Long Range Model 1 - Grade 6

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						

Educators will be able to introduce and integrate Biodiversity throughout the year, this LRP contains several cross-strand STEM activities which allows students to continuously deepen their knowledge and understanding of the big ideas in Grade 6.

Nature of seasons, special events and natural environments around us, helps educators to connect and deepen the understanding for students, especially when educators allow for cross-curricular integrations.

Inquiry and curiosity are important characteristics to foster in any learning environment. Engagement and motivation increase when students are encouraged to explore curriculum content in ways that are meaningful to them.
Creating a learning environment in which students feel safe, supported, and valued will help them voice their questions and ideas. There are many ways that educators can create such an environment, including:

- Honoring students' background knowledge and inviting them to share what they know
- Becoming a co-learner with students when uncovering content guided by students' wonderings
- Encouraging students to ask good questions and giving them the opportunity to find answers and/or solutions
- Supporting students as they carry out the scientific and engineering processes

Reflective Questions when Planning:

- What expectations are assumed in order for other expectations to be addressed?
- How might I revisit expectations at various times throughout the year?
- How can I create opportunities for students to continue to practise and consolidate learning when they are engaged in new learning?
- How will I use formative assessment to guide daily lessons?
- What materials, tools, and resources will be needed for each unit?

Term 1 - Overview, Guidelines, Best Practice and Assessment Ideas
In term one, students will explore in depth the concept of biodiversity and its importance for planet Earth. They will develop their knowledge of biodiversity and see how other science strands, such as local energy production, space exploration, and aviation, can have a direct impact on biology.

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	**Biodiversity and its impact on our environment** **Big Ideas:** Discuss how different natural systems need different types of species in order to reach an ideal	**NOTE:** Teachers should choose from this list of STEM activities that best suit their students, school, and Community.	**B1.1** assess the benefits of biodiversity and the consequences of the diminishing of biodiversity **B2.1** describe the distinguishing characteristics of different	**Health and Physical Education:** Students go outside for a small walk around the schoolyard, or nearby park. Students can explore the variety of species they discover (plants vs animals)	**First Steps**: STAO Safety in Elementary Science and Technology Be sure to review safety

	level of biodiversity. Those same systems are affected by various solar system components and movements. **Guiding questions:** Prove biodiversity through the characteristics of species. How does biodiversity help Earth's health? Which signs show abundant biodiversity in a specific environment (e.g. garden, forest, or other environments) Which solar system components influence Earth's biodiversity? How does the Moon's position and motion around Earth, and Earth's motion around the Sun influence biodiversity in various regions of the globe? What characteristics allow Earth to develop such vast biodiversity, and how can this knowledge be transposed to other solar system components?	**A1.2** Students conduct a population survey looking for, and identifying, various species found in a given area (transect). Students build and design their own digital biome with their species and their relationship with the natural environment. **A1.5** Students can design their own habitat or landscape with a coding platform. **A1.5** Students design their own biome in a makerspace environment while classifying species. **A1.1** Students research and explore how certain species provide us with day-to-day items which we use or eat and their impact on society and day-to-day tasks. **A1.3, A1.4** Students research, plan, design, and build a home for a Canadian species to enhance their habitat (eg. bat box, bee	groups of organisms, and use these characteristics to further classify these organisms using a classification system **B2.2** demonstrate an understanding of biodiversity as the diversity of life on Earth, including the diversity of organisms within species, among species in a community, and among communities and the habitats that support them **B2.3** describe ways in which biodiversity within species is essential for their survival **E2.1** identify components of the solar system, including the Sun, Earth and other planets, natural satellites, comets, asteroids, and meteoroids, and describe their main physical characteristics **E2.5** describe various effects of the relative positions and motions of Earth, the Moon, and the Sun	and create a tally of their findings. Students can play a game of Freeze Tag while acting as their favorite species. Students can play the '*Predator vs Prey*' game. A sample of these rules is found on the exploringnature.org website **Language Arts** Students read, explore, and write argumentative texts or small group discussions or speeches that talk about climate change, endangered species, invasive species, and human displacement. Allow students to be curious and passionate about a biodiversity topic, local, provincial, national, or even global topic. (Reading, Writing, Oral Communication, and Media Literacy can all be included) **Social Studies:** **UN Sustainability Goals Connections Projects** Students choose to study real-world problems and solutions, such as organic farming, habitat restoration projects, controlling	guidelines for all experiments and activities and instruct students to follow safety guidelines. Collecting numerous arts and crafts materials, plasticine or playdough is helpful for hands-on creation. Collecting recycling materials, wood, and makerspace materials is also helpful when planning for building and creating. STEM kits and other makerspace supplies (saws, safety goggles, wood, etc.) can be found at Kidder Canada Use a digital platform that allows students to showcase their biomes digitally or find an online ecosystem simulator. • Canada Learning Code has this lesson plan to explore the sounds of wildlife

