Grade 6-8 Science Curriculum Core Ideas & Skills Outcomes

Gr 6-8 Core Ideas and Learning Contexts

Grade 6

GCO 1.0 Students will use scientific inquiry and technological design skills to solve practical problems, communicate scientific ideas and results, and make informed decisions while working collaboratively.

The Nature of Science: Core ideas and contexts	
Behaviour and Properties of Light	• Light: Electromagnetic spectrum (EMS); Sources of visible light; Properties of light; Behavior of light e.g., dispersion, absorption and transmission; Law of reflection; Refraction; Shadow formation: shape, location and size • Sound: Properties; Propagation through different mediums (matter) • Olfactory (smell) receptors: biochemical and biophysical receptors
Biological Forms and Processes	• Interactions among sense organs, nerves and the brain enabling organisms to predict, analyse and respond to changes in their environments: - **Seeing** (Vision): Detection and response to visible light; Different kingdoms organs e.g., plants, eye spots, compound eyes, mammalian eyes, etc.; Model of human eye e.g., structures and functions - **Hearing** (Auditory): Detection and response; how do different organisms process sound; Model of human ear e.g., structures and functions - **Touch** (Tactile), **Taste** (Gustatory) **and Smell** (Olfactory): Conditions and diseases affecting organs; Prevention; Treatment - **Vestibular** (sense of balance) and **proprioception** (unconscious awareness of the position of our body parts) • Information processing: brain, spinal cord, and nerve network (*Nervous System*)
Technological Applications	• Wayfinding technologies e.g., telescope, periscope, eyes, ears, camera, remote sensing, etc. • Corrective technologies e.g., eye glasses, hearing aid, etc., • Adaptive technologies e.g., Braille, immersive reader, seeing-eye dog, etc.

GCO 2 Students will demonstrate an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology (STSE).

Learning and Living Sustainably: Core ideas and contexts	
Safety	• Correct use of equipment and tools • Conducting field work and investigations safely • Safety and prevention practices: wafting, eyewear, protective earwear, gloves, UV clothing, sunscreen, etc. • Sensory processing issues
Sustainability 	• Health and well being of self: sensory organs; eyes; ears; olfactory system • Empathy for those with sensory impairments: visually impaired, hard of hearing, colour blindness, etc.; sensory processing issues; sensory seeking, sensory avoiding • Life and career pathways: scientific literate citizen, eye surgeon, ENT specialist, hearing health professional, audiologist, hearing instrument technician, optometrist, ophthalmologist, etc., • Science and the UN Sustainable Development Goals: Good Health and Well-being [SDG 3], Reduced Inequalities [SDG 10], Life Below Water [SDG 14] and Life on Land [SDG 15]
Applied Technology	• Design challenge: Build an accessibility device to address a sensory impairment and/or limitation E.g., a sensory room • Ecological systems: economic and environmental challenge of making stuff; what we make; how we make it; how does it fit into a larger system; and life cycle of a product.

Grade 7

GCO 1.0 Students will use scientific inquiry and technological design skills to solve practical problems, communicate scientific ideas and results, and make informed decisions while working collaboratively.

The Nature of Science: Core ideas and contexts	
Matter	• Particle model of matter: States of matter e.g., solids, liquids, gas and plasma • Quantitative analysis of physical properties: Temperature, mass, volume, and density • Energy transfer and conservation: 1st Law of thermodynamics; heat vs. temperature; energy transfers: convection, conduction, radiation; role in transforming matter • Heating curve: Temperature; heat vs. temperature; boiling, melting, and freezing points of water
Weather Systems and Climate	• Earth systems: biosphere, atmosphere, hydrosphere, and geosphere • Definitions: Weather, climate, global warming • Cycles: Seasons e.g., day-night (sunlight); water e.g., fresh water, salt water; atmospheric flow patterns; role of gravity • Water in the atmosphere: Complex patterns of changes; movement e.g. winds, landforms, ocean temperatures and currents; phases e.g., solidification, evaporation, transpiration, condensation, sublimation; precipitation e.g., rain, snow, sleet, hail, etc. • Quantitative analysis: Insolation (light intensity), albedo, air temperature, wind speed and direction, humidity, barometric pressure, amount of precipitation, etc. • Weather patterns: Trends and relationships between barometric pressure, temperature, precipitation patterns and weather systems • Meteorology: Weather instruments e.g., analog and digital instruments; remote sensing e.g. satellite imagery; monitoring, reporting and predicting e.g., Traditional knowledge systems, farmers almanac; accuracy and reliability

