Long Range Model 1 - Grade 8

STRAND A: STEM Skills and Connections	A1.1 Scientific Research	A1.2 Scientific Experimentation	A1.3 Engineering Design	A1.4 Safety	A1.5 Communication	A2. Coding and Emerging Technologies	A3. Applications Connections and Contributions

A1. STEM Investigation and Communication Skills: use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures

A1.1 use a scientific research process and associated skills to conduct investigations

A1.2 use a scientific experimentation process and associated skills to conduct investigations

A1.3 use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems

A1.4 follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials

A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

A2. Coding and Emerging Technologies: use coding in investigations and to model concepts, and assess the impact of coding and of emerging technologies on everyday life

A2.1 write and execute code in investigations and when modelling concepts, with a focus on creating clear and precise instructions for simple algorithms

A2.2 identify and describe impacts of coding and of emerging technologies on everyday life

A3. Applications, Connections, and Contributions: demonstrate an understanding of the practical applications of science and technology, and of contributions to science and technology from people with diverse lived experiences

A3.1 describe practical applications of science and technology concepts in their home and community, and how these applications address real-world problems

A3.2 investigate how science and technology can be used with other subject areas to address real-world problems

A3.3 analyse contributions to science and technology from various communities

Term 1 - Overview, Guidelines, Assessment ideas
In Term one, the Big Idea revolves around Water. Students will assess the importance of water, land, air, and all fundamental elements of earth and consider the impact of environmental, economic, and social impacts on the environment as well as innovative technologies introduced in response to these impacts. Planned learning experiences in the community early in the term, such as field trips and outdoor education, may provide opportunities for students to see the relevance of their classroom learning and its connection to the broader world. Also, connections to comprehensive education and career/life planning program (e.g., myBlueprint), skilled trades, and further inquiry are offered throughout the term. Educators create an inclusive learning environment by attending to students with special needs, providing choice as well as grouping students when appropriate.

Materials: Adjust accordingly, depending on availability of equipment and resources: water filtration device (glass jars, sand, coal, small rocks - consider buying in bulk as a consumable expense), Online mapping knowledge, microscopes, saltwater circuit, Desalination technologies, Sustainable form of transportation, Building a structure to represent a highway and water
*Considerations - how will materials be disposed of in an ecological way? How do we move away from using plastic materials?

Community Connections: Local Outdoor Education Spaces, Indigenous voices that are representative of local communities, local conservation authorities, post secondary and skilled trades which will vary depending on the community.

Assessment ideas: When planning for assessment, consider peer and self-assessment for learning activities in the field. Also, consider student voice and choice when planning assessments. Strand A focuses on the STEM skills and connections that frame learning in the other four strands: Life Systems, Matter and Energy, Structures and Mechanisms, and Earth and Space Systems. Students integrate learning from Strand A as they investigate concepts, develop and apply skills, and make meaningful connections to their lives and communities. Assessment of STEM skills will be ongoing throughout Term 1 and Term 2.

Month or Suggested Timeline	Big Ideas and Guiding Questions for an Inquiry Stance	STEM Skills and Connections (Strand A)	Strands and Expectations	Cross-Curricular Integrations	Resources
September October	**Big Idea:** Water Environmental, Economic, and Social Impacts **Guiding Questions** How is water filtered naturally? How is local water contaminated? What are some examples of	(?) **A1.1** Students conduct research on various water contaminations throughout Canada and locally Example: Students will research Indigenous drinking water advisories, historic fuel spill contaminating Nunavut water treatment tank and the Walkerton tragedy	**Strand B: Life Systems** **B2.3** compare the structure and function of plant and animal cells **B2.5** describe various unicellular and multicellular organisms, and compare ways in which these two types of organisms meet their basic needs	**Geography**: Use online Mapping Tools to research current water statuses. Invite a guest speaker from this organization to walk students through this site. Describe various ways in which human settlement has affected the environment	STAO Safety in Elementary Science and Technology UNDRIP English: United Nations Declaration on the Rights of Indigenous Peoples Drinking water advisories: Boil water advisories Ontario (English)

