

Year Group	Term One	Term Two	Term Three	Term Four	Term Five	Term Six
Intent of Study	<p>In Year 7 Science at SAIL, the curriculum is designed to support students as they transition into secondary school by nurturing curiosity, critical thinking, and a deeper understanding of the world around them. Through engaging topics such as forces, the solar system, heredity, the human skeleton and muscles, diffusion, and separation techniques, students are encouraged to explore scientific concepts that connect to their everyday lives.</p> <p>The curriculum promotes personal growth by developing students' confidence in asking questions, conducting investigations, and drawing evidence-based conclusions. It fosters resilience through practical experiments that require problem-solving and perseverance, and it encourages collaboration and respect during group work and discussions.</p>					
Year 7	<p>Forces</p> <ul style="list-style-type: none"> What forces do The different kinds of force Measuring forces Using force arrows Balanced and unbalanced forces Friction Reducing friction Energy Transferring energy <p>Solid, liquid, gas states and changes of state</p> <ul style="list-style-type: none"> Solid and liquid states Melting: particle model 	<p>Solid, liquid, gas states and changes of state</p> <ul style="list-style-type: none"> Bunsen burners Melting: melting points and freezing points Particle model of substances in the gas state Boiling and condensing Changes of state: energy and evaporation <p>Cells</p> <ul style="list-style-type: none"> The common processes of all living organisms Observing cells with a light microscope Preparing and observing a microscope slide Animal cell structures and their functions Plant cell structures and their functions Multicellular and unicellular organisms specialised cells are adapted for their functions 	<p>Our solar system and beyond</p> <ul style="list-style-type: none"> The spinning earth Our solar system Gravity Stars, galaxies and the universe Heating by the Sun Earth's tilt Seasons on Earth Changing ideas about Earth <p>Solutions</p> <ul style="list-style-type: none"> Pure substances Mixtures: choosing equipment Mixtures: equipment diagrams Mixtures and solutions Diffusion Dissolving Variables Dissolving: scientific methods Solubility: practical Solubility: analysis Saturated solutions 	<p>Ecosystems</p> <ul style="list-style-type: none"> food chain Predator – prey relationships Adaptations of predators and prey Food webs Ecosystems and habitats Pollination and human food security Using chemicals in farming Bioaccumulation The importance of biodiversity <p>Sound, light and vision</p> <ul style="list-style-type: none"> Sound vibrations Travelling vibrations Travelling sound Reflecting and absorbing sound Shadows Reflecting light from mirrors How we see things Reflections in mirrors 	<p>Heredity and DNA</p> <ul style="list-style-type: none"> Heredity Heredity and genetic material Genetic material and DNA A model of the structure of DNA DNA from fruit The discovery of the structure of DNA DNA, chromosomes, genes and the genome <p>Separation techniques</p> <ul style="list-style-type: none"> Separating an insoluble solid for a liquid separating a soluble solid from a liquid Separating pure salt from dirty rock salt Separating liquids Simple distillation Distillation: practical Chromatography <p>human skeleton and muscles</p> <ul style="list-style-type: none"> The human skeleton Muscles Movement Biomechanics 	<p>Heating and cooling</p> <ul style="list-style-type: none"> Measuring temperature Changing temperature Mixing substances of different temperatures Cooling Thermal conductors Thermal insulators Energy and temperature <p>Energy and substance</p> <p>Diffusion</p> <ul style="list-style-type: none"> Diffusion: moving particles Diffusion through a permeable material: practical Diffusion through the cell membrane Diffusion through a selectively-permeable membrane: practical <p>climate change and living sustainably</p> <ul style="list-style-type: none"> The greenhouse effect Global warming Climate change and human activities Sustainable use of resources Eating sustainably Heating and cooling our school sustainably Waste and recycling
Year Group	Term One	Term Two	Term Three	Term Four	Term Five	Term Six
Intent of Study	<p>In Year 8 Science at SAIL, students deepen their understanding of the natural world through topics like the human digestive system, atoms, elements and compounds, chemical reactions, earth resources, series circuits, and fuels and energetics. The curriculum encourages curiosity, analytical thinking, and practical investigation. Students build resilience and teamwork through experiments and discussions, while learning to apply scientific knowledge to real-life challenges and global issues.</p>					
Year 8	Human digestive system	Biodiversity		Earth's resources	Reproduction in humans	Making images

