

## BIG IDEAS

Science informs our decisions and impacts our daily lives.

Science has everyday uses and safety implications in the workplace.

Science helps explain how natural changes and human choices affect global systems.

## Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p><b>Questioning and predicting</b></p> <ul style="list-style-type: none"> <li>• Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest</li> <li>• Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world</li> <li>• <b>Formulate multiple hypotheses</b> and predict multiple outcomes</li> </ul> <p><b>Planning and conducting</b></p> <ul style="list-style-type: none"> <li>• Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)</li> <li>• Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods</li> <li>• Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data</li> <li>• Apply the concepts of accuracy and precision to experimental procedures and data:               <ul style="list-style-type: none"> <li>– significant figures</li> <li>– uncertainty</li> <li>– scientific notation</li> </ul> </li> </ul>	<p><i>Students are expected to know the following:</i></p> <p><b>Personal/Home Science</b></p> <ul style="list-style-type: none"> <li>• health science:               <ul style="list-style-type: none"> <li>– <b>nutrition and lifestyle</b></li> <li>– <b>allergies and sensitivities</b></li> <li>– <b>medications and supplements</b></li> <li>– non-Western health practices, including First Peoples health and healing practices</li> </ul> </li> <li>• <b>safe use</b> and storage of <b>household chemicals</b></li> <li>• home technologies:               <ul style="list-style-type: none"> <li>– <b>home automation and safety alarms</b></li> <li>– <b>home appliances</b></li> <li>– <b>home electrics</b></li> </ul> </li> <li>• <b>science literacy</b> and informed decision making: <b>pseudo-science</b> versus science</li> </ul> <p><b>Local/Workplace Science</b></p> <ul style="list-style-type: none"> <li>• waste <b>recycling</b> and disposal:               <ul style="list-style-type: none"> <li>– <b>industrial and workplace</b></li> <li>– recycling processes</li> <li>– <b>transfer stations and landfills</b></li> <li>– impacts of personal choices</li> </ul> </li> </ul>

Learning Standards (continued)

Curricular Competencies	Content
<p><b>Processing and analyzing data and information</b></p> <ul style="list-style-type: none"> <li>• Experience and interpret the local environment</li> <li>• Apply <b>First Peoples perspectives</b> and knowledge, other ways of knowing, and local knowledge as sources of information</li> <li>• Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies</li> <li>• Construct, analyze, and interpret graphs, models, and/or diagrams</li> <li>• Use knowledge of scientific concepts to draw conclusions that are consistent with evidence</li> <li>• <b>Analyze cause-and-effect relationships</b></li> </ul> <p><b>Evaluating</b></p> <ul style="list-style-type: none"> <li>• Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions</li> <li>• Describe specific ways to improve their <b>investigation</b> methods and the quality of the data</li> <li>• Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled</li> <li>• Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources</li> <li>• Consider the changes in knowledge over time as tools and technologies have developed</li> <li>• Connect scientific explorations to careers in science</li> <li>• Exercise a healthy, informed skepticism, and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources</li> <li>• Consider social, ethical, and environmental implications of the findings from their own and others' investigations</li> <li>• Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems</li> <li>• <b>Assess risks</b> in the context of personal safety and social responsibility</li> </ul>	<ul style="list-style-type: none"> <li>• chemicals commonly found in the workplace or in industrial products: <ul style="list-style-type: none"> <li>– chemical safety, including disposal methods</li> <li>– current WHMIS and <b>other</b> standards</li> <li>– <b>components of mixtures</b></li> <li>– <b>classes of hazardous chemicals</b></li> </ul> </li> <li>• combustive and explosive materials: <ul style="list-style-type: none"> <li>– combustible mixtures</li> <li>– explosive potential</li> <li>– safety</li> </ul> </li> <li>• forensic science: <ul style="list-style-type: none"> <li>– <b>methodologies and technologies</b></li> <li>– <b>forensic techniques and protocols</b></li> <li>– <b>impact of advances in technology</b></li> </ul> </li> </ul> <p><b>Global Science</b></p> <ul style="list-style-type: none"> <li>• <b>extreme weather events:</b> <ul style="list-style-type: none"> <li>– causes and impacts</li> <li>– weather and climate change</li> </ul> </li> <li>• disaster preparedness: <ul style="list-style-type: none"> <li>– <b>natural and human-influenced</b> events</li> <li>– <b>survival needs</b></li> </ul> </li> <li>• agriculture <b>practices and processes:</b> <ul style="list-style-type: none"> <li>– chemicals used in agriculture</li> <li>– environmental impacts</li> <li>– impacts of personal choices</li> </ul> </li> </ul>

