Subject Overview

MYP Sciences

Grade 6

Unit title	Key Concept	Related concept(s)	Global context	Statement of Inquiry	ATL Skills and Learner Profile	Content and Service Learning	Summative Assessment & MYP Objectives
Unit 1 - What do scientists do? (6 weeks) Physics	Relationships	Evidence	Identity and relationships Exploration - Teams	A scientist means to gather evidence about similarity and difference in nature to help us understand how things are related.	**Learner Profile** Inquirer Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Gather and organize relevant information to formulate an argument • Interpret data Research: Information Literacy Skills • Process data and report results • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Identify strengths and weaknesses of personal learning strategies (self-assessment)	**Discuss** how to think and work scientifically **Formulate** inquiry questions that can lead to scientific investigation **Identify** variables **Classify** variables as independent or dependent for a given experimental investigation **List** the main features of a scientific laboratory **Formulate** rules for safe laboratory practice **Evaluate** risk in laboratory activities **Service Learning** Students take action by **researching** popular scientific misconceptions, including some provided. Students will then need to 'debunk' these misconceptions by creating a poster, web presentation or a movie to explain the real science behind them.	**Summative**: Students design and carry out an experiment to test the strength of an egg. Criterion B: Inquiring and designing
Unit 2 – What changes? (5 weeks) Chemistry	Change	Form, Trans-formation	Fairness and development Exploration – Human capability and development	Science enables us to change the form of matter into useful materials that can make the world a better place.	**Learner Profile** Inquirer Thinking: Critical Thinking Skills • Interpret data Research: Information Literacy Skills • Process data and report results. • Make connections between various sources of information. Self- Management Skills: Reflection skills • Identify strengths and weaknesses of personal learning strategies (self-	**Classify** materials as natural or artificial **Suggest** uses for both natural and artificial materials **Outline** the three principal states of matter in terms of their physical properties Identify physical changes and describe changes of physical state as: melting, boiling, condensing, freezing **Classify** mixtures, suspensions, solutions and pure substances **Define** solution, solute, solvent **Explain** dissolving as a physical process of binding a solid, liquid or gas in another liquid **Demonstrate** separation techniques for mixtures and suspensions that exploit the properties of the substances **Outline** the use of evaporation and condensation in separation of solutions **Identify** chemical and biotic chemical changes such as burning, oxidation, decomposition	**Summative**: Students draw results and conclusions after following practical instructions to find out what happens when something rusts. Criteria C: Processing and evaluating.

					assessment)	*Some students could:* **Explain** chemical change in terms of reactant elements and molecules **Describe** variant mixtures such as colloids, crystals	
Unit 3 – How do living things work? (6 weeks) Biology	Relationships	Form, Function	Globalization and Sustainability Exploration – Diversity and connection.	By understanding the relationships between the necessities of life and the specialized forms and functions of living things, we can take decisions and actions for healthier and more sustainable lifestyles.	**Learner Profile** Communicator Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses	**Outline** and give examples of the characteristics of all living things **Outline** and give examples of the necessities of all living things **Outline** and give examples of some specialized structures of different species **Outline** and make inferences about the relationship between specialized structures and their functions **Compare** and **contrast** specialized characteristics of different species **Compare** and **contrast** specialized necessities of different species **Describe** how we are able to use our understanding of living things in order to take decisions and actions that impact life **Describe** how our decisions and actions are limited by the characteristics of living things. <u>Service Learning</u> Students take action during the summative assessment by acting as professional bloggers for a blog that focuses on healthy living and life choices.	**Summative**: Students research, design and carry out an experiment to identify the best conditions to produce either bean sprouts, yoghurt or bread dough. Criteria A: Knowing and Understanding Criteria B Planning and designing
Unit 4 – What makes changes happen? (5 weeks) Chemistry & Physics	Change	Energy	Globalization and Sustainability Exploration – Human impact on the environment	Through controlling energy we can make changes happen that have an impact on the way people live now and in the future.	**Learner Profile** Principled Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Practice empathy Communication skills • Use appropriate forms of writing for different purposes and audiences	**Describe** a range of observed processes such as combustion, temperature change, electricity generation and chemical reactions in terms of energy changes **Classify** phenomena in terms of the energy changes involved **Classify** kinds of energy as either potential or kinetic **Define** temperature as a measure of thermal (internal) energy in a body **Describe** solid, liquid and gas states of matter in terms of thermal energy **Describe** thermal (internal) energy in terms of the kinetic energy of particles **Explain** heat as an exchange of thermal energy between bodies **Describe** heat transfer processes: conduction, convection, radiation **Describe** the properties of thermal conductors and insulators **Identify** as useful or wasted energy exchanged in physical systems **Apply** understanding of energy change, transfer and loss to suggest ways in which energy loss can be minimized in a variety of everyday situations Some students could: **Outline** the principle of energy conservation in terms of heat loss **Outline** heat transfer processes of conduction, convection and radiation in terms of particle motion and radiant energy transfer **Suggest** a relationship between heat transfer and temperature change for bodies of different materials and mass	**Summative**: Students read the article to answer questions about how we can save money and save the planet. They then research a chosen method of preventing heat loss in households. Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science

Unit 5 – How can we study the living world? (5 weeks) Biology	Systems	Interaction, balance	Scientific and technical innovation Exploration – The biological revolution	Scientists have developed methods and tools to understand and maintain the interactions that keep ecosystems in balance.	**Learner Profile** Thinkers Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Interpret data Research: Information Literacy Skills • Process data and report results. Self- Management Skills: Organization • Plan short- and long term assignments; meet deadlines.	**State** the characteristics of all ecosystems **Describe** differences between various ecosystems **Define** 'ecosystem' **Define** and give examples of populations **Define** and give examples of habitats **Define** and give examples of abiotic and biotic factors in ecosystems **Define** 'biome' **State** the main biomes of the world **Describe**, compare and contrast different biomes according to their abiotic and biotic factors and interactions **State** and describe interactions between organisms in healthy ecosystems **Outline** scientific innovations that have helped to keep ecosystems healthy and in balance	Summative: Students design and construct their own mescocosm. Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 6 – Where do we fit into the world? (4 weeks) Physics	Systems	Environment, Models	Orientation in space and time Exploration - Scale	We have learnt about our place in the systems that affect life on Earth through looking beyond into space and making models.	**Learner Profile** Reflective Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Practice empathy Communication skills • Use appropriate forms of writing for different purposes and audiences	**Organize** objects in the Solar System as planets, natural satellites, comets, asteroids **Describe** the main regions of the Earth system: geosphere (and lithosphere), hydrosphere (and Cryosphere), atmosphere, biosphere (androsphere) **Identify** and describe the main regions of the Earth's interior: inner core, outer core, mantle, crust **Evaluate** geological and paleontological evidence for the formation and development of the Earth **Identify** and describe the main regions of the atmosphere: Troposphere, Stratosphere, Mesosphere, Thermosphere, Exosphere **Identify** and describe the main regions and forms of water in the hydrosphere: oceans, atmospheric vapour, ice, underground water, and groundwater **Evaluate** the impact of space exploration on our understanding of the Solar System Some students could: **Summarize** theories about the origins of the Solar System and the formation of planets and satellites **Outline** the principal geological eons in the development of the Earth: Precambrian (Hadean, Archean, Proterozoic) and Paleozoic **Evaluate** evidence for the existence of chemicals necessary for life – notably water – in other parts of the Solar System	Summative assessment Take action! Into space? Students inquire into the relationship between the advent of space research, our understanding of the inter-relationship of Earth's systems, our place in them and impact on the Earth. Criteria D: Reflecting on the impacts of Science

MYP Sciences

Grade 7

Unit title	Key Concept	Related concept(s)	Global context	Statement of Inquiry	ATL Skills and Learner Profile	Content and Service Learning	Summative Assessment & MYP Objectives
Unit 1 - Where are we now and where might we be going? (6 weeks) Biology and Physics	Relationships	Movement Models	Orientation in space and time Exploration – Turning points and "big history"	Through making *models* of the world we have understood how *place and time relate to motion* and we have made the world seem a smaller place.	**Learner Profile** Reflective Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	**Outline** how a coordinate system is used to specify location **Determine** the distance between two points using coordinates **State** that distance is measured in metres **State** that displacement accounts for direction of travel **Apply** the relationship average speed = $\frac{\text{distance}}{\text{time}}$ **State** that speed is measured in m s^{-1} **Explain** that any change in velocity – whether caused by change in speed or in direction – is an acceleration **State** that acceleration is measured in m s^{-2} **State** that force is measured in newtons **Outline** that matter is kept together by electrostatic attraction and kept apart by electrostatic repulsion **Describe** force systems in terms of force arrows to show size and direction of forces **Explain** that unbalanced forces cause motion or deformation **Outline** the relationship between force, mass and acceleration *Some students could:* **Apply** the relationship $a = \frac{F}{m}$ to determine accelerations **Outline** Einstein's theory that the greatest possible velocity is the speed of light in a vacuum, *c* **State** the value of *c* as close to 300 million m s^{-1}	**Summative**: Students apply their knowledge and understanding to solve Newtons law's problems. Criteria A: Knowing and understanding
Unit 2 - How do we map matter? (5 weeks) Chemistry	Change	Models Patterns	Scientific and technical Innovation Exploration – Systems, Models, Principles and discoveries	By changing matter we can identify patterns in properties that help us to make models, and the models help us invent new kinds of material.	**Learner Profile** Knowledgeable Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills	**Classify** materials as elements, mixtures, molecules **Outline** the structures of compounds and polymers **Describe** the main features of the periodic table **Outline** atomic structure in terms of nuclei, electrons and their respective electric charges **Explain** conservation of mass in chemical reactions **Outline** chemical reactions in terms of word equations **Distinguish** metals and non-metals in terms of their physical properties **Identify** reactivity series and patterns within the periodic table **Outline** different types of chemical reaction: combustion, thermal decomposition, oxidation (and reduction), displacement **Explain** uses of metals in terms of their physical properties **Describe** how chemical processes can be used to extract a metal from its ore **Describe** the properties of acids and alkalis in terms of their reactions: acid + metal, acid + carbonate, acid	**Summative**: Stomach ache - This is a full investigation in which students use the stimulus context of food scientists working to test the effectiveness of indigestion remedies. Criteria B: Planning and designing Criteria C: Processing and evaluating

					• Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	+ alkali **Describe** the use of indicators to measure acidity and alkalinity, and outline the pH scale *Some students could:* **Make predictions** about chemical reactions using chemical formulae **Determine** the chemical formula of a compound using ion valency **Describe** the formation of ions in solution by acids and alkalis	
Unit 3 - Who are we? (5 weeks) Biology	Relationships	Evidence, Patterns	Identities and relationships Exploration - Physical, psychological and social development	Because scientists understand the relationships between genes and inherited characteristics, we can use genetic patterns as evidence for identification and decision making.	**Learner Profile** Principled Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	**Define** DNA **Define** genes **Describe** the relationship between inherited characteristics and genes **Give examples** of the relationship between inherited characteristics and genes **State** the number of chromosomes that humans have **Identify** some characteristics of human chromosomes **Define** genome **Define** karyotype **Describe** how genes and characteristics are inherited **Evaluate** our ability to and the possibility of modifying the genes that make up the human genome **Identify** and describe the phases of mitosis and meiosis **Describe** the role of mitosis and meiosis in growth, reproduction, and inheritance of traits **Compare** and contrast the processes of mitosis and meiosis **Define** trait, allele dominant, recessive, homozygous, and heterozygous **Distinguish** between and identify dominant and recessive traits and alleles **Describe** how genetic patterns identified **Justify** how individuals can be identified through inherited characteristics and genetic patterns using a Punnett Square **Define** DNA fingerprint **Describe** how gel electrophoresis works to identify a person's DNA fingerprint **Justify** and evaluate the extent to which legal cases should depend on identifying people through DNA **Analyse** and evaluate DNA evidence in order to make judgments about a person's identity *Some students could:* **Evaluate** our ability to modify the genes that make up the human genome, and the possibility of doing so **Research**, analyse and justify external factors that affect gene function **Research** and analyse unusual genetic traits **Service learning** For their Summative assessment, students write a journalistic 'opinion piece' about using DNA evidence	**Summative**: Students write a journalistic 'opinion piece' about using DNA evidence to make legal decisions, supporting their opinion with scientific evidence and reasoning and demonstrating an understanding of the relationship between genetic patterns and inherited characteristics. Criteria D: Reflecting on the impacts of Science

						to make legal decisions, supporting their opinion with scientific evidence and reasoning and demonstrating an understanding of the relationship between genetic patterns and inherited characteristics.	
Unit 4 - What does a wave tell us? (5 weeks) Physics	Relationships	Form, Energy	Personal and cultural expression Exploration – Analysis and argument	Understanding the relationships between different forms of wave energy helps us better communicate and express our thoughts.	**Learner Profile** Inquirer Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask “what if” questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	*All students should:* **Outline** the properties of oscillatory motion around an equilibrium point **Describe** longitudinal and transverse wave motion **Describe** a wave in terms of the key dimensions of wavelength, frequency and amplitude **Outline** the relationship between the speed of waves and the properties of media **Summarize** the subjective experience of brightness and colour in terms of the dimensions of a light wave **Describe** the phenomenon of reflection in terms of a ray model **Describe** the phenomenon of refraction in terms of a ray model **Outline** the names and function of the principal parts of the human eye **Describe** how the eye forms an inverted image **Compare** the eye to a camera **Outline** the principal regions of the electromagnetic spectrum **Outline** how the Earth's atmosphere protects us by filtering out dangerous radiations from the Sun and deep space **Explain** the phenomenon of white light in terms of addition of frequencies **Explain** the colour of a surface in terms of subtraction and selective reflection of frequencies **Explain** the transmission of sound through media as a longitudinal vibration with compression and rarefaction **Outline** the function of the human ear as a sound detector **Describe** the subjective experience of sound in terms of pitch and volume **Outline** the use of sound for echo location and ultrasonic imaging **Describe** the measurement of sound amplitude using the decibel scale **Outline** the frequency-dependency of loudness for the human ear **Explain** how sound loudness can be reduced using different materials *Some students could:* **Outline** the relationship between the speed of waves and the properties of media **Describe** how the eye forms an inverted image **Describe** the measurement of sound amplitude using the decibel scale **Outline** the frequency-dependency of loudness for the human ear **Service learning** For their summative assessment, students investigate the sound absorption properties of different materials, or different thicknesses of material, and then to apply	**Summative**: Students investigate the sound absorption properties of different materials, or different thicknesses of material, and then to apply their findings to the real-life problem of noise reduction near an airport. Criteria B: Planning and designing Criteria C: Processing and evaluating

						their findings to the real-life problem of noise reduction near an airport.	
Unit 5 - How does our planet work? (5 weeks) Physics & Chemistry	Systems	Models, Patterns	Globalization and sustainability Exploration - Systems, Opportunity, Consequences and responsibility, Models	Modelling interactions between Earth's systems allows us to understand patterns that we can use to secure or improve human experiences.	**Learner Profile** Reflective, Thinker Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact. Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	**Describe** the characteristics of a system **Define** the ecospheres: biosphere, hydrosphere, geosphere, and atmosphere **Describe** the natural systems that maintain life on Earth **Describe** how the ecospheres interact **Identify** the processes and events that contribute to the current conditions on Earth **List** cycles of matter, including the water cycle **Compare** and contrast cycles of matter **Outline** how energy flows through the ecospheres **Analyse** a climatograph **Organize** climate data to create a climatograph **Identify** and outline some patterns in climate and weather around the world **Compare** and contrast climate data from different cities **Outline** the unique properties of water that have an influence on climate and weather **Define** leeward and windward **Describe** the rain shadow effect **Design** and conduct an investigation to determine how the temperatures in water, air and earth vary over time **Outline** the plate tectonic theory **Define** convergent, divergent and transform boundaries **Describe** the effects of plate movement **Distinguish** between convergent, divergent and transform boundaries **List** different types of seismic activity around the world **Describe** how early warning systems work **Evaluate** the use of early warning systems **Describe** Pangaea **Describe** how models help people understand different Earth systems *Some students could:* **Research** and analyse how the movement of water can transform the surface of the Earth **Analyse** a climatograph **Research**, analyse and hypothesize about the climate of different regions around the world **Research**, analyse and hypothesize about the presence of the rain shadow effect **Evaluate** the use of early warning systems	**Summative**: Students research, build and test a hydropower station Criteria B: Planning and designing Criteria C: Processing and evaluating Criteria D: Reflecting on the impacts of Science
Unit 6 - How do we respond to our world? (5 weeks)	Change	Consequence	Scientific and technical innovation	Scientific innovations designed to enhance our ability to perceive and respond	**Learner Profile** Thinker	**List** the sense organs and their functions **Describe** how the sense organs function **Define** stimulus **Justify** the importance of different senses in terms of	**Summative**: Students consider the possible advantages of the typical responses

Biology			Exploration - Adaptation	to change in our surroundings have consequences on our survival.	Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	long-term survival of the species **Describe** the role of the central nervous system in our perception of and response to different stimuli **Define** neuron **Define** nerve **Match** sense organs to their related stimuli **Describe** the stimulus response mechanism **Describe** the importance of sensory neurons, motor neurons, glands, and muscles in the perception of and response to stimuli **Analyse** and justify typical responses to stimuli and the advantages of such responses on the long-term survival of the species **Describe** other (non- human) organisms respond to different stimuli **Design** and carry out an investigation to test how a plant or invertebrate animal responds to stimuli **Define** natural selection **List** 3 factors that allow for the process of natural selection **Describe** the process of natural selection **Describe** the process of adaptation *Some students could*: **Analyse** and justify typical responses to stimuli and the advantages of such responses on the long-term survival of the species **Research** and analyse how organisms other than humans respond to stimuli **Research**, analyse and justify adaptations that have resulted from the process of natural selection	that come from the central nervous system, using the visible thinking strategy of 'What makes you say that?' to explain their thinking. Criteria A: Knowing and understanding