	<ul style="list-style-type: none"> The parts of the human digestive system Digestion and enzymes Food tests: practical Bacteria in the human digestive system Absorption and transport of nutrients in humans <p>Atoms, elements and compounds</p> <ul style="list-style-type: none"> Atoms and elements Properties of elements Metallic elements Molecular elements Common elements Compounds and their formation Chemical formulae Naming compounds A particle model of chemical reactions 	<ul style="list-style-type: none"> Independence within ecosystems Pyramids of number Pyramids of biomass Plants are adapted for their environment Animals are adapted for their environment Ecological sampling of living organisms Ecological sampling using a quadrat Conserving biodiversity <p>Understanding chemical reactions</p> <ul style="list-style-type: none"> Characteristics of chemical reactions Conservation of mass and balanced symbol equation Chemical reactions: oxidation Chemical reaction: combustion Chemical reactions: decomposition Chemical reaction: precipitation <p>Moving by force</p> <ul style="list-style-type: none"> Calculating speed Measuring speed: practical Measuring speed accurately Reading distance-time graphs Interpreting distance-time graph Changing speed Newton's first law Streamlining Comparing the speed of different parachutes Changing the speed of a parachute 	<p>Moving by force</p> <ul style="list-style-type: none"> Calculating speed Measuring speed: practical Measuring speed accurately Reading distance-time graphs Interpreting distance-time graph Changing speed Newton's first law Streamlining Comparing the speed of different parachutes <p>Changing the speed of a parachute</p> <p>Species and classification (differences between species)</p> <ul style="list-style-type: none"> Classification and species Classifying organisms using a classification key Identification and classification in the field Classification at the cellular level <p>Variation (differences within species)</p> <ul style="list-style-type: none"> Reproduction and variation Variation within species Continuous and discontinuous variation: practical Discontinuous variation: data handling and analysis Continuous variation: data handling and analysis 	<ul style="list-style-type: none"> Inside rock Rocks and minerals Types of rocks Structure of earth Tectonic plates Igneous rock Metamorphic rock <p>Series circuit</p> <ul style="list-style-type: none"> making a series circuit Fixing faulty circuits Electric current Measuring electric current Measuring voltage Changing voltage Static electricity Static electricity: charge 	<ul style="list-style-type: none"> Reproduction and inheritance Life-cycle and reproduction Puberty in humans and sexual maturity Gametes and fertilisation in sexual reproduction Human reproductive organs The human menstrual cycle Gestation and Birth in humans Healthy pregnancy <p>Fuels and energetics</p> <ul style="list-style-type: none"> Heating and cooling Cooling curve: practical Exothermic and endothermic chemical reactions Comparing fuels Power stations Using more renewable energy resources 	<ul style="list-style-type: none"> Seeing in colour The visible spectrum Reflecting colour A pinhole camera Reflected images Refracting light Focusing light <p>Diet and exercise</p> <ul style="list-style-type: none"> Good and ill health Balanced diet Food is a source of building materials and energy Energy provided by food: practical Imbalanced diet: starvation and deficiency diseases Imbalance diet: obesity The effects of exercise of the human body The effects of exercising breathing and heart rate Recovery time after exercise <p>Climate change and greenhouse gases</p> <ul style="list-style-type: none"> Greenhouse gases and global warming Evidence for global warming Impact of climate change on sea levels Impacts of transport on the greenhouse effect Reducing emissions from transport Reducing emissions from industry Using renewable energy resources
Year Group	Term One	Term Two	Term Three	Term Four	Term Five	Term Six
Intent of Study	In Year 9 Science at SAIL, students explore key biological, physical, and environmental concepts including breathing and respiration, photosynthesis, hidden forces, the carbon cycle, waves, climate change, and reproduction in plants . The curriculum encourages analytical thinking, curiosity, and practical investigation. Through experiments and discussions,					

	students develop resilience, teamwork, and a deeper understanding of global scientific challenges. They learn to apply scientific knowledge to real-world contexts and make informed decisions.					
Year 9	<p>Breathing and respiration</p> <ul style="list-style-type: none"> Breathing, respiration and gas exchange The human gas exchange system and breathing Estimating lung volume Adaptations of the human lungs for gas exchange Cellular respiration Aerobic cellular respiration Anaerobic cellular respiration in humans An aerobic cellular respiration and fermentation in microorganisms <p>Acids and bases</p> <ul style="list-style-type: none"> Acids and bases pH scale and universal indicator solution Practical: red cabbage indicator solution Chemical reactions: acid and metal Metal oxides and non-metal oxides Chemical reactions: neutralisation Chemical reactions: acid and metal carbonate 	<p>Magnets and electromagnets</p> <ul style="list-style-type: none"> Magnetic poles The magnetic field of a bar magnet Electromagnets Current through an electromagnet Using electromagnets <p>Plant nutrition and photosynthesis</p> <ul style="list-style-type: none"> Plant nutrition Photosynthesis Adaptations of plants for photosynthesis: absorbing light Adaptations of plants for photosynthesis: gas exchange and stomata <p>Materials</p> <ul style="list-style-type: none"> Materials and composites: including metals, ceramic and polymers Structure of polymers The reactivity series for metals Chemical reactions: displacement of metals Catalysts 	<p>Hidden forces</p> <ul style="list-style-type: none"> Gravitational force and weight Stretching springs Hooke's Law Stretching rubber The force of a floor Levers Turning forces Floating, mass