



**STANDARDS**

**PAGE REFERENCES**

**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.*

**Science Inquiry and Application**

**During the years of grades 5-8 all students must use the following scientific processes to construct their knowledge and understanding in all science content areas:**

- Identify questions that can be answered through scientific investigations;
- Design and conduct a scientific investigation;
- Use appropriate mathematics, tools and techniques to gather data and information;
- Analyze and interpret data;
- Develop descriptions, models, explanations and predictions;
- Think critically and logically to connect evidence and explanations;
- Recognize and analyze alternative explanations and predictions; and
- Communicate scientific procedures and explanations.

## STANDARDS

## PAGE REFERENCES

## Strands

**Strand Connections:** Systems can be described and understood by analysis of the interaction of their components. Energy, forces and motion combine to change the physical features of the Earth. The changes of the physical Earth and the species that have lived on Earth are found in the rock record. For species to continue, reproduction must be successful.

## Earth and Space Science

## Topic: Rocks, Minerals and Soil

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 is still present today. Heat released from Earth's core drives convection currents throughout the mantle and the crust.

**Note:** The thicknesses of each layer of Earth can vary and be transitional, rather than uniform and distinct as often depicted in textbooks.

## Student Edition:

516, 534-536

## Teacher Edition:

GQ 516, 534; MEI 536; VL 536

**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 that type of boundary.

## Student Edition:

495-499, 503-507, 511-517, 545-546

*Careers in Science* 501

*Lab* 520

*MiniLab* 516

*Skill Lab* 509

## Teacher Edition:

FC 497; GQ 516; PB 513; RC 498; RRMS 506; SCB 492F; TD 511, 513, 515, 517; VL 497, 498, 504, 512, 514

STANDARDS	PAGE REFERENCES
<p><b>A combination of constructive and destructive geologic processes formed Earth’s surface.</b>  Earth’s surface is formed from a variety of different geologic processes, including but not limited to plate tectonics.  <b>Note:</b> The introduction of Earth’s surface is found in ESS grade 4.</p>	<p><b>Student Edition:</b>  472-474, 479-482, 511-518, 532-533, 545-552  <i>How Nature Works</i> 469  <i>Lab</i> 520  <i>Launch Lab</i> 479  <i>MiniLab</i> 474, 481  <b>Teacher Edition:</b>  GQ 473; RD 533; RPT 482; RS 473; SCB 458F, 492F; TD 479, 515; VL 472, 473, 474, 480, 514</p>
<p><b>Evidence of the dynamic changes of Earth’s surface through time is found in the geologic record.</b>  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.  <b>Note:</b> Environmental and climate conditions also can be documented through the cryosphere as seen through ice cores.</p>	<p><b>Student Edition:</b>  565-566, 570-571, 575-579, 583-588, 601-602  <i>Lab</i> 590, 632  <i>MiniLab</i> 577  <i>Skill Practice</i> 581, 607  <b>Teacher Edition:</b>  A 575; DI 567, 577; GQ 566, 570, 571, 583, 588, 602; IF 579; S 576; VL 576</p>
<p><b>Physical Science</b></p> <p><b>Topic: Matter and Motion</b>  <i>This topic focuses on forces and motion within, on and around the Earth and within the universe.</i></p>	
<p><b>Content Statements</b></p>	
<p><b>Some forces between objects act when the objects are in direct contact or when they are not touching.</b>  Magnetic, electrical and gravitational forces can act at a distance.  <b>Note:</b> Direct contact forces were addressed in the elementary grades.</p>	<p><b>Student Edition:</b>  45-47  <i>Launch Lab</i> 44, 54  <b>Teacher Edition:</b>  DI 47; NF 46; SCB 42E; TD 45; V 44</p>

STANDARDS	PAGE REFERENCES
<p><b>Forces have magnitude and direction.</b></p> <p>The motion of an object is always measured with respect to a reference point.</p> <p>Forces can be added. The net force on an object is the sum of all of the forces acting on the object. The net force acting on an object can change the object's direction and/or speed.</p> <p>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 continues to move at a constant speed in a straight line.</p>	<p><b>Student Edition:</b> 46, 54-57, 62-64 <i>Launch Lab</i> 54 <i>MiniLab</i> 57 <i>Skill Practice</i> 60, 68</p> <p><b>Teacher Edition:</b> BUF 56; CFOD 56; DI 55, 63; GQ 55, 64; SDF 46; TD 57; VL 63</p>
<p><b>There are different types of potential energy.</b></p> <p>Gravitational potential energy changes in a system as the masses or relative position(s) 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.</p>	<p><b>Student Edition:</b> 89-90, 165, 209 <i>MiniLab</i> 89</p> <p><b>Teacher Edition:</b> CE 90; GQ 89; NE 90; RS 91; VL 209</p>
<b>Life Science</b>	
<p><b>Topic: Species and Reproduction</b> <i>This topic focuses on continuation of the species.</i></p>	
<b>Content Statements</b>	
<p><b>Diversity of species occurs through gradual processes over many generations. Fossil records provide evidence that changes have occurred in number and types of species.</b></p> <p>Fossils provide important evidence of how life and environmental conditions have changed.</p> <p>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.</p> <p>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.</p> <p><b>Note:</b> Population genetics and the ability to use statistical mathematics to predict changes in a gene pool are reserved for grade 10.</p>	<p><b>Student Edition:</b> 570-571, 603-604, 811-816 <i>Careers in Science</i> 623 <i>MiniLab</i> 813 <i>Skill Practice</i> 607</p> <p><b>Teacher Edition:</b> GQ 603, 811, 812, 813, 814, 815, 816; PC 571; SS 570; TA 605; VL 571</p>

STANDARDS	PAGE REFERENCES
<p><b>Reproduction is necessary for the continuation of every species.</b></p> <p>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.</p>	<p><b>Student Edition:</b> 794 <i>Skill Practice</i> 809</p> <p><b>Teacher Edition:</b> HATI 794; SCB 790E</p>
<p><b>The characteristics of an organism are a result of inherited traits received from parent(s).</b></p> <p>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.</p> <p>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 contribute DNA to the offspring.</p> <p><b>Note 1:</b> The focus should be the link between DNA and traits without being explicit about the mechanisms involved.</p> <p><b>Note 2:</b> Students are not expected to know any of the ways in which bacteria reproduce.</p> <p><b>Note 3:</b> The molecular structure of DNA is not appropriate at this grade level.</p>	<p><b>Student Edition:</b> 793-794 <i>Lab</i> 818 <i>Launch Lab</i> 792 <i>MiniLab</i> 797 <i>Science &amp; Society</i> 800 <i>Skill Practice</i> 809</p> <p><b>Teacher Edition:</b> FPO 793; HATI 794; RWS 805; SCB 790E</p>