		house, insect home, butterfly feeder, bird house/feeder).  **A1.3, A1.4** **Save the Pollinators Project** Students study the role of local pollinators (butterflies, moths, bees, birds) and their role in biodiversity, as well as how invasive species and climate change are affecting pollinators. Students create food webs including pollinators. Students design a pollinator garden that could be implemented at school or built as models, taking specific needs of pollinators and native plant species into account for the designed habitat. Students communicate with the school community by creating posters about creating pollinator-friendly gardens.  **A1.1, A1.3, A1.4** **Tree Study**: Students choose a tree in their schoolyard or community. They take pictures of it in fall, winter, and spring, and collect data on it such as its approximate height (use thumb rule), the number of leaves, approximate age (using circumference), and any wildlife		microplastics, Ontario Species At Risk Act, etc., and investigate how the current UN Sustainability Goals are being addressed in Canada and the world to improve biodiversity. Students investigate First Nations, Metis, and Inuit peoples' solutions to biodiversity issues. Students create a media work of their findings and/or create local action projects to address local biodiversity issues. Students investigate the local First Nations, Metis, and Inuit ways of knowing about space. For example, what are some Indigenous names for moon phases for each month's moon? **Mathematics:** Students use estimation, calculations, and measurements about their tree during the tree study.	• Canada Learning Code has this lesson plan about habitats Find a local biodiversity issue or find resources that discuss the meaning of sustainability in biodiversity and the environment, using the UN Sustainable Development Goals) Resources to support outdoor learning and opportunities for teacher training *Project Wild* by Canadian Wildlife Federation **Next Steps:** Action Project funding opportunities with resources for outdoor learning and UN Sustainability goals. STEM Learning Challenges year-long activities and resources *STEM at School* by Let's Talk Science

		living on or near it. Students research why trees are important for biodiversity and present what they have learned about their tree and biodiversity in media works to the school community. Students can plant a tree or group of trees in the schoolyard or as part of a gardening project for the school.			Organize a field trip to a local conservation site (can also be done in the winter or spring/summer) Tree or garden planting can be planned in the fall and implemented in the spring. Alternatively, students can plant certain species in the fall for spring/summer harvest such as garlic, asparagus, or rhubarb in a school garden. Some trees do better when planted in the fall as well. Invite a guest speaker, parent, or community member who studies, explores, and works in either biodiversity or species conservation (virtual invite or in-person invite). If possible, invite a beekeeper to share about work in his/her skilled trade. Register your school with Ecoschools Canada

					to get certification. *Ecoschools Canada* has resources that tie into the Grade 6 biodiversity curriculum and global issues
October November	**Electricity and its impact on our environment** **Big ideas:** Evaluate how electricity production and consumption should impact communities locally and internationally. Discuss how that same electricity production may affect the relationship within species, between species, and between species and their natural environment, which can impact local and world biodiversity. **Guiding questions:** What are the various types of relationships within species, between species, and between species and their natural environment? How does biodiversity within and among communities allow resilience of these communities? How do electricity technologies and production impact FNMI	**NOTE:** Teachers should choose from this list of STEM activities that best suits their students, school, and community. **A1.1** Students can research different methods of production of electricity and how these methods affect various populations. **A1.5** Students can determine their electricity consumption and research ways to reduce their footprint. Students can communicate their findings with the school and community and organize action projects about reducing energy consumption. **A1.3, A1.2, A1.4** **Wind and Water Turbine Investigation** Students research how turbines are used in almost all ways of	**B2.4** describe ways in which biodiversity within and among communities is essential for maintaining the resilience of these communities **B2.5** describe interrelationships within species, between species, and between species and their natural environment, and explain how these interrelationships sustain biodiversity **C1.1** assess the short- and long-term impacts of electrical energy generation technologies in Canada on society and the environment, including impacts on First Nations, Métis, and Inuit communities, and on climate change **C1.2** assess choices that reduce personal use of electrical energy from both renewable and non-renewable sources, and advocate for the responsible use of electrical energy by the	**Social Studies:** History of electricity power in Canada and its contribution to society can be investigated, and coding platforms can be used to share what is learned. Students learn about global consumption and production of energy, as well as Canada's role in this global issue; sustainability goals with the UN can be discussed here. **Mathematics:** Students can create and analyse graphs about energy consumption in Canada, the world, and also in their school by contacting their Board Plant department and asking for school electricity use. **Language Arts:** Students communicate their learning about energy conservation and the effects of	**First Steps**: Be sure to review safety guidelines for all experiments and activities and instruct students to follow safety guidelines. Teachers should collect materials for building models of the solar system and/or turbines, such as recyclable materials and makerspace materials. Program a micro:bit to calculate temperature. Resources for calculating energy use and footprint can be found at Ecoschools Canada **Next Steps:** Other lesson plans about sustainability and energy can be found at