MYP Sciences

Grade 8

Unit title	**Key Concept**	**Related concept(s)**	**Global context**	**Statement of Inquiry**	**ATL Skills and Learner Profile**	**Content and Service Learning**	**Summative Assessment & MYP Objectives**
Unit 1 How do we make it work? (5 weeks) Physics	Change	Energy, Movement	Scientific and technical innovation Exploration – Systems, models, methods; products, processes and solutions	Machines have revolutionized life by making it easier to change energy from stored forms to movement and back again.	**Learner Profile** Thinker Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills • Access information to be informed and inform	**Recall** that energy is measured in joules[1.4] **Describe** the use of energy as work in some machines **Describe** a range of observed processes such as combustion, temperature change, electricity generation and chemical reactions in terms of energy changes[1.4] **Classify** phenomena in terms of the energy changes involved[1.4] **Classify** kinds of energy as either potential or kinetic[1.4] **Apply** understanding of energy change, transfer and loss to suggest ways in which energy loss can be minimized in a variety of everyday situations[1.4] **Analyse** simple machines such as levers, pulleys and gears **Summarize** the function of simple machines in terms of forces of effort and load, and distance of action **Identify** force-magnifying and distance-	**Summative**: Take action! Observing energy use Students analyse the energy use of everyday household appliances that, while perhaps taken for granted, have made modern life in the developed world what it is. Students will need to deploy critical-thinking skills in interpreting the information they find as they look at energy ratings on household appliances, and also transfer understanding of renewable and non-renewable energy sources from Grade 6. They will also need to consider whether an appliance is using energy or only distributing it – such as radiators in a

					others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	magnifying levers **Outline** some possible applications of simple machines **Recall** that power is the rate of changing energy and is measured in watts **Apply** the relationship energy = power × time to compare the work done by some simple machines **Identify** energy exchanged in physical systems as useful or wasted[1.4] **Apply** the relationship $\text{efficiency} = \frac{\text{work out}}{\text{energy in}}$ or $\text{efficiency} = \frac{\text{power out}}{\text{power in}}$ to compare machines **Describe** chemical changes as endothermic or exothermic according to the direction of heat flow between the environment and the reactants **Summarize** the energy difference between reactants and products in endothermic and exothermic chemical changes **Describe** combustion as an exothermic chemical change involving oxygen and a fuel *Some students could:* **Outline** how the total energy in the universe is defined as a constant throughout time **Explain** in terms of heat loss why the value of efficiency is always < 1 **Outline** how energetic change in the universe tends towards a state of uniform, constant temperature **Service learning** Students carry out Service learning in the Summative assessment task.	central heating system. They then evaluate the impact of the appliances both economically and environmentally. Extension task: include the variation of energy use with time, by looking at its metering – see, for example, *MYP by Concept 4–5: Physics*, chapter 6, page 110. Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science
Unit 2 - How do humans impact the natural world? (5 weeks) Chemistry	Change	Consequences, Environment	Fairness and development Exploration - Ecology and disparate impact	The environment changes as a consequence of how we develop and manage natural resources around the world.	Learner Profile Principled Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills	**Describe** different environmental value systems **Describe** the characteristics of a healthy environment **List** examples of environments that are healthy and not healthy **Describe** changes environments undergo over time **Outline** the importance of biodiversity in creating a healthy ecosystem **Identify** patterns in environmental changes as depicted in different graphics **Describe** environmental 'tipping points' **Define** and **give examples** of natural resources **Distinguish** between renewable and non-renewable natural resources **Identify** some ways in which humans develop natural resources **List** the factors that determine how humans develop and manage natural resources **List** natural resources that people in different	**Summative**: Students take the role of a mobile application designer, designing an application for a mobile device that will be used to help people make decisions that contribute to the healthy management and development of natural resources around the world. There is no requirement for exactly what the app must do, but it needs to help users understand the relationship between people and the condition of the environment and offer suggestions or guidance for how people can take actions that contribute to

					• Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	communities use in their daily lives **Outline** the role of petroleum in the production of petrochemicals beyond its use for energy **List** ways in which the environment changes as a result of developing natural resources **Describe** how different viewpoints on the environment can influence the way in which people develop and cause changes within it **Outline** circumstances in which people have or do not have the 'right' to use natural resources **Outline** the responsibilities that all people have towards the environment *Some students could:* **Compare**, **contrast** and **justify** their and others' environmental values **Describe** the scientific processes that cause or result from changing environments **Interpret** and **analyse** graphics for environmental changes that have occurred in recent years **Discuss** the importance of the principle of tipping points when considering actions that affect the environment **Discuss** different ways in which people develop natural resources **Discuss** the factors that determine how people develop and manage natural resources **Discuss** the ways in which the environment changes as a result of developing natural resources **Discuss** the strengths and limitations of the production and use of petrochemicals **Discuss** how different viewpoints on the environment can influence the way in which people develop and cause changes within it **Discuss** and **justify** circumstances in which people have or do not have the 'right' to use natural sources **Discuss** and **justify** the responsibilities that all people have toward the environment **Service learning** App created for summative assessment.	positive change in the environment. By creating an app that provides users with information about the environment to help take actions in support of environmental protection, students will demonstrate that they are able to apply what they know and understand about the environment; to identify the consequences of human actions; how the environment changes (for better and for worse) as a result of human actions; and that humans have choices for how to develop and manage natural resources in a more sustainable and environmentally-friendly way. Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science
Unit 3 - What should I eat? (5 weeks) Biology	Relationships	Consequences Function	Scientific and technological innovation Exploration – Models and solutions	Because what we consume is related to and has consequences on how our bodies function and feel, we can choose what we eat and drink based on scientific principles and developments.	**Learner Profile** Balanced Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research	**Describe** the relationship between what we consume and our health **Identify** important cell structures (i.e. ribosomes, mitochondria, cell membrane) **Identify** the molecules that make up or are used by cell structures **Identify** the four macronutrients (carbohydrates, proteins, lipids and fibre) **Identify** the component parts of each macronutrient (amino acids, fatty acids, etc.) **Describe** the role of each of the macronutrients in healthy body function **Distinguish** between the functions of each of the macronutrients **Identify** healthy sources of each of the macronutrients **Describe** the role of enzymes in digestion	**Summative**: Take action! Diet design Students take the role of a dietician. They apply the science of nutrition and the human body to design a meal plan for a client based on their client's food preferences, activity levels and health or athletic goals. They will present their client with the meal plan, together with a scientific explanation to support the recommended foods and drinks in the plan. By designing a meal plan that meets the needs of their clients' lifestyles, students demonstrate that

					question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	**Compare** and **contras**t the molecular characteristics of the three types of fat **Justify** the benefits and limitations of different types of diets **Describe** common digestive disorders **Describe** the relationship between food choices and digestive disorders **Create** visual representations of data related to amino acids found in different foods **Describe** the process of photosynthesis **Describe** the process of cellular respiration **Identify** the role of carbohydrates (glucose) in cellular respiration **Identify** foods that would supply the body with the quickest source of energy **Identify** scientific understanding and developments that impact the function and performance of the human body **Discuss** the relationship between industrially produced foods and supplements and good health **Discuss** the scientific basis of nutritional supplements *Some students could:* **Discuss** the relationship between enzymes and the different macromolecules **Justify** why carbohydrates are the macromolecule that is digested first **Describe** scientific understanding and developments that impact the function and performance of the human body **Justify** the meal choice for athletes who need sustained source of energy versus a quick source of energy **Interpret and analyse** data about nutritional supplements to justify their role in human health **<u>Service learning</u>** Diet design for summative assessment	they understand the relationship between and consequences of what people consume and how the body functions. Through their choice of foods and beverages they pick for their clients, the students can also demonstrate their understanding of scientific principles and developments in their meal plan. Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 4 - How do we put electricity and magnetism to work? (5 weeks) Physics	Relationships	Form Balance Transformation	Orientation in space and time Exploration - Scale	Electrical and magnetic forces fill space as fields; understanding their form and relationships allows us to transform energy in useful ways.	**Learner Profile** Thinker Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask “what if” questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy	**Classify** observed forces in terms of electrical and magnetic interactions **Outline** the basic properties of magnetic fields: polarity, strength, variation **Outline** the interaction of the Earth’s magnetic field with magnetic materials and charged particles **State** that negative electric charge is carried by electrons, positive electric charge is carried by protons **Explain** how a surplus or deficit of electrons leads to a static electric charge **Outline** and compare the properties of electric and magnetic fields **Outline** how moving electric charge produces an electric current **Describe** how the flow of electrons is used to do work **State** that electric current is measured in amperes **Outline** how to use switches in simple series and parallel circuits **Describe** how current varies in different parts of	**Summative**: This major investigative task models the solution of an engineering problem – the choice of conductor to use in a computer network. Students research the conductors used in computer network cabling systems, and then design and carry out an investigation to determine the factors affecting the resistance of a metal conductor. Finally, they write a report on the best kinds of cabling to use. Criteria B: Planning and designing Criteria C: Processing and evaluating

					Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	series and parallel circuits **Explain** the distinction between conventional and real current flow **Identify** electrical conductors and insulators **Describe** how energy in an electric circuit is measured as potential difference, or voltage, and is measured in volts **Measure** the currents and voltages in circuits containing different conductors **Explain** resistance as an inverse measure of the conductive properties of a material **State** that resistance is measured in ohms (Ω) *Some students could:* **Outline** how the bulk physical properties of conductors affect the conduction of current through a circuit **Summarize** resistance as caused through obstructions to the flow of free electrons	
Unit 5 - How can we connect? (5 weeks) Physics	Systems	Energy Interaction	Personal and cultural expression Exploration – Fields and disciplines	We interact and express ourselves through systems that manipulate information as different forms of energy.	**Learner Profile** Communicator Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills Use appropriate forms of writing for different purposes and audiences	**Identify** the key media in the history of information transmission: visual/sound, analogue telegraphy, radio telegraphy, analogue telephony, mobile digital telephony, internet **Draw** ray diagrams showing the effects of plane, concave (diverging) and convex (converging) mirrors **Describe** the formation of images, and their properties, by simple lens and mirror systems **Define** the properties of images: magnification, diminished image, lateral inversion, real and virtual images **Outline** the phenomenon of total internal reflection in terms of the refractive properties of different optical media **Draw** ray diagrams to show total internal reflection **Describe** the use of total internal reflection in fibre optic signal transmission **Outline** the production and reception of radio waves **Outline** the function of some analogue information systems: LPs, magnetic audio tape **Explain** the encoding of information digitally using binary numbers **Describe** some applications of digital information encoding: bar/QR codes, TV remotes, DVD/BluRay **Outline** the use of binary information to store information in computer memory **Outline** the principal elements of digital information networks: router/modem, server **Outline** the operation of a cell phone system **Justify** the arguments for responsible digital citizenry *Some students could:* **Summarize** the technique of amplitude modulation to encode information in waves **Describe** the application of amplitude modulation to simple information systems: morse code, radio, fibre optic transmission **Summarize** the technique of frequency modulation to encode information in waves	**Summative**: The first task empowers students and teachers to research online safety and to raise awareness of these issues. While many developed countries now have extensive, government or law-enforcement sponsored initiatives to keep young people safe online, it is essential that schools worldwide play their part. As online telecommunications develop so quickly, no sooner has a danger been removed than new ones are discovered, so the most effective way to keep young people safe is to equip them with the thinking tools and skills to appraise each situation for danger as it arises. The second task allows students to enrich their understanding of the cell phone network through research and analyse the stages in the processing of a cell signal. A good treatment of the subject will apply understanding of attenuation, signal modulation, frequency switching and handover as described in the text in this unit. Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science

