

Science – Year 7 (MYP Year 1)

Strands & Concepts	Benchmarks - Students are able to:
<p>1. Life science</p> <p>Ecosystems and populations</p> <ul style="list-style-type: none"> • What is a system, biome ecosystem? • Energy transfer – the role of producers & consumers in food chains and food webs • Limiting factors • Species interactions • Population growth & resource depletion 	<p>1.1a. Analyse the roles of organisms as part of interconnected food webs, populations, communities and ecosystems;</p> <p>1.1b. Assess survival needs and interactions between organisms and the environment;</p> <p>1.1c. Assess the requirements for sustaining healthy local ecosystems;</p> <p>1.1d. Evaluate human impacts on local ecosystems;</p> <p>1.1e. Identify the biotic and abiotic factors of an ecosystem; and,</p> <p>1.1f. The effects of limiting factors on ecosystems.</p>
<p>2. Chemistry</p> <p>Properties of matter</p> <ul style="list-style-type: none"> • States of matter • Molecules in motion • Changing states of matter • Mixtures & solutions • Solubility • Separating mixtures 	<p>1.2a. Conduct investigations into the property of matter (mass, density, boiling point, freezing point, solubility, shape, colour, size, magnetism, electrical conductivity);</p> <p>1.2b. Use appropriate instruments to determine the mass of a regular shaped object (prism, cubes);</p> <p>1.2c. Use appropriate instruments to determine the volume of any liquid (i.e. use a graduated cylinder and read the meniscus);</p> <p>1.2d. Using calculations, determine the density of a material and then rank the materials in order of density;</p> <p>1.2e. Use particle spacing to explain in a variety of forms the three states of matter (solid, liquid, and gas);</p> <p>1.2f. State the 5 changes of state (sublimation, evaporation, condensation, freezing, melting);</p> <p>1.2g. Classify and compare substances as either mechanical mixtures or solutions;</p> <p>1.2h. Conduct investigations into the separation techniques of mechanical mixtures (chromatography, filtering) and solutions; and,</p> <p>1.2i. Investigate the components of solutions (solvent, solute) and prepare different types of solutions (unsaturated, saturated, supersaturated).</p>

<p>3. Physics</p> <p>Electricity & magnetism</p> <ul style="list-style-type: none"> • The history of electricity & magnetism • Series & parallel circuits • Circuit diagrams (including circuit components) • Generation of electricity • Magnetic fields • Magnetic shielding • Electromagnets & their practical uses 	<p>1.3a. Recall early ideas about electricity and magnetism;</p> <p>1.3b. Identify the difference between current and static electricity;</p> <p>1.3c. Deduce electrical conductors and insulators through experimentation;</p> <p>1.3d. Construct series and parallel circuits;</p> <p>1.3e. Draw circuit diagrams (series and parallel) to include a variety of circuit components;</p> <p>1.3f. Identify methods of generating energy and the effects this generation has on the environment;</p> <p>1.3g. Identify the properties of magnets and what causes magnetism;</p> <p>1.3h. Investigate magnetic field patterns through experimentation;</p> <p>1.3i. State how materials act as magnetic shields (look at the Earth as a big magnet); and,</p> <p>1.3j. Construct an electromagnet and identify practical uses of electromagnets.</p>
<p>4. Earth & space science</p> <p>Atmospheric science</p> <ul style="list-style-type: none"> • The water cycle • Weather & climate • Human impact on weather & climate • Layers of the atmosphere <p>Earth & The Solar System</p> <ul style="list-style-type: none"> • The moon's effect on the Earth • Day & night • Space exploration • The Earth and beyond 	<p>1.4a. Identify the changes of state within the water cycle and the role of energy from the Sun in driving the process;</p> <p>1.4b Construct water filtration units;</p> <p>1.4c. Use their knowledge of evaporation, condensation and the kinetic theory to determine, 'What's in a cloud?';</p> <p>1.4d. State the direct and indirect human impact has on weather and climate;</p> <p>1.4e. Explain the rotation of the Earth;</p> <p>1.4f. Construct a Sun-Earth model to explain day and night;</p> <p>1.4g. Recall the phases of the Moon and how lunar and solar eclipses occur;</p> <p>1.4h. Deduce that tides are formed by the gravitational pull of the Moon;</p> <p>1.4i. Investigate the invention of the telescope;</p> <p>1.4j. Create a scale model of our inner Solar System and research particular aspects of the planets, and outer Solar System (Kuiper belt, Oort cloud) in more detail; and,</p> <p>1.4k. Explore different galaxies through research and further reading.</p>