	communities, both in the short term and the long term? How do electricity technologies impact communities in the rest of Canada? Would personal energy reduction influence biodiversity or climate change in Ontario? What effects do both renewable and non-renewable energy sources have on biodiversity?	making energy (e.g. nuclear, coal, water, wind, tidal, etc.). Students design a wind or water turbine by researching different models and build it using various materials. Students test their turbines and examine the pros and cons of using wind or waterpower and communicate their findings by creating media works.  **A1.1, A1.3, A1.4, A1.5** Students build models of the solar system, moon phases, and eclipses using a variety of objects in a makerspace environment, coding platforms, and/or digital design. Students present their models to their classmates and/or build them collaboratively.	school community	energy use by creating media works, announcements, and posters/presentations to share with their school and community.	The World's Largest Lesson Invite a guest speaker, parent, or community member who studies, explores, and works in power plants, HydroOne, or any energy-related field (skilled trade - electrician).
November December	**Space exploration and its impact on our environment** **Big ideas:** Judge whether space exploration meaningfully impacts Earth's biodiversity. Discuss how it can also impact the relationships between species, the presence of species in different areas but also	**NOTE:** Teachers should choose from this list of STEM activities that best suits their students, school, and community.  **A1.2, A1.4** Students conduct experiments to investigate gravity (record the speed with which various items fall to the ground from a given	**B1.1** assess the benefits of biodiversity and the consequences of the diminishing of biodiversity **B1.2** analyse a local issue related to biodiversity while considering different perspectives; plan a course of action in response to the issue;	**Mathematics:** Students investigate the speed of gravity by recording the time it takes various items to fall a certain distance and then calculating their speed (using ratios). Students collect and analyse	**First Steps**: Be sure to review safety guidelines for all experiments and activities and instruct students to follow safety guidelines. Teachers should collect

	the environment in which humans, including FNMI live. **Guiding questions:** Compare and contrast the biodiversity of the different planets of our solar systems. What characteristics of planet Earth support its biodiversity? How does space exploration allow humans to meet their social, emotional, and physiological needs? How does space exploration impact climate change? How does climate change contribute to a loss of biodiversity? How does climate change contribute to the loss of biodiversity in the agriculture fields? How could society use biodiversity to build farms on various solar system objects such as planets or moons?	height).  **A.2** Students complete computer simulations that investigate the weight and mass on different planets (Explore Learning Gizmos).  **A1.3, A1.4** **Growing Plants in Space Inquiry** Students research the basics of growing plants without soil (as would be done on the Moon and Mars) and compare different technologies such as hydroponics. Students design, build and test devices that will grow plants successfully using UV lights or sunlight, and without soil (grow towers, other constructed devices). Students communicate their findings by creating media works to inform others of the pros and cons of hydroponics in space	and act on their plan **B2.7** explain how climate change contributes to a loss of biodiversity, and describe the impact of this loss **B2.8** describe the importance of biodiversity in supporting agriculture, including Indigenous agriculture around the world **E1.1** analyse the impact that conditions in space have on humans engaged in space exploration, and explain how humans meet their social, emotional, and physiological needs in space **E1.3** evaluate the social and environmental impacts of space exploration, while taking various perspectives into consideration	data from the Tomatosphere and/or Living Space projects mentioned in Resources. Students calculate their weight on different planets and objects in the solar system. **Health:** Students investigate healthy foods by growing vegetables in their classrooms using hydroponics or other methods, and discuss the nutritional values of foods by comparing whole foods such as tomatoes to processed foods. **Social Studies:** Students can investigate global, national, and local issues related to sustainable food practices, world hunger and local hunger, climate change, and food issues, and present their findings using media works. Students can also investigate how First Nations, Inuit, Metis, and early Canadians used and continue to use sustainable food practices (example: 3 Sisters - corn, beans, and squash). Students can also start action projects	materials for the *Growing Plants in Space* inquiry, such as a UV garden and hydroponics equipment (if possible) - what teachers will need will depend on what their students design. Register the classroom for the Tomatosphere project with Let's Talk Science. Register the classroom for the Living Space project with Let's Talk Science Living Space | Let's Talk Science. Find online resources or books that showcase Aurore Borealis that can be seen in northern Canada Find books or any digital or non-digital resources that describe the relationships between forces of gravity, weight, and mass for the solar system

