

Bemidji Area Schools

Grade 7 Science Outcomes

Strand	Substrand	Standard "Understand that ...	Benchmark "The student will ...	Activity	Assessment
1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	7.1.1.1.1 Understand that prior expectations can create bias when conducting scientific investigations. <i>For example:</i> Students often continue to think that air is not matter, even though they have contrary evidence from investigations. Standard Outcome: <i>Students recognize that scientific knowledge is subject to change as new information becomes available.</i>	Science World Magazine and Minnesota Conservation Volunteer articles and activities. Science projects	Students will regularly discuss and recognize variation, bias, and other differences while conducting labs.
			7.1.1.1.2 Understand that when similar investigations give different results, the challenge is to judge whether the differences are significant, and if further studies are required. <i>For example:</i> Use mean and range to analyze the reliability of experimental results. Standard Outcome: <i>Students use mean, median and range to analyze the reliability of experimental results.</i>	Science World Magazine and Minnesota Conservation Volunteer articles and activities. Science projects	Students will regularly discuss and recognize variation, bias, and other differences while conducting labs.
		2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	7.1.1.2.1 Generate and refine a variety of scientific questions and match them with appropriate methods of investigation, such as field studies, controlled experiments, review of existing work, and development of models. Standard Outcome: <i>Students demonstrate mastery by conducting field studies, controlled experiments, reviewing the work of other, and developing a variety of models.</i>	Scientific method labs and activities conducted throughout the year. Science fair projects. Science World Magazine and Minnesota Conservation Volunteer articles and activities.	Students will develop a science project incorporating the scientific method, explain how findings apply to everyday life, and do peer reviews of investigations.
			7.1.1.2.2 Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables, ensuring that one variable is systematically manipulated, the other is measured and recorded, and any other variables are kept the same (controlled). <i>For example:</i> The effect of various factors on the production of carbon dioxide by plants. Standard Outcome: <i>Students develop a research question, formulate a testable hypothesis, differentiate between qualitative and quantitative data and state the different variables that can influence the outcome of the investigation.</i>	Scientific method labs and activities conducted throughout the year. Science fair projects. Science World Magazine and Minnesota Conservation Volunteer articles and activities.	Students will develop a science project incorporating the scientific method, explain how findings apply to everyday life, and do peer reviews of investigations.
			7.1.1.2.3 Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation). Standard Outcome: <i>Students conduct an experiment, gather evidence using data tables and graphs, make claims, analyze the data and formulate a conclusion.</i>	Scientific method labs and activities conducted throughout the year. Science fair projects. Science World Magazine and Minnesota Conservation Volunteer articles and activities.	Students will develop a science project incorporating the scientific method, explain how findings apply to everyday life, and do peer reviews of investigations.

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1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	7.1.1.2.4 Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations. . <i>Standard Outcome: During labs and other investigations students compare evidence, identify faulty reasoning, and propose alternative explanations.</i>	Scientific method labs and activities conducted throughout the year. Science fair projects. Science World Magazine and Minnesota Conservation Volunteer articles and activities.	Students will develop a science project incorporating the scientific method, explain how findings apply to everyday life, and do peer reviews of investigations.
	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	3. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	7.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context. <i>For example: Use online data sets to compare wildlife populations or water quality in regions of Minnesota.</i> <i>Standard Outcome: Students will recognize environmental changes by interpreting data sets.</i>	Frog and worm dissection labs (actual and virtual). Various online science activities.	Students successfully use technical tools and data during classroom labs and other investigations.
			7.1.3.4.2 Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a life science context. <i>Standard Outcome: Students can properly use a variety of science tools,(such as Celsius thermometer, metric ruler, protractor, times, microscope, hand lens, graduated cylinder, triple beam balance) to describe and investigate natural systems.</i>	Frog and worm dissection labs (actual and virtual). Various online science activities.	Students successfully use technical tools and data during classroom labs and other investigations.
2. Physical Science	1. Matter	1. The idea that matter is made up of atoms and molecules provides the basis for understanding the properties of matter.	7.2.1.1.1 Recognize that all substances are composed of one or more of approximately one hundred elements and that the periodic table organizes the elements into groups with similar properties. <i>Standard Outcome: Students demonstrate through model and discussion a solid understanding of the basic properties of matter (metals and nonmetals) and the basic arrangement of elements on the periodic table.</i>	Chemical changes lab (liver), online and hands on photosynthesis & respiration activities. Hands on atom and molecule activities. Properties of matter lab.	Students successfully demonstrate they understand the process of photosynthesis and respiration by stating the different compounds and elements involved and how energy drives a chemical reaction leading to the production of products

