved many times throughout history and numerous scientists have contributed to these advances. Know that elements have a one or two letter symbol that can be used to identify them. Know that metals are generally shiny, malleable, good conductors of heat, good conductors of electricity and have high melting points. Know that non-metals are generally dull, brittle, poor conductors of heat, poor conductors of electricity and have low melting points. Know that different elements are used for different purposes, depending on their properties. Know that a chemical is a strong force of attraction that holds atoms together in molecules and compounds, and that these bonds cannot be easily separated. Know that when a metal and a non-metal bond, the compound is named with the metal first and non-metal second. The ending of the non-metal is changed to -ide. Know that when a metal, non-metal and oxygen bond, the compound is named with the metal first and non-metal second. The ending of the non-metal is changed to -ate. Know that chemical reactions can be represented using word equations. Know that reactants are the starting materials of a reaction, and that these are the substances that react together. Know that the products are the substances that have been made at the end of a chemical reaction. Know that thermal decomposition reactions break down one reactant in simpler substances using heat.	Know how to draw a chemical substance if it is described as an atom, molecule or compound. Know how to identify the dependent, independent and control variables for any given experiment. Know how to make property observations to group elements by type. Know how to identify the chemical elements and the quantity of atoms that are present in a chemical formula. Know how to undertake a practical investigation that can be used to identify: • Whether a substance conducts electricity. • Whether a substance conducts heat. • How heavy a substance is. Know how to predict the name of the compound that results from a reacting metal and non-metal. Know how to identify the observations that show a chemical reaction is taking place. Know how to predict the name of the compound that results from a reacting metal, non-metal and oxygen. Know how to identify the reactants and products from a chemical equation. Know how to translate a written description of a chemical reaction into a word equation.	Tier 2: Arrangement Substance Random Regular Observation Property Purpose Reaction Decompose Tier 3: Atom Element Molecule Compound Mixture Pure Formula Periodic table Brittle Malleable Metal Non-metal Bond Effervescence Dissolve Thermal decomposition Reactants Products



		Know that current is the flow of charge around a circuit. Know that charge carries the energy around the circuit. Know that for a current to flow in a circuit there must be a cell, battery or powerpack and be the circuit must be complete Know that that batteries or cells arranged together must have opposite terminals connected for the circuit to work. Know that an open switch will not allow current to flow. Know that a switch can be used to turn lamps on and off in a circuit. Know that a filament lamp transfers energy to a thermal store and then to a radiation pathway. Know that an ammeter measures the flow of current through a component. Know that electrical components can be represented in diagrams by symbols. Know that electrical conductors allow current to move through them easily. Know that electrical insulators do not allow current to move through them. Know that models are used in science to represent abstract or invisible concepts, and that there a range of models that can represent electrical circuits. Know that in a series circuit there is only one pathway for the current to follow, whereas in a parallel circuit there is more than one pathway for the current to follow. Know that in a series circuit if a lamp fails then current will cease to flow and any other lamps will go out. Know that lamp brightness will decrease in a series circuit as more lamps are added. Know that lamp brightness appears to stay the same in a parallel circuit when more lamps are added. Know that in a parallel circuit if a lamp fails then current will only stop in that pathway only; all other pathways will still have a current flowing. Know that domestic circuits are wired in parallel. Know that current is constant throughout a series circuit, but is shared between pathways in a parallel circuit. Know that voltage is the amount of energy carried by the charges Know that a cell or battery effectively pushes the charges around the circuit. Know that a greater voltage will result in a higher current. Know that voltage is measured in volts, and measured using a voltmeter. Know that a voltmeter is placed in parallel with the component we want to measure the voltage across. Know that resistance of a component makes it harder for current to flow through. Know that thicker wires have higher resistances than thinner wires. Know that a resistor is a component that is used in circuits to change the overall resistance.	