

**Virtual Learning Academy**  
**Jefferson County Educational Service Center**  
**Academic Content Standards**  
**Science 08**

**Lesson 01: The Universe and Our Solar System**

The Universe and Our Solar System

<b>Standard Benchmark and Indicator</b>
S01. Earth and Space Sciences
A. Describe how the positions and motions of the objects in the universe cause predictable and cyclic events. (06-08)
01. Describe how objects in the solar system are in regular and predictable motions that explain such phenomena as days, years, seasons, eclipses, tides and moon cycles. (08)

**Grade 8 Science**

**Lesson 02: Predictable Motion-Moon Phases**

Predictable Motion-Moon Phases\*

<b>Standard Benchmark and Indicator</b>
S01. Earth and Space Sciences
A. Describe how the positions and motions of the objects in the universe cause predictable and cyclic events. (06-08)
01. Describe how objects in the solar system are in regular and predictable motions that explain such phenomena as days, years, seasons, eclipses, tides and moon cycles. (08)

**Grade 8 Science**

**Lesson 03: Tools to Study the Universe**

Tools to Study the Universe\*

<b>Standard Benchmark and Indicator</b>
S01. Earth and Space Sciences
B. Explain that the universe is composed of vast amounts of matter, most of which is at incomprehensible distances and held together by gravitational force. Describe how the universe is studied by the use of equipment such as telescopes, probes, satellites and spacecraft. (06-08)
08. Name and describe tools used to study the universe (e.g., telescopes, probes, satellites and spacecraft). (08)

E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
11. Use models to analyze the size and shape of Earth, its surface and its interior (e.g., globes, topographic maps, satellite images). (08)
<b>S04. Science and Technology</b>
A. Give examples of how technological advances, influenced by scientific knowledge, affect the quality of life. (06-08)
01. Examine how science and technology have advanced through the contributions of many different people, cultures and times in history. (08)

## Grade 8 Science

### Lesson 04: Geological Events

#### Geological Events

<b>Standard Benchmark and Indicator</b>
<b>S01. Earth and Space Sciences</b>
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
10. Explain that most major geological events (e.g., earthquakes, volcanic eruptions, hot spots and mountain building) result from plate motion. (08)

## Grade 8 Science

### Lesson 05: Layers of the Earth

#### Layers of the Earth

<b>Standard Benchmark and Indicator</b>
<b>S01. Earth and Space Sciences</b>
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
09. Describe the interior structure of Earth and Earth's crust as divided into tectonic plates riding on top of the slow moving currents of magma in the mantle. (08)

## Grade 8 Science

## Lesson 06: Tectonic Plate Theory

### Tectonic Plate Theory

Standard Benchmark and Indicator
S01. Earth and Space Sciences
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
09. Describe the interior structure of Earth and Earth's crust as divided into tectonic plates riding on top of the slow moving currents of magma in the mantle. (08)

### Grade 8 Science

## Lesson 07: The Rock Cycle

### The Rock Cycle\*

Standard Benchmark and Indicator
S01. Earth and Space Sciences
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
12. Explain that some processes involved in the rock cycle are directly related to thermal energy and forces in the mantle that drive plate motions. (08)

### Grade 8 Science

## Lesson 08: Constructive Landforms

### Constructive Landforms\*

Standard Benchmark and Indicator
S01. Earth and Space Sciences
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
13. Describe how landforms are created through a combination of destructive (e.g., weathering and erosion) and constructive processes (e.g., crustal deformation, volcanic eruptions and deposition of sediment). (08)

### Grade 8 Science

## Lesson 09: Landforms Created on the Earth

### Landforms Created on the Earth

Standard Benchmark and Indicator
S01. Earth and Space Sciences
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
13. Describe how landforms are created through a combination of destructive (e.g., weathering and erosion) and constructive processes (e.g., crustal deformation, volcanic eruptions and deposition of sediment). (08)

## Lesson 10: What is Motion?

### What is Motion?

Standard Benchmark and Indicator
S03. Physical Sciences
B. In simple cases, describe the motion of objects and conceptually describe the effects of forces on an object. (06-08)
01. Describe how the change in the position (motion) of an object is always judged and described in comparison to a reference point. (08)
02. Explain that motion describes the change in the position of an object (characterized by a speed and direction) as time changes. (08)
S02. Measurement
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
01. Explain how a small error in measurement may lead to a large error in calculated results. (08)
F. Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions. (08-10)
06. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs. (08)

