

**BEMIDJI AREA SCHOOLS  
SCIENCE LEARNER OUTCOMES  
EIGHTH GRADE**

**I. HISTORY AND NATURE OF SCIENCE**

**A. Scientific World View**

Standard: The student will understand that science is a way of knowing about the world that is characterized by empirical criteria, logical argument and skeptical review.

**Benchmarks:**

1. The student will explain and give examples of how science can be used to make informed ethical decisions by identifying likely consequences of particular actions.
2. The student will explain the development, usefulness and limitations of scientific models in the explanation and prediction of natural phenomena.

**STANDARD ASSESSMENT**

1. Explain how scientific information can be used to make ethical decisions by understanding cause and effect.
2. Understand the importance of scientific models in the prediction of natural phenomena.

**STANDARD OUTCOME**

**The student will research natural phenomena and choose a scientific model to explain the relevance to Earth Science.**

**I. HISTORY AND NATURE OF SCIENCE**

**B. Scientific Inquiry**

Standard: The student will understand that scientific inquiry is used by scientists to investigate the natural world in systematic ways.

**Benchmarks:**

1. The student will know that scientific investigations involve the common elements of systematic observations, the careful collection of relevant evidence, logical reasoning and innovation in developing hypotheses and explanations.
2. The student will describe how scientists can conduct investigations in a simple system and make generalizations to more complex systems.

**STANDARD ASSESSMENT**

1. Understand the steps and procedures involved in scientific investigation.
2. Explain how scientists can apply information from scientific investigations and apply that to every day life.

### **STANDARD OUTCOME**

**The student will participate in numerous labs and activities involving inquiry to understand the relevance to scientific investigation.**

## **I. HISTORY AND NATURE OF SCIENCE**

### **B. Scientific Inquiry**

Standard: The student will use multiple skills to design and conduct scientific investigations.

#### **Benchmarks:**

1. The student will specify variables to be changed, controlled and measured.
2. The student will use sufficient trials and adequate sampling size to ensure reliable data.
3. The student will use appropriate technology and mathematics skills to access, gather, store, retrieve and organize data.

### **STANDARD ASSESSMENT**

1. Conduct a number of scientific investigations using a variety of skills and tools.
2. Collect data from scientific investigations and formulate results and conclusions.

### **STANDARD OUTCOME**

**The student will perform a scientific investigation on a topic of their choice in the field of Earth Science.**

## **I. HISTORY AND NATURE OF SCIENCE**

### **C. Scientific Enterprise**

Standard: The student will know that science and technology are human efforts that both influence and are influenced by civilizations and cultures worldwide.

#### **Benchmarks:**

1. The student will evaluate the credibility and validity of scientific and technological information from various sources.

### **STANDARD ASSESSMENT**

1. Apply information to support or refute a given scientific topic in the area of Earth Science.

### **STANDARD OUTCOME**

**The student will research a desired controversial issue in the area of Earth Science. The student will write an opinion paper on their chosen topic to support or refute their findings.**

## **I. HISTORY AND NATURE OF SCIENCE**

### **D. Historic Perspectives**

Standard: The student will understand how scientific discovery, culture, societal norms and technology have influenced one another in different time periods.

**Benchmarks:**

1. The student will relate personal experiences in scientific investigation to the experiences of scientists throughout history.
2. The student will cite examples of how science and technology contributed to changes in agriculture, manufacturing, sanitation, medicine, warfare, transportation, information processing or communication.

**STANDARD ASSESSMENT**

1. Define science and technology and understand their relationship.
2. Recognize that science and technology have changed multiple areas of every day life.

**STANDARD OUTCOME**

**The student will research an aspect of every day life that has been changed by technology and/or science and express how the impact has created a change in the past century.**

**III. EARTH AND SPACE SCIENCE****A. Earth Structure and Processes**

Standard: The student will identify Earth's composition, structure and processes.

**Benchmarks:**

1. The student will explain how earthquakes, volcanoes, sea-floor spreading and mountain building are evidence of the movement of crustal plates.
2. The student will describe how features on the Earth's surface are created and constantly changing through a combination of slow and rapid processes of weathering, erosion, sediment deposition, landslides, volcanic eruptions and earthquakes.
3. The student will describe the various processes and interactions of the rock cycle.
4. The student will interpret successive layers of sedimentary rocks and their fossils to document the age of and history of the Earth.
5. The student will recognize that constructive and destructive Earth processes can affect the evidence of Earth's history.
6. The student will classify and identify rocks and minerals using characteristics including but not limited to density, hardness and streak.