and shape Pressure Pressure at different depths and heights <p>Adaptations, competition, natural selection and evolution</p> <ul style="list-style-type: none"> Fossils show that species change over time Understanding time scales Adaptations Competition Heritable variation Natural selection A model of natural selection Evolution 	<p>Carbon cycle and climate change</p> <ul style="list-style-type: none"> Physical weathering and erosion Formation of sedimentary rock Fossils and the rock cycle Formation of fossil fuels Gases in the atmosphere Atmospheric carbon The carbon cycle <p>Waves</p> <ul style="list-style-type: none"> Water waves Sound waves Speed of sound Hearing sound Ultrasound 	<p>Disease and drugs</p> <ul style="list-style-type: none"> Differences between infectious and non-infectious disease The gas exchange system in healthy humans Lifestyle diseases Asthma Smoking Vaping Recreational drug use: depressants Recreational drug use: stimulants Solvent abuse <p>Patterns in the periodic table</p> <ul style="list-style-type: none"> Groups of elements in the periodic table Group 1 and 2 metals Group 7 (halogens) Group 0 (noble gases) 	<p>Resistance and parallel circuits</p> <ul style="list-style-type: none"> Electrical resistance Thickness of a wire Length of a wire Making parallel circuits Voltage in parallel circuits Loops of a parallel circuit Measuring current in a parallel circuit Comparing series and parallel circuits Mains Electricity <p>Reproduction in plants</p> <ul style="list-style-type: none"> Flower structure Pollination and fertilisation Insects and food security Fruit and seeds Factors affect affecting seed germination: practical Factors affect affecting C germination: data analysis Seed dispersal: practical Seed dispersal: data analysis <p>Climate change and biodiversity</p> <ul style="list-style-type: none"> Agriculture and habitat loss Deforestation affects the carbon and water cycles Impacts of climate change on biodiversity Climate change and food production Advantages and disadvantages of plastic food packaging
Year Group	Term One	Term Two	Term Three	Term Four	Term Five	Term Six

<p>Intent of Study</p>	<p>In year 10, Students explore key scientific ideas across biology, chemistry, and physics through practical and real-world contexts. They investigate chemical reactions, energy transfer, and Earth systems. Lessons focus on building curiosity and confidence in science. Skills developed: observation, data analysis, teamwork, and scientific communication.</p>					
<p>Year 10</p>	<p>Award Specification BTEC FIRST PRINCIPLES OF APPLIED SCIENCE Unit 1: Principles of Science Learning aim A: Explore cells, organs and genes A.1 The basic structure, function and adaptations of the following eukaryotic cells: a. motor and sensory neurones b. red blood cell c. white blood cell d. egg cell e. sperm cell f. root hair cell g. xylem and phloem cells h. guard cell. A.2 The function of the following components of eukaryotic cells: a. nucleus – contains genetic information that controls the activities of the cell b. cytoplasm – where most chemical reactions take place c. cell membrane – allows entry and exit of substances d. chloroplasts – the sites of photosynthesis e. cell wall – provides structural support f. vacuole – contains cell sap and provides extra support for the cell g. mitochondria – the sites of respiration. A.3 Cells form tissues, tissues form organs and organs</p>	<p>Award Specification BTEC FIRST PRINCIPLES OF APPLIED SCIENCE Unit 1: Principles of Science Learning aim A: Explore cells, organs and genes A.10 Pedigree analysis using homozygous and heterozygous individuals. A.11 Determination of genotypes and phenotypes of offspring from genetic diagrams and pedigree analysis. A.12 The probability, percentage or ratio of offspring displaying particular inherited characteristics from genetic crosses. A.13 Gene mutations occur when the base sequence on a DNA molecule is changed: a. genetic mutations can change the characteristics of organisms b. genetic mutations can be beneficial or harmful to organisms. Learning aim B: Explore the roles of the nervous and endocrine systems in homeostasis and communication B.1 Homeostasis is the maintenance of a constant internal environment that is controlled by nervous and hormonal communication. B.2 The structure of the nervous system is made up of the central nervous system (CNS) (brain and</p>	<p>Award Specification BTEC FIRST PRINCIPLES OF APPLIED SCIENCE Unit 1: Principles of Science Learning aim C: Explore atomic structure and the periodic table C.1 Elements as metals or non-metals according to their position in the periodic table. C.2 The structure of the atom as a nucleus containing protons and neutrons, surrounded by electrons in shells (energy levels). C.3 The nucleus of an atom is very small compared to the overall size of the atom. C.4 Atoms of a given element have the same number of protons in the nucleus and this number is unique to that element. C.5 The meaning of the terms 'atomic number', 'mass number' and 'relative atomic mass'. C.6 The relative charge and relative mass of a proton, a neutron and an electron. C.7 Atoms contain equal numbers of protons and electrons. C.8 Elements are arranged in the periodic table in order of increasing atomic number, in rows called periods. Elements with similar properties are placed in the same vertical column – these columns are called groups. C.9 Definition of an isotope of an element, as having the same number of protons but a different number of neutrons.