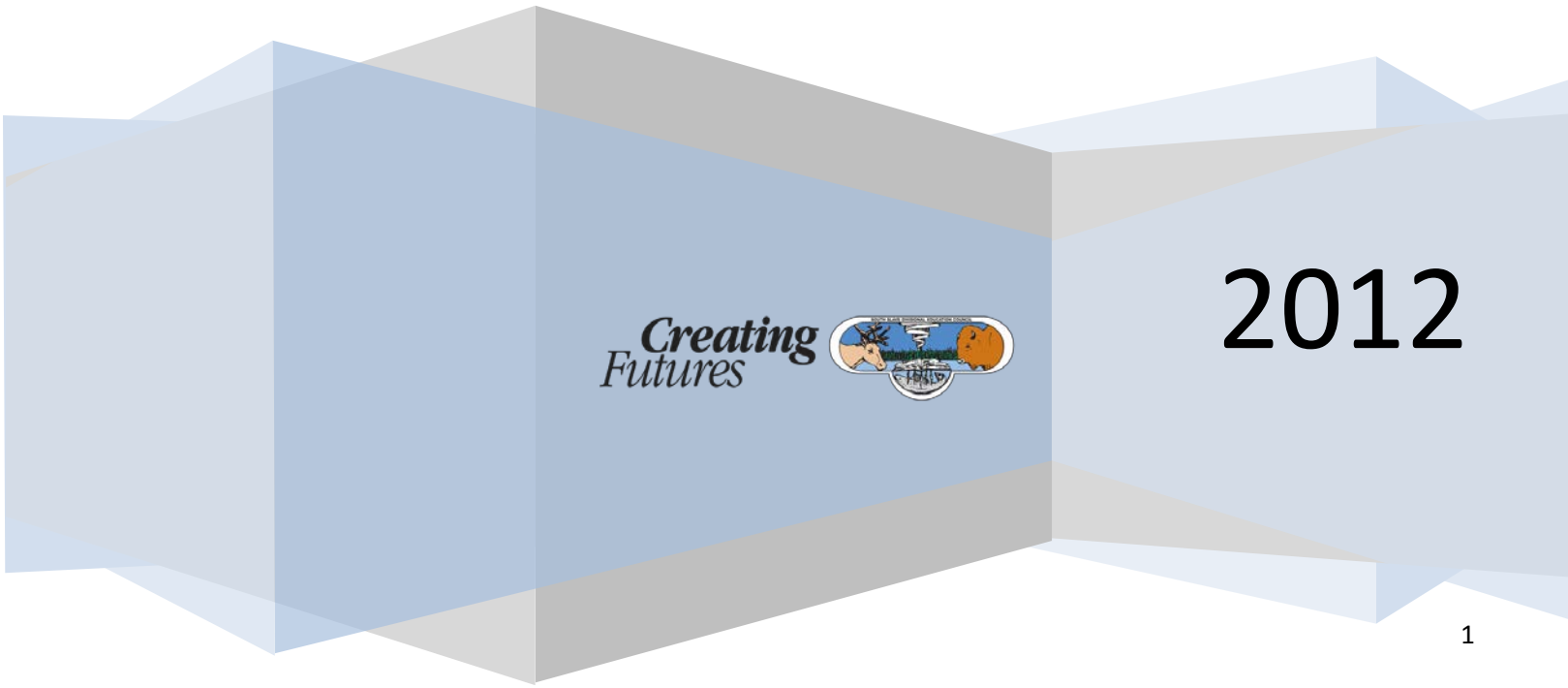
South Slave Divisional Education Council

SCIENCE GRADE 8

CURRICULUM PACKAGE

February 2012



2012

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Dene Kede

Dene Kede, the culture-based curriculum of the NWT, serves as the heart of the NWT Curriculum. Dene Kede was developed under the guidance of Dene elders and shares, through its teachings, the knowledge, skills, and values of the Dene. These cultural understandings serve as the underpinnings for all learning in all content areas and it is expected that the teachings and knowledge contained within Dene Kede shall be woven into all lessons. In this manner our students will become more capable, more successful and better able to *walk in two worlds.*

Strong Like Two People:

Module Purpose: to motivate student to pursue educational goals which include learning in Dene and non-Dene cultures