Learning Standards (continued)

Curricular Competencies	Content
<p><b>Applying and innovating</b></p> <ul style="list-style-type: none"> <li>• <b>Contribute to care for self, others, community</b>, and world through individual or collaborative approaches</li> <li>• Co-operatively design projects with local and/or global connections and applications</li> <li>• Contribute to finding solutions to problems at a local and/or global level through inquiry</li> <li>• <b>Implement multiple strategies to solve problems in real-life, applied, and conceptual situations</b></li> <li>• Consider the role of scientists in innovation</li> </ul> <p><b>Communicating</b></p> <ul style="list-style-type: none"> <li>• Formulate physical or mental theoretical models to describe a phenomenon</li> <li>• <b>Communicate scientific ideas, information, and perhaps a suggested course of action</b>, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations</li> <li>• Express and reflect on a variety of experiences, perspectives, and worldviews through place</li> </ul>	<p><b>Global Science (continued)</b></p> <ul style="list-style-type: none"> <li>• <b>energy generation</b> and needs: <ul style="list-style-type: none"> <li>– <b>production</b></li> <li>– <b>economics</b></li> <li>– environmental impacts</li> </ul> </li> <li>• sustainability of <b>resources</b>: <ul style="list-style-type: none"> <li>– impacts of personal choices</li> <li>– First Peoples worldview and sustainability</li> <li>– <b>product life cycles</b></li> </ul> </li> </ul>

**Big Ideas – Elaborations**

**Science informs our decisions and impacts our daily lives.**

*Sample opportunities to support student inquiry:*

- How do the substances you take into or use on your body affect your health?
- What are some potential dangers to be aware of when storing chemicals in your home?
- How do home technologies function to contribute to our health and safety?
- Why is science literacy important?

**Science has everyday uses and safety implications in the workplace.**

*Sample opportunities to support student inquiry:*

- What types of safety precautions should be considered in the workplace?
- How can industrial waste materials be dealt with responsibly?
- How do catalytic converters in cars convert harmful pollutants from combustion into less harmful emissions?
- How has science helped to solve crimes?

**Science helps explain how natural changes and human choices affect global systems.**

*Sample opportunities to support student inquiry:*

- How do your actions affect the world around you?
- What is the life cycle of a cell phone?
- How do local changes affect global weather?

**Curricular Competencies – Elaborations**

*Sample opportunities to support student inquiry:*

**Questioning and predicting:**

- **Formulate multiple hypotheses:** What are some possible drug interactions and their negative effects?

**Processing and analyzing data and information:**

- **First Peoples perspectives:** Describe a First Peoples healing practice and how it is understood to support healing.
- **Analyze cause-and-effect relationships:** What advice could you give someone who wishes to make changes to improve their nutrition and lifestyle?

## Curricular Competencies – Elaborations

### Evaluating:

- **Investigation:** May address questions such as:
  - How does an electrostatic precipitator assist in improving air quality?
  - What kind of remediation is necessary after a chemical spill?
  - What are the differences between recyclable and non-recyclable plastics?
- **Assess risks:**
  - Is it safe to eat GMO foods?
  - How can you use lock-out protection when changing a light fixture?

### Applying and innovating:

- **Contribute to care for self, others, community:**
  - How can you help set up a disaster preparedness relief site in your community?
  - What would you include in an emergency survival kit?
- **Implement multiple strategies to solve problems in real-life, applied, and conceptual situations:**
  - Design safe storage plans for chemicals found in the home (including flammable and poisonous materials).

