# Criteria Categories and Criteria for Science K-9

| Criteria category | Grade K | Grades 1-2 | Grades 3-4 | Grades 5-6 | Grades 7-8 | Grade 9 |
|---|---|---|---|---|---|---|
| **Questioning** | • Makes observations about objects and events in familiar contexts<br>• Uses observations and curiosity to form questions | • Makes and records observations about objects and events in familiar contexts<br>• Uses observations and curiosity to form their own questions<br>• Makes predictions based on their observations | • Makes and records observations about objects and events in familiar contexts<br>• Asks questions about observations that can be investigated<br>• Makes predictions based on prior knowledge | • Makes and records observations about objects and events in unfamiliar contexts<br>• Asks questions about their observations that lead to a scientific inquiry<br>• Makes predictions about their scientific inquiries | • Makes and records accurate and precise observations<br>• Asks questions about their observations that lead to a scientific inquiry<br>• Makes predictions about their scientific inquiries<br>• Formulates a hypothesis | • Makes and records accurate and precise observations<br>• Asks a testable question answered through scientific inquiry<br>• Makes multiple predictions for an outcome<br>• Formulates multiple hypotheses |
| **Procedures and Evidence** | • Safely uses materials<br>• Gathers simple data | • Safely uses materials to test predictions<br>• Gathers and organizes simple data (measurements and observations)<br>• Recognizes that data come from multiple sources | • Suggests ways to plan and safely conduct an investigation<br>• Collects, sorts, and classifies simple data<br>• Recognizes that data come from multiple sources | • Chooses appropriate methods and materials, with support, to safely conduct their own inquiry<br>• Investigates changes to a single variable<br>• Chooses, measures, and records data in a variety of ways<br>• Collects and organizes data from multiple sources | • Chooses appropriate methods and materials to safely conduct their own inquiry<br>• Measures and controls variables<br>• Accurately collects and records data using a variety of tools<br>• Finds and uses data from multiple sources | • Plans and uses a variety of investigation methods and materials to safely collect reliable data<br>• Performs experiments using dependent and independent variables<br>• Accurately collects and records data using a variety of tools<br>• Finds and uses data from reliable sources |

| Criteria category | Grade K | Grades 1-2 | Grades 3-4 | Grades 5-6 | Grades 7-8 | Grade 9 |
|---|---|---|---|---|---|---|
| **Analysis** | • Represents simple data in a variety of ways<br>• Discusses observations | • Sorts and classifies data and identifies simple patterns<br>• Uses their simple data to establish a relationship between their predictions and results | • Represents patterns and relationships in data using given methods (e.g., table, graph)<br>• Uses data to infer the relationship between predictions and results<br>• Reflects on evidence to determine whether an investigation was a fair test | • Represents patterns and relationships in data using a variety of methods<br>• Uses data to support conclusions<br>• Identifies possible sources of error and refines investigation methods<br>• Demonstrates an openness to new ideas and identifies assumptions in secondary sources | • Identifies and represents patterns and relationships in data in a variety of ways<br>• Uses data to support conclusions<br>• Identifies possible sources of error and refines investigation methods<br>• Identifies bias and assumptions in primary and secondary sources | • Seeks, analyzes, and represents patterns and relationships among variables<br>• Draws conclusions consistent with data<br>• Evaluates experimental methodology, including sources of error and their impact on data<br>• Identifies bias and evaluates validity of data in primary and secondary sources |
| **Ethics** | | • Considers social and environmental consequences of their actions | • Considers ethical responsibilities when designing an investigation | • Identifies social, ethical, and environmental implications in investigations | • Evaluates social, ethical, and environmental implications in investigations | • Evaluates social, ethical, and environmental implications in investigations |
| **Communicating** | • Communicates observations and ideas reflecting personal experience of place | • Communicates observations and ideas reflecting personal experience of place | • Explains ideas and processes reflecting personal or shared experience of place | • Explains ideas and processes reflecting personal or others' experience of place | • Clearly and concisely communicates scientific ideas and information<br>• Expresses and reflects on place through a variety of methods | • Creates a model to describe a phenomenon<br>• Clearly and concisely communicates scientific ideas and information<br>• Expresses and reflects on place through a variety of methods |