				such as food bank collections. **Language** Students research famous Canadian astronauts and pioneers of space flight technology and prepare biographies using media works or reports. Students research and make a list of as many skilled trades related to space as they can. Students can choose one and research the career path to that trade.	Coding platform of your choice (e.g. Scratch) for this lesson called Taking Off by Canada Learning Code. The Perimeter Institute of Theoretical Physics has space activities and resources for teachers **Next Steps:** Invite a guest speaker, parent, or community member who studies, explores, and works in space-related technologies (virtual invite or in-person invite).
December January	**Flying machines and their impact on our environment** **Big ideas:** Assess how aviation technology facilitated intercontinental transportation which has sequentially impacted local and global biodiversity. **Guiding questions:** Determine and evaluate the environmental impacts of flight machinery on Earth's atmosphere.	**NOTE:** Teachers should choose from this list of STEM activities that best suits their students, school, and community. **A1.1** Students calculate the carbon footprint of various transportation machines and determine the most efficient machine.	**B1.1** assess the benefits of biodiversity and the consequences of the diminishing of biodiversity **B1.2** analyse a local issue related to biodiversity while considering different perspectives; plan a course of action in response to the issue; and act on their plan **B2.6** explain how invasive species reduce biodiversity in local environments	**Social studies:** Students investigate contributions of aviation technology to the global environment, as well as safety or transportation of critical goods. Students also investigate how invasive species such as zebra mussels are moved from lake to lake by float planes. Students can also investigate other invasive species and how they have impacted Canada's natural environment.	**First Steps**: Be sure to review safety guidelines for all experiments and activities and instruct students to follow safety guidelines. Teachers should collect materials for building the flying contraptions, such as paper, straws, etc. Find resources that

	How does flight technology allow humans to meet their social, emotional, and physiological needs? How does flight machinery contribute to supporting agriculture, including Indigenous agriculture around the world? How does flight machinery contribute to the loss of biodiversity in the agriculture fields?	 **A1.2, A1.3, A1.4** Students can design, build and test an experiment to determine the greenhouse effect of the survival of various plants.  **A1.2, A1.3, A1.4** **Build a Bird Inquiry** Students research the special adaptations of birds and other flying animals which allow them to fly. Students then design, build and test a flying contraption that uses the principles of flight to fly across a specific distance (for example 10 m). Students make alterations to their contraptions to conduct experiments on ways to change flight direction and speed. Students compare their flying model to flying animals and describe similarities and differences	**B2.8** describe the importance of biodiversity in supporting agriculture, including Indigenous agriculture around the world **C1.2** assess choices that reduce personal use of electrical energy from both renewable and non-renewable sources, and advocate for the responsible use of electrical energy by the school community **D1.1** assess the impacts on society of aviation technologies, while considering both local and global perspectives **D2.1** identify flight-related applications of the properties of air **D2.2** describe the relationships between the four forces of flight – lift, weight, thrust, and drag – that make flight possible **D2.4** describe ways in which the four forces of flight can be altered **D2.5** describe characteristics and adaptations that enable organisms to fly	Students investigate how aviation technology is damaging the Earth's atmosphere and how First Nation, Metis, Inuit, and early Canadians have dealt with issues such as droughts, flooding, biodiversity loss, and other possible effects of climate change. Students share their findings by creating media works. **Mathematics:** Students use measurement to measure plant heights in the greenhouse gas experiment. Students measure the distances of their flying contraptions from the Build a Bird Inquiry. Students use calculations for carbon footprint to compare various transportation machines. **Language** Students research pioneers in flight technology or pilots such as Amelia Earhart, and the Wright Brothers and share their learnings by creating biographical media works or reports. Students research and make a list of as many skilled trades related to flight as they can.	discuss the importance of biodiversity, nature and the environment for indigenous communities. Find a coding platform that will allow students to demonstrate the principles of flight with various organisms. Find coding resources that incorporate STEM activities like this micro:bit challenge. **Next Steps:** Organize a field trip to a local conservation site (can also be done in the spring or fall) Invite a guest speaker, parent, or community member who studies, explores and works in flight-related technologies or a pilot (virtual invite or in-person invite). If possible, invite an aircraft mechanic to share his/her skilled trade expertise.