Science – Year 8 (MYP Year 2)

Strands & Concepts	Benchmarks - Students are able to:
<p>1. Life science</p> <p>Body systems</p> <ul style="list-style-type: none"> • The skeletal system • The digestive system • Circulatory & respiratory system 	<p>2.1a. Identify key components of the skeletomuscular, digestive, circulatory and respiratory system and their function in the human body;</p> <p>2.1b. Describe the pathway of consumed food in the digestive system and how it helps meet animal needs for energy;</p> <p>2.1c. Describe the pathway of circulating blood in the circulatory system with reference to major arteries, veins and heart;</p> <p>2.1d. Describe the process of respiration and its function; and,</p> <p>2.1e. Explain the interactions between digestive, circulatory and respiratory system to transport nutrients and waste.</p>
<p>2. Chemistry</p> <p>Structure of matter</p> <ul style="list-style-type: none"> • Introduction to atoms • Introduction to elements and Periodic Table • Classification of matter • Chemical reactions • Reactants & products 	<p>2.2a. Identify the atom as the smallest unit of an element;</p> <p>2.2b. Describe the characteristics of neutrons, protons, and electrons, including charge and location;</p> <p>2.2c. Describe properties of, use symbols and locate common elements on the periodic table;</p> <p>2.2d. Describe some relationships between elements using the periodic table (alkaline metals, alkaline earth metals, halogens, inert gases);</p> <p>2.2e. Distinguish between pure substances and mixtures;</p> <p>2.2f. Describe the types of evidence that indicate chemical change; and,</p> <p>2.2g. Identify reactants and products in a chemical reaction through experimentation.</p>
<p>3. Physics</p> <p>Force & motion</p> <ul style="list-style-type: none"> • Identifying types of forces • Balanced & unbalanced forces • Forces at work; gravity, friction • Objects in motion <p>Transfer of energy</p> <ul style="list-style-type: none"> • Defining 	<p>2.3a. Identify that a force is a push or a pull and is measured in newtons (N);</p> <p>2.3b. List the various types of forces (gravity, elastic, electric, buoyancy, electrostatic, magnetic, friction, compression, and tension);</p> <p>2.3c. Distinguish between balanced and unbalanced forces (calculate <i>resultant force</i>) and represent the data using diagrams (free body diagrams);</p> <p>2.3d. Analyze forces in real-life situations (rockets, projectiles, parachutes, ships on water, satellites);</p> <p>2.3e. Investigate how when two objects rub together, friction slows them down;</p> <p>2.3f. Explain Newton’s First Law of Motion (Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.);</p> <p>2.3g. Analyze how structural shape (square, triangle) affect strength (Demo egg shell);</p>

<p>energy and forms of energy</p> <ul style="list-style-type: none"> • Energy changes • Energy in foods • Alternative energy sources 	<p>2.3h. Investigate the forces acting on a bridge (compression, tension) and then apply this knowledge to analyze the forces acting on a local bridge;</p> <p>2.3i. Define and describe the different forms of energy;</p> <p>2.3j. Describe a variety of alternative energy sources;</p> <p>2.3k. Explain through investigation how energy can transfer from one form to another; and,</p> <p>2.3l. Investigate how food energy is measure and calculate a weekly "energy in versus energy out" .</p>
<p>4. Earth & space sciences</p> <p>Dynamic Earth</p> <ul style="list-style-type: none"> • The lithosphere • Theory of continental drift • (The Rock Cycle) 	<p>2.4a. Define the term 'lithosphere';</p> <p>2.4b. Draw and label the layers of the Earth;</p> <p>2.4c. Utilise computer simulations to explain the involvement of plate techtonics in continental drift;</p> <p>2.4d. Explain how volcanoes occur and demonstrate through experiment how rate of cooling affects crystal size in igneous rocks;</p> <p>2.4e. Investigate how the Earth's surface is changing due to physical and chemical weathering and erosion;</p> <p>2.4f. Identify the formation of different rock types in the rock cycle; and,</p> <p>2.4g. Use simple classification keys to identify rock types.</p>

Science - Year 9 (MYP Year 3)