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Major Cultural Understanding: Education in both cultures creates a person who is "Strong Like Two People".	
Explain ways that education in both cultures creates a person who is "Strong Like Two People".	• Demonstrate understanding of how academic and cultural education creates a person who is Strong Like Two People. o S/he can operate in and enjoy both cultures. o S/he has the trust of both cultures and can help the two to understand each other. o S/he will be able to make positive choices from both cultures.
Major Cultural Understanding: Being "Strong Like Two People" will provide more opportunities for the student.	
Describe how being "Strong Like Two People" will provide more opportunities for the student.	• Explain opportunities that might include: o Occupational choices and higher standards of living o Prestige o Gain knowledge and therefore influence o Ability to help Dene in complex areas of economic and political development o Ability to learn and experience the world
Major Cultural Understanding: Attitudes for becoming "Strong Like Two People"	
Identify attitudes for becoming "Strong Like Two People"	• Explain benefit of attitudes such as: o Setting academic and cultural goals o Seeking learning experiences and support
Major Cultural Understanding: Strategies for goal setting	
Identify various strategies for goal setting	• Visualize self in five years as a young adult • Assess personal strengths and weaknesses that will help or hinder in reaching long-term goals • Identify year-end goals • Identify what must be done to reach goals • Identify people to help them reach their goals • Identify shorter-term goals

Hunting Camp

Module Purpose: to give students the knowledge and understandings related to a spring or fall hunting camp and to give them the experience of a fall hunting camp.

Major Cultural Understanding: Dene knowledge of the hunting area is important to hunting success and safety.	
Explain ways in which Dene knowledge of the hunting area is important to hunting success and safety.	• Describe route landmarks and Dene names • Identify geographical features, landmarks and spiritual site in the area • Identify potentially dangerous areas • Explain importance of historical land use information • Identify seasonal uses of area by community
Major Cultural Understanding: Dene knowledge of game is important for hunting success**.**	
Describe how Dene knowledge of game is important for hunting success.	• Identify small game found at hunting location • Identify small game and caribou habitat, life cycles and habits (Note: Caribou are to be studied only if people in the community hunt them. This can be substituted with any other large game hunted in the fall or spring.) • Describe hunting techniques based on knowledge of game • Identify other resources in the area used by the community

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Hunting Camp

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Major Cultural Understanding: Attitudes related to camping and hunting	
Explain significance of attitudes related to camping and hunting	• Explain importance of showing respect toward others and the land • Ways to learn in unfamiliar situations • Demonstrate taking responsibility and leadership in doing camp chores • Demonstrate following leadership of the hunt leader during the hunt • Demonstrate patience and determination
Major Cultural Understanding: Skills related to land travel and camping	
Demonstrate skills related to land travel and camping	• Demonstrate setting up and maintaining a camp • Demonstrate using a map for travel • Demonstrate computing travel distances using a map • Demonstrate canoe handling • Demonstrate using direction indicators
Major Cultural Understanding: Skills related to hunting	
Demonstrate skills related to hunting	• Illustrate how to predict weather • Demonstrate skills of: tracking, pursuing and shooting game • Demonstrate the making of stretchers or other equipment required for small game
Major Cultural Understanding: Skills related to Dene laws	
Explain/demonstrate various skills related to Dene laws	• Ways of honouring water, land and fire • Illustrate handling game and equipment with respect • Describe reasons for hunting only as much as can he used and using as much of the parts as possible
Major Cultural Understanding: Skills related to land and water safety and survival	
Explain/demonstrate skills related to land and water safety and survival	• Explain ways of making shelter: moss huts with smoke fire, spruce bark • Describe how to make a shelter with pitch and roots and poles, spruce bough shelters • Explain first aid for burns, cuts and broken bones review • Demonstrate and/or describe practice of gun safety • Explain ways of finding direction using stars and wind and sun • Illustrate using ingenuity "when tools are not available • Describe/demonstrate how to make basic repairs to small engines
Major Cultural Understanding: Skills related to handling hunting and camping equipment and supplies	
Explain/demonstrate skills related to handling hunting and camping equipment and supplies	• Explain ways of gathering hunting equipment and basic camping supplies • Explain ways of packing for efficiency
Major Cultural Understanding: Skills related to handling game	
Explain/demonstrate skills related to handling game	• Explain ways of: o Cleaning and butchering o Making caches o Smoking meat or making drymeat o Cooking meat on a campfire o Packing meat

