References and Resources

CORRELATION TO THE NEWFOUNDLAND AND LABRADOR GRADE 7 SCIENCE CURRICULUM

UNIT 1 OUTCOMES	MCGRAW-HILL RYERSON DISCOVERING SCIENCE 7 NOTE: THE CURRICULUM OUTCOMES ARE FUNDAMENTAL TO THE MCGRAW-HILL RYERSON DISCOVERING SCIENCE PROGRAM. FOLLOWING ARE SOME POINTS IN THE TEXTBOOK WHERE THE CURRICULUM OUTCOMES ARE ADDRESSED. THIS IS NOT AN EXHAUSTIVE LIST.
Components of an Ecosystem	
1.01 Identify questions related to a local ecosystem such as "What types of species live in a particular ecosystem?" (208-2, 208-3)	Getting Started, p. 4 Section 3.3, Monitoring and Managing Ecosystems, p. 86-93
1.02 Describe an ecosystem as a group of interacting living and nonliving things	Section 1.1, Types of Ecosystems, p. 8-15
1.03 Identify examples of ecosystems within Newfoundland and Labrador. Include: (i) ocean (ii) forest (iii) pond (iv) arctic	Section 1.1, Types of Ecosystems, p. 8-15
1.04 List examples of organisms that live in each ecosystem	Section 1.1, Types of Ecosystems, p. 8-15
1.05 Demonstrate the importance of choosing words that are scientifically appropriate	Section 1.1, Types of Ecosystems, p. 8-15 Section 1.3, Biotic Parts of an Ecosystem, p. 24-29
1.06 Define and use terms in context. Include: (109-12, 109-13) (i) ecosystem (ii) abiotic (iii) biotic (iv) species (v) organism (vi) population (vii) community (viii).habitat (ix) niche	Section 1.1, Types of Ecosystems, p. 8-15 Section 1.3, Biotic Parts of an Ecosystem, p. 24-29
1.07 Investigate the biotic and abiotic factors of a local ecosystem (306.3)	Section 1.2, Abiotic Parts of an Ecosystem, p. 16-23 Section 1.3, Biotic Parts of an Ecosystem, p. 24-29
1.08 Define and delimit questions to investigate in a local ecosystem (208-3)	Conduct an Investigation 1-2A, Field Trip to the Schoolyard (Core Lab), p. 20-21
1.09 Organize and record information collected in an investigation of an ecosystemusing instruments effectively and accurately. (209-3, 209-4)	Conduct an Investigation 1-2A, Field Trip to the Schoolyard (Core Lab), p. 20-21
1.10 Communicate questions, ideas, plans, and results, using lists, notes in point form, sentences, oral language, and other means. (211-2)	What Do Living Things Need for Survival 1-1A, p. 10
1.11 Work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise (211-3)	Scrutinizing Soil 1-1B, p. 13
1.12 Evaluate individual and group processes used in planning, decision making, and completing a task (211-4)	What Do Living Things Need for Survival 1-1A, p. 10 Scrutinizing Soil 1-1B, p. 13
1.13 Describe the following abiotic factors of local ecosystems. (i) intensity of sunlight (ii) air, soil and water temperature (iii) wind direction and speed	Section 1.2, Abiotic Parts of an Ecosystem, p. 16-23

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1.14 Use a key to identify the biotic factors observed in the local ecosystem (210-1)	Think About It 1-3A, Seabirds! p. 26-27
1.15 Identify the biotic factors of a local ecosystem wwwScience, Coldwater Coral Reefs, p. 28	Think About It 3-3A, Modelling an Environmental Impact Assessment, p. 92 Integrated Research Investigation, Saving Endangered Species, p. 99
1.16 Describe interactions between biotic and abiotic factors in an ecosystem. (306-3) Include: (i) biotic-abiotic (ii) abiotic-abiotic (iii) biotic-biotic	Section 2.1, Types of Interactions, p. 35-39
1.17 Describe symbiotic relationships as a form of biotic-biotic interactions	Section 2.1, Types of Interactions, p. 35-39
1.18 Define symbiosis	Section 2.1, Types of Interactions, p. 35-39
1.19 Define and give examples of parasitism, mutualism and commensalism	Section 2.1, Types of Interactions, p. 35-39
1.20 Investigate an interaction between a biotic and an abiotic factor in an ecoystem	Think About It 2-2B, Defending Against Decomposers, p. 45 Conduct an Investigation 2-2C, The Dirt on Decomposers, p. 46-47
1.21 Design and carry out an experiment controlling major variables. (208-6, 209-1)	Section 2.1, Types of Interactions, p. 35-39
1.22 Organize, compile and display data using tables and graphs. (210-2)	Think About It 2-1A, The Ups and Downs of Living Together, p. 39 Think About It 3-3A, Modelling an Environmental Assessment, p. 92 Project, Making a Garbage-Reduction Diary, p. 98
1.23 Defend a given position on an issue or problem based on their findings (211-5)	Think About It 3-3A, Modelling an Environmental Assessment, p. 92 Project, Making a Garbage-Reduction Diary, p. 98 Integrated Research Investigation, Saving Endangered Species, p. 99
Energy Flow in an Ecosystem	
1.24 Identify the niche of producers, consumers, and decomposers in a local ecosystem. (304-2)	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49
1.25 Define and use in context the terms producer, consumer and decomposer	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49
1.26 Given a diverse group of organisms, classify them as producers, consumers, or decomposers (304-1)	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49
1.27 Explain that observations and identification of similar characteristics enables classification in an ecosystem. (109-1)	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49
1.28 Relate the conditions necessary for the growth and reproduction of microorganisms to various aspects of the human food supply (304-3)	Think About It 2-2B, Defending Against Decomposers, p. 45
1.29 Identify the conditions that affect microorganism growth (i) temperature (ii) moisture (iii) light (iv) acidity (v) salinity	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49 Think About It 2-2B, Defending Against Decomposers, p. 45
1.30 Provide examples of how knowledge of microorganisms has resulted in the development of food production and preservation techniques (111-1)	Think About It 2-2B, Defending Against Decomposers, p. 45