						Suggest advantages of frequency modulation over amplitude modulation in the transmission of information	
Unit 6 - How do our bodies work? (5 weeks) Biology	Systems	Balance Function	Personal and cultural expression Exploration – Philosophies and ways of life	By understanding how our body systems function, people can learn to make decisions for balanced and healthy lifestyles.	**Learner Profile** Communicator Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	**Recall** the basic structures and functions of neurons **Define** neurotransmitters **List** a few common neurotransmitters **Describe** the role of neurotransmitters in signalling between cells **Describe** how signals are sent and received between neurons and other cells **State** the role of acetylcholine in the flight or flight response **Discuss** how different substances and conditions in our bodies can change how our signals are sent between cells **Describe** the characteristics of bones **Distinguish** between the different types of bone **Identify** factors that can affect the health and physical integrity of bones **State and identify** the three types of muscle cells **Compare and contrast** the three types of muscle cells **Identify** the molecules involved in muscle cell contraction **Identify** the cell structures involved in muscle cell contraction **Distinguish between** fast twitch and slow twitch muscle fibers **Identify** the components of the male and female reproductive systems **Compare and contrast** the functions of estrogen and testosterone in males an females **State** the roles of different hormones in the male and female reproductive system **Recall** the process of meiosis **Define** gametes **Compare and contrast** male and female gametes **Describe** the process of fertilization **Outline** the process of fetal develoment **Discuss** when it is possible for a female to become pregnant **Distinguish between** the reproductive process in humans and other mammals **State** factors that contribute to peoples' decisions to reproduce or not reproduce **Describe** different types of human interactions **Discuss** the strengths and challenges of different types of human interactions *Some students could:* **Discuss** the benefits and weaknesses of the structure of bone **Describe** how our activities and what we consume can affect bone health **Describe** the relationship between cells structures, macronutrients, and other molecules on the contraction of muscle cells **Apply** knowledge and understanding of types of skeletal muscle to **justify** people's natural	**Summative**: Students describe how the the signalling system in the human body functions under usual circumstances and how it functions when it is under the influence of substances such as nicotine, sugar, alcohol, marijuana and heroin. Through applying their knowledge and understanding, students communicate scientifically supported strategies for making decisions about balanced and healthy lifestyles. Criteria A: Knowing and understanding

						tendencies/needs for training when participating in sports **Describe** the reasons for and give examples of non-disjunction **Describe** how multiple fetuses (twins, triplets) form	

MYP Biology

Grade 9

Unit title	**Key Concept**	**Related concept(s)**	**Global context**	**Statement of Inquiry**	**ATL Skills and Learner Profile**	**Content**	**Summative Assessment & MYP Objectives**
Unit 1 - How is Life Organised? (5 weeks)	Relationships	Patterns, Development	Identities and relationships Exploration – Moral reasoning and ethical judgement	Your identity is determined by the relationship between different levels of organization in your body which, although differing in complexity, share patterns and functions with all life on Earth.	**Learner Profile** Thinker Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	**State** the characteristics that make something alive or not. **Describe** the characteristics that determine whether something is alive or not Interpret information about viruses to make scientifically supported judgments about whether viruses are alive or not. **Explain** the relationship between the structure of a cell and its function. **Draw** and label diagrams of cells using a microscope. **Describe** and explain the function of different organelles. **Describe** the differences between cells, tissues, organs and organ systems Explain the implications of only using physical characteristics to classify organisms. **Explain** why it is important to use the same method of classification throughout the scientific community. **Explain** Linnaeus' binomial classification system. **Service learning** Students organize a campaign to reduce food waste in the school community	**Summative**: Essay Style Question Criteria D: Reflecting on the Impacts of Science
Unit 2 - What Chemical Processes Support Life (5 weeks)	Systems	Energy, Transformation	Scientific and technical innovation Exploration – Processes and solutions	The systems of life are supported by biochemical reactions and the transformations of energy that occur within cells. Innovations in science could lead to these reactions being utilized to meet growing energy and food needs	**Learner Profile** Inquirer Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4	Respiration **State** the word equations for anaerobic respiration in yeast, plants and humans Outline the differences between respiration and combustion **Explain** how substances required for photosynthesis enter the leaf State the word and chemical equations for photosynthesis **Explain** each part of the starch test using scientific reasoning Outline the experiments that can be carried out to indicate that light, carbon dioxide and chlorophyll are needed for photosynthesis Outline the role of limiting factors **Describe** and explain an experiment that shows how light intensity affects rate of photosynthesis Describe and explain an experiment that shows that plants carry out both photosynthesis and respiration Describe and explain the relationship between structure and function in enzymes +**Outline** an experiment that investigates the effect of enzyme concentration on rate of reaction **Outline** an experiment that investigates the effect of temperature on the rate of reaction	**Summative**: Lab Report: Investigating Factors that affect catalase activity Criteria B: Planning and designing Criteria C: Processing and evaluating

					• Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	**Explain** the differences between respiration and combustion	
Unit 3 - How Do Organisms Sustain Themselves? (5 weeks)	Systems	Balance, Energy, Environment.	Personal and cultural expression Exploration – Lifestyle choices	Systems in living organisms transfer energy and nutrients from the environment to cells, where they are used to maintain the balance of life. Diet can be affected by personal and cultural choices	**Learner Profile** Knowledgeable Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills Use appropriate forms of writing for different purposes and audiences	**Outline** an experiment that measures energy content in food **Evaluate** an experiment that measures energy content of food and explain improvements State the chemical composition of carbohydrates, lipids and proteins **Outline** food tests for starch, simple sugars, proteins and lipids. **Explain** the outcomes of food tests on unknown solutions Explain what is meant by the term ‘digestion’ **Describe** the processes that occur in each part of the digestive system **Describe** the digestion of carbohydrates, proteins and lipids Explain the role of bile in digestion **Describe** and explain how the breathing system is adapted for gas exchange **Explain** the process of ventilation and how it draws air into and out from the lungs **Describe** the passage of blood around the body **Describe** and explain the structure and function of the heart State what is meant by the terms ‘diffusion’, ‘osmosis’ and ‘active transport’ **Outline** how blood vessels are adapted to their function **Outline** how water travels from the soil to the leaves in plants	**Summative**: Test, Brochure Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science
Unit 4 - What Issues do Larger Organisms face? (5 weeks)	Relationships	Environment, Form, Function.	Orientation in space and time Exploration – Constraints and adaptation	The size of organisms determines their distribution in space and time, and the form and function of specialized structures in larger organisms develop from their relationships with the environment.	**Learner Profile** Thinker Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask “what if” questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy	**Describe** how an organism is adapted to the environment and explain how these adaptations aid survival **Outline** how surface area : volume ratio changes as organisms increase in size **Outline** how physical and behavioural adaptations help organisms overcome problems of size **Describe** and explain the factors that increase the rate of diffusion **Explain** why surface area:volume ratio changes as organisms increase in size **Explain** how physical and behavioural adaptations help organisms overcome problems of size	**Summative**: Lab Report Criteria B: Planning and designing Criteria C: Processing and evaluating

					Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.		
Unit 5 - What Factors Affect Human Health? (5 weeks)	Relationships	Evidence, Models, Patterns.	Identities and relationships Exploration – Health and well-being	Human health is a consequence of the relationships and interactions between biological processes in our bodies, our lifestyles and the conditions we live in.	**Learner Profile** Reflective Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills Use appropriate forms of writing for different purposes and audiences	**Approaches** to human welfare around the world Explain the factors in one's surroundings that contribute to human health **Explain** the factors within one's own body that contribute to human health **Outline** the relationship between different types of pathogens and their hosts **Explain** the immune response and symptoms such as fever, sneezing and coughing, and vomiting **Explain** the way science has been applied to address the issue of diseases, through the development of treatments such as antibiotics and vaccines **Discuss** and evaluate the use of antibiotics and vaccines for the treatment and prevention of diseases **Analyse** and evaluate information about antibiotics and vaccines to make scientifically supported judgments about their use in the treatment and prevention of disease Form conclusions about the spread of disease based on information presented in models and graphs **Describe** the different types of diseases, including: communicable; heritable or genetic; autoimmune; lifestyle; mental health Interpret and explain graphs that describe the trends in disease and life expectancy around the world **Analyse** and evaluate trends in disease prevalence and life expectancy to form scientifically supported	**Summative**: Ad campaign on healthy lifestyles Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science
Unit 6 - How do characteristics pass from one generation to another? (5 weeks)	Relationships	Evidence, Models, Patterns	Identities and relationships Exploration – Identity formation	Your identity and relationships with other people are determined by genetic factors: scientific evidence has led to models that help to understand observed patterns of inheritance.	**Learner Profile** Open-minded Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	**Define** the terms 'nucleus', 'chromosome', 'DNA', 'gene', 'allele' **Describe** the structure of DNA and outline how its structure relates to its function **Describe** the cause and effect of gene mutations **Analyse** genetic diagrams to calculate the ratio of expected genotypic and phenotypic outcomes **Explain** how outcomes of genetic crosses can be used to define parental genotypes **Describe** the difference between asexual and sexual reproduction Describe the process of mitosis **Outline** different life cycles for both vertebrates and invertebrates **Explain** the differences between asexual and sexual	**Summative**: Unit Test Designing a Model of DNA Criteria A: Knowing and understanding

						reproduction **Outline** how genes code for proteins Explain how mutations lead to a change in phenotype **Explain** how different life cycles adapt organisms to different environments	

