Grade **4**

SCIENCE CURRICULUM at a Glance

This is a support document only. Please refer to the curriculum to fully understand the intent and context.

Global Competencies

Enduring Understandings

Explaining Phenomena · Collective Endeavour · Science & Technology · Implications · Empowering Agency

Potential Inquiry Questions

- *How is energy detected, stored, and used?*
- *How does energy move through ecosystems?*
- *How is soil formed and what is its role in the environment?*

Strand A. Indigenous Peoples within the Natural World

What contributions do Indigenous ways of knowing, being, and doing make to science?

SCI.4.A.1 Demonstrate an understanding of different First Nations, Métis, and Inuit ways of knowing, being, and doing in relationship with the land and the natural world by exploring Indigenous methods of observing and interpreting the world, applying scientific principles, and creating technologies within local traditional and contemporary cultural contexts (e.g., wholistic, reciprocal, interconnected, and sustainable ways; land-based learning; outdoor learning; intersections with Western science).

Strand B. Science Identity

How do I engage in science?

SCI.4.B.1 Develop a sense of agency, identity, and belonging in science by cultivating natural curiosity about the world, acquiring scientific skills and fostering scientific attitudes, building a personal connection to nature, establishing links between science concepts and personal experience, and recognizing that everyone can contribute to science.

Strand C. Practical Science

STSE CONTEXTS

How do science and our world interact?

SCI.4.C.1
Demonstrate an awareness of the dynamic interplay between science, technology, society, and the environment (STSE), thereby being empowered to critically evaluate the impacts of scientific and technological advancements on individuals, communities, and ecosystems, and to make informed decisions for a sustainable future.

Examples: producing, recording, and transmitting sound; light sources and light pollution; production and consumption of energy by humans; advantages and disadvantages of various sources of energy; energy production in Manitoba and globally; soil types and distribution in Manitoba and globally; soil erosion and mitigation measures; Indigenous uses of rocks and minerals; conservation and protection of land, water, and ecosystems; teachings related to the land in Indigenous communities; sustainable resource management; local and global biodiversity hotspots; wildlife-human interactions and coexistence; urban ecosystems; sustainable agricultural practices

SCIENTIFIC MEASUREMENT

How do we measure scientifically?

SCI.4.C.2
Demonstrate an understanding of units, measuring tools, and the nature of measurement in science. (**Bold** indicates items introduced for the first time at this grade level.)

Include the following:

- Tools: clock, thermometer, ruler, pan balance, balance, volumetric vessels
- Attributes: length, mass, volume, time, temperature, **speed**
- Units: length (km, m, cm, mm), mass (kg, g), volume (L, mL), time (h, min, s), temperature (°C), **speed (km/h, m/s**)
- Skills: measure and estimate using standard SI tools and units, **select measurement tools, display data, recognize importance of standard units, convert between basic SI length and time units**

ACTION AND PRACTICE

How can we do science?

SCI.4.C.3
Demonstrate practical scientific skills through safely and actively participating in a variety of scientific practices such as inquiry-based learning experiences, experimentation, scientific observation, data analysis, measurement, debate and scientific argumentation, communicating scientific information, and designing and building.

Examples:

- Participate in learning experiences that include an Indigenous community member (e.g., Elder, Knowledge Holder, Knowledge Keeper) to share knowledge, experience, or teachings related to the curriculum.
- Make observations to provide evidence that energy can be transferred from place to place by sound and light.
- Examine physical characteristics of soils (e.g., particle size, texture, moisture, distribution, colour, and ability to hold together) from different locations in the local environment (e.g., garden, flowerpot, riverbed and bank, marsh, hilltop, grassy field, lawn, ditch, forest).
- Construct a visual representation of a specific food chain that exists within a habitat or community.
- Use tools and apparatus in a manner that ensures personal safety and the safety of others.

SCIENTIFIC INSTRUMENTS

How do we use tools in science?

SCI.3.C.4
Demonstrate an understanding of the purpose and function of various scientific instruments and materials (considering availability and appropriateness), as well as competence in using them safely.

Examples: magnifying glass, craft and recycled materials, classroom materials, nature materials, charts, safety procedures

CAREERS, HOBBIES, AND ACTIVITIES

Where is science found in our lives?

SCI.4.C.5
Demonstrate an understanding of the connections between the scientific ideas studied and a range of careers, hobbies, and activities.

Examples: optometrist, ophthalmologist, audiologist, sound engineer, musician, teacher, materials transportation, agronomist, farmer, ecologist, hydro worker, geologist, DJing, gardening, Indigenous teachings related to life interconnectedness, making art, playing an instrument, table tennis, outdoor play and learning

Manitoba

Strand D. Nature of Science

PURPOSE

Science is about finding the cause or causes of phenomena in the natural world.