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1.31 Describe how the following food preservation techniques inhibit the growth and reproduction of microorganisms. Include: (i) pickling (ii) salting (iii) drying (iv) smoking (v) refrigeration (vi) freeze-drying (vii) radiation (viii) canning	Think About It 2-2B, Defending Against Decomposers, p. 45
1.32 Describe how energy is supplied to, and how it flows through, a food chain (306-1)	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.33 Explain how producers use light energy, carbon dioxide, and water (photosynthesis) to produce energy for the ecosystem	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49
1.34 Define food chain	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.35 Construct simple food chains using local examples	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.36 Define herbivores, carnivores and omnivores as different types of consumers	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49
1.37 Classify the organisms within food chains as producers, herbivores, carnivores and omnivores	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.38 Apply the concept of a food web as a tool for interpreting the structure and interactions of an ecosystem. (111-6)	Think About It 2-3B, Riddle of the Pyramids, p. 57 Science Watch, Fisheries and Ecosystems, p. 58
1.39 Define food web	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.40 Construct food webs using organisms from local ecosystems	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
Decomposers	
1.41 Describe, using an ecological pyramid, how energy flows through a food web (210-2, 306-1)	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.42 Draw and interpret a pyramid of energy	Think About It 2-3B, Riddle of the Pyramids, p. 57
1.43 Identify the limitations of a pyramid of energy to accurately portray energy flow in a food web. Include: (210-3) (i) they do not always indicate the exact amount of food energy required, but are simple generalizations. (ii) that energy is transformed into other types of energy (heat) and is not always transferred to the next level in the pyramid. (iii) approximately 10% of the energy is lost at each step in the form of heat energy	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.44 Explain using examples why energy pyramids and food webs are not always useful.	Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.45 Describe how matter is recycled in an ecosystem through interactions among plants, animals, fungi and microorganisms. (306-2)	Section 2.2, Roles of Organisms in Ecosystems, p. 40-49 Section 2.3, Food Chains, Food Webs, and the Transfer of Energy, p. 50-59
1.46 Illustrate and explain the nutrient cycle	Section 2.4, Cycles of Matter in Ecosystems, p. 60-63

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Ecological Succession	
1.47 Identify changes that have occurred in a local ecosystems over time (306-4):	Section 3.1, Natural Disturbances and Succession, p. 68-73 Section 3.2, The Impact of People on Ecosystems, p. 74-85 Science Watch, Fisheries and Ecosystems, p. 58 Science Watch, Protecting the Limestone Barrens, p. 84
1.48 Define succession	Section 3.1, Natural Disturbances and Succession, p. 68-73
1.49 Predict what an ecosystem will look like in the future based on the characteristics of the area. (208-5)	Section 3.1, Natural Disturbances and Succession, p. 68-73
1.50 Define pioneer species	Section 3.1, Natural Disturbances and Succession, p. 68-73
1.51 Define climax community	Section 3.1, Natural Disturbances and Succession, p. 68-73
1.52 Distinguish between primary and secondary succession	Section 3.1, Natural Disturbances and Succession, p. 68-73
1.53 Construct a flow chart of images to illustrate the changes occurring during primary and secondary succession. Include: (210-2) (i) bare rock to boreal forest (primary) (ii) forest re-growth after fire (secondary)	Think About It 3-1B, Secondary Succession from Beaver Pond to Bog to Forest, p. 72
1.54 Describe the ecosystem changes that occur in the examples above. Include: (i) soil composition (ii) plant types (iii) animal types (iv) amount of light	Section 3.1, Natural Disturbances and Succession, p. 68-73
1.55 Describe how our need for a continuous supply of wood resulted in the development of silvaculture practice. (112-3)	Section 3.2, p. 74-85
1.56 Make informed decisions about forest harvesting techniques taking into account the environmental advantages and disadvantages. (113-9)	Section 3.2, p. 74-85
1.57 Provide examples of how our understanding of boreal forest ecology has influenced our harvesting practices identifying the positive effects of these practices. (111-1, 113-1)	Section 3.2, p. 74-85
1.58 Identify various science and technology-based careers related to forest management and harvesting. (112-9)	Section 3.2, p. 74-85
1.59 Propose and defend a course of action to protect the local habitat of a particular organism. (113-11, 211-5)	Think About It 3-2B, The Pros and Cons of Conservation, p. 83 Integrated Research Investigation, Saving Endangered Species, p. 99
1.60 Describe how humans have influenced the environment. Include: (i) habitat loss (ii) harvesting resources (iii) pollution (iv) introduced species	Section 3.2, The Impact of People on Ecosystems, p. 74-85
1.61 Debate the pros and cons of habitat conservation Pros (i) sustainability of resource (ii) preservation of biodiversity (iii) eco-tourism Cons (i) artificial habitats (ii) economic loss (job loss, etc.) (iii) limited human use	Think About It 3-2B, The Pros and Cons of Conservation, p. 83