	contaminants? How is local water treated? Where are the local watersheds? Do you have any local freshwater locations where the water is clean and free of contaminants? **Extension Questions** Are there wastewater treatment facilities on local reserves? How do local reserves access clean drinking water? The United Nations declared clean drinking for all, is this accurate?	 **A1.1** Students will conduct research on various areas around Canada where there is fresh, clean drinking water Example: In British Columbia, there is currently fresh, clean drinking water on Wet'suwet'en territory where a pipeline is being built. How will this pipeline affect clean drinking water?  **A1.2** Students use experimentation to simulate the melting of the polar ice caps using a water table activity. See the resources column for an example.  **A 1.2** Students use experimentation to compare the viscosity and density of water to other fluids.  **A1.1** Students research the answer to the question: "What materials would you need to build a water filtration device?" How can we make the device without using plastic materials? Example: Many sites will suggest	**Strand C: Matter and Fluids** **C1.2** assess the environmental and social impacts of fluid spills, including impacts on First Nations, Métis, and Inuit communities, and including the cost and technical challenges related to cleanup and remediation efforts **C2.1** demonstrate an understanding of the factors that affect viscosity, and compare the viscosity of various fluids, including volumetric flow rate **C2.2** demonstrate an understanding of the relationship between mass, volume, and density **C2.3** explain the difference between solids, liquids, and gasses in terms of their density, using the particle theory of matter **Strand D: Structures and Mechanisms** **D2.8** explain how providing information and support to consumers helps to ensure that the systems they use run safely and efficiently	(e.g., water pollution from industry, agriculture, human waste). Analyse the interrelationships between the factors that can contribute to the quality of life (i.e., lack of access to clean water leads to an increase in water-borne disease and to high death rates overall as well as high infant mortality rates) **History**: Indian Act, United Nations Declaration on the Rights of Indigenous Peoples, Truth and Reconciliations Calls to Action **Mathematics**: solve equations that involve multiple terms such as D=m/V **Language**: Write a letter to municipal, federal, and provincial government officials advocating for the right of clean water for all. Also, advocating for the protection of water.	CBC Article English: Ending long-term drinking water advisories Nunavut City of Iqaluit says historical fuel spill likely source of drinking water contamination | CBC News Other related careers are found at bottom of this "Let's Talk Science" page and here careersintrades.ca Teachers can model or students can use this site for ideas How do melting polar ice caps affect sea levels? **Who to contact?** ● Outdoor Education facilities to run water sample demonstrations/ watershed demonstrations ● Local conservation authorities ● Local MPPs, federal and provincial

		using a 2L plastic water bottle, but glass jars can be substituted and reused with other classes.  **A 1.2** Students take a walk to a local water source and record observations of contaminants. Notes: Students can use a clipboard with a worksheet already created with vocabulary to support them with their learning. Alternatively, students can bring their Chromebooks. A suggestion for safety would be to have students carry their Chromebooks in their backpacks.  **A 1.4** During the walk students are reminded to respect nature, not to disturb their environment, and make observations only. Water safety reminders apply here as well.  **A 1.2** Students use experimentation to investigate a local water source and use a microscope to identify the diversity of living microorganisms as an indicator of a healthy water environment.	**D2.9** describe technological innovations involving mechanical systems that have increased productivity in various industries **D2.10** identify social factors that influence the evolution of a system **Strand E: Earth and Space Systems** **E1.1** assess the social and environmental impact of the scarcity of fresh water, and propose a plan of action to help address freshwater sustainability issues **E1.2** demonstrate an understanding of First Nations, Métis, and Inuit knowledges and values about water, connections to water, and ways of managing water resources sustainably **E1.3** assess the impact of scientific discoveries and technological innovations on local and global water systems **E2.1** identify the states of water	**Skilled Trades** Use a comprehensive education and career/life planning program (i.e., myBlueprint) to determine possible related jobs (projected income, required education, student's fit for the role following completion of surveys, etc.). Examples include water treatment technicians, plumbers, pipefitters, etc. **Connection to Skilled Trades:** Invite local technicians to the class (in person or virtually) Examples: ● Wastewater treatment technician (both on reserve and off if possible) ● Professor at a local post secondary institution who specializes in wastewater treatment ● Well water treatment technician Students create questions to ask during an interview (and possibly host an actual interview). Assess students' questions as a consolidation of learning.	government officials ● Ministry of Environment ● Board Indigenous Education Leads to help make connections with local treaty partners ● Local colleges to make connections to skilled trades Science North - Gr. 7/8 Ozobot Challenges p30-36 (Cells: Removing waste from a cell) Sphero - Ugandan water crisis Create a program that will recognize when Sphero is lifted off the ground with a pulley system Scratch - Clean Water for All Science North - Gr. 7/8 Ozobot Challenges (p44-50: Viscosity) - Adjust the speed of the Ozobot depending on the viscosity of the liquid. Science North - Gr. 7/8 Ozobot Challenges (p51-