</p>	<p>Pearson Edexcel Entry Level Certificate in Science (NSC0) Paper 1: Biology 1A – Cells, genetics, inheritance and modification Cells, Genetics, Inheritance and modification 1A.1 Describe the functions of the: a nucleus b cell membrane c cytoplasm in animal cells 1A.2 Describe the functions of the: a nucleus b cell membrane c cytoplasm d chloroplast in plant cells 1A.3 Describe how growth takes place in organisms by: a cell division in animals and plants b cell elongation in plants 1A.4 Describe the importance of cell differentiation in the development of specialised cells 1A.5 Describe how the following specialised cells are adapted to their function: a sperm cells b egg cells c nerve cells d muscle cells 1A.6 Recall the function of: a embryonic stem cells to differentiate into all cell types b adult stem cells to maintain and repair the body 1A.7 Recall the functions of the following nerve</p>	<p>Pearson Edexcel Entry Level Certificate in Science (NSC0) Paper 1: Biology 1A – Cells, genetics, inheritance and modification Cells, Genetics, Inheritance and modification 1A.12 Recall that: a DNA is found in a cell's nucleus, packaged into chromosomes b each chromosome contains several genes c a gene is a section of a DNA molecule d a gene contains the information needed to make a protein 1A.13 Define the terms allele, dominant and recessive 1A.14 Use genetic diagrams and Punnett squares to show monohybrid inheritance 1A.15 Recall that a person's sex is determined at fertilisation by the inheritance of an X chromosome from the mother, and either: a an X chromosome (in girls) or b a Y chromosome (in boys) from the father 1A.16 Recall that differences in characteristics within organisms in a species is called variation 1A.17 Describe genetic variation as the variation that arises because organisms inherit different</p>	<p>Pearson Edexcel Entry Level Certificate in Science (NSC0) Paper 2: Biology 1B – Health, disease and the development of medicines 1B.1 Describe the difference between communicable and non-communicable diseases 1B.2 Describe a pathogen as a disease-causing organism 1B.3 Recall that pathogens can be bacteria, fungi, protists or viruses 1B.4 Describe bacteria as single-cell organisms, with a: a circular chromosome of DNA, instead of a nucleus b flagellum, for movement 1B.5 Describe fungi as organisms that: a may be single-celled (yeast) or multi-cellular (mushrooms) b digest food outside the organism and then absorb it 1B.6 Describe viruses as non-living particles that: a contain genetic material b can only reproduce inside living cells 1B.7 Describe some common infections, including: a cholera (bacteria) – causes diarrhoea b tinea (fungus) – causes athlete's foot c malaria (protist) – causes damage to blood and liver d influenza (virus) – causes fever and cold-like 'flu' symptoms 1B.8 Describe how pathogens are spread, including: a cholera (bacteria) – water b tinea (fungus) – direct contact, or through contaminated surfaces c malaria (protists) – mosquito vector d influenza (virus) – airborne 1B.9 Describe methods for reducing or preventing the spread of pathogens, including: a simple hygiene, such as washing hands b treatment of water c control of vectors</p>

	<p>work together to form organ systems, as illustrated by the cardiovascular system (it is not necessary to learn the detail of each organ in this system).</p> <p>A.4 The functions of the following plant organs: a. roots – take in water from the soil and provide anchorage b. xylem – carries water and mineral salts c. phloem – carries glucose d. leaf – where photosynthesis takes place.</p> <p>A.5 Loss of water vapour from the leaves drives transpiration.</p> <p>A.6 DNA is a double helix containing a sequence of complementary base pairs: a. adenine pairs with thymine b. guanine pairs with cytosine.</p> <p>A.7 Chromosomes, in the nucleus, are made up of DNA, and sections of DNA represent genes which give instructions for individual characteristics.</p> <p>A.8 Alleles are different forms of the same gene that give rise to heterozygous and homozygous genotypes.</p> <p>A.9 Monohybrid inheritance using Punnett squares and genetic diagrams.</p>	<p>spinal cord) and the peripheral nervous system (PNS) (sensory and motor neurones). The PNS transmits electrical impulses to and from the CNS.</p> <p>B.3 The difference between involuntary and voluntary responses.</p> <p>B.4 The transmission of electrical impulses from receptor to effector and the role of chemical transmission across synapses.</p> <p>B.5 The components of a simple reflex arc and its role in protecting the body from harm.</p> <p>B.6 The endocrine system consists of glands that release hormones into the blood stream, which travel through the blood to target organs.</p> <p>B.7 The differences in communication between the endocrine and nervous systems: a. speed of communication b. method of transport or transmission c. duration of response.</p> <p>B.8 Blood glucose concentration is regulated by the endocrine system using insulin and glucagon (insulin lowers blood glucose concentrations and glucagon raises it).</p> <p>B.9 The process for body temperature regulation by the nervous system using the following mechanisms: a. sweating b. shivering c. raising/lowering of body</p>	<p>C.10 The existence of isotopes means that some relative atomic masses are not whole numbers.</p> <p>C.11 The relative atomic mass of an element from the relative masses and abundances of its isotopes.