Know how to draw and interpret electrical circuits using correct circuit symbols. Know how to build electrical circuits. Know how to check for errors in circuits that are non-operational Know how to place an ammeter in a circuit to measure the current through a component. Know how to use a multimeter as an ammeter or a voltmeter. Know how to identify what the parts of a physical electrical circuit model represent, for example the rope model: current is represented by the speed of the rope, the components are represented by the people passing the rope through their hands, potential difference is represented by the person moving the rope. Know how to evaluate physical electrical circuit models and identify their limitations. Know how to represent parallel and series circuits using diagrams. Know how to calculate missing current values in parallel circuits. Know how to connect a voltmeter in an electrical circuit. Know how to use and interpret a model to explain voltage. Know how to use the gradient of current voltage graphs to compare resistances. Know how to use and rearrange the equation $V = I \times R$ to calculate missing values for either voltage, current or resistance. Know how to make a prediction, using declarative knowledge, about how much current passes through a wire when the length is increased. Know how to carry out an investigation to compare the relationship between current and wire length. Know how to record data in a suitable table. Know how to represent data on a suitable graph. Know how to stay safe when around electrical devices in the home, classroom and out of the house. Know how to select the correct fuse for the appliance rating. Know how to correctly wire a UK 3 pin plug.	Tier 2: Symbol Components Model Pathway Across Hazard Risk Ratings Fluctuation Tier 3: Current Energy Filament Resistor Cell Battery Powerpack Ammeter Amperes Liquid Charges Metals Conductors Insulators Parallel circuit Series circuit Voltage Voltmeter Volts Resistance Resistor Fuse Live wire Neutral wire Earth wire Circuit breakers Ring main
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		Know that a variable resistor is a resistor whose resistance can be changed by the user. Know that in an ohmic conductor $V = I \times R$ Know that longer wires have higher resistance than shorter wires. Know that electrical currents can be dangerous for the human body. Know that fuses and circuit breakers are used in electrical circuits to prevent current surges. Know that fuses melt if the current is too high breaking the circuit and need to be replaced once they have melted. Know that circuit breakers trip if they detect a fluctuation in current and can be reset. Know that when wiring a plug: the green and yellow wire is called the Earth wire, the blue and yellow wire is called the neutral wire, and the brown wire is called the live wire Know that the Earth, live and neutral wire have a specific connection in a UK 3 pin plug. Know that UK 3 pin plugs contain fuses. Know that the plastic coating on wire is an insulator to prevent the user from receiving an electrical shock. Know that the top pin on a UK 3 pin plug is longer as a safety measure to open up the socket for the 2 lower pins.		
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Spring	Classification	Know that organisms are classified, using smaller and smaller groupings of shared characteristics. Know and identify the genus and species names of an organism from the binomial name. Know why preserving biodiversity is important. Know that observations about the distribution of organisms can be made by using sampling techniques. Know the difference between multicellular and unicellular organisms. Know the differences in cellular features that help us to identify members of different kingdoms. Know that multicellular organisms get the raw materials they need into their cells by diffusion, Know that diffusion is the movement of particles from an area of higher concentration to an area of lower concentration. Know some uses of microscopic fungi including making bread, beer and wine. Know the process of anaerobic respiration. Know and identify the common parts of bacterial cells. Know the functions of the common parts of bacterial cells. Know that bacteria multiply by binary fission and grow well in favourable conditions. Know how to identify the common parts of Protocista cells. Know the functions of the common parts of Protocista cells. Know that algae cells are adapted to make their own food by photosynthesis. Know the photosynthesis equation. Know the role of decomposers in an ecosystem. Know the role of decomposers and plants in the recycling of carbon in an ecosystem as part of the carbon cycle. Know the role of enzymes in the breakdown of starch into glucose molecules. Know some methods of preserving foods.	Know how to use the calculation required to work out a population estimate. Know how to sample a population of organisms. Know how to use a quadrat Know how to use a pooter, sweep net, and pitfall trap to collect data. Know how yeasts can be used in brewing and baking. Know how yeast multiply and the factors that affect a yeast population growth rate. Know how to use bacteria to make yoghurt. Know how to collect bacteria samples that can be grown in a nutrient agar plate.	Tier 2: Classify Diversity Sample Accuracy Estimate Prefixes e.g. multi, uni, micro Population Binary Detect Recycle Tier 3: Variation Species Kingdoms Biodiversity Genus Quadrat Protocista Chloroplast Chlorophyll Mitochondria Nucleus Cell membrane Cell wall Decomposer