		Example: Students will take a sample from their local water source and make observations of their investigation, using a microscope, through words or pictures. Notes: Some considerations if there is a lack of nearby water sources would be to find a video to show the class. Also, if microscopes are unavailable, students can still observe and make notes of their observations of contaminants.  **A 1.4** Students will be reminded of proper handling of the microscope  **A 1.3** Students use an engineering design process to construct a water filtration device based on their learning so far. Notes: Teachers can model the engineering design process for students or have students conduct research online to construct the water filtration device. Consider having students work in groups for peer support and sharing their resources.	on Earth's surface, their distribution, relative amounts, and circulation, and the conditions under which they exist **E2.2** demonstrate an understanding of a watershed, and explain its importance to water management and planning **E2.3** explain how human activity and natural phenomena cause changes in the water table **E2.4** identify factors, including climate change, that have contributed to the melting of glaciers and polar icecaps, and describe the effects of this phenomenon on local and global water systems **E2.6** describe various indicators of water quality, and explain the impact of human activity on those indicators **E2.7** explain how municipalities process water and manage water usage		57: Water Systems and water treatment) - program the Ozobot to follow the journey of water through a water system. Microbit lesson on healthy oceans/

		Extension: Water contaminants around the world (see Sphero - Ugandan water crisis link in the Resources column). **A 1.5** Communicate observations and conclusions of water filtration devices through a wide range of presentation techniques. Example: Assessment opportunities can be included to offer students a variety of presentation options (e.g., WeVideo, Google Slides, paper, pencil, etc.). Students can be assessed on their knowledge of contaminants locally as well as around Canada and the world along with the importance of clean water. **A2** Students will model concepts on water systems by making a prototype that monitors ocean health. Students can also write the code when designing an efficient algorithm to clean water using micro:bit coding that aligns with the UN's Global Goals.			

		A3 Investigate local water treatments. Example: Investigate local wastewater treatment facilities, septic systems, or how well water is maintained and monitored. Note: Teachers can make connections here to previous learning on The Walkerton tragedy and to building wastewater treatment facilities on reserves.			
November	**Big Idea: Water Innovative Technologies** **Guiding Questions** Where do we find salt water in Canada? Where do we find salt water in other parts of the world? Where do we find our freshwater sources in Canada? Where do we find freshwater in other parts of the world? How do desalination technologies help to solve our current global water sustainability crisis?	**A1.1** Students conduct research to compare freshwater vs. saltwater including the differences in density and buoyancy. See the Cartesian diver link in the Resources column. **A1.1** Students conduct research to answer the question: ” What would you need to build a saltwater circuit and/ or water desalination plant?”. See the Resources column for more information. **A 1.3** Students use an engineering design process to build a saltwater circuit. Students learn about the conductivity of saltwater and how	**Strand B: Life Systems** **B2.4** explain the processes of diffusion and osmosis within a cell **Strand C: Matter and Fluids** **C2.5** determine the buoyancy of an object, given its density, in a variety of fluids **Strand D: Structures and Mechanisms** **D1.2** assess the impact on individuals, society, and the environment of alternative ways of meeting needs that are currently met by existing systems, taking different points of view into consideration **D2.1** identify various types of systems	**Mathematics** Create a scale drawing of the saltwater circuit and/or water desalination plant **Geography** Analyse and discuss how processes related to the physical environment may affect human settlements in the future (i.e. the impact of rising sea levels on coastal cities as polar ice caps melt; the impact of increasingly violent tropical storms as a result of climate change) Describe possible features of a sustainable community in the future and analyse some challenges associated with creating such a community **Language**	Cartesian diver Note: Teachers can use this saltwater circuit resource to direct students in their research of materials for a saltwater circuit. Canadian Geographic Water infographic. How do we reduce our water footprint (example: cup of coffee) Ocean Water Desalination activity **Who to contact?** • Outdoor Ed facilities to run water sample