# Sample Application for Grade 2 Science

## Observation Opportunities

Sample activities, based on curricular competencies, that create opportunities for teachers to observe students and assess proficiency

| Criteria category | Grade 2 criteria | Observational activities |
|---|---|---|
| **Questioning** | • Makes and records observations about objects and events in familiar contexts<br>• Uses observations and curiosity to form their own questions<br>• Makes predictions based on their observations | • Take students outside to investigate places where you can find water<br>• Have students draw pictures of water in different phases (solid, liquid, gas)<br>• Listen for student questions before, during, and after classroom demonstrations of chemical and physical changes<br>• Have students draw a picture of a snowman on a summer day |
| **Procedures and Evidence** | • Safely uses materials to test their predictions<br>• Gathers and organizes simple data (measurements and observations)<br>• Recognizes that data come from multiple sources | • Have students brainstorm safe methods for dropping different objects when investigating air resistance<br>• Have students make simple data tables and bar graphs (e.g., daily temperature, rainfall, how far an object rolls)<br>• Have students measure the temperature in different ways |
| **Analysis** | • Sorts and classifies data and identifies simple patterns<br>• Uses their simple data to establish a relationship between their predictions and results | • Have students predict and then investigate how long it takes an ice cube to melt at room temperature<br>• Provide students with simple weather graphs and have them identify patterns (e.g., increasing/decreasing trends)<br>• Provide students with card-sort activities for types of forces |
| **Ethics** | • Considers environmental consequences of their actions | • Have a class discussion about personal water usage and the impacts it may have on the environment<br>• Have students research the impact of releasing butterflies (or other pollinators) into the environment |
| **Communicate** | • Communicates observations and ideas reflecting personal experience of place | • Have students journal (draw and/or write) how they use water throughout the day<br>• Have students draw a map of water sources in their personal place |

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# Sample Application for Grade 5 Science

## Communicating Student Progress

This term, Paul was able to ask questions about his observations of simple machines that led to an independent scientific inquiry. Paul chose appropriate methods and materials to investigate levers safely. He was proficient at measuring and recording data from multiple sources. Paul needs to continue to develop his skill set in identifying and representing patterns and relationships in graphs.

| Criteria categories | Emerging | Developing | Proficient | Extending |
|---|---|---|---|---|
| Questioning | | | ◇ | |
| Evidence | | | ◇ | |
| Analysis | | ◇ | | |
| Ethics | Not reported on this term | | | |
| Communicating | Not reported on this term | | | |

| Criteria categories | Grade 5 |
|---|---|
| **Questioning** | • Makes and records observations about objects and events in unfamiliar contexts<br>• Asks questions about their observations that lead to a scientific inquiry<br>• Makes predictions about their scientific inquiries |
| **Procedures & Evidence** | • Chooses appropriate methods and materials, with support, to safely conduct their own inquiry<br>• Investigates changes to a single variable<br>• Chooses, measures, and records data in a variety of ways<br>• Collects and organizes data from multiple sources |
| **Analysis** | • Represents patterns and relationships in data using a variety of methods<br>• Uses data to support conclusions<br>• Identifies possible sources of error and refines investigation methods<br>• Demonstrates an openness to new ideas and identify assumptions in secondary sources |
| **Ethics** | • Identifies social, ethical, and environmental implications in investigations |
| **Communicating** | • Explains ideas and processes reflecting personal or others' experience of place |

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# Sample Application for Grade 7/8 Science

## Learning Map for Questioning

| Criteria category and criteria | Emerging | Developing | Proficient | Extending |
|---|---|---|---|---|
| **Questioning**<br>Consider the relationships between observation, curiosity, and questioning. | • Makes and records simple observations<br>• Uses their observations to ask questions<br>• Makes simple predictions about their scientific inquiries | • Makes and records appropriate observations<br>• With support, asks questions about their observation that lead to a scientific inquiry<br>• Makes predictions about variables in their scientific inquiries<br>• Formulates a simple hypothesis | • Makes and records accurate and precise observations (both qualitative and quantitative)<br>• Asks questions about their observations that lead to a scientific inquiry<br>• Makes predictions about their scientific inquiries based on past observations<br>• Formulates a single hypothesis based on the independent and dependent variable | • Demonstrates an understanding of validity and reliability of recorded data<br>• Asks a testable question that can be answered through scientific inquiry<br>• Makes multiple predictions for an outcome<br>• Formulates multiple hypotheses |

