

Bemidji Area Schools

Grade 8 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.	8.1.1.1.1 Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given. <i>For example:</i> Evaluate the use of pH in advertizing products such as body care and gardening.	Science magazines and textbook articles and activities. Science projects. Multimedia presentations.	Students will evaluate and discuss a variety of topics within the curriculum to practice evaluating conclusions. The students will develop skills to determine between facts and opinions to support evidence in solving scientific problems.	
		2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural and engineered world and investigate phenomena.	8.1.1.2.1 Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.	Scientific method labs and activities conducted throughout the year. Science fair projects. Mars Landers.	Students will develop a project related to space technology that incorporates engineering, the history of space, and the scientific method to predict and explain the outcomes of their project based on the data and evidence they collect.	
	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	8.1.3.2.1 Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history.	"Wanted scientist" activity. Research of technology through the decades activity. Current and historical event activities.	Students will individually and in a group complete a project that describes, explains, and portrays the importance of scientific, engineering, and technology contributions. This will be done in poster format, and multimedia presentation.	
			3. Science and engineering operate in the context of society and both influence and are influenced by this context.	8.1.3.3.1 Explain how scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations.	Minnesota mining activities. Cookie mining simulation. Space technology activities. Ocean exploration simulations.	Students will successfully demonstrate they understand scientific laws or principles and their impact on society through computer and classroom simulated activities.
				8.1.3.3.2 Understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data. <i>For example:</i> Analyze how new telescopes have provided new information about the universe.	Astronomy activities. Weather forecasting lab. Ocean floor exploration. Geology activities to include: volcanoes, earthquakes, and plate tectonics.	Students will demonstrate that they understand the Earth is continually changing. They will predict how weather patterns occur and the impact weather plays in the roles of all life on Earth.
				8.1.3.3.3 Provide examples of how advances in technology have impacted how people live, work and interact.	Textbook readings and science magazine readings. Technology impact activity.	Students will discuss and explain the impact of technology on society. Students will research technology and explain the impact it has on other countries and compare it to the United States.

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1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	4. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	8.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts. <i>For example:</i> Use data or satellite images to identify locations of earthquakes and volcanoes, ocean surface temperatures, or weather patterns.	Weather mapping. Weather lab. Sun spot cycle activities. Earthquake and volcano activities. Ocean temperature lab.	The student will be able to use scientific data to make weather forecasts and predictions. Students will explain patterns found in scientific data to explain observable phenomenon.
			8.1.3.4.2 Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts.	Measurement lab and activities. Starfish dissection. Earthquake simulation.	Students will participate in measurement labs and collect and collate data. Students will develop a science project and apply all safety measures to complete it. Students will formulate a hypothesis, collect data, draw a conclusion/s, and graph information.
2. Physical Science	1. Matter	1. Pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.	8.2.1.1.1 Distinguish between a mixture and a pure substance and use physical properties including color, solubility, density, melting point and boiling point to separate mixtures and identify pure substances.	Rock and mineral labs and activities.	Students will participate in a variety of labs and activities that explore physical properties and characteristics of rocks and minerals. Students will apply knowledge to determine pure substances in a lab environment.
			8.2.1.1.2 Use physical properties to distinguish between metals and nonmetals.	Rock and mineral labs and activities.	Students will participate in a variety of labs and activities that explore physical properties to distinguish metal and non-metal characteristics of rocks and minerals. In a lab activity students will test samples to determine which samples have metal and non-metal properties.
		2. Substances can undergo physical and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	8.2.1.2.1 Identify evidence of chemical changes, including color change, gas evolution, solid formation and temperature change.	Mineral reaction demonstration. Chemistry activities and demonstrations.	Students will participate in lab and demonstration activities to recognize and determine chemical changes.
			8.2.1.2.2 Distinguish between chemical and physical changes in matter.	Chemistry activities and demonstrations.	Students will participate in lab and demonstration activities to recognize and determine the differences between chemical and physical changes of matter.