</p> <p>C.12 Rules about the filling of electron shells (energy levels) to predict the electronic configuration of the first 20 elements in the periodic table as diagrams and in the form 2.8.1.</p> <p>C.13 The connection between the number of outer electrons and the position of an element in the periodic table.</p>	<p>cells: a sensory neurones b relay neurones in the spinal cord c motor neurones</p> <p>1A.8 Describe the role of neurotransmitters in allowing an impulse to cross a synapse</p> <p>1A.9 Recall the function of the myelin sheath to insulate neurones</p> <p>1A.10 Describe the processes involved in a reflex arc, including: a receptor cells detecting a stimulus b the path taken by the impulse through sensory, relay and motor neurones c the impulse arriving at the effector</p> <p>1A.11 Recall the structure of DNA as: a two strands b coiled to form a double helix</p>	<p>combinations of alleles from their parents</p> <p>1A.18 Recall that genetic variation mostly occurs because of small changes to the structure of DNA, known as a mutation</p> <p>1A.19 Describe environmental variation as the variation that arises because an organism's environment makes it develop different characteristics</p> <p>1A.20 Explain Darwin's theory of evolution by natural selection</p> <p>1A.21 Describe the process of selective breeding, including: a producing wheat that is resistant to disease b producing cows with a high yield of milk</p> <p>1A.22 Describe genetic engineering as a process that involves modifying the DNA of an organism to introduce desirable characteristics</p> <p>1A.23 Describe the benefits and risks of genetic engineering</p>	<p>1B.10 Describe how sexually transmitted infections (STIs) are spread through sexual contact, including: a Chlamydia (bacteria) b HIV</p> <p>1B.11 Describe how STIs can be reduced or prevented by: a avoiding unprotected sexual activity b regular testing for infections</p> <p>1B.12 Describe how physical barriers of the human body provide protection from pathogens, including the skin (preventing pathogens entering the body) and mucus (trapping pathogens)</p> <p>1B.13 Describe how chemical defences of the human body provide protection from pathogens, including hydrochloric acid (in the stomach) and lysozymes (in tears, preventing infections through the eye)</p> <p>1B.14 Describe the role of the immune system of the human body in defence against disease, including the role of: a white blood cells that ingest pathogens b white blood cells that produce antibodies c memory white blood cells in preventing reinfection</p> <p>1B.15 Recall that antibiotics can only be used to treat bacterial infections</p> <p>1B.16 Describe how the process of developing new medicines has many stages, including: a discovery and development b preclinical and clinical testing</p> <p>1B.17 Recall that many non-communicable human diseases, such as cancer, are caused by the interaction of a number of factors, such as diet, lifestyle and genetics</p> <p>1B.18 Describe cancer as the result of changes in cells that lead to uncontrolled cell division</p> <p>1B.19 Describe the effect of exercise and diet on obesity</p> <p>1B.20 Describe the use of BMI (body mass index) as a measure of obesity and perform simple BMI calculations</p>
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	A.10 Pedigree analysis using homozygous and heterozygous individuals. A.11 Determination of genotypes and phenotypes of offspring from genetic diagrams and pedigree analysis.	hair d. vasoconstriction and vasodilation.				1B.21 Describe the harmful effects of smoking on the: a lungs, leading to lung cancer b heart and circulatory system, leading to cardiovascular diseases 1B.22 Recall that cardiovascular disease can be treated by: a life-long medication b surgical procedures c lifestyle changes
Year Group	Term One	Term Two	Term Three	Term Four	Term Five	Term Six
Intent of Study	<p>In year 11, Students deepen their understanding of forces, waves, ecosystems, and environmental impact. They apply scientific knowledge to global challenges and everyday life. Practical work and discussions support independent thinking and problem-solving. Skills developed: critical thinking, research, environmental awareness, and communication.</p>					
Year 11	<p>Pearson Edexcel Entry Level Certificate in Science Biology 1A – Cells, genetics, inheritance and modification</p> <p>1A.1 Describe the functions of the: a nucleus b cell membrane c cytoplasm in animal cells</p> <p>1A.2 Describe the functions of the:</p> <ul style="list-style-type: none"> a. nucleus b cell membrane c cytoplasm d chloroplast <p>in plant cells</p> <p>1A.3 Describe how growth takes place in organisms by:</p> <ul style="list-style-type: none"> a. cell division in animals and plants b. cell elongation in plants <p>1A.4 Describe the importance of cell differentiation in the development of specialised cells</p> <p>1A.5 Describe how the following specialised cells</p>	<p>Pearson Edexcel Entry Level Certificate in Science Biology 1B – Health, disease and the development of medicines</p> <p>1B.1 Describe the difference between communicable and non-communicable diseases</p> <p>1B.2 Describe a pathogen as a disease-causing organism</p> <p>1B.3 Recall that pathogens can be bacteria, fungi, protists or viruses</p> <p>1B.4 Describe bacteria as single-cell organisms, with a:</p> <ul style="list-style-type: none"> a circular chromosome of DNA, instead of a nucleus b flagellum, for movement <p>1B.5 Describe fungi as organisms that:</p>	<p>ENTRY LEVEL CERTIFICATE SCIENCE(AQA) Component 1 – Biology: The human body Outcome 1</p> <p>Cells are the basic building blocks of all living organisms. Most human cells are like most other animal cells and have the following parts: 1. nucleus – controls the activities of the cells and contains the genetic material 2. cytoplasm – where most chemical reactions take place 3. cell membrane – controls the passage of substances in and out of cells. Cells may be specialised to carry out a particular function, eg sperm cells, nerve cells and muscle cells</p> <p>Outcome 2</p> <p>A tissue is a group of cells with a similar structure and function. Students should develop some understanding of size and scale in relation to cells, tissues, organs and systems.