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Environmental Action	
1.62 Provide examples of problems that arise in the environment that cannot be solved using only scientific or technological knowledge. (113-10) Include: (i) decline in cod stocks (ii) oil slicks/spills (iii) acid rain	Section 3.2, The Impact of People on Ecosystems, p. 74-85 Section 3.3, Monitoring and Managing Ecosystems, p. 86-93
1.63 Use various sources to research individuals or groups in Canada interested in protecting the environment. (112-4, 112-8, 209-5) Include: (i) local groups and individuals (ii) national groups and individuals (iii) international groups and individuals	Integrated Research Investigation, Saving Endangered Species, p. 99
UNIT 2 OUTCOMES	
Measuring Temperature	
2.01 Relate personal activities in formal and informal settings to temperature. (109-10)	Section 4.1, Describing Temperature, p. 110-119
2.02 Define temperature operationally	Section 4.1, Describing Temperature, p. 110-119
2.03 Relate temperature to everyday experiences. Include: (i) daily temperature changes (ii) cooking temperatures (iii) refrigeration temperatures (iv) average temperatures in different geographic areas	Find Out Activity 4-1A, Boiling Hot, Freezing Cold, p. 110
2.04 Predict and identify the temperature of various familiar objects. Include: (i) human body temperature (ii) temperatures of boiling and freezing water (iii) comfortable room temperature	Find Out Activity 4-1A, Boiling Hot, Freezing Cold, p. 110
2.05 Provide examples of temperature measuring technologies used in the past. (110-7) Include: (i) Galileo's air thermometer (ii) Early liquid thermometers	Section 4.2, Measuring Temperature, p. 120-131
2.06 Identify scales used in temperature measurement. Include: i) Celsius ii) Fahrenheit iii) Kelvin	Section 4.2, Measuring Temperature, p. 120-131
2.07 Select appropriate methods and tools in order to construct and test a thermometer (208-8, 210-13)	Conduct an Investigation 4-2B, Make Your Own Thermometer, p. 128-129
2.08 Compile and display data collected in the test of the design of the constructed thermometer (210-2)	Conduct an Investigation 4-2B, Make Your Own Thermometer, p. 128-129
2.09 Describe various instruments used to measure temperature (308-1). Include: (i) liquid-in-glass thermometer (ii) thermocouple (iii) resistance thermometer (digital thermometers) (iv) bimetallic strip (thermostat) (v) infrared thermometer	Section 4.2, Measuring Temperature, p. 120-131

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Temperature and Matter	
2.10 Define temperature using the Particle Theory of Matter. (308-2)	Section 5.1, Particle Theory of Matter, p. 136-143 Section 6.3, Temperature versus Heat, p. 206-215
2.11 Define matter	Section 5.1, Particle Theory of Matter, p. 136-143
2.12 Describe the Particle Theory of Matter. Include: (i) All matter is made up of tiny particles. (ii) These particles are always moving - they have energy. The more energy the particles have, the faster they move. (iii) There is space between all particles. (iv) There are attractive forces between the particles. (v) The particles of one substance differ from the particles of other substances.	Section 5.1, Particle Theory of Matter, p. 136-143
2.13 Define kinetic energy	Section 5.1, Particle Theory of Matter, p. 136-143
2.14 Define temperature as a measure of the average kinetic energy of the particles of a substance	Section 5.1, Particle Theory of Matter, p. 136-143
2.15 Explain how each state of matter reacts to changes in temperature. (308-3)	Conduct an Investigation 5-3C, The Plateau Problem (Core Lab), p. 166-167
2.16 Compare the characteristics of the three states of matter in terms of: (i) volume (ii) shape	Section 5.3, Changes of State, p. 158-169
2.17 Describe the three states of matter using the particle theory of matter in terms of: (i) arrangement of particles (ii) movement of particles	Section 5.2, States of Matter, p. 144-157
2.18 Define expansion and contraction	Section 5.2, States of Matter, p. 144-157
2.19 Use the particle theory of matter to explain expansion and contraction in the three states of matter	Section 5.2, States of Matter, p. 144-157
2.20 Explain changes of state using the Particle Theory of Matter. (308-4) Include: (i) melting (ii) freezing (iii) evaporation	Section 5.3, Changes of State, p. 158-169
2.21 State a hypothesis, carry out an experiment, identify and control major variables and state a conclusion based on experimental data (208-5, 208-6, 210-11)	Conduct an Investigation 5-3C, The Plateau Problem (Core Lab), p. 166-167
2.22 Use heating and measuring tools accurately and safely (209-6)	Conduct an Investigation 5-3C, The Plateau Problem (Core Lab), p. 166-167
2.23 Organize, compile and display data using tables and graphs (209-4, 210-2)	Conduct an Investigation 5-3C, The Plateau Problem (Core Lab), p. 166-167
Heat Transfer	
2.24 Compare transmission of heat by conduction, convection, and radiation. (308-5)	Section 6.1, Processes of Transferring Heat, p. 191
2.25 Define conduction, convection and radiation in terms of: (i) particle movement (ii) state(s) in which it occurs	Section 6.1, Processes of Transferring Heat, p. 191