	Acids and alkalis	Know that chemicals come with assigned hazard symbols to indicate the risk of using them. Know that risk assessments are used to identify hazards and describe how to minimise them. Know that acids and alkalis are corrosive which means they attack materials such as stone, metal and skin. Know that we can make acids and alkalis safer to use by diluting them down in water. Know that when diluting corrosive acids and alkalis down, they can become irritants. Know that acids can be identified from the ending "acid" in the name and are often sour and bitter in real world applications. Know that alkalis can be identified from the ending "hydroxide" in the name and are used in cleaners as they kill bacteria. Know that neutral substances are neither acidic nor alkaline. Know that acids and alkalis are usually transparent solutions that require indicators to identify them. Know that litmus paper comes in two forms, red and blue. Know that red litmus paper stays red in acids and turns blue alkalis. Know that blue litmus paper stays blue in alkalis and turns red in acids. Know that both types of litmus paper do nothing in neutral solutions. Know that litmus paper is an example of a qualitative test; it only indicates whether a solution is an acid or alkali. Know that universal indicator is quantitative test and indicates the strength of the acids and alkalis. Know that many natural foods such as cherries, blueberries and red cabbage are natural indicators. Know that the strength of acids and alkalis is measured on the pH scale. Know that numbers represent the relative strengths of acids and alkalis. pH 1 is strongly acidic, pH 7 is neutral and pH 14 is strongly alkaline. Know that the pH scale is based on the colour changes of universal indicator. Red is strongly acidic, green is neutral, and purple is strongly alkaline. Know that pH meters are a more accurate method of measuring pH as they provide a digital number and do not require a comparison of colour. Know that when acids and alkalis react, a neutralisation reaction has occurred. Know that when an alkali reacts with an acid and vice versa, the overall pH is brought closer to neutral. Know that indigestion is caused when stomach acid rises out of the stomach towards the oesophagus. Know that bases are solid substances that neutralise acids. Know that when two chemicals react together, we describe it using a chemical word equation. Know that the chemicals that react together are called the reactants.	Know how to identify potential hazards within a laboratory setting. Know how to safely use a chemical when provided with a chemical symbol. Know how to write a risk assessment. Know how to identify acids, alkalis and neutral substances from either name or properties. Know how to undertake a litmus test. Know how to predict the outcome of a litmus test if the type of solution is provided. Know how to undertake a universal indicator test. Know how to use the pH indicator range of any given indicator. Know how to identify the limitations of an indicator within a given scenario. Know how to predict the pH of everyday solutions. Know how to compare the acidity and alkalinity of different solutions using the pH scale. Know how to test pH using a pH meter. Know how to describe situations where pH testing is necessary. Know how to identify a neutralisation reaction. Know how antacids work to neutralise heartburn. Know how to undertake a neutralisation reaction using an acid, base and universal indicator. Know how to write the word equation for a neutralisation reaction. Know how to deduce the name of a salt if given an acid and a base. Know how to identify the reactants and products in a word equation. Know how to write word equations if you are provided with the reactants and products. Know how to write word equations for neutralisation reactions.	Tier 2 Minimise Dilute Symbol Bitter Limitation Advantage Disadvantage Tier 3 Hazard Acid Alkali Neutral Corrosive Irritant Indicator Quantitative Qualitative Base Efficient Reaction Irreversible Reactant Product Salt
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		Know that the new chemicals that are formed in a chemical reaction are called the products. Know that chemical reactions are irreversible and can't be undone. Know that salts are made when an acid reacts with a base or alkali. Know that when a base reacts with an acid it always produces a salt and water. Know that hydrochloric acid always produces a chloride salt. Know that nitric acid always produces a nitrate salt. Know that sulfuric acid always produces a sulfate salt.		