				Students can choose one and research the career path to that trade.	

Term 2 - Guidelines, Assessment ideas
In term 2, students will come to understand the impact role that technologies play on the different science sectors, such as space exploration, climate change, and the aviation sectors. Students will gain knowledge of current and emerging technologies of the world.

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
February March	**Prerequisites to understanding technology** **Big ideas:** Understand technologies in space, flight, and electricity, and evaluate how they work by introducing key aspects of physics, chemistry, and energy that are related to them. **Guiding Questions:** What are commonly observed electrostatic phenomena? Compare and contrast current electricity with static electricity. What criteria represent good conductors and good insulators? What is the difference between mass and weight?	**NOTE:** Teachers should choose from this list of STEM activities that best suits their students, school, and community. **A1.2, A1.3, A1.4** Incorporate STEM activities in the investigation of the properties of air in relation to flight (e.g., hot air rises, air has mass, etc.). **A1.2, A1.4** Students can demonstrate the differences between parallel and series circuits by using electrical materials provided by the school. **A1.2, A1.4** Students can predict and investigate the effects of certain insulators or conductors on a	**C2.1** explain commonly observed electrostatic phenomena, using the principles of static electricity **C2.2** describe current electricity, and compare and contrast current electricity with static electricity **C2.3** identify materials that are good conductors of electric current and materials that are good insulators **E2.2**: distinguish between the concepts of mass and weight **E2.3**: describe the relationship between the force of gravity and the weight of a body **E2.4**: identify the types of bodies in space that emit light and those that reflect light	**Math:** Students can use online circuit simulation or coding activities to investigate and demonstrate the functions and components of electrical circuits. Students use measurement devices, such as rulers, meter sticks, measuring tapes, and weigh scales during flight experiments. Students record data collected during flying experiments to analyse data to determine the optimal weight for sustained flight. **Social Studies:** **Zero Carbon Life Activity** Students research what First	**First Steps**: Be sure to review safety guidelines for all experiments and activities and instruct students to follow safety guidelines. Materials may be needed such as balloons, jars, water, scales, plastic syringes, and tubing. If access to materials is limited, try using digital media to showcase the basic principles of air. Collect items for electricity activities (e.g. wires, batteries, lights, buzzers, motors, switches, etc.) and items for testing conductivity (e.g. paper

	How is one's weight influenced by the force of gravity? What types of bodies in space emit light and what types of bodies in space reflect light? What allows the hummingbird to stay immobile while controlling its flight?	simple circuit.  **A1.1** Students can identify objects around the classroom or their household that utilizes either series or parallel circuits.  **A1.3, A1.4** Students can design and investigate the forces of flight by creating a variety of paper airplanes and then adding cargo to see how they fly.  **A1.3, A1.4** Students design, build and test vehicles (boats, cars) powered by static electricity.  **A1.3, A1.4** Teachers can organize a variety of STEM challenges that allow students to use their flight devices to complete certain goals, such as: which one can stay in the air the longest? Which one can reach the furthest?  **A.2** Students can incorporate coding platforms to demonstrate the	**D2.1** identify flight-related applications of the properties of air **D2.2** describe the relationships between the four forces of flight – lift, weight, thrust, and drag – that make flight possible **D2.3** describe ways in which flying machines and various organisms use balanced and unbalanced forces to control their flight **D2.4** describe ways in which the four forces of flight can be altered	Nations, Metis, Inuit, and early Canadians used before electricity (e.g., transportation, heat, light). Students design an off-the-grid home that uses only renewable energy sources for basic human needs such as light, food preparation, transportation, and heating. Students build models of their homes using a variety of materials and build turbines to power their homes. Students communicate their learning by displaying their model homes and explaining their choices (this may take longer than the 6-week time period and could be started during this time period and continued throughout the term) **Language Arts:** Students investigate the pros and cons of types of energy production. Students can show their learning by conducting debates, writing persuasive reports, or making media works. Students research human impact on energy consumption with a lens on climate change. Students communicate their learning by creating media works.	clips, paper, pennies, coffee stir sticks, etc), and makerspace materials for building static electricity vehicles. Find online simulation or coding platforms (e.g. MakeyMakey or micro:bits) that allow students to identify types of circuits and their functions. Find resources in your classroom or school to showcase the principles and properties of air and/or electricity. Find coding platforms or coding resources similar to this Canada Takes Flight lesson. Canada takes flight activity) that allows students to incorporate flight properties. Resources to support outdoor learning and opportunities for teacher training. *Project Wild* by Canadian Wildlife Federation.