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2. Physical Science	1. Matter	1. The idea that matter is made up of atoms and molecules provides the basis for understanding the properties of matter.	7.2.1.1.2 Describe the differences between elements and compounds in terms of atoms and molecules. <i>Standard Outcome: Students can correctly identify and distinguish between models of elements and compounds and know that elements have unique properties.</i>	Chemical changes lab (liver), online and hands on photosynthesis & respiration activities. Hands on atom and molecule activities. Properties of matter lab.	Students successfully demonstrate they understand the process of photosynthesis and respiration by stating the different compounds and elements involved and how energy drives a chemical reaction leading to the production of products (substances) that are different from the original ingredients.
			7.2.1.1.3 Recognize that a chemical equation describes a reaction where pure substances change to produce one or more pure substances whose properties are different from the original substance(s). <i>Standard Outcomes: Students can look at a chemical equation and describe what is happening and how the properties of each substance are different.</i>	Chemical changes lab (liver), online and hands on photosynthesis & respiration activities. Hands on atom and molecule activities. Properties of matter lab.	Students successfully demonstrate they understand the process of photosynthesis and respiration by stating the different compounds and elements involved and how energy drives a chemical reaction leading to the production of products (substances) that are different from the original ingredients.
4. Life Science	1. Structure and Function of Living Systems	1. Tissues, organs and organ systems are composed of cells and function to serve the needs of all cells for food, air and waste removal.	7.4.1.1.1 Recognize that all cells do not look alike and that specialized cells in multicellular organisms are organized into tissues and organs that perform specialized functions. <i>Standard Outcomes: Students can identify different types of cells by how they appear and can explain the function of cells (specifically nerve, muscle, skin and blood) and that structure and function are interrelated.</i>	Cell models, displays	Students will demonstrate that they understand the functions of the different organ systems and how they are interrelated through labs, discussions, and other evaluations.
			7.4.1.1.2 Describe how the organs in the respiratory, circulatory, digestive, nervous, skin and urinary systems interact to serve the needs of vertebrate organisms. <i>Standard Outcome: Students correctly describe the operation and jobs of the above mentioned organ systems and how they interact to serve the needs of a complex organism.</i>	Cell models, displays	Students will demonstrate that they understand the functions of the different organ systems and how they are interrelated through labs, discussions, and other evaluations.

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4. Life Science	1. Structure and Function of Living Systems	2. All living organisms are composed of one or more cells which carry on the many functions needed to sustain life.	7.4.1.2.1 Recognize that cells carry out life functions, and that these functions are carried out in a similar way in all organisms, including, animals, plants, fungi, bacteria and protists. <i>Standard Outcome: Students correctly identify and describe the functions of all cells.</i>	Reaction time lab, Lung & diaphragm demo, altered reality lab. Active Art online demos.	Students will build and explain cell models and describe the common functions of all cells.
			7.4.1.2.2 Recognize that cells repeatedly divide to make more cells for growth and repair. <i>Standard Outcome: Students accurately demonstrate graphically or otherwise how cells divide and correctly state why cells divide.</i>	Reaction time lab, Lung & diaphragm demo, altered reality lab. Active Art online demos.	Students will build and explain cell models and describe the common functions of all cells.
			7.4.1.2.3 Use the presence of the cell wall and chloroplasts to distinguish between plant and animal cells. <i>For example: Compare microscopic views of plant cells and animal cells.</i> <i>Standard Outcome: Students correctly point out the key differences between plant and animal cells (cell wall, chloroplasts, vacuole size).</i>	Reaction time lab, Lung & diaphragm demo, altered reality lab. Active Art online demos.	Students will build and explain cell models and describe the common functions of all cells.
	2. Interdependence Among Living Systems	1. Natural systems include a variety of organisms that interact with one another in several ways.	7.4.2.1.1 Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem. <i>Standard Outcome: Students will define population, community, ecosystem, habitat, shelter, and niche and determine the key relationships between an organism and its environment.</i>	Project Wet and Project Wild activities. Bioassessment and micro/macroeinvertebrate activities. Multi-source investigation of climate change. Labs oriented towards carrying capacity and limiting factors.	The student will be able to identify populations, communities and organisms in Minnesota and their role in the ecosystem.
			7.4.2.1.2 Compare and contrast the roles of organisms within the following relationships: predator/prey, parasite/host, and producer/consumer/decomposer. <i>Standard Outcome: Students will study the predator/prey (owls/mice and deer/wolf) parasite/host (wood tick/mammal and dog/tapeworm), producer/consumer/decomposer relationships.</i>	Project Wet and Project Wild activities. Bioassessment and micro/macroeinvertebrate activities. Multi-source investigation of climate change. Labs oriented towards carrying capacity and limiting factors.	The student will be able to identify populations, communities and organisms in Minnesota and their role in the ecosystem.
			7.4.2.1.3 Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition. <i>Standard Outcome: Students will be able to identify population trends based on biotic and abiotic factors in the environment.</i>	Project Wet and Project Wild activities. Bioassessment and micro/macroeinvertebrate activities. Multi-source investigation of climate change. Labs oriented towards carrying capacity and limiting factors.	The student will be able to identify populations, communities and organisms in Minnesota and their role in the ecosystem.