Strands & Concepts	Benchmarks - Students are able to:
<p>1. Life science</p> <p>Cells</p> <ul style="list-style-type: none"> • Cells – the fundamental units of life • Diffusion & osmosis <p>Reproduction</p> <ul style="list-style-type: none"> • Asexual and sexual reproduction • Plants and animals reproductive parts • Mitosis and meiosis 	<p>3.1a. Properly use a microscope to examine cells and organisms;</p> <p>3.1b. Prepare slides for microscope use;</p> <p>3.1c. Draw appropriately scaled diagrams (magnification indicated) depicting what they have seen under the microscope;</p> <p>3.1d. Identify various organelles in plant and animal cells and their corresponding function(s);</p> <p>3.1e. Compare animal and plant cells;</p> <p>3.1f. Distinguish between sexual and asexual reproduction;</p> <p>3.1g. Identify various types of asexual reproduction;</p> <p>3.1h. Identify reproductive parts of specific animals and plants and the role they play in fertilization;</p> <p>3.1i. Outline the stages of mitosis and meiosis, and compare the two processes and their function;</p> <p>3.1j. Explain causes and effects of genetic abnormalities; and,</p> <p>3.1k. Evaluate the ethical considerations of cloning and IVF technologies.</p>
<p>2. Chemistry</p> <p>Changing matter</p> <ul style="list-style-type: none"> • KMT (collision theory) • Atomic structure • Organization of the Periodic Table of Elements • Conservation of mass • Reaction rates • Acids and alkaline 	<p>3.2a. Understand that all matter has mass and occupies space (has volume) and demonstrate how this can be verified experimentally using direct and indirect measurements;</p> <p>3.2b. Distinguish between and give examples of pure substances, mixtures, elements, compounds, solutions, suspensions, and mechanical mixtures;</p> <p>3.2c. Convert between base and derived metric units for length, volume, and mass;</p> <p>3.2d. Describe and represent using diagrams the phase changes on matter, according to the collision theory (KMT);</p> <p>3.2e. Distinguish between heterogeneous and homogeneous substances;</p> <p>3.2f. Describe through observation the difference between a physical and chemical change;</p> <p>3.2g. Through experimentation, identify possible observations as evidence that a chemical reaction has occurred;</p> <p>3.2h. Distinguish between endothermic and exothermic reactions;</p> <p>3.2i. Review atoms, elements, periodic table families;</p> <p>3.2j. Determine the number of protons, electrons, and neutrons of any element given the atomic number and atomic mass;</p> <p>3.2k. Investigate properties of different groups of elements;</p> <p>3.2l. Construct and name simple molecules;</p> <p>3.2m. Evaluate how a particular molecule of their choice affects society in positive or negative ways;</p>

	<p>3.2n. Experimentally and mathematically confirm the Law of Conservation of Mass;</p> <p>3.2o. Identify factors that affect reaction rates (e.x. temperature, surface area, concentration, presence of a catalyst);</p> <p>3.2p. Graph data relating to how temperature and concentration affect reaction rates;</p> <p>3.2q. Contrast acids and bases and their occurrence in the world;</p> <p>3.2r. Create an indicator using natural chemicals (cabbage, lichen, tea, flowers) and test the acidity of various chemicals;</p> <p>3.2s. Understand and use the pH scale;</p> <p>3.2t. Make a common craft video to demonstrate knowledge of pH and give examples at different values; and,</p> <p>3.2u. Write a formal lab report.</p>
<p>3. Physics</p> <p>Energy on the move</p> <ul style="list-style-type: none"> • Convection, conduction, radiation <p>Light & sound</p> <ul style="list-style-type: none"> • Waves and EMR • Properties of light • Interaction of light • Structure of human eye and ear 	<p>3.3a. Explain the difference between heat and temperature through investigation, using collision theory;</p> <p>3.3b. Analyze the concept of heat transfer by conduction, convection and radiation;</p> <p>3.3c. Deduce the best heat insulators through experimentation;</p> <p>3.3d. Investigate heat energy in everyday life and investigate questions through experimentation such as, 'How does a thermos work?', 'Does white coffee cool faster than black coffee?', 'Why use a lid on a pan?' etc;</p> <p>3.3e. Determine the properties of light and sound;</p> <p>3.3f. Define the law of reflection through experimentation;</p> <p>3.3g. Show how light can be refracted through different media;</p> <p>3.3h. Demonstrate through experimentation the effect concave and convex lenses have on light rays;</p> <p>3.3i. Draw the structure of the eye and ear and correctly match the structure to the function of each component of the eye and ear;</p> <p>3.3j. Explain why things are coloured and how humans see colour (extension: colour blindness);</p> <p>3.3k. Investigate how light and sound energy travel; and,</p> <p>3.3l. Identify different sections of the electromagnetic spectrum.</p>
<p>4. Earth & space sciences</p>	<p>Integrated as follows 3.2k, 3.2q, 3.3b, 3.3k, 3.3l</p>