		relationship between the four forces of flight.  **A1.3** Students build and test a rotary flight device, adding paper clips for weight. Students record and analyse data (graph) to determine the optimal weight for sustained flight.		Students use electricity-related vocabulary (e.g. types of insulators and conductors) that we see in our classrooms or school. Students study the types of lamps that can be used, their benefits and impact on energy consumption, and the history of using oil lamps in First Nations, Metis, and Inuit as well as early Canadian settlements for heat and light. Students research and make a list of as many skilled trades related to electricity as they can. Students can choose one and research the career path to that trade.	Action Project funding opportunities with resources for outdoor learning and UN Sustainability goals. Learning for a Sustainable Future STEM Learning Challenges year-long activities and resources *STEM at School* by Let's Talk Science STEM kits and other supplies can be found at ● Kidder Canada ● Flinn Scientific Canada Lesson plans about sustainability and energy can be found at The World's Largest Lesson.
March April	**Technology and its influence on flight machines** **Big ideas:** Discuss how without technology, flight for the human species is impossible. Prove that flight technologies have evolved through the decades bettering themselves and creating new opportunities in	**NOTE:** Teachers should choose from this list of STEM activities that best suits their students, school, and community.  **A.2** Students can code a model that uses balanced or unbalanced forces to control their flight.	**C2.4** describe how technologies transform various forms of energy into electrical energy **C2.5** describe ways in which electrical energy is transformed into other forms of energy **C2.6** explain the functions of the components of a simple	**Math:** Students investigate and explore the design thinking process while applying math knowledge throughout these STEM challenges. Coding can be explored by allowing students to use a	**First Steps**: Be sure to review safety guidelines for all experiments and activities and instruct students to follow safety guidelines. Collect items for

	aviation. **Guiding questions:** Which energies and electrical principles are used to create mechanisms and technologies to obtain flight? Which technologies have been used to improve airplanes through the decades? Compare the technologies used to obtain flight between airplanes, helicopters, and rockets. How are energies transformed from one to another to create flight? What types of technologies allow the transformation into electrical energy? What various forces allow simple flight machines to fly? How do technologies help those flight machines to replicate the forces that make flight possible? In which ways could the four forces of flight be altered? Compare and contrast the ways balanced and unbalanced forces are used by various organisms and flying machines to control flight.	**A1.3, A1.4** Students design, test and build a vehicle powered by alternative energy (e.g. wind-powered car or boat). With teacher direction, vehicles can be designed and tested for speed or distance (record fair test results) to get the best results. **A1.3, A1.4** Students design, build and test an electronic game (buzzer style, or light-up answers). **A1.2, A1.4** Students can participate in a STEM activity that demonstrates flight patterns with helicopter principles and/or hot air balloon principles. **A1.1** Students can explore the impact or the future of drone technology on species, laws, and regulations, noise control, and/or delivery of critical equipment and medicine.	electrical circuit **C2.7** distinguish between series and parallel circuits, and identify common uses of each type of circuit **D2.1** identify flight-related applications of the properties of air **D2.2** describe the relationships between the four forces of flight – lift, weight, thrust, and drag – that make flight possible **D2.3** describe ways in which flying machines and various organisms use balanced and unbalanced forces to control their flight **D2.4** describe ways in which the four forces of flight can be altered **D2.5** describe characteristics and adaptations that enable organisms to fly	variety of coding platforms to demonstrate and apply knowledge of properties of air, four forces of flight, and/or how altering forces can alter flight patterns. Students can utilize coding platforms to design and replicate various organisms that use forces to control their flight. Students use measurement to calculate speed and measure distance and time.	electricity activities (e.g. wires, batteries, lights, buzzers, motors, switches, etc.) and makerspace materials for building electronic games, alternative energy vehicles, and/or helicopter and hot air balloon investigations. Find resources that showcase the various types of energy transformation, its impact on society and the environment, and the many renewable or non-renewable energy sources. An example is this Ingenium Energy 101 resource. Find educational books that discuss the links between the properties of air and flight-related applications. Find digital books and digital interactive simulations that showcase the principles of air. **Next Steps**:

					Think ahead for Earth Day, Earth Hour, and much more Earth Day
May	**Technology and its impact on climate change** **Big ideas:** Discuss how the use of technologies in agriculture, urbanisation, and other sectors have an impact on climate change. **Guiding questions:** How does climate change affect biodiversity? How does the increase in technology contribute to a change in climate change? How did the increase of flight machines impact biodiversity in local agriculture? How did space technologies help in understanding environmental changes on Earth? Can technology be used to fight climate change and increase biodiversity?	**NOTE:** Teachers should choose from this list of STEM activities that best suits their students, school, and community. **A1.1** Students research and investigate local or global environmental issues that have an impact on species and human activity. **A1.3, A1.4** **Canadian Species at Risk Projects** Students study and research the needs and habitats of a Canadian Species at Risk. Students identify factors contributing to the decline of the species, including climate change and invasive species, and design possible solutions to those problems (examples: animal road crossings, plastic collectors in rivers, etc.). Students build and test models if possible; students communicate their findings by sharing models of their solutions	**B2.6** explain how invasive species reduce biodiversity in local environments **B2.7** explain how climate change contributes to a loss of biodiversity, and describe the impact of this loss **B2.8** describe the importance of biodiversity in supporting agriculture, including Indigenous agriculture around the world **C1.1** assess the short- and long-term impacts of electrical energy generation technologies in Canada on society and the environment, including impacts on First Nations, Métis, and Inuit communities, and on climate change **C1.2** assess choices that reduce personal use of electrical energy from both renewable and non-renewable sources and advocate for the responsible use of electrical energy by the school community	**Social Studies**: Students can research and investigate a global environmental issue and concern, for example how are Canadian organizations protecting monarch migrations to the south, and how are Canadian organizations helping to fight climate change. Students can research and communicate how the protection of Canadian agriculture is important to Canada's economy and around the world. Students can investigate the actions and consequences of flooding of traditional Indigenous hunting and gathering areas as a result of dam construction. Populations of bees are declining; students investigate the local and global impact of beekeeping and start action projects to help pollinators in their school. Students research the use of traditional light and heat lamps of	**First Steps**: Be sure to review safety guidelines for all experiment activities and instruct students to follow safety guidelines. Collect makerspace materials for STEM design and build activities such as models for the *Species At Risk* projects or building the space robot (which will also need electricity materials). Find resources that discuss the impact, cause, consequences, and relationships of the energy sector on Indigenous lands and communities Pikangikum First Nation Connected to Ontario Power Grid Wataynikaneyap Power

		 **A1.1, A1.5** Students create a timeline about a biodiversity issue that investigates: Who/What: is the event about WHEN: The date when the event happened Where: (country) it happened Why: is it important to biodiversity Students prepare an illustration, graphic or picture of the event or species involved Example of an issue: students investigate the effects of microplastics on water and land biodiversity  **A1.3, A1.4, A1.5, A.2** Students design and build a game (using coding, electronic or board) that teaches others about biodiversity.  **A1.3, A1.4** **Satellite Investigation:** Students investigate the use of global satellites and their use in research and technology for helping us understand the effects of climate change and weather patterns. Students use data from NASA to investigate	**E1.2** assess the role of space exploration technology in observing and understanding environmental changes on Earth, including climate change	First Nations, Inuit, and Metis. Students study the types of lamps that can be used, their benefits, and their impact on energy consumption. **Language Arts:** Students research, write about, debate, and/or create media works about the pros and cons of types of energy creation and/or biodiversity issues. Students investigate human impact on energy consumption and/or biodiversity loss with a lens on climate change and write announcements, make posters, or other media works to share what they have learned. Students use their learned vocabulary of types of insulators and conductors that we see in our classrooms or school, as well as other terms related to energy.	**Next Steps:** Organize a field trip to an outdoor conservation area. Lesson plans about sustainability and energy can be found at The World's Largest Lesson