		the amount of salt in a solution impacts the amount of conductivity and/ or desalination plant. Notes: The materials for this EDP are extensive. Possible solutions would be to model this, have students work in groups, and/or observe this EDP process from the video and complete reflection questions.  **A 1.4** Students should follow these safety precautions when building this circuit. Have students use goggles or safety glasses for eye protection. If not using a battery cap, it is easy to short circuit the battery if the wire ends that are connected to the positive and negative terminals of the battery touch. If they touch, the battery overheats and can cause severe burns.  **A 1.5** Communicate observations and conclusions of students' circuits and/ or desalination plant through oral presentations, videos, and diagrams. Extension: Assessment possibility	**D2.3** identify the various processes and components of a system that allow it to perform its function efficiently and safely **D2.9** describe technological innovations involving mechanical systems that have increased productivity in various industries **D2.10** identify social factors that influence the evolution of a system **Strand E: Earth and Space Systems** **E1.1** assess the social and environmental impact of the scarcity of fresh water, and propose a plan of action to help address freshwater sustainability issues **E1.3** assess the impact of scientific discoveries and technological innovations on local and global water systems	Research uses of freshwater and/or the water footprint of everyday items. Analyse Infographics about freshwater and saltwater. **Skilled Trades** Use a comprehensive education and career/life planning program (i.e., myBlueprint) to determine possible related jobs (projected income, required education, student's fit for the role following completion of surveys, etc.). Examples include well drilling technicians, water treatment field technicians, welders, etc. Other related careers are found at careersintrades.ca	demonstrations ● Local conservation authorities ● Local MPPs, federal and provincial government officials ● Ministry of Environment ● Board Indigenous Education Leads to help to make connections to local treaty partners ● Local colleges to make connections to skilled trades

		would be for students to explain why this technology is important.  **A2.2** Students will identify and describe the impacts of coding and of emerging technologies by looking at techniques for ocean desalination as a system with inputs, components, and outputs.  **A3** Students will investigate the following questions: Where are the local freshwater sources? Why is it important to protect local freshwater? What are members of your community doing to protect local freshwater?  **A3** Create questions to ask a reverse osmosis water filtration technician during an interview (and possibly host an actual interview). Host a guest speaker to present about the role.			
December January	**Big Idea:** Water Environmental and Social	 **A1.1**	**Strand C: Matter and Fluids** **C1.2** assess the environmental	**Geography**: Use online Mapping Tools to	Lab activity: National Geographic Oil spill