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Birchbark Canoes

Module Purpose: to give students an awareness and appreciation of the science and technology behind the Dene birchbark canoes, an understanding of the historical importance of the canoe, and experience with working with land materials in a Dene way

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Major Cultural Understanding: The birch bark canoe is an example of the sophistication of traditional Dene technology.	
Explain ways in which the birch bark canoe is an example of the sophistication of traditional Dene technology.	• Describe the scientific and technological principles of structure and materials used for: o Creating maneuverability and speed for the canoe o Creating canoe durability o Creating ability of canoe to bear weight o The scientific principles involved in: o Slipstreaming
Major Cultural Understanding: Canoes were a very important part of Dene history and culture.	
Identify how canoes were a very important part of Dene history and culture.	• Provide details regarding how canoes were a part of history and culture of the Dene in the following ways: o Uses of birch bark vs. Spruce vs. Moose hide canoes by o Various tribes and in various seasons o Caribou hunting o Fishing o Muskrat hunting o Trading o Enabled extensive hunting territory during summer o Months o Into the barrens o Down mountains
Major Cultural Understanding: Canoe building involved expertise and cooperation.	
Explain ways in which canoe building involved expertise and cooperation.	• Describe how Birchbark and moose hide canoes were built involving the efforts of many people working cooperatively together. • Explain reasons why learning how to build the canoes required many years of experience with others more knowledgeable and experienced in the making and using of canoes. • Explain ways in which those who were very skilled at building birchbark or moose skin canoes were highly esteemed people because the canoe designs were the result of generations of Dene experimenting and learning from one another. The knowledge passed down from one to another was very complex and invaluable.
Major Cultural Understanding: The land was shown respect when taking materials for canoe building.	
Describe way that the land was shown respect when taking materials for canoe building.	• Explain how bark was taken from trees in such a way that the trees were not killed. • Describe ways that the land was honoured for the resources it gave 10 enable life.
Major Cultural Understanding: Skills related to working with wood.	
Describe and/or demonstrate skills related to working with wood.	• Describe how to: o Work with spruce wood, spruce root, birchbark, spruce gum and moss o Work with wood working tools • Explain ways in which to achieve wood working while in the bush

Birchbark Canoes

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Major Cultural Understanding: Attitudes related to working with wood.	
Explain positive attitudes related to working with wood.	• Describe how to demonstrate respecting and learning from resource people or Elders • Explain value of reflecting on personal talents and interests with respect to new experiences • Demonstrate how to show patience and determination while developing one's woodworking skills

Leadership

Module Purpose: to give students an understanding of the meaning of Dene leadership, to provide them with stories of Dene leaders and heroes, and to give them a sense of what Dene leadership mean today.

Major Cultural Understanding: A traditional Dene leader was one who enabled others to survive.	
Explain how a traditional Dene leader was one who enabled others to survive.	• Identify ways in which food and security were provided to those who went with a leader because of the leader's special abilities.
Major Cultural Understanding: Traditionally, Dene leaders were spiritual leaders.	
Explore and explain how traditionally, Dene leaders were spiritual leaders.	• Explain ways in which they lived morally good lives. • Explore and describe how they were prophets with messages to the Dene from the Creator. • Provide details of how they reminded Dene that there was a power greater than them and that they had to be humble in their living.
Major Cultural Understanding: Traditional Dene leaders had special abilities and attitudes.	
Identify traditional Dene leaders had special abilities and attitudes.	• Describe how they led by example rather than by force or persuasion. • Identify how that they were the most capable providers. • Explain ways that they knew the land exceptionally well and were hardworking. • Explore ways that they were often spiritual people possessing medicine powers that they used for the good of the people. • Describe their foresight and planned ahead. • Explain ways in which they demonstrated they were concerned with the welfare of the whole group, rather than simply themselves and their families. • Provide examples of ways they were generous. • Explain how they were humble. They did not brag about their abilities, nor did they abuse their power by imposing their wishes on people. • Describe how they recognized that their leadership was based on the support of others. • Provide examples of how they were often good orators and communicators.
Major Cultural Understanding: Traditionally, leaders were identified by Elders and led through consensus.	
Explore ways in which traditionally, leaders were identified by Elders and led through consensus.	• Explain why people did not compete for leadership nor were there elections. o Instead, a person became a leader when others chose to follow him or her (traditionally, the leaders were predominantly male) because of his abilities and attitudes. • Describe the impact of there being no law that said that everyone must follow the same leader. Those who did not wish to follow that person were free to go their own way or to make their own decisions. • Explore ways in which elders and the most experienced were influential deciding who should be chosen as leader. Every person did not have equal influence or power in deciding who to follow.