Science - Year 10 (MYP Year 4)

Strands & Concepts	Benchmarks - Students are able to:
<p>1. Life science</p> <p>Human equilibrium</p> <ul style="list-style-type: none"> • Regulation (the brain, central nervous system) • Homeostasis • Diffusion, osmosis • Endocrine system • Disease and the human body 	<p>4.1a. Understand that behaviour is one kind of response an organism can make to an internal or environmental stimulus and requires coordination and communication at many levels including cells, tissues, organs, and whole organism;</p> <p>4.1b. Define diffusion and osmosis, and experimentally analyze how these processes enable a cell to maintain equilibrium;</p> <p>4.1c. Describe the basic structure and function of the parts of central nervous system;</p> <p>4.1d. Describe the basic structure and function of the parts of the human brain (lobes, neurons, synapses);</p> <p>4.1e. Understand the behavioural response is a set of actions determined in part by heredity and in part form experience;</p> <p>4.1f. Analyse using a flowchart how the human body maintains equilibrium (temperature, hydration, glucose, electrolyte, O₂/CO₂, waste removal, etc);</p> <p>4.1g. Create a medical pamphlet to describe the cause and treatment for one of the above states of disequilibrium;</p> <p>4.1h. Explain the structure and function of the endocrine system; and,</p> <p>4.1i. Describe the stages of disease from acquisition to transmission and how the human body responds.</p>
<p>2. Chemistry</p> <p>Bonding</p> <ul style="list-style-type: none"> • Ionic, covalent, metallic bonds • Atomic structure • IUPAC names • Organic and inorganic compounds 	<p>4.2a. Understand that atoms are able to bond together in one of three different ways – covalent, ionic and metallic;</p> <p>4.2b. Understand the connection between properties of materials and their bonding;</p> <p>4.2c. Know that the forces that hold atoms together in a molecule (intramolecular forces) are much stronger than the forces between molecules (intermolecular forces) and this accounts for the low melting and boiling points of molecular compounds;</p> <p>4.2d. Distinguish between a molecular structure and a giant structure using compounds such as water, oxygen, diamond, graphite silicon (IV) oxide etc.;</p> <p>4.2e. Describe the characteristics of neutrons, protons, and electrons, including charge, location, and relative mass;</p>

	<p>4.2f. Describe atoms using electronic structure; 4.2g. Recognise that an ion is a charged particle; 4.2h. Draw electron dot diagrams of ionic and covalent compounds; 4.2i. Apply the IUPAC naming system to hydrocarbons; 4.2j. Identify the difference between alkanes and alkenes; 4.2k. Investigate some of the products of the fractional distillation of crude oil through investigation; 4.2l. Investigate through experiment the structure of polymers such as plastics; 4.2m. Describe how human's usage of plastics has affected the Earth both positively and negatively; and, 4.2n Identify other homologous series such as alcohols and carboxylic acids and the reaction products when two such reactants are placed together.</p>
<p>3. Physics</p> <p>Kinematics</p> <ul style="list-style-type: none"> • $F=ma$ • Distance, time, velocity, acceleration • Graphing • Vectors • Newton's Laws of motion <p>Electrostatics & electrodynamics</p> <ul style="list-style-type: none"> • Ohm's law • AC & DC • Functions of circuit components • Operations of electrical devices • Relate electrical energy to power consumption • Simple circuit problems 	<p>4.3a. Define distance, displacement, time interval, velocity and acceleration; 4.3b. Analyze graphically the relationship between displacement and time interval for an object traveling in uniform motion; 4.3c. Define vectors and perform operations on vectors; 4.3d. State Newton's laws of motion and provide examples to illustrate the first and third laws; 4.3e. Use Newton's second law to solve problems involving net force, mass and acceleration; 4.3f. Define current, resistance and potential difference, and use correct SI units; 4.3g. Solve simple Ohm's law ($V = IR$) problems; 4.3h. Compare and contrast alternating current (AC), direct current (DC) and static electricity; 4.3i. Design and draw circuit diagrams of, and construct series and parallel circuits; 4.3j. Explain the characteristics of electric current, potential difference and resistance in simple and parallel circuits; 4.3k. Explain what different meters measures and how they are connected within an electric circuit to measure the quantities; and, 4.3l. Determine the energy consumption of various appliances and calculate their operating costs using a utility bill.</p>