**STANDARD ASSESSMENT**

1. Understand the Theory of Plate Tectonics.
2. Recognize how Earth's surface is created and constantly changes.
3. Describe the rock cycle.
4. Analyze sedimentary rocks and their fossils to predict the age and history of the Earth.
5. Understand how Earth's processes can affect the evidence of its history.
6. Classify and identify rocks and minerals according to a variety of characteristics.

**STANDARD OUTCOME**

**The student will collect and identify a variety of rocks and fossils and express how they are part of the Earth's composition, structure and processes.**

**III. EARTH AND SPACE SCIENCE**

**A. Earth Structure and Processes**

**Standard:** The student will investigate the impact humans have on the environment.

**Benchmarks:**

1. The student will identify and research an environmental issue and evaluate its impact.

**STANDARD ASSESSMENT**

1. Understand the affects that humans have had on the environment.

**STANDARD OUTCOME**

**The student will choose an environmental issue and develop a project identifying how it has impacted society.**

**III. EARTH AND SPACE SCIENCE**

**B. The Water Cycle, Weather and Climate**

**Standard:** The student will investigate how the atmosphere interacts with the Earth system.

**Benchmarks:**

1. The student will define radiation, conduction and convection and explain their effects on weather and climate.
2. The student will identify the forces that create currents and layers in the Earth's atmosphere and water systems.
3. The student will describe the effect of Earth's rotation on the winds and ocean currents.
4. The student will collect and use data to predict the weather.
5. The student will identify the composition and structures of the atmosphere.
6. The student will describe climate changes that have occurred over time.

**STANDARD ASSESSMENT**

1. Explain the relationship among radiation, conduction, and convection as it relates to weather and climate.
2. Identify and explain currents and layers of Earth's atmosphere and water systems.
3. Understand the variables of wind and ocean currents.
4. Analyze and predict the weather.
5. Label and identify the compositional structures of the atmosphere.
6. Describe climate changes that have occurred over time.

### **STANDARD OUTCOME**

**The student will demonstrate how the atmosphere plays a role in weather and climate. The student will investigate an area of meteorology and make a visual representation of its interaction/affect on the Earth.**

## **III. EARTH AND SPACE SCIENCE**

### **C. The Universe**

Standard: The student will compare objects in the solar system and explain their interactions with the Earth.

#### **Benchmarks:**

1. The student will recognize that the sun is the principal energy source for the solar system and that this energy is transferred in the form of radiation.
2. The student will explain how the combination of the Earth's tilted axis and revolution around the sun causes the progression of seasons and weather patterns.
3. The student will compare and contrast the planets, taking into account their composition, mass and distance from the sun and recognize the conditions that have allowed life to flourish on Earth.
4. The student will use the predictability of the motions of the Earth, and sun to explain the length of day, length of year, phases of the moon, eclipses, tides and shadows.

### **STANDARD ASSESSMENT**

1. Know the sun is the primary energy source for the solar system and that its energy is transferred in the form of radiation..
2. Understand why the Earth has seasons and weather patterns.
3. Research the planets and comprehend how conditions on Earth allow for life.
4. Explain how Earth's rotation and revolution in the galaxy affect the phases of the moon, eclipses, tides, length of year, length of day, and shadows.

### **STANDARD OUTCOME**

**The student will explain the affects of the sun and moon on Earth. The student will compare and contrast another planet with Earth.**

## **III. EARTH AND SPACE SCIENCE**

### **C. The Universe**

Standard: The student will describe the composition and structure of the universe.

#### **Benchmarks:**

1. The student will recognize that the universe consists of many billions of galaxies, each containing many billions of stars and that there are vast distances that separate these galaxies and stars from one another.
2. The student will recognize that the sun is a medium-sized star and is the closest star to Earth. It is the central and largest body in the solar system and is one of billions of stars in the Milky Way Galaxy.

## **STANDARD ASSESSMENT**

1. Understand the universe consists of many galaxies with many stars and that the universe covers vast distance
2. Recognize the sun as a medium sized star and the role it plays in the solar system.

## **STANDARD OUTCOME**

**The student will view a variety of visual representations of the composition and structure of the universe. The student will understand the different modes of space travel and recognize the limited abilities for scientists examining the universe.**