Grade **7**

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

- *What is matter made of?*
- *What is the role of gravity on Earth and in the Solar System?*
- *How does energy move on Earth, in ecosystems, and through space?*

Strand A. Indigenous Peoples within the Natural World

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

SCI.7.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.7.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.7.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: particle theory and its contribution to science and technology; chemistry of cooking; heat capacity of water and life; historical and modern understanding of the apparent motion of celestial bodies; significance of celestial bodies (Earth, Sun, Moon, stars) in various cultures; humans in space; current and future space missions; climate change; heating, cooling, and insulating technologies; renewable and non-renewable energy generation; biodiversity and sustainability; conservation and protection of land, water, and ecosystems; sustainable resource management; ethnobotany; wildlife-human interactions and coexistence

SCIENTIFIC MEASUREMENT

How do we measure scientifically?

SCI.7.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: calendar, clock, thermometer, ruler, pan balance, balance, volumetric vessels, spring scale, **compass, astrolabe**
- Attributes: length, mass, volume, time, temperature, speed, force, **direction, altitude, energy**
- Units: length (km, m, cm, mm), mass (kg, g), volume (L, mL), time (h, min, s), temperature (°C), speed (km/h, m/s), force (N), **direction (compass coordinates), altitude (degrees), energy (J)**
- Skills: measure and estimate using standard SI tools and units; select measurement tools; display quantitative data (charts, line graphs, tables, etc.); recognize importance of standard units; convert between SI length, time, and volume units; understand meaning of SI prefixes and their symbols (micro, milli, centi, deci, deka, hecto, kilo, mega); **understand the purpose, utility, and immutability of the metric system**

ACTION AND PRACTICE

How can we do science?

SCI.7.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, 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.
- Follow established safety procedures for working with heating appliances and hot materials (e.g., switch hot plates off immediately after use, use tongs and insulated mitts for carrying hot materials).
- Explain how evidence gathered while investigating states of matter and changes in states of matter supports or refutes the particle theory of matter.
- Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and Moon, and seasons.
- Use a technological problem-solving process to design, construct, and evaluate a prototype of a device that will provide a solution to a practical problem related to heating or cooling (e.g., cooking food, keeping food warm or cool for an extended period, keeping a shelter warm or cool, keeping a person warm or cool).
- Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

SCIENTIFIC INSTRUMENTS

How do we use tools in science?

SCI.7.C.4
Demonstrate an understanding of the purpose and functioning of various scientific instruments and materials (considering availability and appropriateness), as well as competence in using them safely.

Examples: telescope, binoculars, glassware, hot plate, chemical substances, craft and recycled materials, classroom materials, materials from nature, logbook, diagrams, charts, graphs, spreadsheets, safety procedures

CAREERS, HOBBIES, AND ACTIVITIES

Where is science found in our lives?

SCI.7.C.5
Demonstrate an understanding of the connections between the scientific ideas studied and a range of careers, hobbies, and activities.

Examples: physicist; astronomer; heating, ventilation and air conditioning (HVAC) technician; heating and cooling; engineer; ecologist; dance; sailing; boating; fitness; composting; gardening; practices of hunting, trapping, and fishing; berry picking; stargazing; track and field events; baseball

Manitoba

Strand D.
Nature of Science

PURPOSE	METHOD	APPLICATION	IMPLICATION
Science is about finding the cause or causes of phenomena in the natural world.	Scientific explanations, theories, and models are those that best fit the evidence available at a particular time.	The knowledge produced by science is used in engineering and technologies to create products and processes.	Applications of science often have ethical, environmental, social, economic, and political implications.
What is science for?	*How is science done?*	*How is science used?*	*What are the impacts of using science?*
SCI.7.D.1 Demonstrate the understanding that empirical data must be systematically collected, and conclusions reviewed, to detect potential errors and minimize bias. Include the following: peer review, types of bias.	**SCI.7.D.3** Demonstrate the understanding that models are metaphorical representations of phenomena used to aid understanding or explain what is happening. Examples: physical model, mathematical model, simulation	**SCI.7.D.5** Demonstrate the understanding that many factors play a role in finding optimal solutions to problems. Examples: available materials; effects on humans and other animals; environmental effects; costs	**SCI.7.D.7** Demonstrate the understanding that technologies that improve human life can have predictable and unforeseen detrimental consequences. Examples: medicine; improved agriculture and overpopulation; overproduction and pollution; resources and space depletion; extinction
SCI.7.D.2 Demonstrate an understanding of the nature of scientific predictions, and how they are tested. Include the following: hypothesis, experiment, variables.	**SCI.7.D.4** Demonstrate the understanding that scientific models may be well established (e.g., Solar System model) while others are more tentative (e.g., black hole model).	**SCI.7.D.6** Demonstrate the understanding that seeking solutions to problems often involves employing a variety of strategies before an actual solution is determined. Examples: drawings, models, mathematical modelling, computer simulations	**SCI.7.D.8** Demonstrate the understanding that when detrimental effects of a technology are revealed, the trade-off between the advantages and consequences of continued use must be carefully considered. Include the following: fossil fuels and climate change; paper usage and biodiversity; cell phones and social health.