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Summer	Sound and light	Know that sound is produced by vibrations. Know that the volume of a sound is how loud it is. Know that the pitch of a sound is how high it is. Know that the amplitude of a sound refers to its vibration size and therefore volume. Know that the frequency of a sound refers to the numbers of vibrations per second and therefore pitch. Know that a vibrating object causes nearby air particles to vibrate. Know that vibrating objects push the air particles closer together, allowing them to spread out. Know that sound is transferred through the air by particles knocking into the air particles in front of them. Know that sound is detected by the human ear by the air particles vibrating parts inside the ear. Know that the louder the sound is, the bigger the vibration of the air particles. Know that sound takes time to travel from the source to the observer. Know that scientific models do not accurately show all aspects of a situation. Know that particle models to represent sound in air do not show the usual movement of the gas. Know that particle models to represent sound in air do not show air as a mixture of gases. Know that the movement of air particles caused by sound is similar to the up and down movement of a wave on water. Know that like all waves, sound waves transfer energy. Know that the volume of sound waves decreases with distance from source. Know that the amplitude of sound waves decreases with distance from source. Know that the energy of a sound wave is spread between more particles the further from the source you go. Know that extra movement of air particles due to sound waves causes a slight heating effect. Know that sound waves can travel through liquids and solids. Know that some sound waves reflect when they change medium. Know that sound becomes muffled when passing through a solid medium. Know that humans cannot hear underwater due to their ears only being adapted to hear in air. Know that sound can be represented on diagrams by lines. Know that each line represents a pulse of sound. Know that when sound reaches a hard surface it can reflect. Know that an echo is when a reflected sound wave is heard. Know that surfaces that are at right angles to the sound source are more likely to produce a clear echo. Know that the vibration of particles in a solid increase when sound is absorbed. Know that transparent materials can be clearly seen through.	Know how to classify sounds by their volume and pitch. Know how to describe sounds by their amplitude and frequency. Know how to explain how sound waves cause a heating effect in particles. Know how to explain why sound moves. quicker in solids than liquids, and quicker in liquids than gas. Know how to explain the different effect of sound waves on various surfaces. Know how to explain the different effect of light waves on various surfaces. Know how to use light rays as straight arrows to represent light on diagrams. Know how to use a protractor. Know how to identify patterns in data. Know how to make a conclusion from data. Know how to apply the laws of reflection.	Pitch Vibrate Amplitude Frequency Pulse Compression Medium Vacuum Reflect Echo Absorb Noise Transmit Transparent Translucent Opaque Normal Protractor Incident ray
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		Know that the image produced when looking through translucent materials is not clear Know that sound can be represented on diagrams by lines. Know that opaque materials do not allow light through and therefore cannot be seen through at all. Know that light travels in straight lines. Know that light rays are straight arrows used to represent light on diagrams. Know that shadows are created by light being blocked by opaque materials. Know that the closer the object to the light source, the bigger the shadow produced. Know that shadows are often not black but are the colour of the surface. Know that the angle of incidence is measured between the incident ray and the normal. Know that the angle of reflection is measured between the reflected ray and the normal.		