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2. Physical Science	1. Matter	2. Substances can undergo physical and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	8.2.1.2.3 Use the particle model of matter to explain how mass is conserved during physical and chemical changes in a closed system.	Chemistry activities and demonstrations. Acid and base in a big lab.	Students will participate in lab and demonstration activities to understand how mass is conserved during physical and chemical changes in a closed system.
			8.2.1.2.4 Recognize that acids are compounds whose properties include a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water.	Chemistry activities and demonstrations.	Students will participate in lab and demonstration activities to recognize the characteristics of acids and understand that they are compounds.
	3. Energy	1. Waves involve the transfer of energy without the transfer of matter.	8.2.3.1.1 Explain how seismic waves transfer energy through the layers of the Earth and across its surface.	Seismograph activities and worksheets. Slinky/wave demonstration.	Students will participate in a variety of labs and activities that explore seismic waves and activity. They will explain how seismic waves and activity transfer energy through the Earth and on the surface.
3. Earth Science	1. Earth Structure and Processes	1. The movement of tectonic plates results from interactions among the lithosphere, mantle, and core.	8.3.1.1.1 Recognize that the Earth is composed of layers, and describe the properties of the layers, including the lithosphere, mantle and core.	Earth models. Earth drawings. Maps.	Students will construct detailed drawings of the Earth and its many layers and parts. They will label, identify, and describe the properties of each of the layers and parts and utilize that in a variety of activities including geological mapping.
			8.3.1.1.2 Correlate the distribution of ocean trenches, mid-ocean ridges and mountain ranges to volcanic and seismic activity.	Ocean floor models. Ocean poster graphs. Maps. Textbook readings.	Students will understand the impact of seismic activity and how it relates to the distribution of ocean features.
			8.3.1.1.3 Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates.	Earthquake labs and activities. Volcano labs and activities. Plate tectonic labs and activities. Textbook readings.	Students will understand and recognize the role of tectonic plates and how their slow movement results in major geological events.
		2. Landforms are the result of the combination of constructive and destructive processes.	8.3.1.2.1 Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering, erosion and deposition of sediment.	Land formation models. Earth processes activity. Textbook readings.	Students will make visual representations of a chosen landform and explain what forces have created and impacted its existence.

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3. Earth Science	1. Earth Structure and Processes	2. Landforms are the result of the combination of constructive and destructive processes.	8.3.1.2.2 Explain the role of weathering, erosion and glacial activity in shaping Minnesota's current landscape.	Glacier introduction. Geological history and maps of Minnesota. Glacier impact activity. Textbook readings.	Students will utilize maps of Minnesota and the United States that are from previous periods of time to see how the current landscape of our state has changed over time. Students will recognize the impact glaciers have had on the landscape of Minnesota.
		3. Rocks and rock formations indicate evidence of the materials and conditions that produced them.	8.3.1.3.1 Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.	Relative age dating activities and worksheets. Rock stations and samples. Textbook readings.	Students will have an understanding of sedimentary rocks and how they formed. Students will infer from given data the history of sedimentary rock for a given area when provided information about the history of the specific region.
			8.3.1.3.2 Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks.	Mineral labs and stations. Rock stations and samples. Textbook readings.	Students will classify and identify a given set of minerals and identify them according to their characteristics. Students will also classify and identify a given set of rocks according to their texture and composition.
			8.3.1.3.3 Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock.	Rock stations and samples. Textbook readings.	Students will be able to infer how igneous, sedimentary and metamorphic rocks formed due to their composition.
	2. Interdependence Within the Earth system	1. The sun is the principal external energy source for the Earth.	8.3.2.1.1 Explain how the combination of the Earth's tilted axis and revolution around the sun causes the progression of seasons.	Astronomy labs and activities. Worksheet on seasons. Textbook readings.	Students will be able to explain why the earth has seasons.
			8.3.2.1.2 Recognize that oceans have a major effect on global climate because water in the oceans holds a large amount of heat.	Global climate maps. Ocean water activity. Textbook readings.	Students will be able to explain how oceans impact the global climate.
			8.3.2.1.3 Explain how heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and hydrosphere producing winds, ocean currents and the water cycle, as well as influencing global climate.	Global climate maps. El Niño/La Niña activities. Water cycle models. Textbook readings.	Students will be able to explain the impact of the sun on earth's surface and atmosphere. They will understand the sun's role within the atmosphere and hydrosphere and how it additionally impacts global climate.

