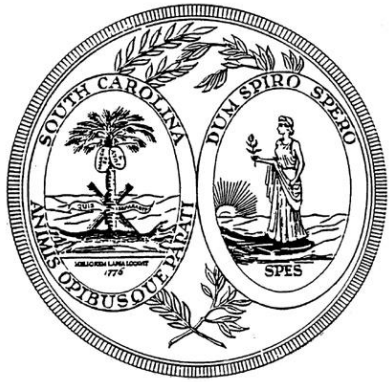
South Carolina Academic Standards and Performance Indicators for Science 2014



Instructional Unit Resource

5th Grade

South Carolina Academic Standards and Performance Indicators for Science 2014
Fifth Grade Science Instructional Unit Resource

As support for implementing the *South Carolina Academic Standards and Performance Indicators for Science 2014*, the standards for Fifth Grade have been grouped into possible units. In the Overview of Units below, the titles for those possible units are listed in columns. Refer to the Overview document to note these unit titles and how Standards, Conceptual Understandings, Performance Indicators, Science and Engineering Practices, and Crosscutting Concepts align. Following the Overview of Units, an Instructional Unit document is provided that delivers guidance and possible resources in teaching our new *South Carolina Academic Standards and Performance Indicators for Science 2014*. The purpose of this document is to provide guidance as to how all the standards in this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students. This document is a living document and instructional leaders from around the state will continuously update and expand these resource documents. These documents will be released throughout the 2016-2017 school year with the intentionality of staying ahead of instruction. Teachers should also note that links to the Standards document, A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, the SEP Support Document, and the Support Document 2.0 are embedded throughout the Instructional Unit format for reference.

Acknowledgments

Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. “Gratitude is the memory of the heart. Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness.” It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by teachers and instructional leaders across the state that have made and are continuing to make the Instructional Unit Resources possible.

Grade 5 Overview of Units

Unit 1		Unit 2		Unit 3		Unit 4
PHYSICAL SCIENCE: MATTER AND MIXTURES		EARTH SCIENCE: CHANGES IN LANDFORMS AND OCEANS		LIFE SCIENCE: INTERDEPENDENT RELATIONSHIPS		PHYSICAL SCIENCE: FORCES AND MOTIONS
Standard		**Standard**		**Standard**		**Standard**
5.P.2		5.E.3		5.L.4		5.P.5
Conceptual Understanding		**Conceptual Understanding**		**Conceptual Understanding**		**Conceptual Understanding**
5.P.2.A	5.P.2B	5.E.3A	5.E.3B	5.L.4A	5.L.4B	5.P.5A
Performance Indicators		**Performance Indicators**		**Performance Indicators**		**Performance Indicators**
5.P.2.A.1 5.P.2.A.2	5.P.2B.1 5.P.2B.2 5.P.2B.3 5.P.2B.4 5.P.2B.5 5.P.2B.6	5.E.3A.1 5.E.3A.2	5.E.3B.1 5.E.3B.2 5.E.3B.3 5.E.3B.4	5.L.4A.1 5.L.4A.2	5.L.4B.1 5.L.4B.2 5.L.4B.3 5.L.4B.4	5.P.5A.1 5.P.5A.2 5.P.5A.3 5.P.5A.4 5.P.5A.5
***Science and Engineering Practices**		***Science and Engineering Practices**		***Science and Engineering Practices**		***Science and Engineering Practices**
5.S.1A.2 5.S.1A.3 5.S.1A.4 5.S.1A.6 5.S.1A.7 5.S.1A.8		5.S.1A.1 5.S.1A.2 5.S.1A.4 5.S.1A.6 5.S.1A.8 5.S.1B.1		5.S.1A.2 5.S.1A.4 5.S.1A.6 5.S.1A.7 5.S.1A.8		5.S.1A.1 5.S.1A.2 5.S.1A.3 5.S.1A.4 5.S.1A.7 5.S.1A.8
***Crosscutting Concepts**		***Crosscutting Concepts**		***Crosscutting Concepts**		***Crosscutting Concepts**
2,4,5,7		1,2,3,4,7		1,2,5		2,3,4,7

**Teachers have the discretion to enhance the selected SEP's and CCCs.*

Unit Title
Earth Science: Changes in Landforms and Oceans
Standard http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
5.E.3 The student will demonstrate an understanding of how natural processes and human activities affect the features of Earth's landforms and oceans.

