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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Environmental Interactions				
After completion of this unit, the student will be able to:				
The environment consists of both biotic and abiotic factors, each affecting the organisms living there.				
1. Define the following terms: - **environment** - an organism=s surroundings - **biotic factors** - the living or dead parts of an organism=s surroundings - **abiotic factors** - the non-living parts of an organism=s surroundings.				
2. Identify examples of both biotic and abiotic factors for the local environment.				
3. Define **ecosystems** as *the network of interactions linking biotic and abiotic factors.*				
Photosynthesis and cellular respiration are vital to the maintenance of life on this planet.				
1. Define **photosynthesis** as *the process occurring in green plants that use the sun=s energy to convert water and carbon dioxide into food and oxygen.*				
2. Relate the role of photosynthesis to the maintenance				

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Outcomes	R	D	C	Changed Outcome
of life on this planet.				
3. Analyze photosynthesis and cellular respiration as being opposite reactions.				
4. Recognize that activities such as logging and other forms of deforestation impact negatively on oxygen levels on our planet.				
5. Appreciate the need for conversion of plant life on our planet.				
A food chain describes the movements of energy through an ecosystem. After completion of this unit the student will be able to:				
1. Define **food chain** as *the movement of food energy through an ecosystem from producers to different levels of consumers.*				
2. Illustrate examples of food chains which would be found in Newfoundland and Labrador.				
3. Construct a food web from a list of common plants and animals found in the woods of Newfoundland and Labrador.				
4. Use the following terms in describing components of a food web: producers, consumers, decomposers, herbivores, carnivores, omnivores, predator and prey.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Nutrient cycles outline the routes by which materials are recycled in nature.				
1. Define **mutualism** as *a relationship between two species in which both species benefit from the relationship.*				
2. Define **commensalism** as *a relationship between two species in which one species benefits and the other is neither benefitted nor harmed.*				
3. Define **parasitism** as *a relationship between two species in which one benefits and the other is harmed.*				
4. Give examples for each of the following relationships: mutualism, commensalism, and parasitism.				
5. Define **niche** as *the organisms way of life including its habitat, food and interactions with other biotic and abiotic factors of the environment.*				
Living things interact with each other as well as their environment.				
1. Illustrate nutrient cycles to show how materials of our world are recycled.				
2. Appreciate the environmental value of recycling consumer products.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Abiotic factors interact to affect the distribution and well-being of living things within an ecosystem				
1. Define **range of tolerance** as *the range within which abiotic factors can be tolerated and the organism survive.*				
2. Give examples to illustrate the relationships between the abiotic factors and the variety of plants and animals which live in Newfoundland and Labrador.				
Germination of seeds is affected by the abiotic factor of temperature				
1. Conduct an investigation to determine the effect of temperature on the germination of radish seeds.				
A community consists of populations of organisms living within the same area.				
1. Define **species** as *a group of organisms that can naturally interbreed to produce fertile offspring.*				
2. Define **community** as *a group of interacting populations of two or more different species that live together in the same area.*				
3. Define **population** as *members of a species, (naturally interbreeding organisms) living within the same area.*				

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Outcomes		**R**	**D**	**C**	**Changed Outcome**
4.	Describe examples of communities within his/her own area.				
5.	Identify populations that exist in the various communities within his/her local area.				
6.	Identify, through the use of reference guides, samples of the flora (plants) and fauna (animals) found in the local environment.				
7.	Analyze a community (from field trips) with particular reference to: - biotic and abiotic factors - relationships exhibited among organisms - micro-environments - examples of food chains - examples of human influence				
8.	Appreciate nature and the need to conserve areas for future generations to enjoy.				
Scientists use a variety of sampling techniques to estimate sizes of population.					
1.	Define a **sample** as *a randomly selected group representing an entire population of organisms.*				
2.	Estimate the size of a population using the quadrat sampling method.				
3.	Estimate the size of a population using the mark-				