MYP Chemistry

Grade 9

Unit title	**Key Concept**	**Related concept(s)**	**Global context**	**Statement of Inquiry**	**ATL Skills and Learner Profile**	**Content**	**Summative Assessment & MYP Objectives**
Unit 1 - What is Matter? (5 weeks)	Change	Movement, Energy Transfer	Identities & Relationships Exploration – Moral reasoning and ethical judgement	The particle model of matter helps us to make sense of the world around around us through understanding the changes that take place in the number of particles in a given space, the spaces between particles, the movement of particles, and the cumulative effect on the energy of the particles during phase changes.	**Learner Profile** Inquirer Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	**Apply** measurement skills to a range of common substances Interpret complex text, using a three-level-guide **Describe** the states and properties of matter with reference to the spatial arrangement and movement of particles, and the processes occurring during changes of state **Calculate** and estimate density from mass and volume data **State** examples of pure and impure substances **Investigate**, using controlled variables, the effects of impurities of the properties of pure substances Identify examples of physical and chemical changes	**Summative**: In this student-led conference reflecting on 'how matter really matters', students research and consider one example of pure matter (element or compound) that is critical to our lives, in the society we know, and share it in a format similar to a poster session at a scientific conference. The poster or virtual presentation explains how the chemistry interacts interacts with a moral, ethical, social, economic, political, cultural or environmental factor in our world. Criteria D: Reflecting on the impacts of Science
Unit 2 - How do we use matter? (7 weeks)	Change	Conditions	Personal & Cultural Expression Exploration – Analysis and argument	Improving the world around us while ensuring the longevity of natural resources is based on our understanding of the behaviour of matter, the optimum conditions for its use and the implications of changing those conditions.	**Learner Profile** Open-minded Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	**Suggest** examples of how solids and liquids may vary Identify relationships between types of mixtures (solutions, oils, alloys, emulsions) by building a concept map **Create** and **present** examples of colloids, for use as gifts or fundraising for the school Identify examples of preservatives found in commercial mixtures, such as food, cosmetics and cleaning agents **Investigate** colloids using simple practical approaches: (a) identifying whether the continuous phase is oil or water, (b) inverting the emulsion and (c) observing an emulsion under a microscope at high magnification Reflect on the impacts of science in the production of toiletries or in the modern phenomenon of molecular gastronomy. **Demonstrate** or explain a range of separation techniques including filtration distillation, chromatography and osmosis **Design** a separating device and test its effectiveness experimentally on a mixture of waste substances. **Determine** using practical laboratory skills the ratio of solids by mass in a mixture prepared by your teacher, using the apparatus available in your science laboratory	**Summative**: Various problems allow for the application of the understanding of mixtures and separation processes in daily life, and the physical properties of the substances involved. Criteria A: Knowing and understanding
Unit 3 - How do we map matter?	Systems	Patterns	Scientific and Technical Innovation	Scientific & technological innovation has	**Learner Profile** Communicator	**Identify** properties of metals (for example, alkali metals, alkaline earth metals, rare earth metals) and non-metals (for example halogens and noble gases)	**Summative**: Various problems allow for the

(6 week)			Exploration – Models and Methods	allowed us to identify patterns in the properties of chemical elements and so build systems to classify them.	Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	**Outline** differences between atoms and ions, and protons, neutrons and electrons **Investigate** physical or chemical properties of a range of metals and non-metals State the origins of the names of some of the chemical elements **Organize** groups of elements on a standard (mediumlong) periodic table, identifying periodic trends within groups and periods **Present** a model or display that describes an alternative and chemically justified arrangement of groups of elements forming the periodic table **Create** a game based on the periodic table to help others learn about patterns in the periodic table	application of the understanding of mixtures and separation processes in daily life, and the physical properties of the substances involved. Criteria A: Knowing and understanding
Unit 4 - How do atoms bond? (Bonding) (6 weeks)	Relationships	Evidence	Identities & Relationships Exploration - Attitudes	Chemical & Physical properties provide evidence of the relationships both between and within atoms	**Learner Profile** Communicator Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask “what if” questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	**Describe** properties of metals, ionic solids, covalent molecular substances and covalent molecular network solids **Outline** bonding relationships between groups of elements in the periodic table, developing understanding of periodic trends **Identify** examples of polar molecules (liquids) **Suggest** how inter- and intra-molecular forces explain different types of chemical interactions between particles (molecules, ions or atoms) **Evaluate** the bonding relationships between parts of a complex synthetic molecule and its function, presenting findings in a mode that reflects the audience who will use it **State** names and chemical formulas of molecules using IUPAC rules **Identify** the numbers of atoms of different elements represented in the symbolic representation of a chemical compound **Present** formulas for the chemical compounds by valency and chemical symbols Describe the relationship between the charge of an ion in solution and its migration towards the oppositely charged electrode **Investigate** how a measurable property of a slime changes in response to a condition that changes bonding between its molecules	**Summative**: Students investigate experimentally and report on how a measurable property of a slime (a cross-linked covalent molecular substance) changes in response to a condition that changes bonding between its molecules. An important consideration of their report should be the representation of their data. Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 5 - What are the impacts of chemical industry?	Change	Interactions	Globalization and sustainability Exploration – Human impact on the environment	The chemical industry has brought change that affects global interactions with positive and negative environmental impacts.	**Learner Profile** Principled Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on	Case studies involving chemical environmental pollution **Present** relevant information in the local community about how wastes should be safely disposed of **Investigate** systematically combinations of ionic solutions for their potential to form precipitates (ionic compounds with low solubility), as an example of a type of chemical reaction **Formulate** balanced chemical equations ‘by inspection’ – balancing chemical equations is an application of the law of conservation of mass Identify colour changes associated with a range of indicators of acids and bases **Describe** the relationship between the pH scale and hydrogen ion concentration in a solution Investigate the relationship between the concentration of an acid or a base and the pH measured in a serial dilution Investigate acid–base reactions experimentally, for example: formation of salts, by reacting (a) acids and carbonates, (b) metal oxides and acids, and (c) metals with acids	**Summative**: Individually, students research and promote how a category of waste can be disposed of safely. Criteria D: Reflecting on the impacts of Science

					others Communication skills • Use appropriate forms of writing for different purposes and audiences	**Compare** the corrosive effects of acids and bases and **identify** examples of uses of salts Investigate how a factor affects the solubility of an ionic compound **<u>Service learning</u>** Students create a poster on responsible waste disposal as part of their Summative Assessment. This will involve extensive research, such as asking to speak to the owner/ manager and offering to help.	
Unit 6 - What are the determines chemical change? (6 weeks)	Change	Movement	Orientation in space and time Exploration – Displacement and exchange	Physical and chemical change requires the transfer of kinetic energy between particles of matter over time and affects the space they occupy.	**Learner Profile** Thinker Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask “what if” questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	**Identify** similarities between the movement of particles and familiar experiences with the motion of a ball **Suggest** how particle/kinetic theory may explain a range of familiar phenomena Interpret kinetic theory as described by the Maxwell–Boltzmann distribution curve to **explain** a range of phenomena involving state changes **Identify** and interpret evidence of diffusion in a gas **Describe** the effect of temperature on the rate of a reaction Investigate the effect of surface textures on the rate of a reaction **Describe** the mole concept and complete chemical calculations involving molar quantities **Calculate** the amounts (moles) of a variety of substances in further examples of types of chemical reaction: (a) gas produced during the decomposition of water by electrolysis (b) the synthesis reaction between oxygen and iron (c) moles of hydrogen ions, H+(aq), in an acid standardized using titration Formulate equations for exothermic and endothermic reactions, including ΔH	**Summative**: Independently, students investigate a factor that changes the effect of a nucleation surface (provided by Mentos® or another sweet) on release of dissolved carbon dioxide in a soft drink, for a performance to interest younger chemists. Criteria B: Planning and designing Criteria C: Processing and evaluating

<u>MYP Physics</u>

<u>Grade 9</u>

Unit title	**Key Concept**	**Related concept(s)**	**Global context**	**Statement of Inquiry**	**ATL Skills and Learner Profile**	**Content**	**Summative Assessment & MYP Objectives**
Unit 1 - How big is the world? (5 weeks)	Relationships	Patterns, Development	Identities and Relationships Exploration - Attitudes	We understand our own relationship to the Universe when we identify patterns at different scales.	**Learner Profile** Inquirer Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations	**State** the ranges of magnitude of distances, masses and times that occur in the universe, from smallest to greatest. • Recall the S.I. prefixes, units and scientific notation. • **Describe** how the magnification of different instruments has benefitted observations in resolution and developed understanding. • **State** ratios of quantities as differences of orders of magnitude. • **Distinguish** between accuracy and precision.	**Summative**: Topic Test Criteria A: Knowing and understanding

					Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	• **Demonstrate** proper use of significant figures in scientific calculations. • **Show** the uncertainty of measurements. • **Explain** how the structure and arrangement of atoms can produce different materials and discuss the impacts this might have on the world. • **Organize** relevant information to formulate a testable hypothesis. • **Explain** how to manipulate variables. • **Explain** how sufficient, relevant data can be collected. • Recognize and evaluate propositions. • **Evaluate** evidence and arguments. • **Consider** ideas from multiple perspectives.	
Unit 2 - How Do Forces Interact? (5 weeks)	Relationships	Interactions	Identities and Relationships Exploration - Independence	By identifying relationships of similarity and difference we understand how force and matter interact.	**Learner Profile** Thinker Thinking: Critical Thinking Skills • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	• **Recall** the names of the four 'fundamental' forces (electromagnetic, gravitational, strong nuclear and electroweak forces) • **State** that force is measured in newtons (N) • **Interpret** a range of examples for each of the four fundamental forces • **Analyse** the four fundamental forces in terms of strength and distance of action • **Apply** the reciprocal nature of distance–strength relationships to explain observations • **Discuss** bar magnets and magnetic fields • **Recall** that the Earth is a magnet with its own magnetic field • **Outline** that matter is both kept together and kept apart by electrostatic attraction and repulsion • **Outline** the difference between mass and weight • **Recall** that strength of force fields is usually proportional to 1/d2 • **Outline** the significance of the relative sizes of the gravitational and Coulomb constants • **Evaluate** which of the four fundamental forces is the most useful to mankind.	**Summative**: Data Collection: Investigating The Earths Gravitational Field Criteria C: Processing and evaluating
Unit 3 - Amazing Structures (5 weeks)	Systems	form	Scientific and technical innovation Exploration - Methods	Natures forms have inspired us to use systems of force and to create innovative structures	**Learner Profile** Caring Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question	• **Describe** force systems in terms of force arrows to show size and direction of forces • **Apply** vector diagrams to test whether forces are balanced or produce a resultant • **Apply** vector diagrams to estimate size and direction of resultant forces • Use vector diagrams to solve multiple force problems and calculate the resultant • **Describe** the direction the frictional force acts • **Explain** with vectors how to arrive at a net force of zero in 1 dimension • **Explain** that unbalanced forces cause motion or deformation • **Define** the law of moments • Solve problems on the turning effect of a force • **Analyze** the center of gravity of different objects • **Interpret** force systems in terms of strong structural unit shapes: cantilevers and right-angled triangles, arches and equilateral triangles • **Describe** how strong structural unit shapes deform under load • **Outline** the variables that affect the choice of design in a structure, particularly in terms of physical properties of materials • **Explain** strength of strong structural unit shapes in	**Summative**: Designing a Method: Investigating Balancing Points The real cost of human advancement in chemistry (Criterion D) Criteria B: Planning and designing Criteria D: Reflecting on the impacts of Science

						terms of force distribution	
Unit 4 - How far, how fast, how much faster? (5 weeks)	Relationships	Movement	Orientation in space and time Exploration - Displacement and exchange	To know where we are and where we are moving to we need to describe the relationship between space and time.	**Learner Profile** Knowledgeable Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	• **Recall** that distance is measured in metres (m), and speed in metres per second (m s–1) • **Define** the terms distance and displacement • **Apply** the relationship average speed = distance/time • **State** that displacement accounts for direction of travel • Contrast and explain the difference between distance and displacement • **Recall** that any change in velocity – whether caused by change in speed or in direction – is an acceleration • **Recall** that acceleration is measured in metres per second squared (m s–2) • **Define** the terms speed, velocity and acceleration • **Contrast** and **explain** the difference between speed and velocity • **Solve** accelerations from changes in velocity and times • **Analyse** displacement–time graphs in terms of velocity • Solve problems using equations of motion (the SUVAT equations) for displacement, velocity and acceleration • **Calculate** stopping distances at varying speeds • **Discuss** the dangers of excessive vehicle speeds • **Outline** a range of safety features to reduce the fatality rate in vehicle crashes	**Summative**: Lab Report Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 5 - Free to Move? (5 weeks)	Change	Movement	Fairness and Development Exploration - Security and freedom	Movement is change and our world have been changed by freedom of movement.	**Learner Profile** Open-minded Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	• **Recall** that forces cause a change in shape or motion, direction or speed • **State** Newton's first law of motion. • **Recall** the concept of inertia is a resistance to change in kinetic state • **Apply** the concept of inertia to discuss motion of objects in the absence of force • **Summarize** Newton's first law of motion in terms of inertia • **State** Newton's second law of motion. • **Explain** how forces change motion and so cause acceleration • **Outline** the changes in displacement, velocity and acceleration for objects in free-fall • **Outline** the effects of resistive forces in gases and liquids • **Describe** Newton's second law of motion in terms of momentum • **Describe** the concept of momentum • State Newton's third law of motion. • **State** that forces occur in action–reaction pairs • **Outline** the law of conservation of momentum • **Analyse** motion in terms of force pairs acting on different bodies	**Summative**: Unit Test Criteria A: Knowing and understanding
Unit 6 - How do we make life easier? (5 weeks)	Change	Development	Fairness and Development Human	Human life has been completely changed and developed	**Learner Profile** Caring	Mechanical, chemical, electrical, magnetic, nuclear • **Recall** that the joule is the SI unit for energy • **Explain** the concepts of potential and kinetic energy forms	**Summative**: **Essay**

			capability and development	through the use of machines that are created to transform energy and do useful work.	Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	• **Explain** that energy is the capacity to cause change, and that change is measured as work in various situations • **Solve** problems involving work done by machines that transform energy • **Solve** problems involving work done by gravitational fields • **Explain** that in each transformation of energy some energy is wasted as heat • **Outline** the principle heat transfer processes: conduction, convection, radiation • **Describe** the states of matter in terms of particle motion • **Explain** state changes in terms of energetics • **Solve** problems involving specific heat capacities • **State** the definition of efficiency • **Solve** problems about the efficiency of machines and energy transformation processes • **Present** energy transformations in the form of Sankey diagrams • **Suggest** some different ways of minimizing energy loss • Describe systems for dissipating energy usefully, e.g. heat-sinks, crumple zones **<u>Service learning</u>** During the Summative, students share how bikes make life easier in the developing world.	Criteria D: Reflecting on the impacts of Science

<u>MYP Biology</u>

<u>Grade 10</u>

Unit title	**Key Concept**	**Related concept(s)**	**Global context**	**Statement of Inquiry**	**ATL Skills and Learner Profile**	**Content and Service Learning**	**Summative Assessment & MYP Objectives**
Unit 1 - How have different forms of life arisen?	Change	Interaction, Environment	Globalization and sustainability Exploration – Conservation	Species change over time through interactions with their environment: the evolution of humans has impacted global biodiversity in ways that may not be sustainable.	**Learner Profile** Reflective Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and	**State** the evidence for the evolution of species **Describe** how fossils are formed **Describe** and explain how species evolve by natural selection **Outline** evidence for natural selection Interpret data that shows evidence for natural selection **Outline** the role of isolation in speciation **Outline** the stages of meiosis and describe how they lead to variation and the production of gametes Describe what is meant by the term ‘superbug’ **Describe** how superbugs have evolved **Explain** how meiosis leads to variation **Explain** how DNA provides evidence for the tree of life **Explain** how homologous structures could provide evidence for evolution. **Explain** how fossil records could provide evidence for evolution. **Explain** the evolution of antibiotic resistance in bacteria **<u>Service learning</u>** As part of the Summative Assessment: Students	**Summative**: Unit Test (Criterion A) Essay - Taking Action against Extinction (Criterion D) Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science ii

					construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills Use appropriate forms of writing for different purposes and audiences	present their findings to raise awareness of the suggestions, and alternatives. Conder the difference if more people bought and used products that are less disruptive to the balance of ecosystems.	
Unit 2 - How are organisms adapted to survive?	Change	Environment, Interaction	Orientation in space and time Exploration – Evolution	Organisms are more likely to survive when they are adapted to interact with their surroundings and respond to changes in their environment.	**Learner Profile** Balanced Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	**Define** the terms 'nucleus', 'chromosome', 'DNA', 'gene', 'allele' **Describe** the structure of DNA and outline how its structure relates to its function **Describe** the cause and effect of gene mutations **Analyse** genetic diagrams to calculate the ratio of expected genotypic and phenotypic outcomes **Explain** how outcomes of genetic crosses can be used to define parental genotypes **Describe** the difference between asexual and sexual reproduction **Describe** the process of mitosis **Outline** different life cycles for both vertebrates and invertebrates **Explain** the differences between asexual and sexual reproduction **Outline** how genes code for proteins Explain how mutations lead to a change in phenotype **Explain** how different life cycles adapt organisms to different environments	**Summative**: Design Lab & Lab Report: Investigating the effect of animal coverings Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 3 - How do species interact?	Systems	Balance Function	Globalization and sustainability Exploration – Diversity and interconnection	Ecosystems can be in balance when the species sharing their habitat have interconnected and sustainable functions and roles.	**Learner Profile** Caring Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	• **Discuss** the impact of removing the top predator from an ecosystem e.g. Pisaster ochraceus (starfish) • **Define** producer, trophic level, niche, consumer, omnivore, decomposer, saprotroph, detritivore • **Distinguish** between photosynthesis and chemosynthesis • **Construct** a food chains/webs • **Describe** energy flow through a food chain • **Outline** Robert Paine's experiment • **Discuss** the impact of removing the top predator from an ecosystem e.g. Pisaster ochraceus (starfish) • **Define** producer, trophic level, niche, consumer, omnivore, decomposer, saprotroph, detritivore • **Distinguish** between photosynthesis and chemosynthesis • **Construct** a food chains/webs • **Describe** energy flow through a food chain • **Define**: commensalism, parasitism, competition, mutualism, symbiosis	**Summative**: Unit Test Criteria A: Knowing and understanding