February	Impacts **Guiding Questions** What are some current developments occurring locally? What are some major developments occurring globally that have significant impacts on the environment? Who benefits from development? How do innovative technologies lessen the environmental impact of development? What are the opinions of this development from local community members? How does this development impact farmers, local reserves, businesses, homes, etc.?	Students conduct research on local current developments that impact the environment Example: ● Proposed Hwy 413 through York, Peel, and Halton regions ● Current pipeline protests in BC on Indigenous territory **A1** Students conduct research on local watersheds Example: Where is your local watershed? Extension: Invite a guest from a local outdoor education location to come in to do a live demonstration. **A 1.3** Students use an engineering design process to build a model that represents the projected highway and includes all local watersheds Using the example of the map in the links above, students create a model using materials such as a shoe box, construction paper, popsicle sticks, etc. with rivers, creeks, etc. that flow into the local	and social impacts of fluid spills, including impacts on First Nations, Métis, and Inuit communities, and including the cost and technical challenges related to cleanup and remediation efforts **Strand D: Structures and Mechanisms** **D2.8** explain how providing information and support to consumers helps to ensure that the systems they use run safely and efficiently **D2.10** identify social factors that influence the evolution of a system **Strand E: Earth and Space Systems** **E1.1** assess the social and environmental impact of the scarcity of fresh water, and propose a plan of action to help address freshwater sustainability issues **E1.2** demonstrate an understanding of First Nations, Métis, and Inuit knowledges and values about water, connections to	research the Greenbelt, current development as well as future development. **History**: Analyse some of the challenges facing different individuals, groups, and/or communities in Canada between 1890 and 1914 and compare some of these challenges with those facing present-day Canadians (i.e. increasing industrialization) **History**: Indian Act, United Nations Declaration on the Rights of Indigenous Peoples, Truth and Reconciliations Calls to Action **Language**: create a poster or presentation to promote awareness of the importance of watersheds and maintaining freshwater sustainability **Mathematics** Graph using data from experiments (independent and dependent variables) **Skilled Trades**	cleanup. UNDRIP Stop The 413 Pipeline in BC Related careers are found at careersintrades.ca UN SDG #6 - Clean water and sanitation Mousetrap car instructions micro:bit-oil spill cleaner-upper **Who to contact?** ● Outdoor Education facilities to show the impacts of development on watersheds ● Local conservation authorities ● Local MPPs, federal and provincial government officials ● Ministry of Environment ● Board Indigenous Education Leads to help make

		watershed(s). Students will be able to visually see the impact of construction on local watersheds.  **A 1.3** Students use an engineering design process to build a more sustainable or environmentally friendly form of transportation Example: Students build a mousetrap-powered car or a wind-powered car  **A 1.5** Students will communicate their observations and conclusions of their model to explain how this will affect ecosystems, watersheds, and species  **A2.1** Students will write and execute code by building the code for an autonomous vehicle to mop up oil spills with the option to build a prototype using micro:bit -oil spill cleaner-upper**.**  **A3.3** Students will answer the questions: Were local Indigenous	water, and ways of managing water resources sustainably **E1.3** assess the impact of scientific discoveries and technological innovations on local and global water systems **E2.2** demonstrate an understanding of a watershed, and explain its importance to water management and planning **E2.3** explain how human activity and natural phenomena cause changes in the water table **E2.6** describe various indicators of water quality, and explain the impact of human activity on those indicators **E2.7** explain how municipalities process water and manage water usage	Use a comprehensive education and career/life planning program (i.e., myBlueprint) to determine possible related jobs (projected income, required education, student's fit for the role following completion of surveys, etc.). Examples include environmental field technicians, automotive service technicians, bus operators, heavy equipment technicians, electric motor service technicians, transport truck operators, transport truck mechanics, etc. **Art** The Onama Collection is a collection of artwork that can be used to raise awareness for the urgent need for water protection. Students can also colour the posters.	connections to local treaty partners ● Local colleges to make connections to skilled trades

		communities consulted on the development process? Were The United Declaration of the Rights of Indigenous people Article 23, Article 26, Article 29, Article 32, Article 37 upheld?  **A3.1** Students will create questions to ask a community member in a related career (e.g., a civil engineer working in the construction of highways; a mechanical engineer working on sustainable transportation) during an interview (and possibly host an actual interview). Host a guest speaker to present about the role			

Term 2 - Guidelines, Assessment ideas

In term two, the Big Idea focuses on Food Security. It is also a chance to relate food security and innovative technologies at the cellular level. Students will assess the importance of water, animals, plants, land, air, and all fundamental elements of earth and consider the impact of environmental, economic, and social impacts on the environment. Planned learning experiences in the community early on in the term, such as field trips and outdoor education, may provide opportunities for students to see the relevance of their classroom learning and its connection to the broader world.