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Learning and Living Sustainably: Core ideas and contexts	
Safety	• Correct use of equipment and tools • Conducting field work and investigations safely • Emergency preparedness; severe weather e.g. blizzards, flooding; etc.
Sustainability  *Click on image to visit website.*	• Climate science basics e.g., greenhouse gas effects, carbon cycle and physical impacts – sea level rise and severe weather; Climate resilience e.g., Adaptation and mitigation strategies • Global climate systems: Definitions e.g., global warming, greenhouse effect, climate change; local and global impacts e.g., economic, societal, and environmental concepts and connection to human lives and threats to biodiversity • Technology for good: Climate modelling; mitigation and adaption simulations • Impact analysis across spatial and temporal scales: Local, regional, national and global; impact of geographic locale on weather e.g., coastal, land-locked, lake-effect, etc. and impact of weather on land and infrastructure e.g., coast erosion, flooding, electricity outage, etc. • Life and career pathways: Climate literate citizen, meteorologist, climatologist, climate scientist, and climate adaptation and mitigation, etc. • Science and the UN Sustainable Development Goals: Sustainable communities and cities [SDG 11]. Climate Action [SDG 13], Life Below Water [SDG 14] and Life on Land [SDG 15]
Applied Technology	• Provincial weather sensor array: Province-wide weather monitoring stations

Grade 8

GCO 1.0 Students will use scientific inquiry and technological design skills to solve practical problems, communicate scientific ideas and results, and make informed decisions while working collaboratively.

The Nature of Science: Core ideas and contexts	
Motion & Stability	• Qualitative descriptions of motion: Direction of movement, time taken to travel a set distance, acceleration, rotation and revolution • Force as a physical property: Push-pull, area, and pressure • Forces and Interactions: Contact, gravitational, and muscular
Laws of Motion	• Definitions: Hypothesis, theory and law • Law of Gravity: force, 9.8 m/s/s • Newton's Laws: 1st Law: Inertia, net force, balanced and unbalanced forces; 2nd Law: Effects of force and mass on acceleration; and 3rd Law: Action-reaction, Forces in pairs
Space Exploration	• Solar System: Earth's place in the universe; Movement of celestial body e.g., rotation, revolution; types of celestial objects e.g. NEO, planets, moons, stars, etc. • Space Travel: Aeronautics – Rockets, propulsion, fuel, navigation and steering, and atmospheric drag; Spaceships – Design and construction, parts of a rocket, form and function e.g. the ISS modular design; and Propulsion – hydraulics, gravity, atmospheric drag, and friction • Living and working in space: Hazards, Zero-gravity, effect on human systems, etc.
Technological Applications	• Robotics: Canadarm (1 and 2) • Remote sensing; telescopes; RADARSTAT satellites; etc.

GCO 2 Students will demonstrate an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology (STSE).

Learning and Living Sustainably: Core ideas and contexts	
Safety	• Correct use of equipment and tools • Conducting field work and investigations safely • Space Hazards: Radiation, isolation, distance from Earth, gravity fields, hostile/closed environments
Sustainability  *Click on image to visit website.*	• Human Survival: wellness: mental and physical well-being; Zero-gravity: body systems and functions • History of space exploration: Successes, failures, and milestones, partnerships between Canadian and International space agencies e.g. NASA, ESA, and UN Space agency • Exosphere (space) traffic: Reusable rockets, space junk • Cost - benefit analysis of space exploration • Life and career pathways science literate citizen, astronaut, biomedical engineer, astrophysicist, computer/information systems scientist, science policy analyst, software engineer, project manager, space artist, etc. • Science and the UN Sustainable Development Goals: Good Health and Well-Being [SDG 3], Industry, Innovation and Infrastructure [SDG 9], Climate Action [SDG 13], and Partnership for the Goals [SDG 17]
Applied Technology	• Space technology and innovation used in every life: Memory foam, CAT scans, Water purification systems, scratch resistant eyeglass lenses, and more! • Space technologies and Climate Change: Earth observation techniques, global environment monitoring, and remote sensing

GCO 1	Students will use scientific inquiry and technological design skills to solve practical problems, communicate scientific ideas and results, and make informed decisions while working collaboratively.

