Name(s):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Science Inquiry Critical Challenge**

**Driving Question:** Why is *Science Inquiry* so important?

This assignment will demonstrate your understanding of the following learning outcomes:

* ***Demonstrate scientific literacy.***
* ***Demonstrate scientific inquiry skills.***

In grade 9 this means you can:

**Question and predict:**

* Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest
* Make observations aimed at identifying your own questions, including increasingly abstract ones, about the natural world
* Formulate multiple hypotheses and predict multiple outcomes

**Plan and Conduct:**

* Collaboratively and personally plan, select, and use appropriate investigation methods to collect reliable data (qualitative and quantitative)
* Assess risks and address ethical issues associated with your proposed methods
* Select and use appropriate equipment to systematically and accurately collect and record data

**Process and Analyze Data and Information:**

* Experience and interpret the local environment
* Seek and analyze patterns, trends, and connections in data, including describing relationships between variables and identifying inconsistencies
* Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
* Analyze cause-and-effect relationships

**Evaluate:**

* Evaluate your methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
* Describe specific ways to improve your investigation methods and the quality of the data
* Demonstrate an awareness of assumptions, question information given, and identify bias in your own work and secondary sources
* Exercise a healthy, informed skepticism and use scientific knowledge and findings to form your own investigations 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

**Apply and Innovate:**

* Contribute to care for self, others, community, and world through personal or collaborative approaches
* Co-operatively design projects with local and/or global connections and applications
* 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

**Communicate**

* Communicate scientific ideas, 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 of place

You or you and your partner will choose how to demonstrate your understanding of the importance science inquiry by designing a unique experiment or innovation.

You will be responsible for the background research needed for the introduction for the activity and you will be writing a research report about the scientific concepts behind the experiment.

Be sure to include an annotated list of the sources you used, with a print-out of the page. These pages should be included when you hand in your assignment. This assignment will be considered incomplete and will not be marked if a source list is not included. WHMIS information and MSDS data sheets with an interpretation of the information that is relevant to student safety **MUST** also be included with your assignment. You will be presenting your experiment multiple times, to a classmate, to another student, to your teacher, and to another teacher. If you move onto the school and/or district *Celebration of Scientific Inquiry* you will need to present to a community member and members of the public viewing your project.

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| **SCIENCE RUBRIC**  **Science Inquiry** |