When addressing Indigenous Science and Knowledge ensure that UNDRIP is aligned with all teaching, assessments, and student success. Also, connections to comprehensive education and career/life planning program (i.e., myBlueprint), skilled trades, and further inquiry are offered throughout the term. Educators create an inclusive learning environment by attending to students with special needs, providing choice as well as grouping students when appropriate.

Materials: Adjust accordingly, depending on availability of equipment and resources: building a fish ladder, hydroponic system, Irrigation system, microscopes, animal and plant cells, build a 3D model of plant and animal cells

*Considerations - how will materials be disposed of in an ecological way? How do we move away from using plastic materials?

Connections: Local Outdoor Education Spaces, life cycle presentations, Indigenous voices that are representative of local communities, Local plants, and animal presentations

When planning for assessment, consider peer and self-assessment for learning activities in the field. Also, consider student voice and choice when planning assessments. Strand

A focuses on the STEM skills and connections that frame learning in the other four strands: Life Systems, Matter and Energy, Structures and Mechanisms, and Earth and Space Systems. Students integrate learning from Strand A as they investigate concepts, develop, and apply skills, and make meaningful connections to their lives and communities. Assessment of STEM skills will be ongoing throughout Term 1 and Term 2.

Month or Suggested Timeline	Big Ideas and Guiding Questions for an Inquiry Stance	STEM Skills and Connections (Strand A)	Strands and Expectations	Cross-Curricular Integrations	Resources
March April	**Big Idea:** Food Security, Environmental and Social Impacts **Guiding Questions** What are the local food sources that are native to the land? How has climate change and economic development (e.g., dams) impacted our food insecurities? How has automation of the food industry changed how we manage our food sources and make them more sustainable year-round? What has happened to the pollinator (e.g., honeybees) population? Why is this so important? How has this impacted food security? What are some local	 **A1.1** Students conduct research on local plants and food sources. Example: Wild Rice, Atlantic Salmon, Strawberries, Blueberries, etc. Students can watch a video (see the Resources column) for an understanding of harvesting wild rice.  **A1.1** Students conduct research on the life cycles of the Atlantic Salmon/ Harvesting Wild Rice and the need to build structures to assist with migration.  **A 1.3** Students use an engineering design process to build a fish ladder or a hydroponic system. Note: This activity can also be connected to simple machines (ladder-inclined plane) and the	**Strand B: Life Systems** **B1.2** analyse beneficial and harmful effects of developments in cell biology and associated emerging technologies on human health and the environment, while taking different perspectives into consideration (i.e., perspectives of farmers, pesticide manufacturers, people with life-threatening allergies) **B2.3** compare the structure and function of plant and animal cells **Strand C: Matter and Energy** **C1.1** assess the environmental, social, and economic impacts of various innovations and technologies that are based on the properties of fluids **C2.4** explain the difference between liquids and gasses in terms of their compressibility	**The Arts:** Students will engage actively in drama exploration and role play, by examining multiple stakeholder perspectives and possible outcomes related to automation of the food industry Students can role play in this game to understand the challenges that Atlantic Salmon face **Mathematics:** Use mathematical modeling to represent, analyse, make predictions, and provide insight into real-life situations by collecting data on local food sources and life cycles of Atlantic Salmon. Investigate how to maintain a balanced budget by buying local food sources. **Geography**	Experience life cycle of a salmon Students can watch the video for an understanding of harvesting wild rice James Whetung: Harvesting Wild Rice Other related careers are found at careersintrades.ca Teachers and students can use this site for ideas Irrigation Ideas - TryEngineering.org Powered by IEEE **Who to contact?** ● Outdoor Ed facilities for field trips to investigate local food sources