Conceptual Understanding
5.E.3A. Some of the land on Earth is located above water and some is located below the oceans. The downhill movement of water as it flows to the ocean shapes the appearance of the land. There are patterns in the location and structure of landforms found on the continents and those found on the ocean floor.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand *what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great t*ime to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**
Continental Shelf — Continental Slope — Mid-Ocean Ridge — Rift Zone — Seamount — Abyssal Plain Trench — Watershed — Drainage Basin — Canyon — Erosion — Deposition
Performance Indicators Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's.
5.E.3A.1 *Construct explanations* of how different landforms and surface features result from the location and movement of water on Earth's surface through watersheds (drainage basins) and rivers. 5.E.3A.2 *Develop and use models* to describe and compare the characteristics and locations of the landforms on continents with those on the ocean floor (including the continental shelf and slope, the mid-ocean ridge, the rift zone, the trench, and the abyssal plain).
***Science and Engineering Practices** **Support for the guidance, overviews of grade level progressions, and explicit details of each SEP can be found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for**

their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.
5.P.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams. 5.P.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
***Cross Cutting Concepts** **(http://www.nap.edu/read/13165/chapter/8)** The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.
1. Patterns: The National Research Council states "Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them" (p. 84). *Patterns can be observed in the location and structure of landforms found on the continents and the ocean floor.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
● 3-3.6 students illustrated Earth's land features, including volcanoes, mountains, valleys, canyons, caverns, and islands
Subsequent Knowledge
● 8.E.5 weathering, erosion and deposition ● H.E. 6 water availability on Earth and groundwater processes

Possible Instructional Strategies/Lessons **Strategies and lessons that will enable students to master the standard and/or indicator.**
● 5.E.3A.1 ○ Erosion in Rivers: A hands on activity that shows the effects of rivers and moving water on banks and surfaces. Includes quizzes and informative questions. This resource can be found at https://www.teachengineering.org/activities/view/nyu_erosion_activity1 ● 5.E.3A.2 ○ Ocean Floor Shoebox: Use a shoebox to make a model of the ocean floor. This resource can be found at://mjksciteachingideas.com/pdf/OceanFloorModel.pdf ○ 3D Ocean Floor Model: Step by step instructions on how to make a 3D model of the ocean floor from self -created, flour dough. This resource can be found at http://www.ehow.com/how_12207506_make-3d-model-ocean-floor-kids.html

Resources

- 5.E.3A.1
  - What are Two Main Causes of Changes to the Earth Surface?: Informative page with illustrations detailing changes in the earth's surfaces due to water movement and drainage basins. This resource can be found at https://www.geolounge.com/what-are-the-two-main-causes-of-changes-to-the-earth-surface/
  - Surf Your Watershed: Locate your watershed in your geographic region on a map. This site has links to click on to find groups in your area responsible for cleanups, monitoring activities, restoration projects, and other activities. This resources can be found at https://cfpub1.epa.gov/surf/locate/index.cfm
  - Erosion, Deposition, and Weathering: A YouTube video of water movements on earth's surfaces. This resources can be found at https://www.youtube.com/watch?v=B3iDcDGqFG8
- 5.E.3A.2
  - Ocean Floor Project Model: Video modeling how to develop a model of the ocean floor. This resource can be found at https://www.youtube.com/watch?v=B7UVrmQEKTQ

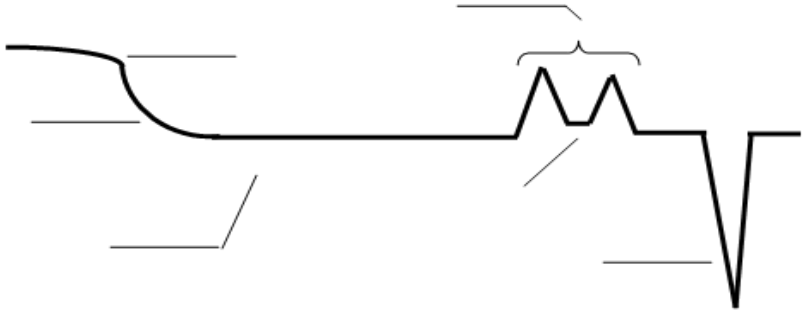
Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- 5.E.3A.1
  - Explain what happens in these watershed areas. What types of land features would you find here?

- 5.E.3A.2
  - Provide students with a sample of Play-Doh or modeling clay. Have them form the ocean floor features (continental shelf and slope, the mid-ocean ridge, the rift zone, the trench, and the abyssal plain) and correctly identify verbally, by labeling, or graphing.