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| --- | --- | --- | --- | --- |
| **CRITERIA** | **Meeting** | | **Approaching** | |
| **√+** | **√** | **√+** | **√** |
| **Questioning and Predicting** | I can demonstrate a sustained intellectual curiosity about a topic of interest.  I can ask multiple insightful and compelling questions.  I can formulate many hypotheses that are significant using accurate scientific terminology.  I can predict significant outcomes.  I am able to collect perceptive qualitative and valid quantitative evidence that supports my prediction. | I can demonstrate an intellectual curiosity about a topic of interest.  I can ask multiple meaningful and convincing questions.  I can formulate some hypotheses that are relevant using scientific terminology.  I can predict relevant outcomes.  I am able to collect pertinent qualitative and precise quantitative evidence that supports my prediction. | I can demonstrate curiosity about a topic of interest.  I can ask multiple appropriate and plausible questions.  I can formulate one or two hypotheses that are superficial using some scientific terminology.  I can predict outcomes.  I am able to collect suitable qualitative and useable quantitative evidence that supports my prediction. | I can demonstrate some curiosity about a topic of interest.  I can ask multiple superficial questions.  I can formulate a prediction that is relevant.  I can predict superficial outcomes.  I am able to collect marginal qualitative and quantitative evidence that supports my prediction. |
| **Planning and Conducting** | I can plan, select, and use focused investigation methods and equipment to collect reliable data.    I can fully assess risks associated with my proposed methods. | I can plan, select, and use purposeful investigation methods and equipment to collect reliable data.    I can fully assess risks associated with my proposed methods. | I can plan, select, and use appropriate investigation methods and equipment to collect reliable data.    I can assess risks associated with my proposed methods. | I can plan, select, and use incomplete investigation methods and equipment to collect reliable data.    I can assess risks associated with my proposed methods. |
| **Processing and Analyzing Data and Information** | I have an innovative description of the relationships between variables.  I have a comprehensive list of the sources of error.  I use astute knowledge of scientific concepts to draw conclusions that are consistent with my evidence. | I have a credible description of the relationships between variables.  I have a thorough list of the sources of error.  I use probable knowledge of scientific concepts to draw conclusions that are consistent with my evidence. | I have a predictable description of relationships between variables.  I have a list of the sources of error.  I use plausible knowledge of scientific concepts to draw conclusions. | I have an unrelated description of the relationships between variables.  I have a partial list of the sources of error.  I use inaccurate knowledge of scientific concepts to draw conclusions. |
| **Evaluating** | I have an insightful evaluation of my methods and experimental conditions, including identifying sources of error or uncertainty,  I can comprehensively describe specific ways to improve my investigation methods and the quality of the data | I have a thoughtful evaluation of my methods and experimental conditions, including identifying sources of error or uncertainty,  I can thoroughly describe specific ways to improve my investigation methods and the quality of the data | I have a predictable evaluation of my methods and experimental conditions, including identifying sources of error or uncertainty,  I can partially describe specific ways to improve my investigation methods and the quality of the data | I have a simplistic evaluation of my methods and experimental conditions, including identifying sources of error or uncertainty,  I can simplistically describe specific ways to improve my investigation methods and the quality of the data |
|  | **Meeting** | | **Approaching** | |
| **√+** | **√** | **√+** | **√** |
| **Evaluating continued** | I can demonstrate a skillful awareness of assumptions, and identify bias in my own work and secondary sources  I can exercise a healthy, informed skepticism and perceptively use scientific knowledge and findings to form my own investigations.  I purposefully consider social, ethical, and environmental implications of the findings from my investigations  I critically analyze the validity of information in secondary sources. | I can demonstrate a logical awareness of assumptions, and identify bias in my own work and secondary sources  I can exercise a healthy, informed skepticism and thoughtfully use scientific knowledge and findings to form my own investigations.  I completely consider social, ethical, and environmental implications of the findings from my investigations  I fully analyze the validity of information in secondary sources. | I can demonstrate an awareness of assumptions, and identify bias in my own work and secondary sources  I can exercise a healthy, informed skepticism and appropriately use scientific knowledge and findings to form my own investigations.  I appropriately consider social, ethical, and environmental implications of the findings from my investigations  I analyze the validity of information in secondary sources. | I can demonstrate a simplistic awareness of assumptions, and identify bias in my own work and secondary sources  I can exercise a healthy, informed skepticism and superficially use scientific knowledge and findings to form my own investigations.  I superficially consider social, ethical, and environmental implications of the findings from my investigations  I partially analyze the validity of information in secondary sources. |
| **Apply and Innovate** | I can efficiently contribute to care for self, others, community, and world through personal or collaborative approaches  I design projects with innovative local and/or global connections and applications  I can explicitly transfer and apply learning to new situations  I can explicitly generate and introduce new or refined ideas when problem solving  I insightfully contribute to finding solutions to problems at a local and/or global level through inquiry | I can practically contribute to care for self, others, community, and world through personal or collaborative approaches  I design projects with credible local and/or global connections and applications  I can thoughtfully transfer and apply learning to new situations  I can thoughtfully generate and introduce new or refined ideas when problem solving  I thoughtfully contribute to finding solutions to problems at a local and/or global level through inquiry | I can viably contribute to care for self, others, community, and world through personal or collaborative approaches  I design projects with predictable local and/or global connections and applications  I can partially transfer and apply learning to new situations  I can partially generate and introduce new or refined ideas when problem solving  I predictably contribute to finding solutions to problems at a local and/or global level through inquiry | I can contribute to care for self, others, community, and world through personal or collaborative approaches  I design projects with unrelated local and/or global connections and applications  I can minimally transfer and apply learning to new situations  I can minimally generate and introduce new or refined ideas when problem solving.  I minimally contribute to finding solutions to problems at a local and/or global level through inquiry |
| **Communicating** | I can explain predictions, observations and results that are significant using accurate scientific terminology from previous knowledge.  I can accurately express and reflect on a variety of experiences, perspectives, and worldviews of place | I can explain predictions, observations and results that are relevant using scientific terminology from previous knowledge.  I can reasonably express and reflect on a variety of experiences, perspectives, and worldviews of place | I can explain relevant predictions, observations and results using some scientific terminology.  I can express and reflect on a variety of experiences, perspectives, and worldviews of place | I can explain a superficial prediction, observations and results.  I can partially express and reflect on a variety of experiences, perspectives, and worldviews of place |