	Natural resources	Know that igneous rocks can be identified from their crystal grains that are often multi-coloured and do not contain fossils. Know that sedimentary rocks can be identified from layers and softness and often contain fossils of dead organisms. Know that metamorphic rocks can be identified through having properties of both sedimentary and igneous rocks. Know that rocks are made of different grains that fit together. Know that interlocking grains overlap and lock together creating hard rocks. Know that rounded grains have gaps between them creating porous and brittle rocks. Know that the grains in rocks are different compounds called minerals. Know that magma is molten rock below the Earth's crust. Know that lava is cooling molten rock above the Earth's crust. Know that Igneous rocks are caused by the cooling of molten rock. Know that intrusive igneous rocks are formed slowly underneath the Earth's crust. Know that extrusive igneous rocks are cooled quickly above the Earth's crust. Know that extrusive igneous rocks have bigger crystals as they are formed slower and have more time to grow. Know that metamorphic rocks are created when a rock is placed under huge amounts of pressure or heat or both. Know that the chemical compounds in a rock change when they are exposed to high heat and pressure. This changes the properties of the rock. Know that sediments of rocks are deposited by water or wind in the ocean.	Know how to identify an igneous rock from its characteristics. Know how to identify a sedimentary rock from its characteristics. Know how to identify a metamorphic rock from its characteristics. Know how to undertake an experiment to test the porosity of a rock. Know how to link a rock type and its properties to a job or function. Know how to describe the process of igneous rock formation. Know how to describe the difference between the formation and properties of intrusive and extrusive igneous rocks. Know how to identify intrusive and extrusive igneous rock from grain sizes. Know how to explain how metamorphic rocks are formed. Know how to explain how sedimentary rocks are formed. Know how to deduce the type of weathering that has occurred given the conditions of rock. Know how models are used to describe complex scientific ideas. Know how to describe the properties of ceramics and composite materials. Know how to compare the properties of different plastic polymers.	Tier 2: Texture Crystals Interlocking Rounded Absorb Compress Fossil River Glacier Finite Evaluate Limitation Ethics Tier 3 Igneous Sedimentary Metamorphic Mineral Porous Permeable Magma Lava Extrusive Intrusive Metamorphosis Deposit Compaction Cementation



		Know that sediments in the ocean are compacted and cemented together under pressure to form sedimentary rocks. Know that biological weathering occurs when living organisms interact with rocks, breaking them down. Know that chemical weathering occurs when chemical reactions break down rocks into smaller pieces. Know that physical weathering occurs when temperature and weather conditions break down rocks into smaller pieces. Know that erosion is the transportation of weathered rocks. This can occur by wind, rivers and glaciers. Know that igneous, sedimentary and metamorphic rocks can become each other and are all linked through the rock cycle. Know that a natural resource is a substance or material that is made in naturally in the world. Know that fossil fuels are made from the remains of living organisms that lived millions of years ago. They are formed under high pressure and temperature over millions of years. Know that fossil fuels are finite and can't be remade once they are used. Know that crude oil is used to make petrol, diesel, kerosene and plastic polymers. Know that a polymer is made from many small repeating units called monomers. Know that polymers can be designed to have different properties making plastics incredibly useful. Know that composite materials are a combination of two or more materials and take the most desirable properties of both. Know that ceramic materials are shaped and moulded before heating. They set into hard but brittle structures. Know that our use of natural resources is not sustainable and can't be maintained without our human activities changing. Know that if material isn't recycled, it goes to landfill which ruins the environment, causes pollution and the waste can remain for 100s of years. Know that recycling means using the same materials again and again. Know that recycling saves on finite natural resources. Know that recycling requires significantly less energy and therefore produces less pollution. Know that plastics do not biodegrade and can remain in landfill for 100's of years.	Know how to evaluate the use of natural resources comparing their uses to the cost of extracting and using them. Know how to evaluate the ethical concerns raised by obtaining these valuable resources. Know how to evaluate data on the efficiency of recycling materials. Know how evaluate the advantages and disadvantages of recycling.	Erosion Transportation Weathering Synthesis Polymer Monomer Composite Ceramic Biodegrade Landfill
