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| Topic: Earth Science | |
| Big Idea:  The biosphere, geosphere, hydrosphere and atmosphere are interconnected, as matter flows and energy cycles through them. | Thematic Overarching Question:  How do your actions affect the sustainability of Earth’s 4 spheres? |
| Students will know (Content):   * Effects of solar radiation on the cycling of matter and energy. * Matter cycles within biotic and abiotic components of ecosystems. * Sustainability of systems. * First Peoples knowledge of interconnectedness and sustainability. | Students will be able to (skills of inquiry learning):  Questioning and Predicting:   * Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest. * Make observations aimed at identifying their own questions, including increasingly complex ones, about the natural world. * Formulate multiple hypotheses and predict multiple outcomes   Planning and Conducting:   * Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative). * Assess risks and address ethical, cultural and/or environmental issues associated with their proposed methods and those of others. * Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data. * Ensure that safety and ethical guidelines are followed in their investigations.   Processing and Analyzing Data and Information:   * Experience and interpret the local environment. * Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information. * Seek and analyze patterns, trends, and connections in data, including describing relationships between variables (dependent and independent) and identifying inconsistencies. * Use knowledge of scientific concepts to draw conclusions that are consistent with evidence. * Analyze cause-and-effect relationships.   Evaluating:   * Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions. * Describe specific ways to improve their investigation methods and the quality of the data. * Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and secondary sources. * Exercise a healthy, informed skepticism, and use scientific knowledge and findings to form their own investigations and to evaluate claims in secondary sources. * Consider social, ethical, and environmental implications of the findings from their own and others’ investigations. * Critically analyze the validity of information in secondary sources and evaluate the approaches used to solve problems.   Applying and Innovating:   * Contribute to care for self, others, community, and world through individual or collaborative approaches. * Transfer and apply learning to new situations. * Generate and introduce new or refined ideas when problem solving. * Contribute to finding solutions to problems at a local and/or global level through inquiry.   Communicating:   * Communicate scientific ideas, claims, information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations. * Express and reflect on a variety of experiences, perspectives, and worldviews through place. |
| Rubric:  Backwards design (\*) |  |

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| **Steps** | **Learning and tasks** |
| 1. Engagement | David Attenborough’s *A Life on our Planet* |
| 2. Student Questioning | Present the overarching question. Peel the fruit activity to get deeper. Create open questions from closed. Choose group question. |
| 3. Investigation | 1. Background research - research skills lesson (Bell?) 2. Develop a plan for investigation - what data will you collect? How? 3. Class feedback: Methods? Ethics? Bias? 4. Make appropriate changes to plan. 5. Carry out investigation: Collect observations and data. |
| 4. Analysis | Share observations, data with the class - is your group ready for analysis?  Seek and analyze patterns, trends and connections in data - how will you present this?  What conclusions can be drawn from your findings? |
| 5. Synthesis | What are your overall findings? How will you compile it? How will you communicate findings? What further inquiries could be done? |

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| **Lesson/ Date** | **Content and skills** | **Activities and Teaching strategies** | **Materials and Resources** | **Reflection questions/**  **Assessments** |
| 1.  (2 classes) | Interconnectedness between the 4 spheres and human actions.  Questioning | Watch video, make note of connections between spheres and human actions  Share overarching question.  Peel the fruit activity: Based on overarching question, write words that come to mind on the outside.  Ask ‘Why’ questions to get deeper. | David Attenborough’s *A Life on our Planet*  Chart paper  Markers | Inquiry Question  Developed |
| 2. (1 class) | How matter and energy cycles through the 4 spheres.  Research skills.  Planning an investigation | Research skills lesson.  Group brainstorm of investigation plan.  Plan share out.  Reflect, make adjustments. | Chart paper  Chromebooks | Reflect on your investigation plan and the feedback your group received from the class. Has your investigation taken ethical considerations into account? Is your method safe? Will you collect enough data? How could you change your investigation to make it better? |
| 3.  (3-4 classes) | Collecting data | Review 3 ways to collect data:  -library  -labwork  -fieldwork  Develop data tables to organize data.  Share out data once collected.  Reflect on feedback, make adjustments as needed. | Chromebooks | Does your data relate back to your question? Do you have enough data? How do you know? Is there any bias in the source of data or the collection method? |
| 4. (3-4 classes) | Analyzing data and information | -Discuss various graphing methods. Have groups share out how they will analyze their data, give feedback.  -Discuss the difference between copying information and understanding/ processing it to support your findings. | chromebooks | Do you see any patterns or trends in your data? How can you clearly display your data? |
| 5. (2 classes) | Synthesis of Findings |  | Various mediums  chromebooks |  |

Rubric:

Appendix:

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| Canadian Context:  First Peoples Principles of learning |
| British Columbian Context:  Curricular and core Competencies |