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Outcomes	R	D	C	Changed Outcome
recapture method.				
4. Recognize that the accuracy of sampling is dependent upon sample size and the number of samples taken.				
5. Cite examples of how the mark-recapture has been utilized in Newfoundland and Labrador.				
6. Assess the impact of data from sampling techniques on wildlife and fishery management.				
A community undergoes a series of changes during its development.				
1. Define **succession** as *the natural series of changes which occur in an area over time.*				
2. Describe an example of succession occurring in the local environment.				
Humans have often upset the naturally occurring interactions which exist in natural communities.				
1. Identify examples of how humans have affected their environment.				
Consumer Product Testing				
After completion of this unit, the student will be able to:				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Standards are required to ensure that products meet minimum levels in areas such as safety, quality, and specific performance expectations.				
1. Explain why standards are established for consumer products.				
2. Identify qualities and/or performances of a product for which standards might to set.				
3. Propose standards for several consumer products.				
4. Appreciate the need for consumer product testing.				
5. Summarize the role of national testing agencies.				
A consumer product has characteristics which must be considered when evaluating its quality and effectiveness.				
1. Identify characteristics which contribute to the overall quality of a product.				
2. Identify characteristics which are significant to the primary function of a product and those characteristics which are not.				
3. Understand that variation in quality exists between products whose primary function is the same.				
4. Analyze ways in which a product has improved over time.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Consumer product testing must be conducted in a scientific manner.				
1. Design and conduct a scientific investigation to determine the effectiveness of a consumer product.				
2. Communicate the methodology, results and conclusions of the consumer product tests.				
3. Evaluate the design and procedures of consumer product tests.				
4. Describe various testing techniques such as: - random sampling - accelerated aging - field tests - consumer surveys				
The results of product testing provide profiles about significant characteristics of a product which can be used in personal decision making regarding the product.				
1. Analyze a product profile in order to make a personal decision regarding the product.				
2. Appreciate the role of science in generating information about consumer products.				
Consumer products and their production have an impact on the environment.				

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Outcomes	R	D	C	Changed Outcome
1. Identify the environmental concerns that arise from the production, use and disposal of consumer products.				
2. Propose strategies to help minimize the environmental impact of the production, use and disposal of consumer products.				
3. Evaluate his/her own lifestyle as a consumer in terms of environmental considerations.				
4. Appreciate that everyone has a role to play in protecting the environment.				
Consumer information is communicated through labelling and advertising.				
1. Identify the product information that must be communicated through a label.				
2. Compare the information on the labels of various consumer products with the standards that have been set in the Consumer Packaging and Labelling Act.				
3. Identify the symbols which identify potentially dangerous consumer products.				
4. Identify stereotype, cliché, bias, and emotional factors in product advertisements.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
5. Identify advertising claims which can or cannot be tested scientifically.				
6. Evaluate the validity of a media claim for a product by designing an investigation to test the validity of the claim.				
7. Describe the responsibility of producers and marketers in ensuring the advertisements are consistent with actual product characteristics.				
Machines and Work				
A machine is a device that uses energy to perform a task.				
After completion of this unit, the student will be able to:				
1. Define **machine** as *a device which uses energy to perform a task.*				
2. Give examples of machines and the tasks they perform.				
There are six types of simple machines: lever, inclined plane, pulley, wedge, wheel-and-axle and screw.				
1. Illustrate the six types of simple machines.				
The functions of simple machines are to: **- change direction of a force**				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
- move a large load with a small force **- change the speed at which the force is applied**				
1. Use a variety of simple machines to demonstrate their functions.				
Mechanical advantage is the measure of how much a machine changes a force. It is the ratio of effort force to the resistance force.				
1. Define **mechanical advantage** as *the measure of how much a machine changes a force.*				
2. Calculate the mechanical advantage of inclined plane, lever and pulley using data collected through investigations.				
3. Modify the simple machines in AB@ to increase their mechanical advantage.				
Work has been done when a force moves an object through a distance. After completion of this unit the student will be able to:				
1. Define **work** as *the transfer of energy when a force is applied to an object causing the object to move in the direction of the force.*				
2. Define the **joule** as *the standard unit of work*. 1 joule = 1 Newton x 1 meter. (1J = 1N x 1m)				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
3. Calculate work using the formula: Work = Effort Force X Distance object moves (W = F x D), where force is measured in Newtons and distance in meters.				
4. Compute work done by using simple machines.				
5. Describe a situation where an effort is applied on an object, but no work has been done.				
The efficiency of a simple machine is the ratio of the work output to work input.				
1. Define **efficiency** as *the ratio of the work output to the work input.*				
2. Using data collected through investigation, calculate the efficiency of simple machines using the formula: Efficiency = work output / work input				
3. Evaluate the efficiency of various simple machines.				
Gear wheels can be used to transfer rotary motion and force from one part of a machine to another.				
1. Define **gear wheel** as *a wheel with precisely manufactured identical teeth around its edge.*				
2. State that a gear train consists of two or more gear wheels that mesh.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Gear wheels can be used to increase rotational speed, decrease rotational speed or to change the rotational direction.				
1. Describe the various functions of gear wheels.				
2. Identify machines which illustrate several gear wheel functions.				
3. Construct gear arrangements to illustrate several gear wheel functions.				
Chains can be used to connect gears which do not mesh.				
1. Describe a bicycle as a machine in which the gears do not mesh.				
2. Relate the gearing in a bicycle to the numbers of teeth in the front and rear sprockets.				
A mechanical device is made up of two or more simple machines.				
1. Define a **mechanical device** as *a device made up of two or more simple machines.*				
2. Identify the simple machines which work together to make a mechanical device.				
3. Design and build a mechanical device which uses three or more types of simple machines.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Solutions and Substances				
After completion of this unit, the student will be able to:				
Matter is anything that has a mass and takes up space.				
1. Define **matter** as *anything that has a mass and takes up space.*				
2. Explain that theories of matter are based on inferences made by scientists after careful observation of matter and how it behaves.				
Scientific theories are not facts: they are ideas formulated to explain observations.				
1. Recognize that new discoveries may result in the modification or rejection of a theory.				
The particle theory can be used to explain physical properties of matter.				
1. State the particle theory.				
2. Classify matter as either a solid, liquid or gas.				
3. Compare the three states of matter based upon: - shape - volume - particle arrangement				