Leadership

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Major Cultural Understanding: Traditionally, leadership was based on consensus.	
Explain how traditionally, leadership was based on consensus.	• Describe how all those who depended upon his leadership chose him freely to be their leader. They gave the leader their full support in carrying out any decision that was made for the group. There was little in the way of fighting. Those who felt strongly in opposition to a leader could go their own way. • Explain how those who dissented were free to speak their minds to the leader. A good leader would hear all voices, especially those of the Elders and find a solution that suited everybody's concerns (consensus decision-making). • Describe how once consensus was reached and a decision made, it was expected that all the people in the group would act responsibly and efficiently in carrying out the decision. To do otherwise threatened the safety of the group.
Major Cultural Understanding: Traditionally, there were different levels of Dene leadership.	
Identify how traditionally, there were different levels of Dene leadership.	• Describe and discuss various levels of Dene Leadership, including: o The band camp - this was the main group of the Dene in traditional times. Most of their time was spent living within this group (see Grade 7 - Module Four). Often the camps were made up of extended families and friends and followers. The leader of this camp was often a male head of the extended family, a person who displayed all the characteristics of a good leader. o The tribe – when bands would come together for special annual hunts or celebrations, usually one person was chosen to speak for all of them. This tribal leader would meet with the bandleaders and Elders to make decisions concerning the tribe. o The hunting group or family camp - Small hunting groups would sometimes go off from the band camp to hunt and live, especially when food was scarce. These groups were usually made up of family, a father perhaps and one or two grown sons with their wives and children. The father or oldest hunter was the leader while they were away from the band.
Major Cultural Understanding: Non-Dene forms of selecting leadership have been introduced to the Dene.	
Explain how non-Dene forms of selecting leadership have been introduced to the Dene.	• Describe the impact of fur trade on Dene Leadership, those who dealt with the traders in the name of the camp or band became leaders. • Explain how after treaty, elected chief and councilors became official leaders. • Illustrate how/why today, elected mayors and Members of the Legislative Assembly (MLAs) form a part of Dene leadership.
Major Cultural Understanding: Dene perspectives on leadership are still valued and practiced.	
Describe way in which Dene perspectives on leadership are still valued and practiced.	• Provide examples of leaders who are humble and generous and explain why they are preferred. • Indentify reasons why leaders are chosen for their skills and abilities in required areas. • Show ways that leaders consult with Elders for guidance. • Explore/discuss ways that support and cooperation are given to chosen leaders. • Show how consensus and negotiation are used in decision-making. • Explore/discuss ways that Dene Elders today use their Dene perspectives and knowledge about the land to help them to make decisions about how the land is to be used.

Leadership

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Major Cultural Understanding: Attitudes that accompany good leadership.	
Explore attitudes that accompany good leadership.	• Explain ways in which the following attitudes contribute to good leadership: o Taking leadership if one has the required abilities and knowledge o Acknowledging talents in one another o Having input into choosing leadership and supporting it once chosen o Being humble, patient and generous o Leading by example rather than force
Major Cultural Understanding: Skills that accompany good leadership.	
Discuss skills that accompany good leadership.	• Weigh the value of these various skills on good leadership: o Communicating needs o Listening to concerns and voices of others o Consulting with experienced people for guidance o Making decisions based on the welfare of the whole rather than selected individuals o Recognizing that their position is based on the support of others

Discovering Our Dene Talents

Module Purpose: to provide students with the learning attitudes and skills required to further develop their Dene skills