Strand E.
Scientific Knowledge

MATTER

All matter in the universe is made of very small particles.

What happens to particles of matter as heat is added or removed?

SCI.7.E.1 Demonstrate an understanding of the particle theory of matter and its significance to understanding the properties and behaviours of substances in the three different states of matter.

SCI.7.E.2 Demonstrate an understanding of how adding or removing energy affects the speed, and therefore, the kinetic energy of particles in matter.
Include the following: temperature change, state change, conservation of mass during state change, freezing, melting, evaporation, condensation, sublimation.

SCI.7.E.3 Demonstrate the understanding that boiling and melting points are different in different substances due to variations in attraction between the particles that make up each substance.

FIELDS

Objects can affect other objects at a distance.

How does gravity affect objects?

SCI.7.E.4 Demonstrate the understanding that gravity is a universal attractive force between objects, extends infinitely, and increases with the masses of the objects.

SCI.7.E.5 Demonstrate the understanding that the gravitational force on objects on Earth is observed as a downward force on the object called weight.
Include the following: mass, newton (N), weight differences on the Moon or other planets.

SCI.7.E.6 Demonstrate an understanding of the role of gravity in the orbits of planets and various satellites.

SCI.7.E.7 Demonstrate the understanding that tides result from the gravitational interaction between the Moon and large bodies of water.

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 happens to energy as objects cool?

SCI.7.E.8 Demonstrate the understanding that when an object is heated, it has more energy than when it is cold.

SCI.7.E.9 Demonstrate an understanding of the principles of heat transfer from a hot object.
Include the following: conduction, convection, radiation, thermal equilibrium, thermal insulator, thermal conductor.

SCI.7.E.10 Demonstrate the understanding that many phenomena can be understood in terms of energy exchanges.
Examples: weather, growth of plants, physical activity, cooking

SCI.7.E.11 Demonstrate the understanding that when energy is transferred from a store, it can make things happen, and energy is ultimately dissipated to the environment as heat in the process.
Include the following: efficiency.

SPACE SCIENCE

Our Solar System is a very small part of one of billions of galaxies in the universe.

What is the Solar System?

SCI.7.E.12 Demonstrate an understanding of the scale and structure of the Solar System and the nature of the bodies it contains.
Include the following: Sun as central star, eight known planets and their types, orbital distances, Moon, moon phases, orbit, rotation, revolution, solar and lunar eclipses, sizes of celestial bodies.

SCI.7.E.13 Demonstrate the understanding that the apparent motion of the Sun, the Moon, and stars is caused by the rotation of Earth.

SCI.7.E.14 Demonstrate an understanding of the observed motion of planets in relation to background stars.
Include the following: Earth's rotation and revolution.

SCI.7.E.15 Demonstrate an understanding of the extent of human space exploration and related technologies.
Examples: crewed and un-crewed missions, rockets, probes, rovers, satellites

SCI.7.E.16 Demonstrate an understanding of the astronomical significance of lines of latitude and longitude.
Include the following: seasons, time zones, global climate patterns, equinox, solstice, tropics, equator, Arctic/Antarctic circle.

LIFE SYSTEMS

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

How do ecosystems remain stable?

SCI.7.E.17 Demonstrate an understanding of the concept and nature of a self-sustaining ecosystem.
Examples: habitat, population, community

SCI.7.E.18 Demonstrate an understanding of photosynthesis.
Include the following: energy, chlorophyll, glucose.

SCI.7.E.19 Demonstrate an understanding of energy transfer in ecosystems.
Include the following: Sun, energy loss, food chain, food web, ecological pyramid.

SCI.7.E.20 Demonstrate an understanding of the roles of organisms at various trophic levels, and their importance in sustaining an ecosystem.
Include the following: producers (autotrophs), consumers (heterotrophs), decomposers.

SCI.7.E.21 Demonstrate an understanding of the nature of competition for resources within an ecosystem.
Examples: energy, nutrients, water, space

SCI.7.E.22 Demonstrate an understanding of the need for the recycling of nutrients and for the replenishing of energy within ecosystems.

SCI.7.E.23 Demonstrate an understanding of the potential effects on plants and animals in an ecosystem when conditions change.
Examples: loss of food source, loss of habitat, polluted water, climate change