Science 10

Processes of Science

<u>Prescribed Learning Outcome</u>:

A1. SAFETY - I can demonstrate safe procedures.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can identify a variety of dangers in procedures (ex. Cuts from sharp objects; explosions or burns from handling chemicals or heating materials)					
2. I can identify appropriate equipment for a lab activity (ex. Bunsen burner vs hotplate, glassware for chemicals.					
3. I can identify and use appropriate personal protective equipment (ex. Hand and eye protection) and procedures (ex. Hair tied back, clear work area, no loose clothing, no horseplay)					
4. I can use proper techniques for handling and disposing of lab materials (ex. Using special containers for caustic chemicals).					
5. I can use appropriate emergency response procedures (ex. How to use a fire extinguisher é blanket, eye wash station, first air for cuts and burns, knowing who to contact and how)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Processes of Science

<u>Prescribed Learning Outcome</u>:

A2. USE THE SCIENTIFIC METHOD - I can perform experiments using the scientific method.

	Date	Date	Date	Date	Date
Learning Outcome:	**Level of proficiency (M, P, S, N):**				
1. I can describe the elements of a valid experiment • Formulate an hypothesis • Make a prediction • Identify controlled vs experimental variables • Observe, measure, and record using appropriate units interpret data • Draw conclusions					
2. I can use information and conclusions as a basis for further comparisons, investigations, or analyses.					
3. I can communicate results using a variety of methods.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Processes of Science

<u>Prescribed Learning Outcome</u>:

A3. GRAPHING - I can represent and interpret information in graphic form.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can identify and use the most appropriate type of graphic, model, or formula to convey information, including - Bohr model or diagram - Convection model or diagram - Lewis diagrams - Chemical formulae - Line graphs of displacement, time interval, and velocity - Diagrams (ex. Food webs and pyramids, nutrient cycles, plate boundaries)					
2. I can distinguish between dependent and independent variables in a graph.					
3. I can use appropriate scale and axis to create a graph.					
4. I can extrapolate and interpolate points on a graph.					
5. I can extract information from maps, bar graphs, line graphs, tables, and diagrams (ex. Periodic table)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Processes of Science

<u>Prescribed Learning Outcome</u>:

A4. SCIENTIFC LITERACY – Demonstrate scientific literacy.

	Date	Date	Date	Date	Date
Learning Outcome:	**Level of proficiency (M, P, S, N):**				
1. I can identify the main points in a science-related article or illustration.					
2. I can describe the qualities of the scientific ally literate person, such as • Awareness of assumptions (your own and authors`) • Respect for precision • Ability to separate fundamental concepts from irrelevant or unimportant • Recognize that scientific knowledge is continually developing and often builds upon previous theories • Recognizing cause and effect.					
3. I can use given criteria for evaluating evidence and sources of information (ex. Identify supporting or refuting information and bias)					
4. I can explain how science and technology affect individuals, society, and environment.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Processes of Science

<u>Prescribed Learning Outcome</u>:

A5. APPROPRIATE TEAM BEHAVIOR – I can demonstrate ethical, responsible, cooperative behavior.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can describe and demonstrate • Ethical behaviour (ex. Honesty, fairness, reliability) • Open-mindedness (ex. Ongoing examination and reassessment or own beliefs) • Willingness to question and promote discussion. • Skills of collaboration and co-operation • Respect for the contributions of others.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Processes of Science

Prescribed Learning Outcome:

A6. TECHNOLOGY CONNECTION - I can describe the relationship between scientific principles and technology.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can give examples of scientific principles that have resulted in the development of technologies (ex. Velocity / acceleration – technologies related to transportation and athletics)					
2. I can identify a variety of technologies and explain how they have advanced our understanding of science (ex. Seismographic instruments and GPS – plate tectonics and Earth`s layers)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Processes of Science

<u>Prescribed Learning Outcome</u>:

A7. – USES OF TECHNOLOGY - I can demonstrate competence in the use of technologies specific to investigative procedures and research.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can select and carefully use balances and other measurement tools (ex. Thermometers, timing devices, electronic devices)					
2. I can proficiently use the internet as a research tool.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Life Science: Sustainability of Ecosystems

<u>Prescribed Learning Outcome</u>:

B1. INTERACTIONS - I can explain the interaction of abiotic and biotic factors within an ecosystem.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can define *abiotic, biotic, biome,* and *ecosystem.*					
2. I can identify distinctive plants, animals, and climatic characteristics of Canadian biomes (tundra, boreal forest, temperature deciduous forest, temperate rainforest, grasslands)					
3. I can identify biotic and abiotic factors in given scenario or diagram.					
4. I can describe the relationships between abiotic and biotic elements within an ecosystem, including • Air, water, soil, light, temperature (abiotic) • Bacteria, plants, animals (biotic)					
5. I can design and analyse experiments on the effects of altering biotic or abiotic factors (ex. Nutrients in soil: compare two plant types with the same nutrients, compare one plant type with different nutrients)					
6. I can explain various relationships with respect to food chains, food webs, and food pyramids, including • Producer • Consumer (herbivore, carnivore, omnivore) • Predation (predator-prey cycle) • Decomposers • Symbiosis (mutualism, commensalism, parasitism)					
7. I can illustrate the cycling of matter through abiotic and biotic components of an ecosystem by					

tracking • Carbon (with reference to carbon dioxide – CO_2, oxygen – O_2, photosynthesis, respiration, decomposition, volcanic activity, carbonate formation, greenhouse gases from human activity, combustion) • Nitrogen (with reference to nitrate – NO_2, ammonium – NH_4, nitrogen gas – N_2, nitrogen fixation, bacteria, lightning, nitrification, denitrification, decomposition.) • Phosphorus (with reference to phosphate – PO_4, weathering, sedimentation, geological uplift).					
8. I can identify factors that affect the global distribution of the following biomes: tropical rainforest, temperate rainforest, temperate deciduous forest, boreal forest, grasslands, desert, tundra, polar ice.					
9. I can identify factors that affect the global distribution of the following biomes: tropical rainforest, temperate deciduous forest, boreal forest, grasslands, desert, tundra, polar ice.					
10. I can, using examples, explain why ecosystems with similar characteristics can exist in different geographical locations (ie. Significance of abiotic factors)					
11. I can identify the effects on living things within an ecosystem resulting from changes in biotic factors, including • Climate change (drought, flooding, changes in ocean current patterns, extreme weather) • Water contamination • Soil degradation and deforestation					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Life Science: Sustainability of Ecosystems

Prescribed Learning Outcome:

B2. BIOACCUMULATION - I can assess the potential impacts of bioaccumulation.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can define, using examples, the terms *bioaccumulation,, parts per million (ppm), biodegradation,* and *trophic levels* (with reference to producers and to primary, secondary, and tertiary consumers)					
2. I can identify a variety of contaminants that can bioaccumulate (ex. Pesticides, heavy metals, PCB`s)					
3. I can describe the mechanisms and possible impacts of bioaccumulation (ex. Eradication of keystone species, reproductive impacts)					
4. I can compare the impact of bioaccumulation in consumers at different trophic levels (ex. Red tide in oysters and humans; heavy metals in fish and humans, PCB`s in fish, birds, whales)					
5. I can research and analyse articles on the causes and effects of bioaccumulation (ex. Mercury contamination in Inuit communities and the Grassy Narrows First Nation community)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Life Science: Sustainability of Ecosystems

<u>Prescribed Learning Outcome</u>:

B3. EQUILIBRIUM - I can explain various ways in which natural populations are altered or kept in equilibrium..

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can explain how species adapt or fail to adapt to environmental conditions, with reference to the following: • Natural selection • Proliferation • Predator é prey cycle • Ecological succession • Climax community • Extinction • Adaptive radiation					
2. I can describe the impact of natural phenomena (ex. Drought, fire, temperature change, flooding, tsunamis, infestations – pine beetle, volcanic eruptions) on ecosystems.					
3. I can give examples of how foreign species can affect an ecosystem (ex. Eurasian milfoil, purple loosestrife, scotch broom, American bullfrog, European starling in BC)					
4. I can give examples of how traditional ecological knowledge (TEK) can affect biodiversity (ex. Spring burning by Cree in northern Alberta)					
5. I can research and report on situations in which disease, pollution, habitat destruction, and exploitation or resources affect ecosystems					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Chemical Reactions and Radioactivity

<u>Prescribed Learning Outcome</u>:

C1. ATOMIC, IONIC, MOLECULAR STRUCTURE - I can differentiate between atoms, ions, and molecules using knowledge of their structure and components.