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Outcomes		**R**	**D**	**C**	**Changed Outcome**
	- particle movement				
4.	Use the particle theory to explain changes of state.				
5.	Recognize the role of models in explaining behaviour of particles.				
Matter can be classified as pure or impure.					
1.	Define a **pure substance** as *a substance that consists of one type of particle.*				
2.	Define an **impure substance** (mixture) as *consisting of two or more pure substances combined together.*				
3.	Classify everyday substances as pure or impure.				
4.	Distinguish between mechanical mixtures and solutions based upon: - composition - appearance - transparency - examples				
Methods of separating mechanical mixtures take advantage of the physical properties of the particles.					
1.	Describe the following methods used to separate mechanical mixtures: - dissolving - evaporation				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
- filtration - flotation - magnetism				
2. Demonstrate a filtration of a mixture such as sand and water.				
3. Assess the advantages and disadvantages of filtration in solving environmental concerns.				
Separation of solutions usually requires a change of state.				
1. Demonstrate crystallization with the aid of a Aseed@ crystal.				
2. Define **distillation** as *the process of vaporizing and condensing vapours so that a solution can be separated.*				
3. Recognize the importance of distillation in various industries.				
4. Design an investigation to separate a mixture using techniques based on that mixture=s physical properties.				
A threshold limit value indicates the level of which the effect of a chemical can be detected by a chemical test.				
1. Define **threshold limit value** as *the level at which the effect of a chemical can be detected by a chemical*				

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Outcomes	R	D	C	Changed Outcome
test.				
2. Determine the threshold limit value in ppm for a chemical such as salt using the sense of taste.				
3. Identify factors that may alter the average threshold limit value of a chemical.				
The toxicity level of a chemical is the level at which it can cause harm.				
1. Define **toxicity** as *the level at which a chemical can cause harm.*				
2. Explain that the threshold limit value of a chemical is not a valid means of determining its toxicity.				
3. Recognize the implications of testing threshold limit values using the senses.				
Qualitative analysis is used to identify the presence of chemical(s) in a sample.				
1. Define **qualitative analysis** as *analysis for the purpose of detecting the presence of chemical(s) in a sample.*				
Evidence in a qualitative analysis may include the formation of a precipitation and/or colour change.				
1. Define **precipitate** as *a solid substance produced out*				

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Outcomes	R	D	C	Changed Outcome
of a solution as a result of a chemical change.				
2. Conduct a qualitative analysis of known and unknown substances.				
Quantitative analysis is used to determine the amount of chemical(s) in a sample.				
1. Define **quantitative analysis** as *analysis for the purpose of determining the amount of chemical(s) in a sample.*				
2. Construct a standard curve of experimentally determined data.				
3. Using the standard curve, interpolate and extrapolate data for salt solutions of varying concentrations.				
4. Conduct a quantitative analysis to determine the concentration of salt in an unknown solution.				
5. Appreciate the need for proper waste disposal of potentially harmful substances.				
Toxic levels of a chemical can cause acute (short-term) or chronic (long-term) health effects.				
1. Assess the implications of performing toxicity tests on humans.				
2. Identify methods to determine the toxicity levels of a				