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2.26 List common examples of the three processes of heat transfer. Include: (i) conduction - cookware, ice pack (ii) convection - air currents, heating a liquid (iii) radiation - fireplace, sunlight	Section 6.1, Processes of Transferring Heat, p. 191
2.27 Provide examples of heat technologies used past and present to heat homes in Newfoundland and Labrador (110-7) Include: (i) wood stove (ii) electric heat (iii) oil furnace (iv) air to air heat pump (v) hot water radiation (vi) geothermal (vii) solar	Section 6.1, Processes of Transferring Heat, p. 191
2.28 Identify different approaches taken to solve the problem of heating homes during cold times of the year (109-7)	Section 6.1, p. 174-191
2.29 Make informed decision about the various technologies used to hear our homes, taking into account potential advantages and disadvantages (110-7, 113-8)	Section 6.1, p. 174-191 Section 6.2, p. 192-205
2.30 Provide examples of how the technologies used to heat homes have improved over time (110-8)	Section 6.1, p. 174-191 Section 6.2, p. 192-205
2.31 Provide examples of how our understanding of evaporation and condensations of liquids resulted in the development of heat pumps (111-1)	Section 5.3, p. 128-169 Section 6.1, p. 174-191
2.32 Describe how various surfaces absorb radiant heat (308-6)	Section 6.1, p. 174-191
2.33 Design and conduct an experiment to test identified questions, state a hypothesis, identify and control major variables. (208-3, 208-5, 209-1)	Keep it Cool 6-2C, p. 200-201
2.34 Use experimental apparatus and tools safely. (209-6)	Currents in a Pie Pan 6-1A, p. 175
2.35 Organize and display data using tables and graphs. (209-4, 210-2)	Keep it Cool 6-2C, p. 200-201
2.36 State a conclusion, based on experimental data, and explain how evidence gathered supports or refutes an initial idea. (210-11)	Keep it Cool 6-2C, p. 200-201
2.37 Distinguish between thermal conductors and insulators.	Section 6.2, Conductors and Insulators, p. 192-205
2.38 Provide examples of insulating technologies used today and in the past. (109-4) Include: (i) animal fur (ii) sod (iii) fiberglass (iv) thermos	Section 6.2, Conductors and Insulators, p. 192-205
Specific Heat Capacity	
2.39 Compare, in qualitative terms, the specific heat capacities of some common materials. (308-7) Include: (i) water (ii) ice (iii) aluminum (iv) concrete (v) steel	Section 6.3, Temperature versus Heat, p. 206-215

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2.40 Distinguish between heat and temperature	Section 6.3, Temperature versus Heat, p. 206-215
2.41 Define specific heat capacity	Section 6.3, Temperature versus Heat, p. 206-215
Temperature, Heat and Technology	
2.42 Describe how our needs related to heat can lead to developments in science and technology (112-1)	Section 6.1, Processes of Transferring Heat, p. 191 Integrated Research Investigation, Building Codes and Insulation, p. 221
2.43 Identify examples of science- and technology-based careers that are associated with heat and temperature. (112-9)	Career Connect, Ask an Expert, p. 203
UNIT 3 OUTCOMES	
Mixtures and Pure Substances – The Particle Theory	
3.01 Define the Particle Theory of Matter	Section 5.1, Particle Theory of Matter, p. 136-143
3.02 Distinguish between pure substances and mixtures using the particle theory of matter. (307-1)	Section 7.1, How Mixtures Are Different from Pure Substances, p. 232-241
3.03 Using observations, categorize substances as pure or mixtures.	Conduct an Investigation 7-1C, Examining Three Common Beverages
3.04 Define the terms pure substance and mixture using the Particle Theory of Matter	Section 7.1, How Mixtures Are Different from Pure Substances, p. 232-241
Homogeneous and Heterogeneous Mixtures	
3.05 Identify various pure substances Include: (i) distilled water (H_2O) (ii) sugar ($C_{12}H_{22}O_{11}$) (iii) copper (CU) (iv) oxygen (O_2) (v) carbon dioxide (CO_2)	Section 7.1, How Mixtures Are Different from Pure Substances, p. 232-241
3.06 Identify various mixtures that are found in or around student homes. Include: (i) salad dressing (ii) chocolate chip cookie (iii) Kool-aid (iv) concrete (v) air	Section 7.1, How Mixtures Are Different from Pure Substances, p. 232-241
3.07 Distinguish between heterogeneous (mechanical) and homogeneous (solution) mixtures using the particle theory of matter. (307-3)	Section 7.2, Classifying Mixtures, p. 242-249
3.08 Identify that homogeneous mixtures appear as one substance and light will pass through unaffected	Conduct an Investigation 7-2A, Shine On, p. 246
3.09 Identify that heterogeneous mixtures may appear as more than one substance and light will reflect perpendicular to the incident beam	Conduct an Investigation 7-2A, Shine On, p. 246
3.10 Identify some mixtures as combinations of heterogeneous and homogeneous mixtures. Include: (i) orange juice (ii) milk (iii) soft drink	Section 7.2, Classifying Mixtures, p. 242-249