## Lesson 11: Change in Position

### Change in Position

Standard Benchmark and Indicator
S03. Physical Sciences
B. In simple cases, describe the motion of objects and conceptually describe the effects of forces on an object. (06-08)

01. Describe how the change in the position (motion) of an object is always judged and described in comparison to a reference point. (08)
02. Explain that motion describes the change in the position of an object (characterized by a speed and direction) as time changes. (08)
<b>S02. Measurement</b>
A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. (08-10)
06. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs. (08)
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
01. Explain how a small error in measurement may lead to a large error in calculated results. (08)

## Lesson 12: Force and Gravity

### Force and Gravity

<b>Standard Benchmark and Indicator</b>
<b>S03. Physical Sciences</b>
B. In simple cases, describe the motion of objects and conceptually describe the effects of forces on an object. (06-08)
03. Explain that an unbalanced force acting on an object changes that object's speed and/or direction. (08)
<b>S02. Measurement</b>
A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. (08-10)
06. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs. (08)
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
01. Explain how a small error in measurement may lead to a large error in calculated results. (08)

## Lesson 13: Wave Energy

### Wave Energy

<b>Standard Benchmark and Indicator</b>
some forms represent potential energy; and during energy transformations the total
04. Demonstrate that waves transfer energy. (08)
<b>S02. Measurement</b>
A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. (08-10)

A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. (08-10)
06. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs. (08)

## Lesson 14: Vibrations and Waves

### Vibrations and Waves

<b>Standard Benchmark and Indicator</b>
S03. Physical Sciences
D. Describe that energy takes many forms, some forms represent kinetic energy and some forms represent potential energy; and during energy transformations the total amount of energy remains constant. (06-08)
04. Demonstrate that waves transfer energy. (08)
05. Demonstrate that vibrations in materials may produce waves that spread away from the source in all directions (e.g., earthquake waves and sound waves). (08)
S02. Measurement
A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. (08-10)
06. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs. (08)
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
01. Explain how a small error in measurement may lead to a large error in calculated results. (08)

## Lesson 15: Nature of Science

### Nature of Science

<b>Standard Benchmark and Indicator</b>
S06. Scientific Ways of Knowing
A. Use skills of scientific inquiry processes (e.g., hypothesis, record keeping, description and explanation). (06-08)
01. Identify the difference between description (e.g., observation and summary) and explanation (e.g., inference, prediction, significance and importance). (08)
S02. Measurement
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
03. Use appropriate levels of precision when calculating with measurements. (08)

## Lesson 16: Ethical Practices

### Ethical Practices

Standard Benchmark and Indicator
S06. Scientific Ways of Knowing
B. Explain the importance of reproducibility and reduction of bias in scientific methods. (06-08)
02. Explain why it is important to examine data objectively and not let bias affect observations. (08)
S02. Measurement
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
01. Explain how a small error in measurement may lead to a large error in calculated results. (08)
03. Use appropriate levels of precision when calculating with measurements. (08)
S04. Patterns, Functions and Algebra
C. Translate information from one representation (words, table, graph or equation) to another representation of a relation or function. (08-10)
01. Relate the various representations of a relationship; i.e., relate a table to graph, description and symbolic form. (08)
S05. Data Analysis and Probability
E. Evaluate the validity of claims and predictions that are based on data by examining the appropriateness of the data collection and analysis. (08-10)
08. Describe how the relative size of a sample compared to the target population affects the validity of predictions. (08)

## Lesson 17: Asexual Reproduction

### Asexual Reproduction

Standard Benchmark and Indicator
S02. Life Sciences
B. Describe the characteristics of an organism in terms of a combination of inherited traits and recognize reproduction as a characteristic of living organisms essential to the continuation of the species. (06-08)
01. Describe that asexual reproduction limits the spread of detrimental characteristics through a species and allows for genetic continuity. (08)

## Lesson 18: Sexual Reproduction

### Sexual Reproduction

Standard Benchmark and Indicator
S02. Life Sciences
B. Describe the characteristics of an organism in terms of a combination of inherited traits and recognize reproduction as a characteristic of living organisms essential to the continuation of the species. (06-08)
02. Recognize that in sexual reproduction new combinations of traits are produced which may increase or decrease an organism's chances for survival. (08)

## Lesson 19: Survival of the Fittest

### Survival of the Fittest

Standard Benchmark and Indicator
S02. Life Sciences
B. Describe the characteristics of an organism in terms of a combination of inherited traits and recognize reproduction as a characteristic of living organisms essential to the continuation of the species. (06-08)
03. Explain how variations in structure, behavior or physiology allow some organisms to enhance their reproductive success and survival in a particular environment. (08)