</p>	<p>ENTRY LEVEL CERTIFICATE SCIENCE(AQA) Component 3 – Chemistry: Elements, mixtures and compounds Outcome 1</p> <p>All substances are made of atoms. An atom is the smallest part of an element that can exist. A substance that is made of only one sort of atom is called an element. There are about 100 different elements. Elements are shown in the periodic table. Metals are towards the left and the bottom of the periodic table and non-metals towards the right and the top of the periodic table. Elements in the same group of the periodic table have similar chemical properties.</p> <p>Outcome 2</p> <p>When elements react, their atoms join with other atoms to form compounds.</p>	<p>ENTRY LEVEL CERTIFICATE SCIENCE(AQA) Component 3 – Chemistry: Elements, mixtures and compounds Suggested activity for TDA</p> <p>Compare the melting points of a range different substances, eg candle wax, beeswax polish, butter, margarine, cooking fat.</p> <p>Component 5 – Physics: Energy, forces and the structure of matter Outcome 1</p> <p>Describe, for common situations, the changes involved in the way energy is stored when a system changes. For example: • an object projected upwards • a moving object hitting an obstacle • a vehicle slowing down • bringing water to a boil in an electric kettle. Students may be required to describe the intended energy changes and the main energy wastages that occur in a range of devices.</p> <p>Outcome 2</p> <p>Energy can be transferred usefully, stored or dissipated,</p>	<p>ENTRY LEVEL CERTIFICATE SCIENCE(AQA) Component 5 – Physics: Energy, forces and the structure of matter Outcome 5</p> <p>When a force causes an object to move through a distance, work is done on the object. Work done against the frictional forces acting on an object causes a rise in the temperature of the object.</p> <p>Outcome 6</p> <p>Speed is measured by the distance travelled in a certain time. Units of speed include metres per second and kilometres per hour. Simple calculations of average speed using the equation: speed = distance/time will be required.</p> <p>Outcome 7</p> <p>The stopping distance of a vehicle is the sum of the distance the vehicle travels during the driver's reaction time (thinking distance) and the</p>

	<p>are adapted to their function:</p> <ul style="list-style-type: none"> a. sperm cells b. egg cells c. nerve cells d. muscle cells <p>1A.6 Recall the function of: a embryonic stem cells to differentiate into all cell types b adult stem cells to maintain and repair the body</p> <p>1A.7 Recall the functions of the following nerve cells:</p> <ul style="list-style-type: none"> a. sensory neurones b. relay neurones in the spinal cord c. motor neurones <p>1A.8 Describe the role of neurotransmitters in allowing an impulse to cross a synapse</p> <p>1A.9 Recall the function of the myelin sheath to insulate neurones</p> <p>1A.10 Describe the processes involved in a reflex arc, including: a receptor cells detecting a stimulus b the path taken by the impulse through sensory, relay and motor neurones c the impulse arriving at the effector</p> <p>1A.11 Recall the structure of DNA as:</p> <ul style="list-style-type: none"> a. two strands b. coiled to form a double helix <p>1A.12 Recall that:</p> <ul style="list-style-type: none"> a. DNA is found in a cell's nucleus, 	<ul style="list-style-type: none"> a may be single-celled (yeast) or multi-cellular (mushrooms) b digest food outside the organism and then absorb it <p>1B.6 Describe viruses as non-living particles that:</p> <ul style="list-style-type: none"> a contain genetic material b can only reproduce inside living cells <p>1B.7 Describe some common infections, including:</p> <ul style="list-style-type: none"> a cholera (bacteria) – causes diarrhoea b tinea (fungus) – causes athlete's foot c malaria (protist) – causes damage to blood and liver d influenza (virus) – causes fever and cold-like 'flu' symptoms <p>1B.8 Describe how pathogens are spread, including:</p> <ul style="list-style-type: none"> a cholera (bacteria) – water b tinea (fungus) – direct contact, or through contaminated surfaces c malaria (protists) – mosquito vector d influenza (virus) – airborne <p>1B.9 Describe methods for reducing or</p>	<p>Organs are aggregations of tissues performing similar functions. Organs are organised into organ systems which work together.</p> <p>The human circulatory system consists of the heart, which pumps blood around the body (in a dual circulatory system) and blood, which transports oxygen, proteins and other chemical substances around the body.</p> <p>Outcome 3 The human digestive system contains a variety of organs: • salivary glands • stomach • liver • gall bladder • pancreas • small intestine • large intestine.</p> <p>Enzymes are used to convert food into soluble substances that can be absorbed into the bloodstream.