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Solutions	
3.11 Describe the characteristics of solutions using the Particle Theory of Matter and precise scientific language. Include the terms (307-3): (i) dissolving (ii) solute (iii) solvent (iv) solubility (soluble/insoluble)	Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261 Section 8.2, Concentration and Solubility, p. 262-273
3.12 Identify that solutions can form between the three states of matter. Include: (i) solid solute - liquid solvent (ii) gas solute - liquid solvent (iii) gas solute - gas solvent (iv) solid solute - solid solvent (v) liquid solute - liquid solvent	Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261
3.13 Define solute and solvent	Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261
3.14 Given an example of a solution and its components, identify the solute and solvent. Include: (i) alloys such as brass, bronze (ii) air (iii) salt water (iv) rubbing alcohol (v) soda water	Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261
3.15 Describe the concentrations of solutions qualitatively and quantitatively. (307-4)	Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261 Section 8.2, Concentration and Solubility, p. 262-273
3.16 Distinguish between a quantitative and a qualitative description	Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261 Section 8.2, Concentration and Solubility, p. 262-273 Science Skill 5, p. 471
3.17 Define the terms quantitative and qualitative.	Section 8.2, Concentration and Solubility, p. 262-273 Science Skill 5, p. 471
Concentration of Solutions	
3.18 Define concentration	Section 8.2, Concentration and Solubility, p. 262-273
3.19 Describe the concentrations of solutions qualitatively using the terms: (i) dilute (ii) concentrated (iii) saturated (iv) unsaturated	Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261 Section 8.2, Concentration and Solubility, p. 262-273
3.20 Describe the concentrations of solutions quantitatively as the amount of solute per unit volume.	Section 8.2, Concentration and Solubility, p. 262-273
3.21 Express concentration of solutions in g/L. (210-9)	Section 8.2, Concentration and Solubility, p. 262-273
3.22 Convert given concentrations in g/mL to g/L	Section 8.2, Concentration and Solubility, p. 262-273 Science-Math Connect, Working with Concentration Units, p. 272
3.23 Identify different measures of concentration. (109-7) Include: (i) percentage by mass (ii) ppm (parts per million)	Find Out Activity 8-2C, Concentrations of Consumer Products, p. 271

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3.24 State a hypothesis based on background information or an observed pattern of events (208-5)	Conduct an Investigation 8-2A, How Does Temperature Affect Solubility, p. 268-269
Solutions and Solubility	
3.25 Identify and delimit questions and problems to facilitate investigation (208-2, 208-3)	Mixture Match-Up 7-1B, p. 235
3.26 Identify the line of best fit and interpolate or extrapolate based on the line of best fit (210-5)	Conduct an Investigation 8-2A, How Does Temperature Affect Solubility, p. 268-269
3.27 Develop a testable hypothesis on the effect of temperature on solubility (208-1)	Conduct an Investigation 8-2A, How Does Temperature Affect Solubility, p. 268-269
3.28 Carry out procedures controlling the major variables to study the effect of temperature on solubility (209-1)	Conduct an Investigation 8-2A, How Does Temperature Affect Solubility, p. 268-269
3.29 Describe qualitatively the factors that affect the solubility of a solid and a gas. (307-5) Include: (i) temperature (ii) pressure	Section 8.2, Concentration and Solubility, p. 262-273
Separating Solutions	
3.30 Using apparatus safely, identify and separate the components of a variety of mixtures. (209-6, 307-2) Include: (i) mechanical sorting (flotation, magnetism, etc.) (ii) filtration (iii) evaporation (iv) distillation (v) paper chromatography	Conduct an Investigation 7-2B, What Kind of Mixture? p. 247 Think About It Activity 9-1A, Strategies for Separation, p. 279 Conduct an Investigation 9-1B, Making Dirty Water Clear, p. 285 Conduct an Investigation 9-1C, Separating Homogeneous Mixtures (Core Lab), p. 286-289 Project, Purifying Mixtures, p. 304
3.31 Describe how to use different methods to separate a variety of mixtures. Include: (i) mechanical sorting (flotation, magnetism) (ii) filtration (iii) evaporation (iv) distillation (v) paper chromatography	Section 9.1, Separating Mixtures and Solutions, 278-291 Section 9.2, Separating Mixtures from Underground, p. 292-297 Project, Purifying Mixtures, p. 304
3.32 Identify separation techniques used in or around student homes. Include: (i) straining spaghetti in colander (ii) skimming fat off soup (iii) drying clothes (separating water from fabric) (iv) window screens allowing air in while keeping insects out (v) making coffee using ground coffee beans	Section 9.1, Separating Mixtures and Solutions, p. 278-291
3.33 Choose an appropriate separation technique when given a known mixture (students know the identity of the components)	Find Out Activity, Mixed or Pure, p. 229 Think About It 9-1A, Strategies for Separation, p. 279 Project, Purifying Mixtures, p. 304
Distillation	
3.34 Describe the science underlying a distillation apparatus, using the following terms: boiling, evaporation, condensation. (111-5)	Section 9.1, Separating Mixtures and Solutions, p. 278-291
3.35 Define distillation	Section 9.1, Separating Mixtures and Solutions, p. 278-291
3.36 Explain how a distillation apparatus is used to separate a solution	Section 9.1, Separating Mixtures and Solutions, p. 278-291