## Lesson 20: The Fossil Record

### The Fossil Record

Standard Benchmark and Indicator
S02. Life Sciences
D. Explain how extinction of a species occurs when the environment changes and its adaptive characteristics are insufficient to allow survival (as seen in evidence of the fossil record). (06-08)
04. Explain that diversity of species is developed through gradual processes over many generations (e.g., fossil record). (08)

## Lesson 21: Extinction

### Extinction

Standard Benchmark and Indicator
S02. Life Sciences
D. Explain how extinction of a species occurs when the environment changes and its adaptive characteristics are insufficient to allow survival (as seen in evidence of the fossil record). (06-08)
05. Investigate how an organism adapted to a particular environment may become extinct if the environment, as shown by the fossil record, changes. (08)

## Lesson 22: Understanding Technology

### Understanding Technology

Standard Benchmark and Indicator
S04. Science and Technology
A. Give examples of how technological advances, influenced by scientific knowledge, affect the quality of life. (06-08)
01. Examine how science and technology have advanced through the contributions of many different people, cultures and times in history. (08)
02. Examine how choices regarding the use of technology are influenced by constraints caused by various unavoidable factors (e.g., geographic location, limited resources, social, political and economic considerations). (08)

## Lesson 23: The Use of Technology

### Understanding Technology

Standard Benchmark and Indicator
S04. Science and Technology
A. Give examples of how technological advances, influenced by scientific knowledge, affect the quality of life. (06-08)
01. Examine how science and technology have advanced through the contributions of many different people, cultures and times in history. (08)
02. Examine how choices regarding the use of technology are influenced by constraints caused by various unavoidable factors (e.g., geographic location, limited resources, social, political and economic considerations). (08)

## Lesson 24: Technological Design

### Technological Design

Standard Benchmark and Indicator
S04. Science and Technology
B. Design a solution or product taking into account needs and constraints (e.g., cost, time, trade-offs, properties of materials, safety and aesthetics). (06-08)
03. Design and build a product or create a solution to a problem given more than two constraints (e.g., limits of cost and time for design and production, supply of materials

and environmental effects). (08)

## Lesson 25: Product Evaluation

### Product Evaluation

#### Standard Benchmark and Indicator

S04. Science and Technology

B. Design a solution or product taking into account needs and constraints (e.g., cost, time, trade-offs, properties of materials, safety and aesthetics). (06-08)

03. Design and build a product or create a solution to a problem given more than two constraints (e.g., limits of cost and time for design and production, supply of materials and environmental effects). (08)

04. Evaluate the overall effectiveness of a product design or solution. (08)

## Lesson 26: Doing Scientific Inquiry

### Doing Scientific Inquiry

#### Standard Benchmark and Indicator

S05. Scientific Inquiry

A. Explain that there are differing sets of procedures for guiding scientific investigations and procedures are determined by the nature of the investigation, safety considerations and appropriate tools. (06-08)

01. Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific investigations. (08)

## Lesson 27: Doing Scientific Inquiry

### Doing Scientific Inquiry

#### Standard Benchmark and Indicator

S05. Scientific Inquiry

A. Explain that there are differing sets of procedures for guiding scientific investigations and procedures are determined by the nature of the investigation, safety considerations and appropriate tools. (06-08)

02. Describe the concepts of sample size and control and explain how these affect scientific investigations. (08)

## Lesson 28: Scientific Inquiry

## What is Scientific Inquiry

Standard Benchmark and Indicator
S05. Scientific Inquiry
B. Analyze and interpret data from scientific investigations using appropriate mathematical skills in order to draw valid conclusions. (06-08)
03. Read, construct and interpret data in various forms produced by self and others in both written and oral form (e.g., tables, charts, maps, graphs, diagrams and symbols). (08)
S02. Measurement
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
03. Use appropriate levels of precision when calculating with measurements. (08)
S04. Patterns, Functions and Algebra
C. Translate information from one representation (words, table, graph or equation) to another representation of a relation or function. (08-10)
01. Relate the various representations of a relationship; i.e., relate a table to graph, description and symbolic form. (08)
S05. Data Analysis and Probability
A. Create, interpret and use graphical displays and statistical measures to describe data; e.g., box-and-whisker plots, histograms, scatter plots, measures of center and variability. (08-10)
01. Use, create and interpret scatterplots and other types of graphs as appropriate. (08)
B. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose. (08-10)
02. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose; e.g., line graph for change over time, circle graph for part-to-whole comparison, scatterplot for relationship between two variants. (08)
03. Differentiate between discrete and continuous data and appropriate ways to represent each. (08)
F. Construct convincing arguments based on analysis of data and interpretation of graphs. (08-10)
06. Make conjectures about possible relationship in a scatterplot and approximate line of best fit. (08)