  - Label the model of the ocean floor by writing the correct response in the blank:
    - Abyssal plain, Continental shelf, Continental slope, Mid-ocean Ridge, Rift zone, Trench



  - Fill in the table below using information from your ocean floor model and continental landform model (if available).

Continental and Oceanic Landforms

Description	Continental Feature	Oceanic Feature
Low land between hills or mountains		
Deep valley with high, steep sides		
Land which rises high above the ground		
Wide, flat areas of land		

Unit Title
Earth Science: Changes in Landforms and Oceans
Standard http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
5.E.3 The student will demonstrate an understanding of how natural processes and human activities affect the features of Earth's landforms and oceans.

Conceptual Understanding
5.E.3B. Conceptual Understanding: Earth's oceans and landforms can be affected by natural processes in various ways. Humans cannot eliminate natural hazards caused by these processes but can take steps to reduce their impacts. Human activities can affect the land and oceans in positive and negative ways.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**

Weathering	Erosion	Deposition	Earthquakes	Tsunamis	Hurricanes
Landslides	Volcanic Eruptions	Floods	Constructive Forces	Destructive Forces	Waves
Currents	Beaches	Tides	Shore	Barrier Islands	Inlets
Conservation	Pollution	Acid Rain	Chemical Pollution	Mechanical	Physical
Estuaries					

Performance Indicators Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's.
5.E.3B.1 *Analyze and interpret data* to describe and predict how natural processes (such as weathering, erosion, deposition, earthquakes, tsunamis, hurricanes, or storms) affect Earth's surface. 5.E.3B.2 *Develop and use models to explain* the effect of the movement of ocean water (including waves, currents, and tides) on the ocean shore zone (including beaches, barrier islands, estuaries, and inlets).

5.E.3B.3 *Construct scientific arguments* to support claims that human activities (such as conservation efforts or pollution) affect the land and oceans of Earth.
5.E.3B.4 *Define problems* caused by natural processes or human activities and *test possible solutions* to reduce the impact on landforms and the ocean shore zone.

***Science and Engineering Practices**

Support for the guidance, overviews of grade level progressions, and explicit details of each SEP can be found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

5.S.1A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
5.S.1A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
5.S.1A.7 Construct scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts.
5.S.1A.1 Ask questions to (1) generate hypotheses for scientific investigations or (2) refine models, explanations, or designs.
5.5.1B.1 Construct devices or design solutions using scientific knowledge to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the device or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.

***Cross Cutting Concepts** **(http://www.nap.edu/read/13165/chapter/8)**

The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

2. Cause and effect: Mechanism and explanation: The National Research Council (2012) states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *Natural processes such as weathering, erosion, deposition, earthquakes, tsunamis, hurricanes, and storms affect Earth's surface. For example, weathering breaks down and changes the shape of mountains and hurricanes and coastal storms cause erosion to beaches. Various natural processes and human activities affect features of Earth's landforms and oceans. There are causes and effects of weathering and erosion that affects the Earth's landforms and oceans. Movement of ocean water has an effect on ocean shorelines.*

3. Scale, Proportion, and Quantity: The National Research Council (2012) states "In considering phenomena, it is critical to recognize what is

relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance" (p. 84). *Data can be analyzed and interpreted to describe and predict how natural process affect Earth's surface.*

4. Systems and System Models: The National Research Council (2012) states "defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84). *Natural process, including weather systems, affect Earth's surface.*

7. Stability and Change: The National Research Council (2012) states "defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84). For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study. *The shape and size of Earth's features can be changed by natural processes and human activities. Change caused by processes on the ocean floor can occur quickly.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
• 1.E.4 Oceans, rivers, streams • 3.E.4 Weathering, erosion, deposition, volcanoes, floods or earthquake • 3.E.4 Weathering, erosions, fire, landslide, earthquakes, floods • 4.E.2 Thunderstorm, hurricane, tornado
Subsequent Knowledge
• 6.E.2 Ocean currents • 8.E.4 Tides • 8.E.5 Plate tectonics and its relationship to earthquakes and volcanoes • 8.E.5 Weathering, erosion, deposition, earthquakes, volcanoes • 8.E.6 Impact of events (catastrophic) on the conditions of Earth • H.E.3 Theory of plate tectonics, seismic graphs • H.E.3 Management of natural resources and human activity vs. natural disasters • H.E.3 Rate of weathering, reduction of impact of natural disasters • H.E.4 Changes to earth based on geologic time scale • H.E.4 Changes in Earth's environmental conditions • H.E.6 Water availability on Earth and convection currents • H.E.6 Effects of human activity on the hydrology of an ecosystem

Possible Instructional Strategies/Lessons
Strategies and lessons that will enable students to master the standard and/or indicator.