	examples of innovations in response to these impacts (e.g., community gardens, pollinator gardens, etc.)? What is the community and/ or local Indigenous community doing to help revitalize local food sources?	mechanical advantage of these structures. Students can compare the efficiency, monetary cost, environmental costs, and social impacts of these structures.  **A 1.3** Students use an engineering design process to design and compare prototypes of an innovative irrigation system that is based on the properties of fluids composed of simple machines.  **A 1.1** Students conduct research to investigate how automation of the food industry has impacted the environment and society from the point of view of various stakeholders (e.g., business owners, consumers, farmers, environmentalists)  **A 1.5** Conduct a field trip or neighbourhood walk to observe local plants and sources of food, etc. Example: Students will record observations of plant and food sources locally.	**C2.6** explain in qualitative terms the relationship between pressure, volume, and temperature when a liquid or a gas is compressed or heated **C2.7** describe how forces are transferred in all directions in fluids, including using Pascal's law to quantify the transfer of forces in fluids **C2.8** describe factors that affect the flow of fluids\ **C2.9** describe the differences between pneumatic and hydraulic systems **C2.10** compare how fluids are used and how their flow is regulated in living organisms and in mechanical devices or systems **Strand D: Structures and Mechanisms** **D1.1** assess the social, economic, and environmental impacts of automating systems **D1.2** assess the impact on individuals, society, and the environment of alternative ways of meeting	Create an ideal city/country: If you could establish a settlement anywhere in the world, where would it be? What criteria would you use to select the location? Analyse some of the ways in which the physical environment has influenced settlement patterns in different countries and/or regions around the world Analyse and construct various print and digital maps as part of their investigation into issues related to the interrelationship between human settlement and sustainability, with a focus on investigating the spatial boundaries of the issue **Language** Research one of the topics of this section and prepare a presentation about it **Skilled Trades** Use a comprehensive education and career/life planning program (e.g. myBlueprint) to determine possible related jobs (projected income, required education, student's fit for the role following completion of	• Local conservation authorities • Local MPPs, federal and provincial government officials • Ministry of Environment • Board Indigenous Education Leads to help make connections to local treaty partners • Local colleges to make connections to skilled trades

		 **A2.1** Students will model or code an innovative auto seed planting or watering system to identify and describe emerging technologies.  **A3.3** Students can research the following questions**:** Who are your local treaty partners? How are they trying to revitalize local food sources? How is the local community trying to revitalize local food sources? Which non-native foods are being grown locally? How are greenhouse innovations being used to assist with local food demands?  **A3.1** Create questions to ask a community member in a related career (e.g., marine biologist; hydroponic farmer; local farmer) in an interview (and possibly host an actual interview). Host a guest speaker to present about the role.	needs that are currently met by existing systems, taking different points of view into consideration **D2.1** identify various types of systems **D2.4** use the scientific terms displacement, force, work, energy, and efficiency to describe everyday experiences **D2.5** demonstrate an understanding of the relationships between work, force, and displacement in simple systems **D2.6** explain the relationship between input and output forces and determine the mechanical advantage of various mechanical systems, including simple machines **D2.7** identify ways in which energy can dissipate from mechanical systems, and describe technological innovations that make these systems more efficient **D2.9** describe technological innovations involving mechanical systems that have	surveys, etc.). Examples include apiary technician, machinist, horticulturist, industrial electrician, laborer, etc.	

		A3.2 **Applications, Connections, and Contributions** Discuss the question, ‘even if extinct species are reintroduced, are they safe to consume?’ Investigate local contaminants/ pollutants and their effects on local ecosystems	increased productivity in various industries **D2.10** identify social factors that influence the evolution of a system **Strand E: Earth and Space Systems** **E1.2** demonstrate an understanding of First Nations, Métis, and Inuit knowledge and values about water, connections to water, and ways of managing water resources sustainably **E1.3** assess the impact of scientific discoveries and technological innovations on local and global water systems **E2.2** demonstrate an understanding of a watershed, and explain its importance to water management and planning **E2.6** describe various indicators of water quality, and explain the impact of human activity on those indicators		