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4. Life Science	2. Interdependence Among Living Systems	2. The flow of energy and the recycling of matter are essential to a stable ecosystem.	7.4.2.2.1 Recognize that producers use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms. <i>Standard Outcome: Students will understand that producers absorb energy from the sunlight to convert into sugars carbon dioxide and water, which can be utilized immediately, retained for later use, or used by other organisms.</i>	Project Wet and Project Wild activities. Food and Energy Pyramid model.	Students will construct a visual representation of a stable ecosystem and label the main components.		
			7.4.2.2.2 Describe the roles and relationships among producers, consumers, and decomposers in changing energy from one form to another in a food web within an ecosystem. <i>Standard Outcome: Students will be able to explain the roles and relationships among producers, consumers and decomposers in changing energy from one form to another in a food web within an ecosystem and that only a small fraction of available energy is transferred.</i>			Project Wet and Project Wild activities. Food and Energy Pyramid model.	Students will construct a visual representation of a stable ecosystem and label the main components.
			7.4.2.2.3 Explain that the total amount of matter in an ecosystem remains the same as it is transferred between organisms and their physical environment, even though its form and location change. <i>For example:</i> Construct a food web to trace the flow of matter in an ecosystem. <i>Standard Outcome: Students will be able to explain that the total amount of matter in an ecosystem remains the same as it is transferred between organisms and their physical environment, even though its form and location change.</i>				
	3. Evolution in Living Systems	1. Reproduction is a characteristic of all organisms and is essential for the continuation of a species. Hereditary information is contained in genes which are	7.4.3.1.1 Recognize that cells contain genes and that each gene carries a single unit of information that either alone, or with other genes, determines the inherited traits of an organism. <i>Standard Outcome: Students will understand and define heredity, genes and traits.</i>	Sponge Bob genetics activities, genetics hands on projects and labs. Study guides and interactive online activities.	Students will participate in a variety of labs and activities that explore inheritance and reproduction. Periodic quizzes and written tests.		