### Communicating:

- **Communicate scientific ideas, information, and perhaps a suggested course of action.** For example:
  - How could you share what you have learned about safe storage of household chemicals with others (e.g., poster, video, public service announcement)?
  - What needs must be met to survive after an earthquake?
  - What kinds of resources are needed to create your cell phone?
  - How do smoke detectors use alpha radiation to keep you safe?

## Content – Elaborations

### Personal/Home Science

- **nutrition and lifestyle:** fats, protein, carbohydrates in the diet, fad diets compared to balanced diets, exercise
- **allergies and sensitivities:** gluten intolerance, celiac disease, lactose intolerance, sulphites, other allergens, what to do in case of anaphylaxis
- **medications:** prescription and non-prescription drugs, safety in drug interactions, potential overdose (e.g., acetaminophen), addiction risks, safe storage and disposal
- **supplements:** vitamins, protein supplements, minerals
- **safe use:** harmful combinations (e.g., bleach and ammonia), gasoline, propane

## Content – Elaborations

- **household chemicals:** poisons in the home (including cleaning products), chemical hazards for children and pets in the home and garden
- **home automation and safety alarms:** carbon monoxide detector, smoke alarms, and burglar alarms as part of home automation; apps for scheduling lights and sprinklers
- **home appliances:** heat pumps, water heaters, air conditioning and refrigerators, microwave ovens
- **home electrics:** electrical wiring and circuits, circuit overload protection, electrical adaptors (e.g., travel); personal protection from electricity (e.g., lock-out procedure, working near power lines)
- **science literacy:** judging validity of evidence from a variety of sources (e.g., journals, magazines, news, Internet)
- **pseudo-science:** misleading scientific claims related to products (e.g., hair-growth products, magnetic bracelets, anti-aging cosmetics)

## Local/Workplace Science

- **recycling:** recycling of materials (e.g., chairs made from pop bottles, tires made into playground surfacing); classes of waste (e.g., plastic classification system)
- **industrial and workplace:** e-waste, paper, organics
- **transfer stations and landfills:** limitations of recycling
- **other:** physical, health, and environmental hazards
- **components of mixtures:**
  - proportion
  - concentration
  - identification (e.g., chromatography, spectrometry, flame test)
- **classes of hazardous chemicals:** oxidants and solvents, acids and bases
- **methodologies:**
  - steps to preserve and document a crime scene
  - procedures for collection and packaging of evidence (i.e., chain of custody)
- **technologies:** technologies that could be used to gather and analyze evidence at a crime scene (e.g., fingerprint lifting, blood detection, blood typing, DNA extraction, gel electrophoresis, hair/fibre analysis, drug identification through chromatography, mass spectrometry, spectroscopy)
- **forensic techniques and protocols:**
  - identification of forensic techniques used to solve crimes
  - proper lab techniques to identify unknown substances
  - application of forensic techniques and principles to solve a simulated crime
- **impact of advances in technology:**
  - differences between current forensic techniques and those available in a historical crime (e.g., Jack the Ripper)
  - the use of databases for suspect or victim identification (e.g., fingerprints, tattoos, DNA)

Content – Elaborations

Global Science

- **extreme weather events:**
  - hurricanes, tornadoes, drought, flooding
  - evidence, including oral narratives, about extreme weather
- **natural:** earthquake, tsunami, hurricane, avalanches, rock slides
- **human-influenced:** nuclear reactors, oil spills, mining accidents, transportation accidents
- **survival needs:** basic (water, food, shelter), communication, economic, medical, transportation
- **practices and processes:** hydroponics, food crops, feed crops, fuel crops, animal husbandry, new technologies
- **energy generation:** various ways of generating electricity (e.g., hydro, coal)
- **production:** renewable versus non-renewable resources; alternative technologies
- **economics:** energy sources (e.g., coal transportation); global electricity markets (e.g., buying and selling of excess electricity)
- **resources:** Earth has limited resources (e.g., aluminum, rare metals, copper, fossil fuels)
- **product life cycles:** clothing, electronic devices

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