

## Grade Band Theme: Order and Organization

*This theme focuses on helping students use scientific inquiry to discover patterns, trends, structures and relationships that may be described by simple principles. These principles are related to the properties or interactions within and between systems.*

### Earth and Space Science (ESS)

#### Topic: Physical Earth

This topic focuses on the physical features of Earth and how they formed. This includes the interior of Earth, the rock record, plate tectonics and landforms.

#### Content Statements

- The composition and properties of Earth's interior are identified by the behavior of seismic waves.
  - The refraction and reflection of seismic waves as they move through one type of material to another is used to differentiate the layers of Earth's interior. Earth has an inner and outer core, an upper and lower mantle and a crust.
  - The formation of the planet generated heat from gravitational energy and the decay of radioactive elements, which are still present today. Heat released from Earth's core drives convection currents throughout the mantle and the crust.
- Earth's crust consists of major and minor tectonic plates that move relative to each other.
  - Historical data and observations such as fossil distribution, paleomagnetism, continental drift and sea-floor spreading contributed to the theory of plate tectonics. The rigid tectonic plates move with the molten rock and magma beneath them in the upper mantle.
  - Convection currents in the crust and upper mantle cause the movement of the plates. The energy that forms convection currents comes from deep within the Earth.
  - There are three main types of plate boundaries: divergent, convergent and transform. Each type of boundary results in specific motion and causes events (such as earthquakes or volcanic activity) or features (such as mountains or trenches) that are indicative of the type of boundary.
- A combination of constructive and destructive geologic processes formed Earth's surface.
  - Earth's surface is formed from a variety of different geologic processes, including but not limited to plate tectonics.

**Science  
Grade 8**

- Evidence of the dynamic changes of Earth's surface through time is found in the geologic record.
  - Earth is approximately 4.6 billion years old. Earth history is based on observations of the geologic record and the understanding that processes observed at present day are similar to those that occurred in the past (uniformitarianism). There are different methods to determine relative and absolute age of some rock layers in the geologic record. Within a sequence of undisturbed sedimentary rocks, the oldest rocks are at the bottom (superposition). The geologic record can help identify past environmental and climate conditions.

**Physical Science (PS)**

**Topic: Forces and Motion**

This topic focuses on forces and motion within, on and around the Earth and within the universe.

**Content Statements**

- Forces between objects act when the objects are in direct contact or when they are not touching.
  - Magnetic, electrical and gravitational forces can act at a distance.
- Forces have magnitude and direction.
  - The motion of an object is always measured with respect to a reference point.
  - Forces can be added. The net force on an object is the sum of all the forces acting on the object. The net force acting on an object can change the object's direction and/or speed.
  - When the net force is greater than zero, the object's speed and/or direction will change.
  - When the net force is zero, the object remains at rest or continue to move at a constant speed in a straight line.
- There are different types of potential energy.
  - Gravitational potential energy changes in a system as the masses or relative positions of objects are changed.
  - Objects can have elastic potential energy due to their compression or chemical potential energy due to the nature and arrangement of the atoms that make up the object.

## Life Science (LS)

### Topic: Species and Reproduction

This topic focuses on continuation of the species.

#### Content Statements

- Diversity of species occurs through gradual processes over many generations. Fossil records provide evidence that changes have occurred in number and types of species.
    - Fossils provide important evidence of how life and environmental conditions have changed.
    - Changes in environmental conditions can affect how beneficial a trait will be for the survival and reproductive success of an organism or an entire species.
    - Throughout Earth's history, extinction of a species has occurred when the environment changes and the individual organisms of that species do not have the traits necessary to survive and reproduce in the changed environment. Most species (approximately 99 percent) that have lived on Earth are now extinct.
  - Reproduction is necessary for the continuation of every species.
    - Every organism alive today comes from a long line of ancestors who reproduced successfully every generation. Reproduction is the transfer of genetic information from one generation to the next. It can occur with mixing of genes from two individuals (sexual reproduction). It can occur with the transfer of genes from one individual to the next generation (asexual reproduction). The ability to reproduce defines living things.
  - The characteristics of an organism are a result of inherited traits received from parent(s).
    - Expression of all traits is determined by genes and environmental factors to varying degrees. Many genes influence more than one trait, and many traits are influenced by more than one gene.
    - During reproduction, genetic information (DNA) is transmitted between parent and offspring. In asexual reproduction, the lone parent contributes DNA to the offspring. In sexual reproduction, both parents contributed DNA to the offspring.
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## Literacy in Science & Technical Subjects: Grades 6 - 8

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The standards below begin at grade 6; standards for K–5 reading in history/social studies, science, and technical subjects are integrated into the K–5 Reading standards. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations—the former providing broad standards, the latter providing additional specificity.

### Key Ideas and Details

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- Cite specific textual evidence to support analysis of science and technical texts.
- Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

### Craft and Structure

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- Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
- Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
- Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

### Integration of Knowledge and Ideas

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- Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

### Range of Reading and Level of Text Complexity

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- By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.
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