						• **Outline** examples of herbivory and predation • **Describe** examples/impacts of commensalism, parasitism and mutualism • **Distinguish** between interspecific and intraspecific competition • **Define**: keystone species • **State** a few examples of keystone species • **Suggest** the impact of removing keystone species from human population	
Unit 4 - How do the choices people make affect the environment?	Change	Environment, Balance	Globalization and sustainability Exploration – Natural resources and public goods	As a result of the choices that humans make, the environment has undergone and will continue to undergo change. Humans have the ability to understand the consequences of their actions and to act to restore balance in ecosystems and work towards a sustainable future.	**Learner Profile** Balanced Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	• **Identify** how the Neolithic period marked the start of population growth • **Outline** what is meant by exponential growth • **Sketch** a graph displaying population data and analyse any trends • **Identify** the periods in the last 12,000 years where the human population reached 1-2 billion,2-3 billion etc. • **Outline** what the letters of the mnemonic 'AHIPPO' refer to • **Describe** examples for each letter of AHIPPO to highlight human impact • **Discuss** how human threats are harming biodiversity and leading to endangered species • **State** how much of the Earth's surface is utilised for agriculture • **List** different types of pollution as well as the sources of them • **Suggest** some of the effects of pollution on human health • **Determine** the link between fossil fuels and acid rain affecting trees • **Explain** the process of eutrophication • **Solve** the issues of pollution by suggesting realistic strategies • **Explain** how pollutants can lead to biomagnification • **List** the greenhouse gases	**Summative**: **E**ssay - Consequences of our actions Criteria D: Reflecting on the impacts of Science
Unit 5 – How does biotechnology create new options in industry and health?	Change	Development; Transformation	Fairness and development Exploration – Power and priveledge	The development and use of biotechnology to change and transform genes helps create new options, choices and opportunities in industry and health: whether these developments are fair for all remains to be seen.	**Learner profile** Communicator Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection	**Define** the term clone **Describe** selective breeding **Explain** the techniques used to modify genes **Analyse** how humans can manipulate genes to create new cells, tissues and organs **Consider** the use of cloning to benefit agriculture **Analyse** how people's beliefs and values influence the development of biotechnological techniques What are the possible consequences of developing and applying more biotechnology **Discuss** the extent to which people should be allowed to clone organisms.	**Summative:** Design and carry out a practical to investigate the use of and grow tissue cuttings Criteria B: Planning and designing Criteria C: Processing and evaluating

					skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.		

MYP Chemistry

Grade 10

Unit title	**Key Concept**	**Related concept(s)**	**Global context**	**Statement of Inquiry**	**ATL Skills and Learner Profile**	**Content and Service Learning**	**Summative Assessment & MYP Objectives**
Unit 1 - What's inside the nucleus? (4 weeks)	Systems	Evidence	Orientation in space and time Exploration – Exchange and interaction	Evidence from physical properties such as masses of nuclei has helped to elaborate our systems for classifyinf matter and explained the distribution of elements on Earth and elsewhere in the universe.	**Learner Profile** Risk taker Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	**Suggest** how isotope ratios inform understanding about a person's movements **Calculate** the numbers of neutrons and protons to describe atomic structure (including of isotopes) **Outline** examples and uses of stable isotopes **Outline** types of isotope radioactivity and decay and examples of uses of unstable isotopes. **Analyse** nuclear decay in a range of ionic compounds which naturally contain potassium-40 **Present** a case study in which a stable or unstable isotope is an example for reflecting on the impacts of science Analyse data from (a) radioactive decay models and (b) radiation intensity models **Suggest** how components of smoke alarms, which contain the α-emitter americium-241, may be recycled **Calculate** the density of mass in atoms and nuclides **Interpret** complex texts about the origin of different elements, using a three-level guide	**Summative**: Individually, students use the medium of science journalism to narrate a case study featuring the application of a stable or unstable isotope to resolve a problem. The opening story is cited as a model. Criteria D: Reflecting on the impacts of Science
Unit 2 - Why do electron's matter? (4 weeks)	Relationships	Interaction, function	Identities and relationships Exploration – Consciousness and mind	Protons define the dentify of an element, but its relationship and interaction with other elements is a function of its outer electrons.	**Learner Profile** Thinker Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	**Suggest** how the properties of fireworks come from their chemistry S tate the colour (visible radiation) emitted from heated atoms in flame tests **Calculate** the energy carried by photons (light waves) from the compounds in the flame tests, based on the flame colour of the cation **Outline** links between chemistry and physics **Select** columns in data sheets (spreadsheets) to **investigate** periodic trends, including valency patterns **Present** electron configurations of atoms using electron shell notation, dot and cross diagrams and Lewis shell diagrams **Summarize** the results of single displacement reactions **Analyse** electrochemicals in the voltaic cell and in redox reactions **Determine** the reactivity series of metals experimentally **Describe** corrosion protection as a redox reaction Outline conditions in which corrosion of metal objects in the environment is minimized **Present** a formal essay reflecting on the impacts of redox chemistry in a case study involving metal oxidation or reduction **Demonstrate** the extraction of copper metal from	**Summative**: Various problems allow for application of understanding of the octet rule, valence electrons and redox chemistry. Criteria A: Knowing and understanding

						copper(II) oxide **Outline** processes used for the extraction of metals	
Unit 3 - How are environmental systems sustained by their chemistry? (3 weeks)	Systems	Balance	Globalization and sustainability Exploration – Population and demography	Balancing the chemical inputs and the outputs of Earth's systems is a prerequisite to sustain an environment that is hospitable to human life.	**Learner Profile** Caring Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	**Identify** causes of Earth's changing atmosphere **Outline** how processes carried out by living organisms (photosynthesis and denitrification) have changed the composition of Earth's atmosphere **Evaluate** information about Earth's systems, including the atmosphere (characteristics of gases, atmospheric composition) **Interpret** the carbon cycle, emissions and environmental implications Interpret the nitrogen cycle, and nutrient (phosphate) cycles **Evaluate** the feasibility of populating another planet, either by providing technical solutions or terraforming its systems **Compare** the emissions caused by the combustion of different solid fuels **Design** an experimental inquiry into the impacts, on an organism or mineral, of dissolved pollutants in water **Compare** environmental footprints of brands of bottled drinking water and suggest alternatives **Suggest** how different cycles of the Earth are linked **Describe** and explain the catalytic cycle of ozone depletion using a performance art (dance or mime) **Identify** features of the Montreal protocol that contributed to its success **<u>Service learning</u>** Students devise a mime, short play, performance poem or other performance to dramatize the importance of the Montreal and Kyoto protocols. They should perform the pieces to another class, or in a school assembly. Video record them and post them online.	**Summative**: Individually, students reflect on the impacts of science by researching and reporting on the feasibility of populating another planet, either by providing technical solutions or by terraforming its systems. Criteria D: Reflecting on the impacts of Science
Unit 4 - How can energy resources be assessed fairly? (5 weeks)	Change	Energy	Fairness and development Exploration – Human capability and development	Global exploitation of energy resources relies on energy changes in chemical reactions; global development depends on the fair and equitable exchange of those resources.	**Learner Profile** Reflective Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific	**Evaluate** a factor that affects the length of time for which a candle burns in a closed environment **Describe** patterns found in the flashpoints in the combustion of fuels **Outline** the energy changes during combustion reactions **Present** strategies that promote safety from building fires **Identify** fuels fit for different purposes **Demonstrate** a simple fuel cell experimentally **Describe** changes during endothermic and exothermic reactions using energy level diagrams, using calculations to quantify thermal energy produced or absorbed, or as thermochemical equations. Investigate the relationship between the identity of a metal ion and the current generated in a Daniell cell experimentally Investigate a variable that controls energy production in a circuit including a 'fruit battery' **Calculate** enthalpy changes (ΔH) using bond energy tables and experimental measurements **Compare** exothermic reactions with explosive exothermic reactions **Investigate** factors that affect how hand-warmers work by independently developing a hypothesis and testing it experimentally	**Summative**: Independently, students investigate and report on a variable that affects the energy produced in a circuit which includes a 'fruit battery'. Criteria B: Planning and designing Criteria C: Processing and evaluating

					investigation to determine sources of error and evaluate their impact.		
Unit 5 - How can we shift the balance of a reaction? (6 weeks)	Change	Balance Function	Orientation in space and time Exploration – Displacement and change	Change in the balance called chemical equilibrium is affected by the collisions of particles in space and time.	**Learner Profile** Balanced Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	**State** the role of enzymes as catalysts in biological contexts Investigate the role of a catalyst (manganese(IV) oxide) experimentally Investigate independently a factor that affects the efficiency of a catalyst chosen by the student **Solve** problems reflecting on collision theory and factors affecting reaction rates, including graphical representations of reaction kinetics **Investigate** mathematically the relationship between surface area and the number of divisions in a cube of fixed volume **Present** quantitative data analysis for observations on the reaction between sodium thiosulfate and hydrochloric acid **Describe** equilibria and reversible reactions, including the thermal dissociation of hydrated salts, using the correct symbol () **Describe** the Haber process **Solve** problems reflecting on applications of Le Chatelier's principle	**Summative**: Independently, students develop a hypothesis and conduct and report on an investigation into a factor that affects the behaviour of a catalyst, for example a transition metal oxide or an enzyme. Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 6 - Does organic chemistry mean we can make any substance we want? (6 weeks)	Systems	Form, Function	Scientific and technical innovation Exploration – Processes and solutions	The versatile bonding of carbon atoms has allowed humanity to invent systems of molecules of various forms to fulfil different functions.	**Learner Profile** **Knowledgeable** Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	**State** the meaning of the term 'organic chemistry' and list examples **Investigate** compounds experimentally to determine whether they are hydrocarbons **Describe** the classification of alkanes and alkenes as homogous series **Investigate** the solubility of alcohols in water, relating observations to the length of the alkyl chain **Demonstrate** the flammability of ethanol in a 'magic trick' **Outline** industrial uses of alcohol and demonstrate the production of alcohol using fermentation **Describe** examples of carboxylic acids Apply IUPAC naming to organic compounds, including esters Describe examples of isomers, including by presenting their structural formulas **Describe** the extraction of different hydrocarbons by the distillation of crude oil, cracking and reforming **Demonstrate** experimentally the process of saponification **Compare** condensation and addition polymerization	**Summative**: Various problems allow for application of understanding of IUPAC nomenclature, discussion of trends of homologous series and the chemistry of functional groups Criteria A: Knowing and understanding

