GRADE 6 SCIENCE at a glance

This ***Grade 6 Science at a Glance*** can be used in designing, planning, and assessing student learning for the year. It can be used as a planning tool to preview the content of the Grade 6 Science curriculum.

It is organized by **clusters** and sorts learning outcomes into **big ideas**. The clusters are the context in which students develop knowledge and understanding of important ideas in science while actively engaging in science and technology practices, deepening their understanding of concepts as they experience how science is actually done.

This document can be used with the ***Grade 6 Science Curriculum Overview*** to plan clear and concise expectations for student learning. It can also be used to connect learning by making links to other subject areas.

Science PRACTICES CLUSTER 0 OUTCOMES

The **practices** of science and technological design support students in acquiring a better understanding of how scientific knowledge is produced and how solutions to practical problems are designed. Students engaging in scientific inquiry and design activities simultaneously use both knowledge and skills, which deepens their understanding of concepts and provides exposure to the many approaches that are used in science and technology.

These practices are outlined in detail in *Grades 5 to 8 Science: Manitoba Curriculum Framework of Outcomes*.

SCIENTIFIC INQUIRY

- Asking Questions and Making Predictions
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Obtaining, Evaluating, and Communicating Information

DESIGN PROCESS

- Identifying and Defining Practical Problems
- Researching, Planning, and Choosing a Solution
- Constructing and/or Testing the Prototype or Consumer Product
- Evaluating and Optimizing the Solution

DIVERSITY OF LIVING THINGS

- **Classification systems**
  01 02 03 04 05 08 6-0-8f
- **Kingdoms and their characteristics**
  01 06 07 08 09 10 11 12 13
- **Importance of gathering evidence for our comprehension of diversity today and in the past**
  01 14 15 6-0-8e 8f 9b

FLIGHT

- **Properties of air**
  01 02 03 06 07 13
- **Adaptations or features that make use of the properties of air for flight**
  01 03 04 05 08 09 11 13 14 15 6-0-8c 8d
- **Forces involved in flight**
  01 04 05 06 08 09 10 11 12 15

ELECTRICITY

- **Transformation of electrical energy into other forms of energy**
  01 02 03 04 12 13 14
- **Electrical circuits**
  01 03 06 07 08 09 10 11
- **Sources of energy that can be transformed into electrical energy**
  01 15 16
- **Importance and impacts of electrical energy**
  01 05 17 18 19 6-0-8g 9e 9f

EXPLORING THE SOLAR SYSTEM

- **Space exploration and the development of related technologies**
  01 02 03 04 05 06 6-0-8c 8d 8e 8g 9b
- **Conceptions of Earth's position in space and related phenomena**
  01 07 08 09 10 11 16 17 6-0-8b 8d 9a
- **Motions of the Sun, Earth, and moon**
  01 12 13 14 15

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Curriculum Overview

REPORT CARD CATEGORIES

KNOWLEDGE AND UNDERSTANDING

Cluster 1 DIVERSITY OF LIVING THINGS

- Classification systems help us organize and understand the diversity of life on Earth.
  01 02 03 04 05 08
  6-0-8f
- There is a wide variety of living things in the world, which can be grouped in different ways, according to similarities and differences among organisms.
  01 06 07 08 09 10 11 12 13
- Fossils provide evidence about the types of organisms that lived long ago, and can be compared with one another and to living organisms to help us understand diversity today and in the past.
  01 14 15
  6-0-8e 8f 9b

Cluster 2 FLIGHT

- Air has specific properties that, when applied to surfaces, have an effect on flight.
  01 02 03 06 07 13
- Living things that fly and technologies designed to fly have adaptations or features that make use of the properties of air.
  01 03 04 05 08 09 11 13 14 15
  6-0-8c 8d
- Four forces (lift, gravity, thrust, drag) act on devices and living things that fly.
  01 04 05 06 08 09 10 11 12 15

Cluster 3 ELECTRICITY

- Electrical energy can be transformed into new forms of energy such as motion, sound, light, or heat.
  01 02 03 04 12 13 14
- Electrical circuits provide a way of moving energy from one place to another and transforming it into new forms of energy.
  01 03 06 07 08 09 10 11
- Energy from different sources can be used to generate electricity.
  01 15 16
- Electrical energy plays a significant role in society, and its production has an impact on the environment.
  01 05 17 18 19
  6-0-8g 9e 9f

Cluster 4 EXPLORING THE SOLAR SYSTEM

- Space exploration and the technologies developed for it impact our lives and our understandings of Earth and space.
  01 02 03 04 05 06
  6-0-8c 8d 8e 8g 9a 9b
- Human conception of the position of Earth in space has changed over time, and the models representing Earth's position help explain patterns of motion of the objects in the solar system. These patterns have been used in a variety of ways by ancient and present-day cultures.
  01 07 08 09 10 11 16 17
  6-0-8b 8d 9a
- The relative positions of the Sun, Earth, and moon are responsible for predictable phenomena on Earth (e.g., seasons, phases of the moon, eclipses).
  01 12 13 14 15

SCIENTIFIC INQUIRY

Asking Questions and Making Predictions
1a 3a 9c

- Ask testable questions that lead to investigations.
- Make a prediction or hypothesis that identifies a cause-and-effect relationship.