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4. Life Science	3. Evolution in Living Systems	1. Reproduction is a characteristic of all organisms and is essential for the continuation of a species. Hereditary information is contained in genes which are inherited through asexual or sexual reproduction.	7.4.3.1.2 Recognize that in asexually reproducing organisms all the genes come from a single parent, and that in sexually reproducing organisms about half of the genes come from each parent. <i>Standard Outcome: Students will be able to differentiate between sexual and asexual reproduction.</i>	Sponge Bob genetics activities, genetics hands on projects and labs. Study guides and interactive online activities.	Students will participate in a variety of labs and activities that explore inheritance and reproduction. Periodic quizzes and written tests.
			7.4.3.1.3 Distinguish between characteristics of organisms that are inherited and those acquired through environmental influences. <i>Standard Outcome: Students will explain how the environment can affect the inherited traits of some organisms and know the terms instinctive, behavioral and learned characteristics.</i>	Sponge Bob genetics activities, genetics hands on projects and labs. Study guides and interactive online activities.	Students will participate in a variety of labs and activities that explore inheritance and reproduction. Periodic quizzes and written tests.
		2. Individual organisms with certain traits in particular environments are more likely than others to survive and have offspring.	7.4.3.2.1 Explain how the fossil record documents the appearance, diversification and extinction of many life forms. <i>Standard Outcome: Students will examine the fossil record and explain how biological adaptations in structure, function, and behavior contribute to the survival of a species.</i>	Online evolution activities. Study guides, Documentary DVDs, Active Art activity. Power Points.	Students will compare and contrast a variety of organisms to observe their change over time.
			7.4.3.2.2 Use internal and external anatomical structures to compare and infer relationships between living organisms as well as those in the fossil record. <i>Standard Outcome: Students will use scientific evidence to infer similarities among organisms and understand the concept of common ancestry.</i>	Online evolution activities. Study guides, Documentary DVDs, Active Art activity. Power Points.	Students will compare and contrast a variety of organisms to observe their change over time.
			7.4.3.2.3 Recognize that variation exists in every population and describe how a variation can help or hinder an organism's ability to survive. <i>Standard Outcome: Students will understand that variation, adaptation and genetic diversity can help or hinder an organism's ability to survive.</i>	Online evolution activities. Study guides, Documentary DVDs, Active Art activity. Power Points.	Students will compare and contrast a variety of organisms to observe their change over time.
			7.4.3.2.4 Recognize that extinction is a common event and it can occur when the environment changes and a population's ability to adapt is insufficient to allow its survival. <i>Standard Outcome: Students will understand that when a population is unable to adapt to environmental change, extinction occurs.</i>	Online evolution activities. Study guides, Documentary DVDs, Active Art activity. Power Points.	Students will compare and contrast a variety of organisms to observe their change over time.

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4. Life Science	4. Human Interactions with Living Systems	1. Human activity can change living organisms and ecosystems.	7.4.4.1.1 Describe examples where selective breeding has resulted in new varieties of cultivated plants and particular traits in domesticated animals. <i>Standard Outcome: Students will recognize the potential to create new varieties of species through selective breeding.</i>	Pepper moth activity, study guides, Project Wet, Wild, and Learning Tree activities.	Students will understand that within ecosystems, complex interactions exist between organisms and the physical environment.
			7.4.4.1.2 Describe ways that human activities can change the populations and communities in an ecosystem. <i>Standard Outcome: Students will define an ecosystem and a population as species that exist together along with the physical and chemical factors in which they interact (bacterial resistance, pollution, deforestation, overhunting and urban development).</i>	Pepper moth activity, study guides, Project Wet, Wild, and Learning Tree activities.	Students will understand that within ecosystems, complex interactions exist between organisms and the physical environment.
		2. Human beings are constantly interacting with other organisms that cause disease.	7.4.4.2.1 Explain how viruses, bacteria, fungi and parasites may infect the human body and interfere with normal body functions. <i>Standard Outcome: Students will recognize that disease can be caused by infection from other organisms and understand the risks and affects it has on living organisms.</i>	Active Art online demonstrations, potato (bacteria) lab, Project Wet/Project Wild activities.	Students will understand the various causes, risks, and hazards associated with diseases and be able to know the types of care, cures, and preventions associated with various diseases.
			7.4.4.2.2 Recognize that a microorganism can cause specific diseases and that there are a variety of medicines available that can be used to combat a given microorganism. <i>Standard Outcome: Students will recognize different cures for various microorganisms and the variety of medicines available to cure, prevent and care for living organisms.</i>	Active Art online demonstrations, potato (bacteria) lab, Project Wet/Project Wild activities.	Students will understand the various causes, risks, and hazards associated with diseases and be able to know the types of care, cures, and preventions associated with
			7.4.4.2.3 Recognize that vaccines induce the body to build immunity to a disease without actually causing the disease itself. <i>Standard Outcome: Students will understand that the body builds immunity to a disease without actually causing the disease itself.</i>	Active Art online demonstrations, potato (bacteria) lab, Project Wet/Project Wild activities.	Students will understand the various causes, risks, and hazards associated with diseases and be able to know the types of care, cures, and preventions associated with various diseases.
			7.4.4.2.4 Recognize that the human immune system protects against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise from within. <i>Standard Outcome: Students will have knowledge of the various functions within the human body that help to combat foreign substances within and outside the human body. Disease transmission lab.</i>	Active Art online demonstrations, potato (bacteria) lab, Project Wet/Project Wild activities.	Students will understand the various causes, risks, and hazards associated with diseases and be able to know the types of care, cures, and preventions associated with various diseases.