MYP Physics

Grade 10

Unit title	Key Concept	Related concept(s)	Global context	Statement of Inquiry	ATL Skills and Learner Profile	Content and Service Learning	Summative Assessment & MYP Objectives
Unit 1 – How can we communicate? (5 weeks)	Relationships	Movement, Energy	Personal and cultural expression Exploration - Metacognition and abstract thinking	New global relationships have become possible as humanity has learned to communicate through energy transferred as wave motion.	**Learner Profile** Communicate Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	• **Summarize** the properties of oscillatory motion around an equilibrium point • **Describe** longitudinal and transverse wave motion • **Describe** a wave in terms of the key dimensions of wavelength, frequency and amplitude • **Explain** the speed of waves in terms of the properties of media • **Explain** the subjective experience of loudness and of pitch in terms of the dimensions of a sound wave • **Outline** the phenomena of interference and resonance in terms of wave superpositioning • **Outline** the principal regions of the electromagnetic spectrum • **Describe** the communication of information through modulation of wave amplitude and frequency • **Explain** the subjective experience of brightness and of colour in terms of the dimensions of a light wave • **Describe** the phenomenon of reflection in terms of wavefronts and a ray model • **Describe** the phenomenon of refraction in terms of wavefronts and a ray model • **Solve** problems involving Snell's law relating refraction to wave speed • **Describe** the phenomenon of diffraction in terms of wavefronts and a ray model	**Summative**: Lab Report Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 2 - How is our climate changing? (5 weeks)	change	Environmental, evidence, models	Globalization and sustainability Exploration - Human impact on the environment	Scientific evidence shows that human activity is leading to major changes in global environments.	**Learner Profile** Balanced Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different	• **Describe** surfaces in terms of their black-body emissivity and reflectivity • **Identify** the chief greenhouse gases • **Summarize** the greenhouse effect in terms of absorption and re-emission of radiation • **Outline** the effects of the greenhouse effect on the earth–atmosphere system • **Identify** the chief sectors of human activity that contribute to greenhouse gas emissions • **Classify** energy sources as primary or secondary • **Evaluate** energy density of different fuel sources • **Identify** renewable and non-renewable energy sources • **Evaluate** renewable and non-renewable energy sources • **Outline** the key features of a non-renewable fuel source power station • **Outline** the key features of renewable energy sources: wind generators, hydroelectric, tidal, and solar systems • Classify climate phenomena in terms of positive and negative feedback • **Outline** the effects of changing albedo on climate • **Describe** the effects of changing solar irradiation on	**Summative**: Presentation on Harnessing Renewable Energy Criteria D: Reflecting on the impacts of Science

					purposes and audiences	climate • **Evaluate** the evidence that short-term global warming is a consequence of human activity **<u>Service learning</u>** Students start a club or campaign in the school to reduce the school's carbon footprint.	
Unit 3 - Are all our futures electric? (5 weeks)	Systems	Development	Scientific and technical innovation Exploration - Principles and discoveries	The development of electrical systems has defined the modern world and made new futures possible.	**Learner Profile** Caring Thinking: Creative Thinking Skills • Use brainstorming and visual diagrams to generate new ideas and inquiries • Make guesses, ask "what if" questions and generate testable hypotheses Thinking: Critical Thinking Skills • Plan a logical procedure to investigate a research question • Interpret data Research: Information Literacy Skills • Process data and report results4 • Revise understanding based on new information and evidence Self- Management Skills: Reflection skills • Reflect upon a scientific investigation to determine sources of error and evaluate their impact.	• **Recall** that negative electric charge is carried by electrons, positive electric charge is carried by protons • **Explain** that a surplus or deficit of electrons leads to a static electric charge • **Describe** how moving electric charge produces an electric current • **Describe** how the flow of electrons is used to do work • State that electric current is measured in amperes • **Outline** how to use switches in simple series and parallel circuits • **Describe** how current varies in different parts of series and parallel circuits • **Describe** how energy in an electric circuit is measured as potential difference, or voltage, and is measured in volts • **Classify** materials in terms of their conductive properties • **Identify** electrical conductors and insulators • **Measure** the currents and voltages in circuits containing different conductors • **Measure** the V–I characteristics of a range of conductors	**Summative**: Lab Report Realising Potential Criteria B: Planning and designing Criteria C: Processing and evaluating
Unit 4 - Power to the people? (5 weeks)	Relationships	Interaction, Energy	Fairness and development Exploration - Civic responsibility and the public sphere	Manipulating the relationship between interacting electric and magnetic forces makes it possible to distribute plentiful energy to everyone.	**Learner Profile** Caring Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations	• **Recall** the relationship between electric and magnetic fields. • **Describe** the observation you see when passing electric current through a wire • Using your hand, model how magnetic field is generated. • **Explain** how electromagnets can be used in industry • **Recall** the factors that affect an electromagnets • **Describe** how a force is produced using electric and magnetic fields. • **Explain** how it's possible to make a motor using magnetic fields • **State** Flemings LHR, and describe what each finger models • **Describe** how it possible to induce a current with a magnet • **Explain** in terms of magnetic fields and electrons the phenomena of electromagnetic induction • **Describe** the process of how electricity is generated • **Draw** a model of a power station with annotations describing the key processes.	**Summative**: Topic Test Criteria A: Knowing and understanding

						• **Discuss** the energy transfers that take place in a power station • **Apply** your knowledge of electromagnetic induction to explain how a transformer works	
Unit 5 - What's in an atom? (5 weeks)	change	Consequences, energy, environment	Scientific and technical innovation Exploration - Industrialization and engineering	Learning to control nuclear changes allows us to use matter in new ways and release huge quantities of energy, with consequences that can be both positive and negative.	**Learner Profile** Open-minded Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others Communication skills • Use appropriate forms of writing for different purposes and audiences	• **Describe** the basic properties of protons, electrons and neutrons • **Model** the relative size of the atom • **Describe** what is meant by an isotope • **Discuss** the importance of Rutherford and Thompson in developing an understanding of the atom • **Draw** the basic structure of the atom • **Outline** the principle of electrons moving between shells • **Explain** the relationship between neutrons and protons in the nucleus • **Describe** what is meant by ionizing radiation • **Outline** the phenomena of ionization • **Explain** the reason for radioactive decay • **Summarise** the properties of alpha, beta and gamma • **Outline** sources of background radiation • **Explain** how a Gieger-Muller tube works • **Evaluate** which form of radiation is the most harmful to humans • **Calculate** half-life of a decay source • **Outline** the practical uses of alpha, beta and gamma • **Explain** how we use carbon dating to find out the age of objects • **Describe** the process of nuclear fission • **Model** a chain reaction • **Recall** what is meant by binding energy • **Describe** how nuclear fission can be controlled	**Summative**: Useful Radiation Presentation Criteria D: Reflecting on the impacts of Science
Unit 6 - Where are we in the Universe? (5 weeks)	Relationships	Form, Models, Evidence	Orientation in space and time Exploration - Scale	As we extend the reach of our observations, we better understand the relationships that form our models of the Universe, and so our place in the cosmos.	**Learner Profile** Knowledgeable Communication skills • Organize and depict information logically Thinking: Transfer Skills • Apply skills and knowledge in unfamiliar situations Thinking: Critical Thinking Skills • Draw reasonable conclusions and generalizations Research: Information Literacy Skills • Access information to be informed and inform others • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions Social: Collaboration Skills • Considering the global impacts of sciences on others	• **Compare** in terms of relative factors of scale: size of Solar System, size of galaxy, size of known Universe • **Outline** the principal constituents of our Solar System: Sun, rocky planets, gas planets, satellites, asteroids, comets • **Summarize** the astronomical bases for the calendar: the day, the month, the year • **Describe** planetary orbits in terms of centripetal force and gravitational attraction • **Describe** Kepler's laws for planetary motion • **Outline** Newton's law of universal gravitation • **Apply** understanding of lenses to outline the phenomena of magnification and resolution • **Recall** the principle domains of the electromagnetic spectrum and their relative positioning in terms of wavelength and frequency • **Describe** the principal stages in the life of a star, and the magnitude of their duration • **Outline** the properties of: protostars, main-sequence stars, red giants, white dwarves, neutron stars, black holes • **Outline** the properties of some deep space objects: nebulae (both star-forming and supernova remnant), pulsars, other galaxies • **Calculate** time of travel for light over cosmological distances. • **State** the definition of the light year • **Describe** different cosmological models: steady state,	**Summative**: Test and essay Criteria A: Knowing and understanding Criteria D: Reflecting on the impacts of Science

					Communication skills Use appropriate forms of writing for different purposes and audiences		