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Outcomes	R	D	C	Changed Outcome
substance for humans.				
3. Perform a simulated-animal investigation to determine the toxicity level of a substance.				
Data collected from animal studies can provide useful information on the effects of acute and chronic toxicity of a substance.				
1. State that the minimum lethal dose needed to cause 50% of the test animals in a group to die is referred to as LD50.				
2. Determine the LD50 for humans through extrapolation of data collected from animal studies.				
3. Evaluate the use of the results of LD50 of a substance for animals as an effective means of designating a maximum safe amount for humans.				
4. Determine the chronic toxicity of a particular substance based on results of real-life animal studies.				
5. Recognize the need for extensive testing in determining the acute and chronic effects of a particular substance.				
6. Recognize the ethical considerations in performing animal studies.				
The Earth=s Crust				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Rock is the basic material of the Earth=s crust. After completion of this unit, the student will be able to:				
1. Define **geology** as *the study of the materials of the Earth=s crust.*				
2. Appreciate the use of rocks in everyday life.				
Geologists classify rocks into three main groups on the basis of how they were formed.				
1. Classify rock samples on the basis of similar properties or features.				
2. Describe how each of the three groups of rocks - igneous, sedimentary, and metamorphic - form.				
3. Use an identification key to identify rock samples.				
Igneous rocks are classified as either intrusive (plutonic) or extrusive (volcanic).				
1. Explain how the difference in cooling rate of igneous rocks affects the crystal size.				
2. Show the relationship between where igneous rocks are formed, rate of cooling and crystal size.				
3. Identify hand specimens of extrusive rocks such as basalt, rhyolite, obsidian, pumice and intrusive rocks such as granite, gabbro, diabase, and pegmatite.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
The formation of sedimentary rocks may include the processes of weathering, erosion, deposition, precipitation, and lithification.				
1. Describe the processes involved in the formation of sedimentary rocks.				
2. Construct a flow chart which illustrates the formation of sedimentary rocks.				
3. Extrapolate factors which affect deposition in a river system.				
4. Record observations of the settling of sediments containing particles of various sizes.				
5. Infer the relationship between particle size and layering in sediments.				
6. Suggest other factors that might influence the settling rate of sediments.				
7. Describe how precipitation results in the formation of rock salt, gypsum and limestone.				
H. Describe lithification - the process by which sediments become rock.				
1. Identify hand specimens of sedimentary rock such as shale, limestone, gypsum and conglomerate.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
Formation of metamorphic rock occurs when rock is altered by heat, pressure or chemical reactions under the earth=s surface.				
1. Recognize that metamorphic rocks are altered igneous and sedimentary rock.				
2. Explain how igneous and sedimentary rock are changed into metamorphic rock.				
3. Identify hand specimens of the metamorphic rocks marble, quartzite, and slate, and their corresponding sedimentary parent rocks limestone, sandstone and shale.				
Rocks can be changed as a result of changes in their environment.				
1. Construct a diagram which explains the rock cycle.				
Minerals are the building blocks of rocks.				
1. Define **mineral** as *a solid element or compound that occurs naturally in the earth=s crust.*				
2. Distinguish between various properties which are used in mineral identification.				
3. Conduct identification tests on various mineral samples.				

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Outcomes	**R**	**D**	**C**	**Changed Outcome**
4. Identify specific mineral samples based on the results of the identification test.				
5. Explain how the crystal shape of a mineral is determined by the arrangement of its particles.				
6. Grow crystals of various water soluble minerals.				
Fossils can be used to reconstruct events of the past.				
1. Define **fossils** as *the remains or traces of prehistoric organisms preserved in the earth=s crust.*				
2. Describe conditions which are best suited for the preservation of organisms as fossils.				
3. Recognize that fossils represent a limited sample of all life forms that may have been present in the geologic past.				
4. Identify fossils as being one of the following types - actual remains, moulds or imprints, casks, tracks or trails.				
5. Propose an explanation for why fossils are mainly associated with sedimentary rock and not with igneous or metamorphic rock.				
Events of the geologic past can be organized into a Geological Time Scale using basic principles.				

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Outcomes		R	D	C	Changed Outcome
1.	Distinguish between relative age and absolute age.				
2.	Use the principle of superposition to determine the relative age of sedimentary rocks and the fossils contained in them.				
3.	Use fossil examples such as trilobites and dinosaurs to explain how fossils may represent specific time periods in the history of the earth.				
4.	Explain how fossils can be used to correlate (match) the ages of rocks from different locations.				
5.	Appreciate the value of fossils as clues to past life on Earth and time indicators.				
6.	Appreciate that life forms on Earth are continually changing.				
7.	State that the absolute ages of rocks and, hence, fossils, can be determined using natural radioactive clocks in rocks.				
8.	Construct a model of the Geologic Time Scale with approximate absolute ages of local fossils and milestones in Earth history.				