SCO 1.1	Students will ask questions about relationships between and among observable variables to plan investigations (scientific inquiry and technological problem-solving) to address those questions.

Achievement indicators:

- Ask questions about phenomenon that lead to a fair test or brainstorm a practical technological problem.
- Consider appropriate variables; *dependent, independent and control* to formulate a hypothesis.
- Choose appropriate materials and equipment for an investigation.
- Describe the investigation procedures for a *fair test* or a solution to a practical problem.

SCO 1.2	Students will collect and represent data using tools and methods appropriate for the task.

Achievement indicators:
Achievement indicators connected to safety concerning oneself, procedures and practices are noted in GCO 2.0 on page 28. Safety is a subset of sustainability.

- Conduct appropriate investigation to test hypothesis or problem statement.
- Use tools and equipment appropriately (e.g., proper handling, transport, and storage) in an investigation.
- Record observations (*qualitative data*) and/or measurements (*quantitative data*).
- Develop a model to predict and/or describe a phenomenon.

SCO 1.3	Students will analyse and interpret qualitative and quantitative data to construct explanations.

Achievement indicators:

- Organize tables and graphical displays.
- Construct graphical displays of data (e.g., drawings, charts, maps, graphs).
- Interpolate or extrapolate from a data pattern or trend.
- Classify objects and events.
- Obtain information from sources and/or other reliable media to support results.
- Use data (*evidence*) to confirm or refute the hypothesis or initial problem.

SCO 1.4	Students will work collaboratively on investigations to communicate conclusions supported by data.

Achievement indicators:

- Use appropriate science vocabulary, numeric and symbol systems to share understandings.
- Discuss ideas and contributions of peers, teacher and/or guests.
- Suggest reason if data does not follow a general trend or relationship.
- Communicate ideas using a variety of modes (e.g., digital technologies, models, simple reports).
- Present ideas in a clear and logical order.

GCO 2	Students will demonstrate an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology (STSE).

SCO 2.1	Students will consider factors that support responsible application of scientific and technological knowledge and demonstrate an understanding of sustainable practices.

Achievement indicators:

- Follow guidelines for safe use of equipment to conduct a scientific experiment.
- Follow guidelines for safe use of tools to build a prototype of a solution.
- Use science knowledge when considering issues of concern to them.
- Use technological knowledge when considering issues of concern to them.
- Reflect on various aspects of an issue to make decisions about possible actions.
- Promote health and well being of wayfinding organs/structures for self and family.

Gr. 7 SCO Achievement Indicators

GCO 1	Students will use scientific inquiry and technological design skills to solve practical problems, communicate scientific ideas and results, and make informed decisions while working collaboratively.

SCO 1.1	Students will ask questions about relationships between and among observable variables to plan investigations (scientific inquiry and technological problem-solving) to address those questions.

Achievement indicators:

- Ask questions that arise from careful observation of phenomena, models or unexpected results.
- Determine variables (e.g. dependent, independent and control) to formulate a hypothesis.
- Define the problem.
- Select appropriate tools, materials and equipment to carry out a fair test or build a prototype.
- Develop (with guidance) investigation procedures for a fair test or designs a solution to a practical problem.

SCO 1.2	Students will collect and represent data using tools and methods appropriate for the task.

Achievement indicators:
Achievement indicators connected to safety concerning oneself, procedures and practices are noted in GCO 2.0 on page 28. Safety is a subset of sustainability.

- Perform a systematic experimental procedure to test a hypothesis or executes plan to build a prototype.
- Apply scientific ideas or technological principles to test a prototype.
- Use tools and equipment appropriately (proper handling, transport, etc.) in an investigation.
- Record qualitative and quantitative data using measurement tools as appropriate.
- Develop a model to show the relationships amongst variables.

SCO 1.3	Students will analyse and interpret qualitative and quantitative data to construct explanations.

Achievement indicators:

- Evaluate the accuracy of various methods for collecting data.
- Identify possible sources of error.
- Construct graphical displays (e.g., drawings, charts, maps, tables, and graphs).
- Interpret maps, graphs and statistics across spatial and temporal scales.
- Apply concepts of probability and statistics (e.g., mean, median, mode, and variability).
- Iterate to improve the prototype (designed solution).
- Draw a conclusion based on evidence gathered from scientific experiment or testing of the prototype.