What is science for?

SCI.4.D.1 Demonstrate the understanding that science attempts to develop explanations for phenomena in nature.

METHOD

Scientific explanations, theories, and models are those that best fit the evidence available at a particular time.

How is science done?

SCI.4.D.2 Demonstrate the understanding that developing scientific explanations involves systematically collecting data through observations and measurements or using data from other sources.

SCI.4.D.3 Demonstrate the understanding that a hypothesis is a prediction about what is happening, or what might happen, based upon theory, research, past experience, observations, or other evidence.

SCI.4.D.4 Demonstrate the understanding that the data that scientists look for is guided by a theory or a hypothesis, and the evidence they find supports or refutes their predictions.

APPLICATION

The knowledge produced by science is used in engineering and technologies to create products and processes.

How is science used?

SCI.4.D.5 Demonstrate the understanding that engineering is the application of scientific principles and approaches to solving problems, often resulting in new technology that furthers scientific discovery.

SCI.4.D.6 Demonstrate the understanding that when solving problems, there may be many possible solutions, each with associated implications, requiring both critical and creative thinking in choosing the best solution.
Examples: functionality, sustainability, economic considerations, ethics, impacts on all living things and all parts of the ecosystems

IMPLICATION

Applications of science often have ethical, environmental, social, economic, and political implications.

What are the impacts of using science?

SCI.4.D.7 Demonstrate the understanding that technologies may have both beneficial and detrimental social and environmental consequences.

Strand E. Scientific Knowledge

FIELDS

Objects can affect other objects at a distance.

How do light and sound affect objects over a distance?

SCI.4.E.1 Demonstrate the understanding that light and sound are examples of energy that transmits from a source and that can cause effects on objects at a distance.
Examples: light transmitting to the eye, sound transmitting to the ear

SCI.4.E.2 Demonstrate the understanding that light and sound transmissions can interact in various ways with matter.
Examples: reflection, absorption, transmission, scattering

SCI.4.E.3 Demonstrate the understanding that sound is created by an energized source and is transmitted in all directions as vibrations in air (or other material) to the ears.
Include the following: sense, vibrating source, ear, ear drum, loudness, pitch.

SCI.4.E.4 Demonstrate the understanding that light is emitted in all directions by an energized source, and transmits through empty space or transparent matter to the eyes.
Include the following: sense, light source, eye, retina.

SCI.4.E.5 Demonstrate the understanding that visible objects either emit light or reflect light into the eye.
Include the following: luminous, illuminated, source, reflection, light source.

ENERGY

The total amount of energy in the universe is always the same but can be transferred from one energy store to another during an event.

What does energy do?

SCI.4.E.6 Demonstrate the understanding that energy can transfer from a source (e.g., sun, fuel, motor, electrical outlet) to objects or organisms to cause actions (e.g., living, heating, moving, charging).

SCI.4.E.7 Demonstrate an understanding of the varied ways that humans use senses to detect energy in action.
Examples: heat (touch), light (sight), sound (hearing), electrical devices (various), combustion (various), observing motion

SCI.4.E.8 Demonstrate an understanding of the differences among renewable and non-renewable energy sources.
Include the following: hydroelectric, fossil fuels, nuclear, wood, wind, solar.

EARTH SCIENCE

The composition of Earth and its atmosphere and the processes occurring within them shape Earth's surface and its climate.

Where does soil come from and why is it important?

SCI.4.E.9 Demonstrate an understanding of the nature and types of soil.
Examples: sandy, silty, loamy, clay

SCI.4.E.10 Demonstrate an understanding of the properties of fertile soil.
Include the following: air, water, nutrients, worms, insects, microbes, organic matter.

SCI.4.E.11 Demonstrate an understanding of the types of rock, rock formation, and geographic location of rock types.
Include the following: igneous, sedimentary, metamorphic.

SCI.4.E.12 Demonstrate an understanding of weathering and the erosion of rock, and its relation to soil formation.
Include the following: bedrock, boulders, gravel, sand, silt, clay.

LIFE SYSTEMS

Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.

What is the nature of an ecosystem?

SCI.4.E.13 Demonstrate the understanding that every living thing has adapted to survive in a specific habitat.
Examples: food, water, climate, camouflage, survival strategies, shelter

SCI.4.E.14 Demonstrate an understanding of the cycling of matter and flow of energy among living and non-living parts of an ecosystem.
Include the following: food chains, food webs.

SCI.4.E.15 Demonstrate an understanding of how plants and animals (including humans) rely on each other and the environment for survival.
Include the following: soil nutrients, water, food, shelter, fuel, clothing, pollination, seed dispersal.