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3.37 Describe where boiling, evaporation and condensation occurs in a distillation apparatus	Section 9.1, Separating Mixtures and Solutions, p. 278-291
3.38 Carry out procedures controlling the major variables to answer questions arising from practical problems (208-2, 209-1)	Now You See It… 7-1A, p. 233
3.39 Use tools and instruments safely and accurately when carrying out procedures and collecting data (209-3, 209-6)	Examining Three Common Beverages 7-1C, p. 238-239
3.40 Evaluate the potential applications of findings related to distillation and paper chromatography (210-12)	Making Dirty Water Clean 9-1B, p. 285
3.41 Identify, and suggest explanations for, discrepancies in data (210-7)	Separating Homogeneous Mixtures 9-1C, p. 286-289
3.42 Answer new questions that result from the mixture separation activities. (210-16)	Separating Homogeneous Mixtures 9-1C, p. 286-289
3.43 Using distillation as an example show how refining and separation techniques have evolved. (109-4) Include: - simple distillation - fractional distillation	Section 9.1, Separating Mixtures and Solutions, p. 278-291
Applications of Mixture Science	
3.45 Provide examples of how science, related to mixtures and solutions, affect our lives. (112-7)	Section 7.1, How Mixtures Are Different from Pure Substances, p. 232-241 Section 7.2, Classifying Mixtures, p. 242-249 Section 8.1, Making Solutions: Solutes and Solvents, p. 254- 261 Section 8.2, Concentration and Solubility, p. 262- 273 Section 9.1, Separating Mixtures and Solutions, p. 278-291 Section 9.2, Separating Mixtures from Underground, p. 292
3.46 Identify some positive and negative effects and intended and unintended consequences of using salt on highways. (113-1)	Integrated Research Project, Safe, Clean Water for Everyone, p. 305
3.47 Describe how our understanding of the properties of solutions has resulted in better road de-icing technologies (111-1)	Integrated Research Project, Safe, Clean Water for Everyone, p. 305
3.48 Provide examples of how road de-icing technologies have affected our lives, our communities, and our environment (112-	Integrated Research Project, Safe, Clean Water for Everyone, p. 305
3.49 Evaluate the methods used to improve the de-icing ability of sodium chloride including time of application, road weather information, and pre-wetting (113-6)	Integrated Research Project, Safe, Clean Water for Everyone, p. 305
3.50 Make an informed decision about the use of road salt as our main road de-icing chemical taking into account the environmental, social, and economics advantages and disadvantages (113-9)	Integrated Research Project, Safe, Clean Water for Everyone, p. 305
UNIT 4 OUTCOMES	
Rocks and Minerals	
4.01 Classify minerals based on their physical properties. (210-1, 310-2a)	Section 10.1, Investigating Minerals, p. 316-325
4.02 Define mineral	Section 10.1, Investigating Minerals, p. 316-325

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4.03 List and describe properties of minerals. Include: (i) colour (ii) streak (iii) lustre (iv) hardness (v) cleavage (vi) fracture	Section 10.1, Investigating Minerals, p. 316-325
4.04 Use a mineral classification key to investigate questions arising from practical problems (208-2, 210-1)	Conduct an Investigation 10-1C, A Mineralogist's Mystery (Core Lab, p. 322-323)
4.05 Select appropriate methods and tools for collecting and organizing data to identify minerals (208-8, 209-4)	Conduct an Investigation 10-1C, A Mineralogist's Mystery (Core Lab), p. 322-323
4.06 Using a classification key, identify common minerals. Include: (210-1) (i) quartz (ii) calcite (iii) magnetite (iv) mica (v) pyrite (vi) galena (vii) gypsum (viii) talc (ix) feldspar (x) hematite	Conduct an Investigation 10-1C, A Mineralogist's Mystery (Core Lab), p. 322-323
4.07 Classify rocks based on their characteristics and method of formation: (310-2b)	Section 10.2, Investigating Rocks, p. 326-339
4.08 Define rock	Section 10.2, Investigating Rocks, p. 326-339
4.09 Define igneous rock and describe their formation	Section 10.2, Investigating Rocks, p. 326-339
4.10 Differentiate between magma and lava	Section 10.2, Investigating Rocks, p. 326-339
4.11 Differentiate between intrusive and extrusive igneous rocks using examples. Include: -granite(intrusive) - magma -basalt (extrusive) - lava	Section 10.2, Investigating Rocks, p. 326-339
4.12 Relate crystal size in igneous rocks to rate of cooling	Section 10.2, Investigating Rocks, p. 326-339
Classification of Rocks	
4.13 Define sedimentary rock	Section 10.2, Investigating Rocks, p. 326-339
4.14 List and show examples of sedimentary rocks. Include: (i) Shale (small particles) (ii) Sandstone (medium particles) (iii) Conglomerate (large particles) (iv) Limestone (plant and animal particles)	Section 10.2, Investigating Rocks, p. 326-339
4.15 Define metamorphic rock	Section 10.2, Investigating Rocks, p. 326-339
4.16 Describe the formation of metamorphic rocks	Section 10.2, Investigating Rocks, p. 326-339
4.17 List examples of metamorphic rocks and their parent rock. Include: -slate from shale -marble from limestone -quartzite from sandstone -gneiss from granite	Section 10.2, Investigating Rocks, p. 326-339