SCO 1.4	Students will work collaboratively on investigations to communicate conclusions supported by data.

Achievement indicators:

- Work cooperatively to examine own knowledge or knowledge of peers.
- Choose a format of communication appropriate to purpose (e.g., reports, data tables, scientific models, etc.).
- Discuss[2] procedures, results and conclusions of investigations using appropriate scientific terminology
- Discuss the design process leading to the solution using appropriate technological terminology.
- Communicate answers to questions or solutions to problem statement based on evidence.

GCO 2	Students will demonstrate an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology (STSE).

SCO 2.1	Students will consider factors that support responsible application of scientific and technological knowledge and demonstrate an understanding of sustainable practices.

Achievement indicators:

- Follow guidelines for safe use of equipment to conduct a scientific experiment.
- Follow guidelines for safe use of tools to build a prototype of a solution.
- Use science and technological knowledge when considering issues of concern to them.
- Reflect on various aspects of an issue to make decisions about possible actions.
- Explore science- and technology-based careers in Canada based on my interests.
- Describe the causes and effects of climate change.
- Apply systems thinking[4] to understanding of ecosystem interdependence.
- Understand the need for more responsible consumption and production patterns.
- Develop solutions to community issues and challenges concerned with resource use and waste management.

Gr. 8 SCO Achievement Indicators

GCO 1	Students will use scientific inquiry and technological design skills to solve practical problems, communicate scientific ideas and results, and make informed decisions while working collaboratively.

SCO 1.1	Students will ask questions about relationships between and among observable variables to plan investigations (scientific inquiry and technological problem-solving) to address those questions.

Achievement indicators:

- Ask questions that arise from careful observation of phenomena, models or unexpected results.
- Determine variables (e.g. dependent, independent and control) to formulate a hypothesis.
- Define the problem.
- Select appropriate tools, materials and equipment to carry out a fair test or build a prototype.
- Develop (with guidance) investigation procedures for a fair test or designs a solution to a practical problem.

SCO 1.2	Students will collect and represent data using tools and methods appropriate for the task.

Achievement indicators:

Achievement indicators connected to safety concerning oneself, procedures and practices are noted in GCO 2.0 on page 28. Safety is a subset of sustainability.

- Perform a systematic experimental procedure to test a hypothesis or executes plan to build a prototype.
- Apply scientific ideas or technological principles to test a prototype.
- Use tools and equipment appropriately (proper handling, transport, etc.) in an investigation.
- Record qualitative and quantitative data using measurement tools as appropriate.
- Develop a model to show the relationships amongst variables.

SCO 1.3	Students will analyse and interpret qualitative and quantitative data to construct explanations.

Achievement indicators:

- Evaluate the accuracy of various methods for collecting data.
- Identify possible sources of error.
- Construct graphical displays (e.g., drawings, charts, maps, tables, and graphs).
- Interpret maps, graphs and statistics across spatial and temporal scales.
- Apply concepts of probability and statistics (e.g., mean, median, mode, and variability).
- Iterate to improve the prototype (designed solution).
- Draw a conclusion based on evidence gathered from scientific experiment or testing of the prototype.

SCO 1.4	Students will work collaboratively on investigations to communicate conclusions supported by data.

Achievement indicators:

- Work cooperatively to examine own knowledge or knowledge of peers.
- Choose a format of communication appropriate to purpose (e.g., reports, data tables, scientific models, etc.).
- Discuss[2] procedures, results and conclusions of investigations using appropriate scientific terminology.
- Discuss the design process leading to the solution using appropriate technological terminology.
- Communicate answers to questions or solutions to problem statement based on evidence.

GCO 2	Students will demonstrate an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology (STSE).

SCO 2.1	Students will consider factors that support responsible application of scientific and technological knowledge and demonstrate an understanding of sustainable practices.

Achievement indicators:

- Follow guidelines for safe use of equipment to conduct a scientific experiment.
- Follow guidelines for safe use of tools to build a prototype of a solution.
- Use science and technological knowledge when considering issues of concern to me.
- Reflect on various aspects of an issue to make decisions about possible actions.
- Explore science- and technology-based career in Canada based on my interests.
- Analyse the benefits and drawback of human space exploration.
- Raise awareness about the importance of global partnership for sustainable development.
- Differentiate between adaptation and mitigation measures as solutions to climate change.