</p> <p>Outcome 4 Respiration releases the energy needed for living processes and is represented by the equation: glucose + oxygen → carbon dioxide + water (+ energy) Students should know the word equation for respiration. Students should know that glucose is derived from the diet and that carbon dioxide and oxygen gases are exchanged through the lungs. Lifestyle can have an effect on people's health eg diet and exercise are linked to obesity; smoking to cancer; alcohol to liver and brain function. A healthy diet contains the right balance of the different food groups you need and the right</p>	<p>Some compounds are made from metals combined with non metals, for example sodium chloride and magnesium oxide.</p> <p>Chemical reactions can be represented by word equations.</p> <p>Outcome 3 The three states of matter are solid, liquid and gas. Melting and freezing take place at the melting point, boiling and condensing take place at the boiling point. The three states of matter can be represented by a simple model.</p> <p>When a solid melts to become a liquid the particles are able to move about but stay close together. When a liquid boils and becomes a gas the particles separate and move about rapidly.</p> <p>Substances with high melting points have strong forces that hold their particles together. Substances with low boiling points have weak forces between their particles.</p> <p>Outcome 4 Diamond and graphite are forms of the element carbon with different properties because of their different structures. Diamond is hard because the carbon atoms are joined together in a giant three dimensional structure.</p>	<p>but cannot be created or destroyed.</p> <p>The idea of efficiency. Whenever there are energy transfers in a system only part of the energy is usefully transferred. The rest of the energy is dissipated so that it is stored in less useful ways. This energy is often described as being 'wasted'. Unwanted energy transfers can be reduced in a number of ways, eg through lubrication and the use of thermal insulation.</p> <p>How the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls. The higher the thermal conductivity of a material the higher the rate of energy transfer by conduction across the material</p> <p>Outcome 3 Describe the main energy resources available for use on Earth. These include fossil fuels (coal, oil and gas), nuclear fuel, bio-fuel, wind, hydro-electricity, geothermal, the tides, the Sun, water waves. Distinguish between energy resources that are renewable and energy resources that are non-renewable.</p> <p>Outcome 4 A force is a push or pull that acts on an object due to the interaction with another object. All forces between objects are either: • contact forces – the objects are physically touching • non-contact forces – the objects are physically separated.</p>	<p>distance it travels under the braking force (braking distance). For a given braking force the greater the speed of the vehicle, the greater the stopping distance.</p> <p>Outcome 8 Reaction times vary from person to person. Typical values range from 0.2 s to 0.9 s. Knowledge and understanding of methods used to measure human reaction times. Knowledge of how a driver's reaction time can be affected by tiredness, drugs and alcohol. Distractions may also affect a driver's ability to react.</p> <p>Outcome 9 The braking distance of a vehicle can be affected by adverse road and weather conditions, and poor condition of the vehicle. Students should be able to analyse a given situation to identify how braking could be affected.</p> <p>Outcome 10 Some atomic nuclei are unstable. The nucleus gives out ionising radiation. This is a random process called radioactive decay. The nuclear radiation emitted may be: • alpha particles • beta particles • gamma rays. Properties of alpha particles, beta particles and gamma rays limited to their penetration through materials and their range in air.</p>
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	<p>packaged into chromosomes</p> <ul style="list-style-type: none"> • b. each chromosome contains several genes • c. a gene is a section of a DNA molecule • d. a gene contains the information needed to make a protein <p>1A.13 Define the terms allele, dominant and recessive</p> <p>1A.14 Use genetic diagrams and Punnett squares to show monohybrid inheritance</p> <p>A.15 Recall that a person's sex is determined at fertilisation by the inheritance of an X chromosome from the mother, and either:</p> <ul style="list-style-type: none"> • a. an X chromosome (in girls) or • b a Y chromosome (in boys) from the father <p>1A.16 Recall that differences in characteristics within organisms in a species is called variation</p> <p>1A.17 Describe genetic variation as the variation that arises because organisms inherit different combinations of alleles from their parents</p> <p>1A.18 Recall that genetic variation mostly occurs because of small changes</p>	<p>preventing the spread of pathogens, including:</p> <ul style="list-style-type: none"> • a simple hygiene, such as washing hands • b treatment of water • c control of vectors <p>1B.10 Describe how sexually transmitted infections (STIs) are spread through sexual contact, including:</p> <ul style="list-style-type: none"> • a Chlamydia (bacteria) • b HIV (virus) <p>1B.11 Describe how STIs can be reduced or prevented by:</p> <ul style="list-style-type: none"> • a avoiding unprotected sexual activity • b regular testing for infections <p>1B.12 Describe how physical barriers of the human body provide protection from pathogens, including the skin (preventing pathogens entering the body) and mucus (trapping pathogens)</p> <p>1B.13 Describe how chemical defences of the human body provide protection from pathogens, including hydrochloric acid (in the stomach) and lysozymes (in tears, preventing infections through the eye)</p> <p>1B.14 Describe the role of the immune system of</p>	<p>amount of energy. People who exercise regularly are usually fitter than people who take little exercise.