Major Cultural Understanding: Practice is essential for developing the basic Dene Skills.	
Explain ways in which practice is essential for developing the basic Dene Skills.	• Explore and describe ways that various skills are developed with much practice and constant learning: o Mental attitude is important in being able to develop skills. o Setting personal goals and being determined to accomplish them. o Basic skills are often learned by watching and learning from family members. o Watching others learn and practice can develop skills.
Major Cultural Understanding: Developing one's Dene skills gives focus and meaning to life.	
Explore ways in which developing one's Dene skills gives focus and meaning to life.	• Describe how the development of Dene skills requires discipline and commitment, which are important to any life endeavour. • Explain ways in which skill development is a lifetime activity. • Describe how sharing and teaching one's skills to others is rewarding. • Identify ways in which one's skills may become one's livelihood. • Explore and describe how developing and sharing Dene skills strengthens the Dene culture. • Identify how one's developed skills may be seen as work done for the Creator.
Major Cultural Understanding: Development of Dene skills	
Describe the development of Dene skills	• Identify impact of developing one's basic Dene skills • Explain ways to explore and experience a wide range of Dene skills
Major Cultural Understanding: Attitudes helpful in developing basic Dene skills	
Identify attitudes that are helpful in developing basic Dene skills	• Identify and justify attitudes that are helpful in developing basic Dene skills, such as: o Persevering without frustration o Taking risks that could lead to error and correction o Making the choice to practice with one's personal time o Taking opportunities to observe and listen to family and o Community members as they work on their Dene skills o Sharing one's work with others so as to learn from one another

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Discovering Our Dene Talents

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Major Cultural Understanding: Strategies for developing basic Dene skills	
Explore and describe strategies for developing basic Dene skills	• Demonstrate the setting small goals for oneself • Explain the value of promising small rewards for oneself as one makes progress • Describe the value of reminding self that perfection only comes with practice • Describe the value of reminding self of the potential value of the Dene skills one is developing • Describe the value of reminding self of cultural pride and pride in work for the creator

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Attitude Outcomes: common to all units

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Interest in Science; *Students will be encouraged to* develop enthusiasm and continuing interest in the study of science.	• Show interest in science-related questions and issues, and pursue personal interests and career possibilities within science-related fields.
Mutual Respect: Students will be encouraged to appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds.	• Appreciate that scientific understanding evolves from the interaction of ideas involving people with different views and backgrounds
Scientific Inquiry: Students will be encouraged to develop attitudes that support active inquiry, problem solving and decision making.	• Seek and apply evidence when evaluating alternative approaches to investigations, problems and issues.
Collaboration: Students will be encouraged to develop attitudes that support collaborative activity.	• Work collaboratively in carrying out investigations and in generating and evaluating ideas.
Stewardship: Students will be encouraged to develop responsibility in the application of science and technology in relation to society and the natural environment.	• Demonstrate sensitivity and responsibility in pursuing a balance between the needs of humans and a sustainable environment.
Safety: Students will be encouraged to demonstrate a concern for safety in science and technology contexts	• Show concern for safety in planning, carrying out and reviewing activities
Mix and Flow of Matter **Essential Questions:** What are fluids? What are they made of? How do we use them? What properties of fluids are important to their use?	
Investigate and describe fluids used in technological devices and everyday material	• Investigate and identify fluids in household materials, technological devices, living things and natural environments • Explain the WHMIS symbols for labelling substances; and describe the safety precautions when handling, storing and disposing of substances at home and in the lab • Describe examples in which materials are prepared are fluids in order to facilitate transportation, processing or use • Identify properties of fluids that are important to their selection and use
Investigate and describe the composition of fluids and interpret the behaviour of materials in solutions	• Distinguish among pure substances, mixtures and solutions using common examples • Investigate the solubility of different materials and describe their concentration • Investigate and identify factors that affect solubility and the rate of dissolving a solute in a solvent • Relate the properties of mixtures and solutions to the particle model of matter
Investigate and compare the properties of gases and liquids; and relate variations in their viscosity, density, buoyancy and compressibility to the particle model of matter	• Investigate and compare fluids based on their viscosity and flow rate, and describe the effects of temperature change on liquid flow • Observe the mass and volume of liquid and calculate the density using the formula d=m/v • Compare densities of materials; explain the differences in the density of solids, liquids and gases using the particle model of matter