	Date	Date	Date	Date	Date
Learning Outcome:	**Level of proficiency (M, P, S, N):**				
1. I can demonstrate knowledge of the three subatomic particles, their properties, and their location within the atom (ex. By creating models)					
2. I can define and give examples of *ionic bonding* (ex. Metal and non-metal) and *covalent bonding* (ex. Two non-metals, diatomic elements)					
3. I can draw and interpret Bohr models, including protons, neutrons and electrons, of atoms (neutral), ions (charged), molecules (covalent bonding (ex. O_2, CH_4), and ionic compounds (ex. $CaCl_2$). (*First 20 elements only.*)					
4. I can identify valence electrons using the periodic table (excluding lanthanides and actinides)					
5. I can distinguish between paired and unpaired electrons for a single atom.					
6. I can draw and interpret Lewis diagrams showing single bonds for simple ionic compounds and covalent molecules (ex. NaCl, MgO, $BaBr_2$, H_2O, CH_4, NH_4.)					
7. I can distinguish between lone pairs and bonding pairs of electrons.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Chemical Reactions and Radioactivity

<u>Prescribed Learning Outcome</u>:

C2. CLASSIFICATION OF SUBSTANCES - I can classify substances as acids, bases, or salts, based on their characteristics, name and formula.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can identify acids an bases using indicators (ex. Methyl orange, bromethyl blue, litmus, phenolphthalein, indigo carmine)					
2. I can explain the significance of the pH scale, with reference to common substances.					
3. I can differentiate between acids, bases, and salts with respect to chemical formulae and properties.					
4. I can recognize the names and formulae of common acids (ex. Hydrochloric, sulphuric, nitric, acetic)					
5. I can use the periodic table to • Explain the classification of elements as metals and non-metals • Identify the relative reactivity of elements in the alkali metal, alkaline earth metal, halogen, and noble gas groups • Distinguish between metal oxide solutions (basic) and non-metal oxide solutions (acidic)					
6. I can use the periodic table and list of ions (including polyatomic ions) to name and write chemical formulae for common ionic compounds, using appropriate terminology (ex. Roman numerals)					
7. I can convert names to formulae, and formulae to names for covalent compounds, using prefixes up to "deca"					
7a. I can write balanced chemical equations.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Chemical Reactions and Radioactivity

<u>Prescribed Learning Outcome</u>:

C3. ORGANIC VS INORGANIC - I can distinguish between organic and inorganic compounds.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can define *organic compounds* and *inorganic compounds*.					
2. I can distinguish between organic and inorganic compounds, based on their chemical structures.					
3. I can recognize a compound as organic and inorganic from its name, from its chemical formula, or from a diagram or model.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Chemical Reactions and Radioactivity

Prescribed Learning Outcome:

C4. CHEMICAL REACTIONS - I can analyse chemical reactions, including reference to conservation of mass and rate of reaction.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can define and explain the *law of conservation of mass*.					
2. I can represent chemical reactions and the conservation of atoms using molecular models.					
3. I can write and balance (using the lowest whole number coefficients) chemical equations from formulae, word equations, or descriptions of experiments.					
4. I can identify, give evidence for, predict products of, and classify the following types of chemical reactions: • Synthesis (combination) • Decomposition • Single and double replacement • Neutralization (acid-base) • Combustion					
5. I can explain how factors such as temperature, concentration, presence of a catalyst, and surface area can affect the rate of chemical reactions.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Chemical Reactions and Radioactivity

<u>Prescribed Learning Outcome</u>:

C5. RADIOACTIVITY - I can explain radioactivity using modern atomic theory.

	Date	Date	Date	Date	Date
Learning Outcome:	**Level of proficiency (M, P, S, N):**				
1. I can define *isotope* in terms of atomic number and mass number, recognizing how these are communicated in standard atomic notation (ex. Uranium-238:)					
2. I can relate radioactive decay (ex. Alpha - , beta - , gamma -) to changes in the nucleus.					
3. I can relate the following subatomic particles to radioactive decay: proton ($_1^1 p$) neutron ($_0^1 n$) electron ($_{-1}^0 e$) alpha particle ($_2^4 \alpha$) ($_2^4 He$) beta particle ($_{-1}^0 \beta$)					
4. I can explain half-life with reference to rates of radioactive decay.					
5. I can compare fission and fusion					
6. I can complete and balance nuclear equations to illustrate radioactive decay, fission, and fusion.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Physical Science: Motion

C6. OBJECTS IN MOTION - I can explain the relationship of displacement and time interval to velocity for objects in uniform motion.

	Date	Date	Date	Date	Date
Learning Outcome:	**Level of proficiency (M, P, S, N):**				
1. I can define *displacement* (change in position, Δx), *time interval* (Δt) and *velocity* (v_{av})					
2. I can analyse graphically the relationship between displacement and time interval for an object travelling in uniform motion.					
3. I can use the formula $v_{av} = \Delta x / \Delta t$ to calculate the average velocity (v_{av}), displacement (change in position, Δx), and time interval (Δt) for an object in uniform motion, given appropriate data					
4. I can design and conduct one or more experiments to determine the velocity of an object in uniform motion (ex. Using carts, balls, skateboards, bicycles, canoes instill water)					
5. I can					
6. I can					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Physical Science: Motion

<u>Prescribed Learning Outcome</u>:

C7. VELOCITY, TIME, ACCERATION - I can demonstrate the relationship between velocity, time interval, and acceleration.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can define *acceleration* (positive, negative, and zero)					
2. I can give examples of positive, negative, and zero acceleration, including • Falling objects • Accelerating from rest • Slowing down or stopping • Uniform motion					
3. I can, given initial velocity $^{(\Delta t)}$, final velocity $^{(v_f)}$, and the time interval $^{(\Delta t)}$, calculate acceleration using the formula a = $\Delta v/\Delta t$, where $\Delta v = v_f - v_i$ (ex. For falling objects)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Earth and Space Science: Energy Transfer in Natural Systems

<u>Prescribed Learning Outcome</u>:

D1. CHARACTERISTICS OF THERMAL ENERGY - I can explain characteristics and sources of thermal energy.

	Date	Date	Date	Date	Date
Learning Outcome:	**Level of proficiency (M, P, S, N):**				
1. I can define *heat* and *thermal energy*.					
2. I can explain and illustrate how thermal energy is transferred through conduction, convection, and radiation, with reference to • Kinetic molecular theory • Practical examples (ex. Home heating, cooking methods, loss of body heat, insulation)					
3. I can describe Earth's energy sources including • Residual thermal energy from Earth's formation • Energy from radioactive decay • Solar energy (with reference to absorption and radiation in the atmosphere)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Earth and Space Science: Energy Transfer in Natural Systems

<u>Prescribed Learning Outcome</u>:

D2. EFFECTS OF THERMAL ENERGY - I can explain effects of thermal energy within the atmosphere.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can define *atmospheric pressure* and explain how it is measured.					
2. I can identify weather conditions that typically accompany areas of low and high pressure in the atmosphere.					
3. I can describe how energy transfer influences atmospheric convection, atmospheric pressure, and prevailing windows (ex. Differential heating of land and water causes changes in air density and affects prevailing winds)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Earth and Space Science: Energy Transfer in Natural Systems

<u>Prescribed Learning Outcome</u>:

D3. CLIMATE CHANGE - I can evaluate possible causes of climate change and its impact on natural systems.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can describe how natural phenomena can affect climate (ex. Biosphere processes, volcanic eruptions, Coriolis effect, El Nino, La Nina)					
2. I can describe how climate can be influenced by human activities ex. Greenhouse gases, depletion of ozone layer)					
3. I can describe how climate change affects natural systems (ex. Shrinking of the permafrost region, melting of ice shelves / caps / glaciers)					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Earth and Space Science: Energy Transfer in Natural Systems

<u>Prescribed Learning Outcome</u>:

D4. PROCESSES OF PLATE TECTONICS - I can analyse the processes and features associated with plate tectonics.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can define *plate tectonics*, *plate boundary*, *earthquake, trench, volcano, spreading ridge, subduction zone, hot spot.*					
2. I can relate tectonic plate movement to the composition of the following layers of the Earth, as determined by seismic waves (primary, secondary, and surface waves: • Crust • Lithosphere • Asthenosphere • Mantle • Outer core • Inner core					
3. I can describe tectonic plate boundaries, including • Transform boundaries • Divergent boundaries • Convergent boundaries (oceanic-oceanic crust, oceanic-continental crust, and continental-continental crust)					
4. I can identify tectonic mapping symbols.					
5. I can explain how plate movement produces the following features: • Epicentres and shallow-focus to deep-focus earthquakes • Volcanism at subduction zones ex. Volcanic island arcs, volcanic belts and at spreading ridges					

• Mountain ranges and mid-ocean ridges • Hot spot chains (ex. Hawaiian Islands, Yellowstone)					
6. I can identify sources of heat within the Earth that produce mantle convection and hot spot activity (ie. Heat within the core and excess radioactivity within the mantle)					
7. I can explain how mantle convection an ridge pus and slab pull are believed to contribute to plate motion					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____

Earth and Space Science: Plate Tectonics

Prescribed Learning Outcome:

D5. EVIDENCE FOR PLATE TECTONICS - I can evaluate possible causes of climate change and its impact on natural systems.

	Date	Date	Date	Date	Date
Learning Outcome:	Level of proficiency (M, P, S, N):				
1. I can describe evidence for continental drift theory (ex. Fossil evidence, mountain belts, paleoglaciation)					
2. I can relate the following to plate tectonic theory • Three world distribution of volcanoes, earthquakes, mountain belts, trenches, mid-ocean ridges, and rift valleys. • Hot spot and subduction zone eruptions • Magnetic reversals and age of rocks relative to spreading ridges.					

To improve my Level of proficiency (M, P, S, N), I will (describe the specific activities):

Date:_____

Date:_____