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Rock Cycle	
4.18 Identify questions to investigate arising from the study of the rock cycle. (208-2)	Section 10.3, The Rock Cycle and Rock and Mineral Resources, p. 340-351
4.19 Sketch and label a diagram of the rock cycle.	Think About It 10-3A, Recycling the Rocks, p. 341
4.20 Recognize the relationship between various types of rocks (igneous, sedimentary, metamorphic)	Section 10.3, The Rock Cycle and Rock and Mineral Resources, p. 340-351
4.21 Explain how society's needs led to developments in technologies designed to use rocks. (112-3)	Section 10.3, The Rock Cycle and Rock and Mineral Resources, p. 340-351
4.22 Identify various minerals and rocks mined past and present, including but not limited to: (i) gold (Nugget Pond) (ii) granite (Lumsden) (iii) iron ore (Labrador City) (iv) slate (Burgoyne's Cove) (v) gypsum (Flat Bay)	Think About It 10-3B, Research the Resource, p. 347
Structure of Earth	
4.23 Describe the characteristics of Earth's crust and some of the technologies which have allowed scientists to study geological features in and on the earth's crust. (109-7, 1112, 310-1)	Section 11.1, A Moving, Changing Crust, p. 356-373
4.24 Sketch and label a model of Earth's layered interior. Include: (i) inner core (ii) outer core (iii) mantle (iv) crust	Think About It 11-1B, A Model Planet, p. 359
4.25 Describe how the composition of the Earth's crust is determined	Section 11.1, A Moving, Changing Crust, p. 356-373
4.26 Recognize that Earth's crust is broken into plates and movement occurs where plate margins meet (plate tectonics)	Section 11.1, A Moving, Changing Crust, p. 356-373
PLATE TECTONICS THEORY	
4.27 Describe how plate tectonic theory has evolved in light of new geological evidence. (110-4)	Section 11.1, A Moving, Changing Crust, p. 356-373
4.28 Identify Alfred Wegener as the person responsible for proposing the Continental Drift Theory	Section 11.1, A Moving, Changing Crust, p. 356-373
4.29 Describe the Continental Drift Theory and the evidence supporting it; Include evidence from: (i) continental fit (paleogeographic) (ii) fossils (biological) (iii) rock layers (geological) (iv) climate (meteorological)	Section 11.1, A Moving, Changing Crust, p. 356-373
4.30 Identify the technological advances that have provided evidence to support the current theory of Plate Tectonics. Include: (i) sonar (ii) magnetometers (iii) deep sea drilling	Section 11.1, A Moving, Changing Crust, p. 356-373
4.31 Identify types of plate boundaries. Include: (i) Divergent (pulling apart) (ii) Convergent (pushing together) (iii) Transform (sliding past)	Section 11.2, How Earthquakes and Volcanoes Shape Earth's Crust, p. 374-389

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4.32 Identify convection currents in the Earth as the driving force mechanism behind plate tectonics	Section 11.1, A Moving, Changing Crust, p. 356-373
4.33 Provide examples of Canadian contributions to our understanding of local, regional, and global geology.(112-12)	Career Connect, Geophysicist, p. 372 Science Watch, Exploring the Big Deep, p. 388 Think About It 11-3C, Canada—Past, Present, and Future, p. 399 Think About It 11-3D, Rock Stars, p. 399
4.34 Describe how our explanations of how the Earth has changed over time is based on the collection of evidence and finding relationships between various observations in imaginative ways. (109-2)	Section 11.1, A Moving, Changing Crust, p. 356-373
4.35 Describe how our understanding of the forces that shaped our Earth have changed overtime as new evidence was collected. (110-5)	Section 11.1, A Moving, Changing Crust, p. 356-373
4.36 Identify the Theory of Continental Drift as one early explanation for how our Earth changed over time. (110-1)	Section 11.1, A Moving, Changing Crust, p. 356-373
4.37 Identify the Theory of Plate Tectonics as an example of a major shift in our world view. (110-3)	Section 11.1, A Moving, Changing Crust, p. 356-373
EARTHQUAKES, VOLCANOES, AND MOUNTAINS	
4.38 Compare some of the catastrophic events, such as earthquakes and volcanic eruptions that occur on or near Earth's surface. (311-4)	Section 11.2, How Earthquakes and Volcanoes Shape Earth's Crust, p. 374-389
4.39 Define earthquakes	Section 11.2, How Earthquakes and Volcanoes Shape Earth's Crust, p. 374-389
4.40 Explain why earthquakes occur using the concept of plate tectonics	Section 11.2, How Earthquakes and Volcanoes Shape Earth's Crust, p. 374-389
4.41 Define volcano	Section 11.2, How Earthquakes and Volcanoes Shape Earth's Crust, p. 374-389
4.42 Identify how and where volcanoes form. Include : (i) areas where plates collide (ii) areas where plates separate (iii) areas where plates pass over stationary hot spots	Section 11.2, How Earthquakes and Volcanoes Shape Earth's Crust, p. 374-389
4.43 Organize and analyze data on the geographical distribution of earthquakes and volcanoes to determine patterns and trends. (209-4, 210-6, 311-5)	Think About It 11-2E, Patterns in Earthquake and Volcano Locations, p. 386-387
4.44 Provide examples of theories used in the past to explain volcanic activity, earthquakes, and mountain building. (110-1)	Section 11.2, How Earthquakes and Volcanoes Shape Earth's Crust, p. 374-389 Conduct an Investigation 11-3F, Building a Mountain-Building Theory, p. 401
4.45 Identify explanations of volcanic and earthquake activity from the past. Include: (i) Pele (ii) Glooscap	Think About It 11-2C, Seismic Stories, p. 384
4.46 Explain the processes of mountain formation. (311-1)	Section 11.3, Mountain Building and Geologic Time, p. 390-403
4.47 Define folding and faulting.	Section 11.3, Mountain Building and Geologic Time, p. 390-403