Mix and Flow of Matter

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
(Continued)	• Describe methods of altering the density of a fluid, and identify and interpret related practical applications (e.g., describe changes in buoyancy resulting from increasing the concentration of salt in water) • Describe pressure as a force per unit area by using the formula p = F/A, and describe applications of pressure in fluids and everyday situations • Investigate and compare the compressibility of liquids and gases
Identify, interpret and apply technologies based on properties of fluids	• Describe technologies based on the solubility of materials • Describe and interpret technologies based on flow rate and viscosity • Describe and interpret technologies for moving fluids from one place to another • Construct a device that uses the transfer of fluids to apply a force or to control motion
Skills Outcomes	
Initiating and Planning: Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• Define practical problems • Identify questions to investigate, arising from practical problems and issues • Phrase questions in a testable form, and clearly define practical problems • Design an experiment, and identify the major variables
Performing and Recording: Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• Carry out procedures, controlling the major variables • Use instruments effectively and accurately for collecting data • Construct and test prototype designs and systems • Use tools and apparatus safely • Organize data, using a format that is appropriate to the task or experiment
Analyzing and Interpreting: Analyze qualitative and quantitative data, and develop and assess possible explanations	• Identify and suggest explanations for discrepancies in data • Predict the value of a variable, by interpolating or extrapolating from graphical data • Identify new questions and problems that arise from what was learned • Identify and evaluate potential applications of finding
Communication and Teamwork: Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• Identify and correct practical problems in the way a prototype or constructed device functions • Work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise • Communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means

Cells and Systems

Essential Questions:

How can we make sense of the vast diversity of living things?

What do living things have in common—from the smallest to the largest—and what variations do we find in the structure and function of living things?

Investigate living things; and identify and apply scientific ideas used to interpret their general structure, function and organization	• Investigate and describe example scientific studies of the characteristics of living things • Apply the concept of system in describing familiar organisms and analyzing their general structure and function • Illustrate and explain how different organisms have similar functions that are met in a variety of ways
Investigate and describe the role of cells within living things	• Describe the role of cells as a basic unit of life • Analyze similarities and differences between single-celled and multicelled organisms

Cells and Systems

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
(Continued)	• Distinguish between plant and animal cells • Describe the movement of gases and liquids into and out of cells during diffusion and osmosis, based on concentration differences • Examine plant and animal structures; and identify contributing roles of cells, tissues and organ
Interpret the healthy function of human body systems, and illustrate ways the body reacts to internal and external stimuli	• Describe, in general terms, body systems for respiration, circulation, digestion, excretion and sensory awareness • Describe, in general terms, the role of individual organs and tissues in supporting the healthy functioning of the human body • Describe ways in which various types of cells contribute to the healthy functioning of the human body • Describe changes in body functions in response to changing conditions
Describe areas of scientific investigation leading to new knowledge about body systems and to new medical application	• Identify examples of research into functions and dysfunctions of human cells, organs or body systems • Describe ways in which research about cells, organs and systems has brought about improvements in human health and nutrition • Investigate and describe factors that affect the healthy function of the human respiratory, circulatory and digestive systems
Skills Outcomes	
Initiating and Planning: Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• Identify questions to investigate • Rephrase questions in a testable form • Formulate operational definitions of major variables and other aspects of their investigations
Performing and Recording: Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• Use instruments—including microscopes—effectively and accurately for collecting data • Estimate measurements observe and record data, and produce simple line drawings • Organize data, using a format that is appropriate to the task or experiment
Analyzing and Interpreting: Analyze qualitative and quantitative data, and develop and assess possible explanations	• Identify strengths and weaknesses of different methods of collecting and displaying data • Identify and suggest explanations for discrepancies in data • Compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs and line graphs • Identify new questions and problems that arise from what was learned
Communication and Teamwork: Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• Receive, understand and act on the ideas of others • Communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means • Work cooperatively with team members to develop and carry out a plan • Evaluate individual and group processes used in planning, problem solving, decision making and completing a task