		seal level rise and design, build and test models that show ice melt effects on sea level.  **A1.1, A1.3** **Building a Space Robot** Students research robotics, the use of robotics in flight and space missions, and how robots can be used to perform simple functions to help humans; students design, build and test a 'space robot' that uses a battery, wires, and either lights, buzzers, and/or motors as well as recycled items, dowels, gears, wire, tape, etc to move, light up, and/or make sounds and perform a simple task without human assistance; students describe how their robot could help on space missions			
May **June**	**Technology and its impact on space exploration** **Big ideas:** Prove that space exploration without technology is impossible. Take a look at how technology has evolved and led us to space. **Guiding questions:**	**NOTE:** Teachers should choose from this list of STEM activities that best suits their students, school, and community.  **A1.2, A1.3, A1.4** Students design, build, and test a sundial.  **A1.2, A1.3, A1.4** Students design, build, and test	**D2.4** describe ways in which the four forces of flight can be altered **D2.5** describe characteristics and adaptations that enable organisms to fly **E1.2** assess the role of space exploration technology in observing and understanding environmental changes on	**Mathematics:** Students measure angles of their sundials. Students measure weight, height, and distance during the *Rocket Investigation* and *Landing on Mars Inquiry* and collect and analyse data.	**First Steps**: Be sure to review safety guidelines for all experiments and activities and instruct students to follow safety guidelines. Collect materials needed for building STEM investigations such as materials for the

	How do the four forces of flight compare in the creation of simple flight machines and space machines? How has space exploration technology evolved through the years? What tools allow humans to have a deeper knowledge of space?	a space vehicle (Mars Rover) to climb uneven surfaces efficiently.  **A1.2, A1.3, A1.4, A1.5** **Rocket Investigation** Students design, build, and test rockets (bottle or straw, or other) and investigate how changes to nose weight, length, fin size or shape affect flight. Students connect their learning to aviation investigations about various plane designs (stealth, airbus, etc) and/or rocket development, past, and present (for example Dragon X rockets versus early ones). Students communicate their learning by creating media works  **A1.1, A1.2, A1.3, A1.4** **Landing on Mars Inquiry** Students research how space missions have used different strategies to drop payloads on Mars. Students design, build and test parachutes or other devices to slow the descent of a 'space lander' made with an egg in a box designed to withstand impact and dropped from a	Earth, including climate change **E2.6** identify various technologies used in space exploration, and describe how technological innovations have contributed to our understanding of space	**Social Studies:** **More than just Velcro Investigation** Students research various technologies that have been developed during preparation for space travel and how those technologies have helped humans on Earth as well. Students investigate the current issues surrounding space travel and possible habitation of the Moon and Mars, and debate which we should inhabit first based on research into resources, proximity to Earth, etc. Students communicate their findings by having a debate and/or writing persuasive arguments. Students also design, build and test their own Canadarm models using recyclable materials, balsa wood, syringes, tubing, or other approved materials.	rockets, string, parachutes (plastic bags or tissue paper work well), and eggs for testing. Students can code the solar system with simple robotics, or a coding platform (for example using Scratch or Ozobots) Find resources that explain how anti-shock sneakers were inspired by astronauts' special boots for the moon landing. Water treatment and potable water were inspired by space technology, similar to what astronauts use in space. Students can investigate how these technologies can be used on Earth and in space. Find digital or non-digital resources that explain how astronauts eat, sleep and/or complete their scientific research

		determined height (for example 2m). Students communicate their findings by displaying their landers and discussing the positives and negatives of their design			in space (for example, many lessons can be found on the official Canadian Space Agency site). Students can use a coding platform to recreate or simulate CanadaArm (for example: (Canada Learning Code - Canadarm2) Find digital or non-digital resources that discuss the history of CanadaArm1 or 2 and beyond. (for example Canadian Space Agency's official site Invite a guest speaker, parent, or community member who studies, explores, and works in space-related technologies (virtual invite or in-person invite).