Planning and Carrying Out Investigations
1b 3b 3c 4a 4c 4d 4e 5a 5c 5d 5e 5f 9c

- Create a plan to answer a specific question.
- Identify variables that could affect an investigation and variables that should be held constant to ensure a fair test.
- Select and safely use tools to observe and measure.
- Make observations that are relevant, and represent data in a variety of ways.

Analyzing and Interpreting Data
6a 6c 6f 7a 7b 7c 7h 9d

- Interpret and suggest explanations for patterns and discrepancies in data.
- Draw a conclusion based on evidence that explains the results of the investigation and supports or rejects the hypothesis.
- Evaluate the methods used to answer a question, and identify potential applications of investigation results.

Obtaining, Evaluating, and Communicating Information
2a 2b 2c 7f 7g 8a 8b

- Communicate results and conclusions in a variety of ways.
- Recognize that science is a way of answering questions about the world and that there are questions that science cannot answer.
- Access and review information from a variety of sources.

DESIGN PROCESS

Identifying and Defining Practical Problems
1c 3d 9c

- Identify and describe a practical problem that can be solved through a simple design.
- Define the problem by developing criteria for evaluating a prototype or a consumer product based on function, reliability, and aesthetics, and by identifying constraints such as available materials, time, or cost.

Researching, Planning, and Choosing a Solution
1d 2a 3e 7d 9c

- Identify various ways to solve a practical problem, and select and justify one to implement.
- Create a plan for the chosen solution, including materials, safety considerations, labelled diagrams, and steps to follow.

Constructing and/or Testing the Prototype or Consumer Product
4b 4c 4d 4e 5b 5c 5d 9c 9d

- Construct a prototype.
- Test the prototype or consumer product with respect to the criteria and the constraints.

Evaluating and Optimizing the Solution
6d 6e 7d 7e 8c 9c

- Identify and make improvements to a prototype with respect to the criteria, and explain the rationale for changes.
- Evaluate the strengths and weaknesses of a consumer product with respect to criteria.
- Propose and justify a solution to the initial problem.

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Science Practices

Scientific Inquiry

ASKING QUESTIONS AND MAKING PREDICTIONS

Science inquiry begins with a child's sense of wonder about the world. Asking questions stimulates curiosity, promotes the development of ideas, promotes discussion, helps clarify concepts, and can lead to a deeper understanding of a concept. As students progress across the grades, their questions should become more relevant, focused, and sophisticated, which requires teaching effective questioning strategies and giving students opportunities to ask and refine their questions. Making predictions is also an important part of science inquiry. Using prior knowledge, observations, and reasoning, students develop ideas to predict possible answers to questions, rather than simply making random guesses.

PLANNING AND CARRYING OUT INVESTIGATIONS

Throughout their schooling, students are expected to plan and carry out, with appropriate levels of support, investigations in the field or laboratory, working collaboratively as well as individually; investigations gradually become more systematic and require clarifying what counts as data and identifying variables that could affect an investigation. The data and observations that are collected are used to test existing understandings, revise them, or develop new understandings.

ANALYZING AND INTERPRETING DATA

Student investigations produce data that must be displayed and analyzed in order to derive meaning. Because patterns and trends in data are not always obvious, a range of tools including tables, graphical representations, and visualizations are used to identify significant features and patterns in the data and to interpret the results of the investigation.

OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION

Students engage with multiple sources to obtain information that is used to evaluate the merit and validity of their claims, methods, and investigation designs. They develop facility with communicating clearly and persuasively the method(s) used and the ideas generated. Critiquing and communicating ideas individually and in groups is a critical activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations, as well as orally, in writing, and through extended discussions.

For more information about scientific inquiry and student expectations across the grades, consult *Grades 5 to 8 Science: A Foundation for Implementation*.

Design Process

IDENTIFYING AND DEFINING PRACTICAL PROBLEMS

Technological problem solving involves identifying and defining problems that need to be solved. In order to define a problem, students identify the goals or criteria (what the solution needs to have) as well as constraints (limitations such as available tools and materials, time, dimensions, cost, environmental impact, etc.).

At the Middle Years level, a second facet of the design process is introduced to students. The evaluation of consumer products does not involve the construction of a model or prototype, but rather simulates the decision-making process of a consumer when purchasing a product.

RESEARCH, PLANNING, AND CHOOSING A SOLUTION

Research can be necessary to better understand a problem and to identify possible solutions or to make the best choice. Students conduct their own research and consider multiple possible solutions to a given problem. They can then choose the best solution by comparing each possible solution against the criteria and constraints that have been identified.

CONSTRUCTING AND/OR TESTING THE PROTOTYPE OR CONSUMER PRODUCT

Engineering uses models and simulations to analyze and test solutions to a problem. Students develop a plan to construct and/or test a prototype or consumer product against the criteria and constraints that were identified.

EVALUATING AND OPTIMIZING THE SOLUTION

Optimizing the design solution involves a process in which solutions are systematically tested and refined and the final design or decision is improved by trading off less important features for those that are more important.

For more information about the design process and student expectations across the grades, consult *Grades 5 to 8 Science: A Foundation for Implementation*.