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Light and Optical Systems

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Essential Questions: What do we know about the nature of light? What technologies have been developed that use light, and what principles of light do they show?	
Investigate the nature of light and vision; and describe the role of invention, explanation and inquiry in developing our current knowledge	• Identify challenges in explaining the nature of light and vision • Investigate the development of microscopes, telescopes and other optical devices; and describe how these developments contributed to the study of light and other areas of science • Investigate light beams and optical devices, and identify phenomena that provide evidence of the nature of light
Investigate the transmission of light, and describe its behaviour using a geometric ray mode	• Investigate how light is reflected, transmitted and absorbed by different materials; and describe differences in the optical properties of various materials • Measure and predict angles of reflection • Investigate, measure and describe the refraction of light through different materials • Investigate materials used in optical technologies; and predict the effects of changes in their design, alignment or composition
Investigate and explain the science of image formation and vision, and interpret related technologies	• Demonstrate the formation of real images, using a double convex lens, and predict the effects of changes in the lens position on the size and location of images • Demonstrate and explain the use of microscopes; and describe, in general terms, the function of eyeglasses, binoculars and telescopes • Explain how objects are seen by the eye, and compare eyes with cameras • Compare the function and design of the mammalian eye with that of other vertebrates and invertebrates • Investigate and describe the development of new technologies to enhance human vision • Investigate and interpret emerging technologies for storing and transmitting images in digital form
Skills Outcomes	
Initiating and Planning: Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• Identify questions to investigate • Define and delimit questions to facilitate investigation • Design an experiment, and identify the major variables • State a prediction and a hypothesis based on background information or an observed pattern of events • Formulate operational definitions of major variables and other aspects of their investigations
Performing and Recording: Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• Carry out procedures, controlling the major variables • Observe and record data, and prepare simple line drawings • Use instruments effectively and accurately for collecting data • Organize data, using a format that is appropriate to the task or experiment use tools and apparatus safely
Analyzing and Interpreting: Analyze qualitative and quantitative data, and develop and assess possible explanations	• Predict the value of a variable by interpolating or extrapolating from graphical data • Identify strengths and weaknesses of different ways of collecting and displaying data • State a conclusion, based on experimental data, and explain how evidence gathered supports or refutes an initial idea • Identify new questions and problems that arise from what was learned

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Light and Optical Systems

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Communication and Teamwork: Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• Receive, understand and act on the ideas of others • Recommend an appropriate way of summarizing and interpreting their findings
Mechanical Systems **Essential Questions:** How is energy transferred in mechanical devices? How do mechanical devices provide for controlled application of energy in ways that are efficient, effective and responsible?	
Illustrate the development of science and technology by describing, comparing and interpreting mechanical devices that have been improved over time	• Investigate and provide examples of mechanical devices used in the past to meet particular needs • Illustrate how a common need has been met in different ways over time • Illustrate how trial and error and scientific knowledge both play a role in technological development
Analyze machines by describing the structures and functions of the overall system, the subsystems and the component parts	• Analyze a mechanical device, by: o Describing the overall function of the device o Describing the contribution of individual components or subsystems to the overall function of the device o Identifying components that operate as simple machines • Identify the source of energy for some familiar mechanical devices • Identify linkages and power transmissions in a mechanical device, and describe their general function
Investigate and describe the transmission of force and energy between parts of a mechanical system	• Analyze mechanical devices to determine speed ratios and force ratios • Build or modify a model mechanical system to provide for different turning ratios between a driving and driven shaft, or to achieve a given force ratio • Compare theoretical and actual values of force ratios, and propose explanations for discrepancies (e.g., identify frictional forces, and estimate their effect on efficiency) • Identify work input and work output in joules for a simple machine or mechanical system (e.g., use a device to lift a measured mass an identified distance, then calculate the work output) • Describe fluid pressure qualitatively and quantitatively, by explaining how forces are transferred in all directions, describing pressure in units of force per unit area • Describe how hydraulic pressure can be used to create a mechanical advantage in a simple hydraulic jack • Describe and interpret technologies based on hydraulics and pneumatics
Analyze the social and environmental contexts of science and technology, as they apply to the development of mechanical devices	• Evaluate the design and function of a mechanical device in relation to its efficiency and effectiveness, and identify its impacts on humans and the environment • Develop and apply a set of criteria for evaluating a given mechanical device, and defend those criteria in terms of relevance to social and environmental needs • Illustrate how technological development is influenced by advances in science, and by changes in society and the environment
Skills Outcomes	
Initiating and Planning: Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• Identify practical problems • Identify questions to investigate arising from practical problems • Propose alternative solutions to a practical problem, select one, and develop a plan • Select appropriate methods and tools for collecting data to solve problems