	Nutrition	Know that a balanced diet includes a range of specific nutrients from food in specific quantities, and that this is required for our bodies to function effectively. Know the content of a healthy diet includes carbohydrates for energy, lipids for energy and producing cell membranes, proteins for growth and repair, vitamins in small quantities to help cells to function effectively, minerals in small quantities to make new chemicals within the body, dietary fibre to ensure movement of food through the small intestine and water for transport and chemical reactions.	Know how to use food labels to compare the nutritional values of different foods. Know how to calculate the energy requirements in a healthy diet. Know how to apply knowledge of a range of techniques, apparatus, and materials to carry out food tests successfully. Know how to use food tests to compare the nutritional values of different foods to include: Benedict's test for	Tier 2: Absorb Balanced Technique Consume Deficiency Starvation Elimination Lubricant Surface area



		Know that having imbalances within a diet can lead to starvation, obesity or deficiency diseases. Know that digestion is the process that breaks down large, insoluble molecules into smaller, soluble ones within the body. Know the names of the parts of the digestive system and their roles, to include: mouth to moisten and grind food and add digestive enzymes, oesophagus to allow food to pass to the stomach, stomach to churn food, add acid to kill bacteria and add enzymes to break down proteins, small intestine to add digestive enzymes and absorb food into the bloodstream, large intestine to absorb water. Know the difference between physical and chemical digestion. Know that the small intestine is adapted for efficient absorption of food (villi that provide a large combined surface area, close blood supply, surface one cell thick). Know that enzymes are biological catalysts that speed up the rate at which substances are broken down within the digestive system. Know that bacteria play an important role in digestion by preventing harmful bacteria from forming colonies and by digesting food the body cannot.	reducing sugars, Biuret test for protein, iodine test for starch, filter paper test for lipids. Know how to carry out a investigation into absorption in the small intestine using a model gut made from Visking tubing.	Tier 3: Carbohydrate Lipid Protein Vitamin Mineral Fibre Nutrition Diet Nutrient Egestion Digestion Obesity Malnutrition Microorganism Bacteria Small intestine Oesophagus Faeces Rectum Saliva Absorption Enzyme Catalyst
	Respiration	Know that the ventilation system allows oxygen to be breathed into our lungs, and carbon dioxide to be removed from our bodies. Know that the ventilation system consists of the trachea, lungs (containing bronchi, bronchioles, and alveoli), the ribs, intercostal muscles, and the diaphragm. Know that during inhalation the diaphragm contracts and pulls downwards, the intercostal muscles contract drawing the ribs upwards and the volume of the lung increases, decreasing the pressure and drawing oxygen in from the air. Know that during exhalation the diaphragm relaxes, the intercostal muscles contract causing the ribs to move downwards and the volume of the lung decreases, increasing the pressure inside the lungs and expelling oxygen out into the air. Know that gas exchange takes place in the alveoli within the lung, as oxygen diffuses from the alveolus into the capillaries and carbon dioxide diffuses from the capillaries into the alveolus.	Know how the bell jar model can be used to show how ventilation takes place. Know how to make simple measurements of lung volume. Know how the effects of smoking can be modelled using a smoking machine in a fume cupboard. Know how to investigate the effect of exercise on heart rate.	Tier 2: Absorb Transfer Surface area Ventilation Tier 3: Diffusion Oxygen Glucose Aerobic Anaerobic Carbon dioxide Lung Trachea Bronchi Bronchiole Alveolus Diaphragm Mucus Cilia



		Know that the alveolus is adapted to its function by: being moist, having a large combined surface area, having a close network of capillaries, and having a thin (one cell thick) wall. Know that smoking can impact the human gas exchange system: nicotine is addictive and can increase heart rate, tar is a carcinogen and carbon monoxide can reduce the amount of oxygen that red blood cells can carry. Know that asthma can cause bronchioles within the lungs to become narrower and fill with mucus, causing shortness of breath. Know that short term effects of exercise include an increase in breathing rate and depth and an increase in heart rate. Know that long term benefits of cardiovascular exercise include increased heart muscle strength, increased lung capacity and reduced heart rate. Know that aerobic respiration is an exothermic reaction which takes place in the mitochondria and releases energy to enable the cellular processes necessary for life to take place. Know the word equation for aerobic respiration: glucose + oxygen → carbon dioxide + water Know that anaerobic respiration takes place in the cytoplasm, does not require oxygen and transfers less energy than aerobic respiration. Know the word equation for anaerobic respiration: glucose → lactic acid. Know that anaerobic respiration produces lactic acid, which is toxic and can damage muscles. Know that lactic acid produced during anaerobic respiration is broken down after exercise using oxygen, and that the excess oxygen consumed during this time is called EPOC. Know the differences between aerobic and anaerobic respiration, including: the difference in energy transfer, the use of oxygen, where the processes take place and the products formed.		Intercostal muscle Capillary Asthma Carbon monoxide Mitochondria Cytoplasm Haemoglobin
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