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3. Earth Science	2. Interdependence Within the Earth system	2. Patterns of atmospheric movement influence global climate and local weather.	8.3.2.2.1 Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate, and the distribution of particulates and gases. <i>For example:</i> Certain gases contribute to the greenhouse effect.	Meteorology labs and activities. Worksheet on atmosphere. Textbook readings.	Students will understand and describe how Earth's atmosphere has an impact on global climate.
			8.3.2.2.2 Analyze changes in wind direction, temperature, humidity and air pressure and relate them to fronts and pressure systems.	Meteorology labs and activities. Weather forecasting. Weather maps. Textbook readings.	Students will analyze weather data to predict weather forecasts and patterns.
			8.3.2.2.3 Relate global weather patterns to patterns in regional and local weather.	Meteorology labs and activities. Weather forecasting. Weather maps. Textbook readings.	Students will understand and relate global weather to the impact it has on a specific region or area.
	3. Water, which covers the majority of the Earth's surface, circulates through the crust, oceans and atmosphere in what is known as the water cycle.	8.3.2.3.1 Describe the location, composition and use of major water reservoirs on the Earth, and the transfer of water among them.	Ocean models. Water activities. Textbook readings.	Students will identify water sources and how they transfer and move in the Earth.	
			8.3.2.3.2 Describe how the water cycle distributes materials and purifies water. <i>For example:</i> Dissolved gases can change the chemical composition of substances on Earth. <i>Another example:</i> Waterborne disease.	Water cycle models. Water activities. Textbook readings.	Students will label and describe the water cycle. Students will recognize water can become contaminated and understand the processes necessary for purifying it.
	3. The Universe	1. The Earth is the third planet from the sun in a system that includes the moon, the sun seven other planets and their moons and smaller objects.	8.3.3.1.1 Recognize that the sun is a medium sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth.	Star models. HR-Diagram activities. Textbook readings.	Students will understand the size and position of the sun in the solar system.
			8.3.3.1.2 Describe how gravity and inertia keep most objects in the solar system in regular and predictable motion.	Gravity and inertia labs and activities. Textbook readings.	Students will explain the role of gravity and inertia in the solar system.
8.3.3.1.3 Recognize that gravitational force exists between any two objects and describe how the masses of the objects and distance between them affect the force.			Gravity labs and activities. Textbook readings.	Students will understand the concept of gravity and how gravitational force is impacted.	

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3. Earth Science	3. The Universe	1. The Earth is the third planet from the sun in a system that includes the moon, the sun seven other planets and their moons and smaller objects.	8.3.3.1.4 Compare and contrast the sizes, locations, and compositions of the planets and moons in our solar system.	Astronomy labs and activities. Planet Project. N.A.S.A. activities. Textbook readings.	Students will recognize that the moons and planets in the solar system are different sizes, different distances from the sun, and composed of different material.
			8.3.3.1.5 Use the predictable motions of the Earth around its own axis and around the sun, and of the moon around the Earth, to explain day length, the phases of the moon, and eclipses.	Astronomy labs and activities. Eclipse packet. N.A.S.A. activities. Moon phase drawings. Textbook readings.	Students will be able to understand and explain how Earth's movement causes the length of day, phases of the moon, and eclipses.
	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	8.3.4.1.1 Describe how mineral and fossil fuel resources have formed over millions of years, and explain why these resources are finite and non-renewable over human time frames.	Mining lab activities. Human footprint video. Textbook readings.	Students will understand and explain the importance of fossil fuels and their formation. They will be able to identify how these resources are limited and what humans should be doing to conserve them.
			8.3.4.1.2 Recognize that land and water use practices affect natural processes and that natural processes interfere and interact with human systems. <i>For example:</i> Levees change the natural flooding process of a river. <i>Another example:</i> Agricultural runoff influences natural systems far from the source.	Land use debate. Textbook readings.	Students will understand how important human use practices affect the Earth.