Science - Year 11 (MYP Year 5)

Strands & Concepts	Benchmarks - Students are able to:
<p>1. Life science</p> <p>Genetics</p> <ul style="list-style-type: none"> • Inheritance • DNA • Dominant and recessive genes • Punnett's squares • Inherited diseases • Genetic engineering • Behaviour – innate/learned 	<p>5.1a. Discuss then explain questions such as, 'Why do I look like my parents?', 'Why do I have some of my mother's features? and some of my father's features?';</p> <p>5.1b. Isolate chromosomes in onion cells and kiwi fruit, through experimentation;</p> <p>5.1c. Appreciate that different forms of the same gene are called alleles;</p> <p>5.1d. Distinguish between genotype and phenotype;</p> <p>5.1e. Explain how alleles can be dominant or recessive and how this determines the characteristics of an individual;</p> <p>5.1f. Explain through diagrammatic representation the process of carrying out a 'cross' and thus state the resultant ratio of phenotype and genotype (solve word problems involving Punnett's squares);</p> <p>5.1g. Appreciate different blood types in humans;</p> <p>5.1h. Describe how genetic mutations occur giving examples such as cystic fibrosis, albino, Down's syndrome etc.;</p> <p>5.1i. Describe how genetic mutations may also be inherited and explain examples of this through diagrammatic representation;</p> <p>5.1j. Debate the (social, ethical, political, financial, etc.) impacts (both positive and negative) of genetic engineering and selective breeding; and,</p> <p>5.1k. Discuss the concept of 'nature vs nurture'.</p>
<p>2. Chemistry</p> <p>Chemical reactions and their practical applications</p> <ul style="list-style-type: none"> • Moles • Stoichiometry • Types of reactions • Titrations • Electro-chemistry 	<p>5.2a. Understand and apply the mole concept;</p> <p>5.2b. Determine the number of molecules using Avogadro's constant;</p> <p>5.2c. Using moles, experimentally calculate the formula of a compound;</p> <p>5.2d. Given relative atomic mass, determine the percentage mass of each element in a compound;</p> <p>5.2e. Deduce chemical reactions when all reactants and products are given and balancing the equation;</p> <p>5.2f. Recognize and write equations for the major types of chemical reactions — synthesis, decomposition, single replacement, double replacement, and redox reactions;</p> <p>5.2g. Investigate the reactivity of aluminium, alloys, and rusting</p> <p>5.2h. Given balanced equations, calculate the mass of reactants and products;</p> <p>5.2i. Investigate and understand the concepts include acid/base theory, pH and the titration process;</p> <p>5.2j. Investigate and understand the concepts include strong electrolytes, weak electrolytes, nonelectrolytes, dissociation and ionization, and the electrolysis process; and,</p>

	<p>5.2k. Explain Faraday’s contribution to study of electrolysis.</p>
<p>3. Physics</p> <p>Optics</p> <ul style="list-style-type: none"> • Refraction/reflection • Calculation of focal length • Snell’s law • Concave/convex mirrors & lenses • Electromagnetic spectrum <p>Work</p> <ul style="list-style-type: none"> • Power • Torque • Momentum • Simple machines 	<p>5.3a. To qualitatively and quantitatively describe reflection using terms incident and reflected ray, angle of incidence and reflection;</p> <p>5.3b. To qualitatively and quantitatively describe refraction using Snell’s law;</p> <p>5.3c. Identify a mirror/lens as either concave or convex;</p> <p>5.3d. Draw diagrams to qualitatively show how an image is created for concave/convex mirrors and lenses;</p> <p>5.3e. Experimentally determine and be able to calculate the focal length.</p> <p>5.3f. Identify the wavelengths of principal radiations in the electromagnetic spectrum;</p> <p>5.4g. Define work and solve problems involving work, force and displacement;</p> <p>5.4h. Determine graphically the amount of work done on objects by interpreting a force-displacement graph;</p> <p>5.4i. Define power and solve problems involving power, work and time;</p> <p>5.4j. Define torque and identify situations involving the application of torque;</p> <p>5.4k. Define momentum and solve problems involving momentum, mass and velocity; and,</p> <p>5.4l. Describe and demonstrate mechanical advantage of simple machines including lever, wedge, pulley, ramp, screw and wheel and find examples of these machines in our surroundings.</p>