May **June**	**Big Idea:** Innovative Technologies in Cell Biology as it relates to Food Security **Guiding Questions** How have recent advances in cell research advanced our understanding of human health/ food security? What are some different perspectives (e.g., those of farmers and consumers) that need to be taken into consideration with advancements in cell research? How might we consider both the advantages and disadvantages of this type of research to society and the environment?	 **A1.1** Students conduct research on the effect of a technology that has affected the food industry (e.g., pest-resistant crops, farmed fish).  **A1.1** Students conduct research on how gene technology has altered both animal and plant cells and examine the advantages and disadvantages of these processes through different community stakeholders  **A 1.2** Students use experimentation to find and observe components of plant and animal cells. Under a microscope, use live or prepared slides of unicellular organisms such as a protist to examine how they obtain their basic needs  **A 1.2** Students use experimentation to investigate how people are adapting to climate change and/or their settlement location in the world in order to grow food (e.g., shipping container greenhouses in Nunavut; vertical farming)	**Strand B: Life Systems** B1.1 assess how various technologies have enhanced our understanding of cells and cellular processes **B1.2** analyse beneficial and harmful effects of developments in cell biology and associated emerging technologies on human health and the environment, while taking different perspectives into consideration **B2.1** demonstrate an understanding of cells, using cell theory **B2.2** identify organelles and other cell components, including the nucleus, cell membrane, cell wall, chloroplasts, vacuole, mitochondria, and cytoplasm, and explain their basic functions **B2.3** compare the structure and function of plant and animal cells **B2.5** describe various unicellular and multicellular organisms, and compare ways in which these two types of	**The Arts** Apply the creative process to produce a cell model in a three-dimensional form **Language** Prepare and provide an oral presentation about food insecurity in a specific part of the world and how to address it **History** (1890-1914) - interpret and analyse information and events relevant to their investigations, using a variety of tools (i.e., interpret graphs on quality of life indicators such as infant mortality to help them understand perspectives of social reformers and the urban poor) (1890-1914) - identify key social and economic changes that occurred in and/or affected Canada during this period and explain the impact of some of these changes on various individuals, groups, and/or communities (i.e., technological changes)	[UNSDG #3 - Good Health and Well Being] [TinkerCAD] 3D Cell simulation software Creative materials to represent parts of cells **Who to Contact:** ● Local public health units ● Local Agricultural coop ● Board Indigenous Education Leads to help make connections to local treaty partners Other related careers found at [careersintrades.ca] [Hour of Code Climate Activities]

		A 1.5 Research a disease caused by microorganisms or malnutrition, and its treatment and communicate findings through a presentation. **A 1.3** Students use an engineering design process to build a 3D model of an animal or plant cell. **A1.1** Students conduct research on how cell research has advanced a particular structure or cell using sourced materials or computer software (e.g., stem cells or gene splicing). **A 1.5** Visit a local grocery store and farmer's market to compare food sources and the use of pesticides/genetically modified food. **A2.2** Students identify and describe the impacts of coding and of emerging technologies by engaging in an interactive tutorial about climate change using Hour of Code	organisms meet their basic needs **B2.6** describe the organization of cells into tissues, organs, and systems **Strand D: Structures and Mechanisms** **D2.2** describe the purpose, inputs, and outputs of various systems, including systems related to food processing **D2.3** identify the various processes and components of a system that allow it to perform its function efficiently and safely	**Geography** Evaluate evidence and draw conclusions about issues related to global development and quality of life **Mathematics** Use mathematical modeling to represent, analyse, make predictions and provide insight into real-life situations by collecting data on the number of microorganisms in a local water source and graphing the results. Inquiry: Research the cost of food in Northern Communities (e.g., Nunavut) and compare it to the cost of local food. Determine the factors that contribute to the food insecurities in Northern Canada. **Skilled Trades** Use a comprehensive education and career/life planning program (e.g., myBlueprint) to determine possible related jobs (projected income, required education, student's fit for the role following completion of surveys, etc.). Examples include farmers, aircraft mechanics, agricultural	

		activities.  **A3.3** Who are your local treaty partners? How are they trying to revitalize local food sources?  **A3.1** Inquiry: create questions to ask someone in a related career (e.g., geneticist; fish farmer; local farmer; pesticide, herbicide, or fertilizer company representative) during an interview (and possibly host an actual interview). Host a guest speaker to present about the role		equipment operators, nursery and greenhouse managers, tool and die makers, etc.	