</p> <p>Outcome 5 Infectious (communicable) diseases are caused by microorganisms called pathogens. Types of pathogen limited to bacteria and viruses. These may reproduce rapidly inside the body and may produce poisons (toxins) that make us feel ill. Viruses damage cells in which they reproduce.</p> <p>Outcome 6 White blood cells help to defend against bacteria by ingesting them. Vaccination involves introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies so that if the same pathogen re enters the body, antibodies can be produced rapidly.</p> <p>Outcome 7 Medical drugs are developed and tested before being used to relieve illness or disease. Drugs change the chemical processes in people's bodies. People may become dependent or addicted to the drugs and suffer withdrawal symptoms without them. Antibiotics, including penicillin, are medicines that help to cure bacterial disease by killing infective bacteria inside the body, but cannot be used to kill viruses.</p>	<p>Graphite is slippery because the carbon atoms are joined together in layers that can slide over each other.</p> <p>Outcome 5 A mixture contains two or more substances not chemically combined together. Mixtures can be separated by processes such as filtration, distillation, crystallisation and chromatography.</p> <p>Outcome 6 Paper chromatography can be used to separate mixtures and can give information to help identify substances. In paper chromatography a solvent moves through the paper carrying different compounds different distances.</p> <p>Outcome 7 Unreactive metals, such as gold, are found in the Earth as the metal itself, but most metals are found as compounds that require chemical reactions to extract the metal. Metals less reactive than carbon can be produced by heating the metal compounds in the ore with carbon. Ores contain enough metal to make it economic to extract the metal. Large amounts of rock need to be quarried or mined to get metal ores. We should recycle metals to save resources and limit environmental impacts. Students should be able</p>		<p>Suggested activity for TDA Investigate how different surfaces affect the amount of friction on a moving block.</p>
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	<p>to the structure of DNA, known as a mutation</p> <p>1A.19 Describe environmental variation as the variation that arises because an organism's environment makes it develop different characteristics</p> <p>1A.20 Explain Darwin's theory of evolution by natural selection</p> <p>1A.21 Describe the process of selective breeding, including: a producing wheat that is resistant to disease b producing cows with a high yield of milk</p> <p>1A.22 Describe genetic engineering as a process that involves modifying the DNA of an organism to introduce desirable characteristics</p> <p>1A.23 Describe the benefits and risks of genetic engineering</p>	<p>the human body in defence against disease, including the role of:</p> <ul style="list-style-type: none"> • a white blood cells that ingest pathogens • b white blood cells that produce antibodies • c memory white blood cells in preventing reinfection <p>1B.15 Recall that antibiotics can only be used to treat bacterial infections</p> <p>1B.16 Describe how the process of developing new medicines has many stages, including:</p> <ul style="list-style-type: none"> • a discovery and development • b preclinical and clinical testing <p>1B.17 Recall that many non-communicable human diseases, such as cancer, are caused by the interaction of a number of factors, such as diet, lifestyle and genetics</p> <p>1B.18 Describe cancer as the result of changes in cells that lead to uncontrolled cell division</p> <p>1B.19 Describe the effect of exercise and diet on obesity</p> <p>1B.20 Describe the use of BMI (body mass index) as a measure of obesity and perform simple BMI calculations</p>	<p>Suggested activity for TDA Investigate the effect of exercise on pulse rate.</p>	<p>to describe the social, economic and environmental impacts of mining ores and recycling metals.</p> <p>Outcome 8 Metals have giant structures of atoms with strong bonds between the atoms and so most metals have high melting points. Metals are good conductors of electricity and thermal energy. Copper has properties that make it useful for electrical wiring and plumbing. Aluminium is a useful metal because of its low density and resistance to corrosion.</p> <p>Outcome 9 Most metals in everyday use are alloys. Pure iron, gold and aluminium are too soft for many uses and so are mixed with small amounts of other elements to make alloys, which are harder for everyday use. Most iron is converted into steels. Steels are alloys since they are mixtures of iron with carbon and other metals.</p> <p>Outcome 10 Polymers such as poly(ethene), poly(propene) polystyrene and PVC are made from small compounds called monomers that join together to form very long chains. Polymers are waterproof, resistant to chemicals,</p>		
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