Mechanical Systems

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
(Continued)	• Formulate operational definitions of major variables and other aspects of their investigations
Performing and Recording: Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• Research information relevant to a given problem • Select and integrate information from various print and electronic sources or from several parts of the same source • Construct and test prototype designs and systems • Carry out procedures, controlling the major variables • Organize data, using a format that is appropriate to the task or experiment • Use tools and apparatus safely
Analyzing and Interpreting: Analyze qualitative and quantitative data, and develop and assess possible explanations	• Identify and correct practical problems in the way a prototype or constructed device functions • Evaluate designs and prototypes in terms of function, reliability, safety, efficiency, use of materials and impact on the environment • Identify and evaluate potential applications of findings
Communication and Teamwork: Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• Use specific language that is scientifically and technologically appropriate • Communicate practical problems, plans and results in a variety of ways, using written and oral language, data tables, graphs, drawings and other means • Work cooperatively with team members to develop and carry out a plan, and troubleshoot • Problems as they arise
Freshwater and Saltwater Systems **Essential Questions:** How do water, land and climate interact? What are the characteristics of freshwater and saltwater systems, and how do they affect living things, including humans?	
Describe the distribution and characteristics of water in local and global environments, and identify the significance of water supply and quality to the needs of humans and other living things	• Describe, in general terms, the distribution of water in Alberta, Canada and the world; and interpret information about water characteristics • Recognize that fresh water and salt water contain varying amounts of dissolved materials, particulates and biological components; and interpret information on these component materials • Identify major factors used in determining if water is potable, and describe and demonstrate tests of water quality • Describe, in general terms, methods for generating fresh water from salt water, based
Investigate and interpret linkages among landforms, water and climate	• Describe the processes of erosion and deposition resulting from wave action and water flow, by identifying dissolved solids and sediment loads, and identifying sources and endpoints for these materials; describing how waves and tides are generated and how they interact with shorelines • Investigate and describe stream characteristics • Describe processes leading to the development of ocean basins and continental drainage systems • Identify evidence of glacial action, and analyze factors affecting the growth and attrition of glaciers and polar icecaps • Describe the movement of ocean currents and its impact on regional climates

SCIENCE GRADE 8

Freshwater and Saltwater Systems

Outcomes	Achievement Indicators – Measurable outcomes
It is expected that students will:	*The following set of indicators is used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:*
Analyze factors affecting productivity and species distribution in marine and freshwater environments	• Investigate life forms found in fresh water and salt water, and identify and interpret examples of adaptations to these environments • Analyze factors that contribute to the development of adaptations in species found in saltwater and freshwater environments • Investigate and interpret examples of seasonal, short-term and long-term change in populations of living things found in aquatic environments • Analyze relationships between water quality and living things, and infer the quality of water based on the diversity of life supported by it
Analyze human impacts on aquatic systems; and identify the roles of science and technology in addressing related questions, problems and issue	• Analyze human water uses, and identify the nature and scope of impacts resulting from different uses • Identify current practices and technologies that affect water quality, evaluate environmental costs and benefits, and identify and evaluate alternatives • Illustrate the role of scientific research in monitoring environments and supporting development of appropriate environmental technologies • Provide examples of problems that cannot be solved using scientific and technological knowledge alone
Skills Outcomes	
Initiating and Planning: Ask questions about the relationships between and among observable variables, and plan investigations to address those questions	• Identify science-related issues and problems • Identify questions to investigate, arising from science-related issues • Select appropriate methods and tools for collecting relevant data and information • Design an experiment, and identify the major variables
Performing and Recording: Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data	• Research information relevant to a given issue • Select and integrate information from various print and electronic sources or from several parts of the same source • Identify strengths and weaknesses of different methods of collecting and displaying data
Analyzing and Interpreting: Analyze qualitative and quantitative data, and develop and assess possible explanations	• Apply given criteria for evaluating evidence and sources of information • Predict the value of a variable, by interpolating or extrapolating from graphical data • Interpret patterns and trends in data, and infer and explain relationships among the variables • Identify new questions and problems arising from what was learned
Communication and Teamwork: Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results	• Use appropriate vocabulary, including correct science and technology terminology, to communicate ideas, procedures and results • Communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means • Evaluate individual and group processes used in planning, problem solving, decision making and • Completing a task • Defend a given position on an issue, based on their findings