## Lesson 29: Using Mathematical Skills to Interpret Data That Applies to Scientific Investigations

### Using Mathematical Skills to Interpret Data That Applies to Scientific Investigations

Standard Benchmark and Indicator
S05. Scientific Inquiry
B. Analyze and interpret data from scientific investigations using appropriate mathematical skills in order to draw valid conclusions. (06-08)
04. Apply appropriate math skills to interpret quantitative data (e.g., mean, median and mode). (08)
S01. Number, Number Sense and Operations
A. Use scientific notation to express large numbers and numbers less than one. (08-10)

01. Use scientific notation to express large numbers and small numbers between 0 and 1. (08)
G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (08-10)
06. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions. (08)
I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents. (08-10)
08. Add, subtract, multiply, divide and compare numbers written in scientific notation. (08)
<b>S02. Measurement</b>
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. (08-10)
03. Use appropriate levels of precision when calculating with measurements. (08)
<b>S03. Geometry and Spatial Sense</b>
B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence. (08-10)
03. Use proportions in several forms to solve problems involving similar figures (part-to-part, part-to-whole, corresponding sides between figures). (08)
<b>S04. Patterns, Functions and Algebra</b>
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (08-10)
07. Use symbolic algebra (equations and inequalities), graphs and tables to represent situations and solve problems. (08)
08. Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems. (08)
<b>S05. Data Analysis and Probability</b>
C. Compare the characteristics of the mean, median and mode for a given set of data, and explain which measure of center best represents the data. (08-10)
05. Explain the mean's sensitivity to extremes and its use in comparison with the median and mode. (08)
D. Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data. (08-10)
04. Compare two sets of data using measures of center (mean, mode, median) and measures of spread (range, quartiles, interquartile range, percentiles). (08)
H. Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes. (08-10)
10. Calculate the number of possible outcomes for a situation, recognizing and accounting for when items may occur more than once or when order is important. (08)

## Lesson 30: Plate Tectonics

### Plate Tectonics

<b>Standard Benchmark and Indicator</b>
<b>S01. Earth and Space Sciences</b>
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
09. Describe the interior structure of Earth and Earth's crust as divided into tectonic plates riding on top of the slow moving currents of magma in the mantle. (08)

### Lesson 31: Our Dynamic Earth

What causes major geological events?

Our Dynamic Earth. What causes major geological events?

Standard Benchmark and Indicator
S01. Earth and Space Sciences
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
10. Explain that most major geological events (e.g., earthquakes, volcanic eruptions, hot spots and mountain building) result from plate motion. (08)

### Lesson 32: Creation of Landforms

Creation of Landforms

Standard Benchmark and Indicator
S01. Earth and Space Sciences
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
13. Describe how landforms are created through a combination of destructive (e.g., weathering and erosion) and constructive processes (e.g., crustal deformation, volcanic eruptions and deposition of sediment). (08)

### Lesson 33: Models of the Earth

Models of the Earth

Standard Benchmark and Indicator
S01. Earth and Space Sciences
E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
11. Use models to analyze the size and shape of Earth, its surface and its interior (e.g., globes, topographic maps, satellite images). (08)

### Lesson 34: The Rock Cycle

The Rock Cycle

Standard Benchmark and Indicator
S01. Earth and Space Sciences

E. Describe the processes that contribute to the continuous changing of Earth's surface (e.g., earthquakes, volcanic eruptions, erosion, mountain building and lithospheric plate movements). (06-08)
12. Explain that some processes involved in the rock cycle are directly related to thermal energy and forces in the mantle that drive plate motions. (08)

## Lesson 35: Exploring Deep Space

### Exploring Deep Space

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Standard Benchmark and Indicator	Del?
S01. Earth and Space Sciences	<input type="checkbox"/>
B. Explain that the universe is composed of vast amounts of matter, most of which is at incomprehensible distances and held together by gravitational force. Describe how the universe is studied by the use of equipment such as telescopes, probes, satellites and spacecraft. (06-08)	<input checked="" type="checkbox"/>
08. Name and describe tools used to study the universe (e.g., telescopes, probes, satellites and spacecraft). (08)	<input checked="" type="checkbox"/>

## Lesson 36: Science Final Exam