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 knowledge, skills, and attitudes, 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 *Kindergarten to Grade 4 Science: Manitoba Curriculum Framework of Outcomes*.

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

**DESIGN PROCESS**
- Identifying and Defining Practical Problems
- Researching, Planning, and Choosing a Solution
- Constructing and Testing the Model or Prototype
- Evaluating and Optimizing the Solution

**GRADE 2 SCIENCE**

This *Grade 2 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 2 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 2 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.
**Cluster 1 GROWTH AND CHANGES IN ANIMALS**
- Animals, including humans, are living things and, like all living things, they have certain needs so they can stay alive, grow, and develop.
- Animals, including humans, obtain food, which is essential for growth and development, from plants or other animals.
- Animals, including humans, grow, change, have specific characteristics and behaviours, and have offspring similar to themselves.
- Reproduction is essential to every kind of living thing. Parents often engage in behaviours that help their offspring survive, but the offspring of some animals are independent at birth.

**Cluster 2 PROPERTIES OF SOLIDS, LIQUIDS, AND GASES**
- Matter can exist in different states (solid, liquid, or gas), each state having specific properties.
- Matter can change from one state to another (e.g., by melting, freezing, boiling) by heating or cooling.
- Different types of solids, liquids, and gases can be described and classified by their observable properties and interactions with other solids, liquids, and gases (e.g., absorption of water, floatability, ability to dissolve), which can determine their uses.

**Cluster 3 POSITION AND MOTION**
- The position of an object can be described using a variety of reference points.
- The position or motion of an object can be changed by a push or a pull, and the size of the change depends on the strength of the push or pull.
- Different technologies can facilitate the motion of objects (e.g., inclined planes, wheels and axles).

**Cluster 4 AIR AND WATER IN THE ENVIRONMENT**
- Air is a major part of the environment; it can move and affect us and the environment.
- Water is a major part of our environment and can change states as part of the water cycle.
- Clean air and water are necessary for humans, plants, and animals to survive.
- Our actions can have an impact on the quality of air and water, and on its ability to sustain life.
### 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 *Kindergarten to Grade 4 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, etc.).

**RESEARCH, PLANNING, AND CHOOSING A SOLUTION**

Research can be necessary to better understand a problem and to identify possible solutions. 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 TESTING THE MODEL OR PROTOTYPE**

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 model 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 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 *Kindergarten to Grade 4 Science: A Foundation for Implementation*.

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For more information about scientific inquiry and student expectations across the grades, consult *Kindergarten to Grade 4 Science: A Foundation for Implementation*. For more information about the design process and student expectations across the grades, consult *Kindergarten to Grade 4 Science: A Foundation for Implementation*. 

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**Manitoba**