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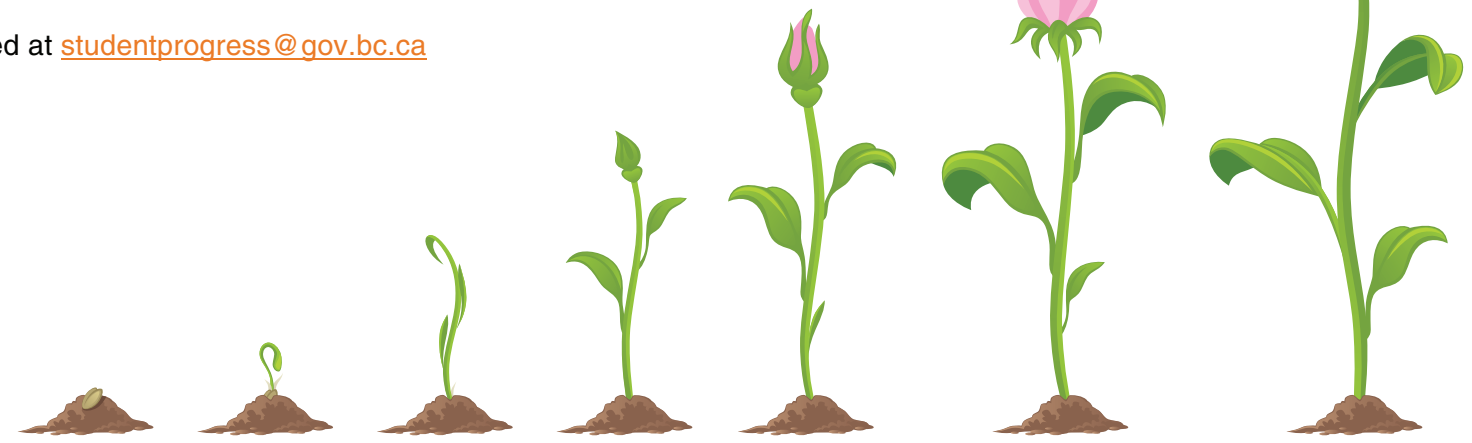

# Sample Application for Grade 9 Science

## Table of Specifications for Case Study Test

Case study includes background information, purpose for research, and raw data. No data analysis or conclusions are provided. Bias is not explicit.

| Criteria categories | Case Study Assessment | Grade 9 criteria |
|---|---|---|
| **Questioning** | • 2–3 questions based on:<br>  ○ Context<br>  ○ Predicting<br>  ○ Formulating hypotheses | • Makes and records qualitative and quantitative observations<br>• Asks a testable question answered through scientific inquiry<br>• Makes multiple predictions for an outcome<br>• Formulates multiple hypotheses |
| **Procedures and Evidence** | • 4–6 questions based on:<br>  ○ Safe procedures<br>  ○ Variables<br>  ○ Data collection methods<br>  ○ Reliability of data | • Plans and uses a variety of investigation materials and methods to safely collect reliable data<br>• Performs experiments using dependent and independent variables<br>• Accurately collects and records data using a variety of tools<br>• Finds and uses data from reliable sources |
| **Analysis** | • 6–8 questions based on:<br>  ○ Creating a graph<br>  ○ Patterns in data<br>  ○ Sources and impact of errors<br>  ○ Possible bias in data<br>  ○ Validity of data | • Seeks, analyzes, and represents patterns and relationships between variables<br>• Draws conclusions consistent with data<br>• Evaluates experimental methodology, including sources of error and their impact on data<br>• Identifies bias and evaluates validity of data in primary and secondary sources |
| **Ethics** | • 2–3 questions based on:<br>  ○ Environmental impacts and concerns<br>  ○ Social impacts and concerns | • Evaluates social, ethical, and environmental implications in investigations |
| **Communicating** | • Holistic assessment of entire response based on:<br>  ○ Clarity of ideas<br>  ○ Scientific accuracy<br>  ○ Logical conclusions<br>  ○ Connection to place | • Creates a model to describe a phenomenon<br>• Clearly and concisely communicates scientific ideas and information<br>• Expresses and reflects on place through a variety of methods |

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