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4.48 Explain how mountains are formed using the theory of Plate Tectonics. Include: (i) folding (ii) faulting (iii) volcanic eruption	Section 11.3, Mountain Building and Geologic Time, p. 390-403
GEOLOGICAL TIME SCALE	
4.49 Develop a chronological model or geological time scale of major events in Earth's history. (209-4, 311-6)	Section 11.3, Mountain Building and Geologic Time, p. 390-403
4.50 Describe the geologic time scale in terms of the four main eras and the major events that occurred in each. Include: (i) Precambrian – formation of the Earth and appearance of simple life forms. (ii) Paleozoic – appearance of more complex life forms (iii) Mesozoic – appearance and extinction of dinosaurs (iv) Cenozoic – appearance of human	Section 11.3, Mountain Building and Geologic Time, p. 390-403
WEATHERING AND EROSION	
4.51 Explain various ways in which rocks can be weathered (311-2)	Section 12.1, Weathering, Erosion, and Soil Formation, p. 408-421
4.52 Define weathering	Section 12.1, Weathering, Erosion, and Soil Formation, p. 408-421
4.53 Identify types of weathering. Include: (i) mechanical (ii) chemical	Section 12.1, Weathering, Erosion, and Soil Formation, p. 408-421
4.54 Define Erosion	Section 12.1, Weathering, Erosion, and Soil Formation, p. 408-421
4.55 Identify the various agents of erosion. Include: (i) water in motion (ii) meteorological processes (rain and wind) (iii) geological processes (gravity and glaciers)	Section 12.1, Weathering, Erosion, and Soil Formation, p. 408-421
4.56 Differentiate between weathering and erosion	Section 12.1, Weathering, Erosion, and Soil Formation, p. 408-421
4.57 Relate various meteorological, geological, chemical and biological processes to the formation of soils. (311- 3) Include: (i) rain and wind (ii) glaciers and gravity (iii) plants and acidic action	Section 12.1, Weathering, Erosion, and Soil Formation, p. 408-421
SOIL	
4.58 List the basic types of soil. Include: (i) clay (ii) sand (iii) gravel	Section 12.2, Soil Types and Characteristics, p. 422-431
4.59 Define porosity and permeability	Section 12.2, Soil Types and Characteristics, p. 422-431
4.60 Relate porosity and permeability to soil types	Section 12.2, Soil Types and Characteristics, p. 422-431
4.61 Classify various types of soil according to their characteristics. (310-3) Include: (i) coarse-textured (sandy gravel) soil (ii) medium-textured (loamy) soil (iii) fine-textured (clay) soil	Section 12.2, Soil Types and Characteristics, p. 422-431

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4.62 Carry out procedures controlling the major variables to answer questions arising from practical issues. (208-2, 209-1)	Settling Sediments 1-2C, p. 336
4.63 Use instruments effectively and accurately for collecting data (209-3)	Conduct an Investigation 7-1C, Examining Three Common Beverages, p. 238-239
4.64 Compile, organize and display data, using a tabular format. (209-4, 210-2, 211-2)	A Mineralogist's Mystery 1-1C, p. 322-323
4.65 Interpret patterns and trends in data, and infer and explain relationships among the variables. (210-6)	A Mineralogist's Mystery 1-1C, p. 322-323
4.66 State a conclusion, based on experimental data, and explain how the data gathered supports or refutes and initial idea. (210-11)	A Mineralogist's Mystery 1-1C, p. 322-323
4.67 Provide examples of how science and technology, associated with soil enrichment, affect communities. (112-7)	Section 12.3, Sustaining Fertile Soils, p. 432-443
4.68 Define fertilizer	Section 12.3, Sustaining Fertile Soils, p. 432-443
4.69 Define composting	Section 12.3, Sustaining Fertile Soils, p. 432-443
4.70 Identify some positive and negative effects and intended and unintended consequences of enriching soils (113-1)	Section 12.3, Sustaining Fertile Soils, p. 432-443
4.71 Identify positive and negative effects of enriching soil. Include: (i) Positive: -enhanced plant growth -decreased erosion -more food -aesthetic (ii) Negative -runoff -algal bloom -decreased water oxygen levels -increased fish mortality	Section 12.3, Sustaining Fertile Soils, p. 432-443
4.72 Suggest solutions to problems or issues related to soil use and misuse. (113-7) Include: (i) reduced reliance on chemical fertilizers (ii) limiting runoff (iii) planting wind breaks (iv) no-till farming	Section 12.3, Sustaining Fertile Soils, p. 432-443