- 5.E.3B.1
  - Weathering, Erosion, and Deposition: This lesson introduces or reviews (if students remember the terms from 3rd grade) the terms weathering, erosion, and deposition and provides hands-on activities to show the students what each one means and how it affects earth materials. This lesson can be found at: http://betterlesson.com/lesson/638340/weathering-erosion-and-deposition

  - Dig This! Erosion Investigation: This is a 5-6 day mini-unit that has students identify erosion problems at their school, investigate the different types of erosion, research erosion, and work with a group to create solutions to erosion problems that may be found on their schoolyard. This unit can be found at: http://www.cas.miamioh.edu/scienceforohio/Erosion/L.html

  - Coastal Erosion: This lesson provides data about beach erosion and deposition for Lefaga, Samoa. The students will turn the data into a line graph and then analyze the data to answer questions. This lesson can be found at: http://www.arm.gov/education/teacher-tools/lessons/coastal-erosion

  - Earthquakes: This 2-3 period lesson takes the students through what causes an earthquake to predicting the effects of an earthquake. Section III of this lesson specifically pertains to this standard, but the background information may be useful for the students. This lesson can be found at: http://scetv.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.lp_earthquakes/earthquakes/

  - Tsunami in a Bottle: In this activity students learn that tsunamis can be caused by earthquakes and the effects of tsunamis on the shoreline. This lesson can be found at: http://www.shakeout.org/california/downloads/ShakeOut_ES1_TsunamiBottle.pdf

  - Hurricanes: Types, Formation, Causes & Effects: This site includes a seven minute video that explains types of hurricanes, how they are formed and their effects. A quiz and worksheet are also included. This site can be found at: http://study.com/academy/lesson/hurricanes-types-formation-causes-effects.html#lesson

- 5.E.3B.2
  - Waves, Currents, and Tides & The Shore Zone: This activity includes copies of a booklet students can make to enforce waves, currents, and tides at the shore zone. Vocabulary, illustrations, and activities are also included. This resource can be found at: ashleycstanton.weebly.com/uploads/2/2/6/4/22641250/shore_zones_booklet.docx

- 5.E.3B.3
  - Protecting Our Planet: Hands on activity that uses macaroni to represent pollution. Groups of students spread the "polluted" macaroni to describe the impact of humans and pollution in our environment, and discuss ways to prevent it. This resource can be found at: http://www.discoveryeducation.com/teachers/free-lesson-plans/protecting-our-planet.cfm

- 5.E.3B.4
  - Pollution (Watersheds): Students will learn about water pollution by making and testing a model of a growing community. This resource can be found at: http://curriculum.scaquarium.org/landing/5-8-watershed/5-8-pollution/

Resources

- 5.E.3B.1
  - 5th Grade Ch. 9 Lesson 4, What is Erosion: This Slideshare explains weathering, erosion, and deposition and shows examples of each using authentic pictures. The Slideshare can be found at: http://www.slideshare.net/allsaintsscience/5th-grade-ch-9-lesson-4-what-is-erosion

  - Hands-On Science and Literacy Activities about Erosion, Volcanoes, and Earthquakes: This site contains links to several lessons, units, and activities pertaining to weathering, erosion, and deposition. This site can be found at: http://beyondpenguins.ehe.osu.edu/issue/earths-changing-surface/hands-on-science-and-literacy-activities-about-erosion-volcanoes-and-earthquakes

  - Hurricanes: This site contains extensive information about hurricanes and has links for lessons that can be used with students to help them understand how hurricanes are formed and what happens during a hurricane. This site can be found at: http://www.weatherwizkids.com/weather-hurricane.htm

- 5.E.3B.2
  - Ocean Shore Zone Flashcards: This site has games and activities covering the ocean shore zone, interactive flashcards, crosswords, hangman, etc. This resource can be found at http://www.studystack.com/flashcard-1514021

- 5.E.3B.3
  - Human Interaction With the Environment-Natural Resources: This is a Slideshare/PowerPoint presentation on the topics of pollution and conservation. This resource can be found at http://www.slideshare.net/awhitelily/human-interaction-with-the-environment

- 5.E.3B.4
  - Pollution Video 1 -For Kids -Pollution: Meaning and Definition: This is a video, from a child's point of view, of pollution, sources, and effects. This resource can be found at: https://www.youtube.com/watch?v=aXmfQLC8ju4

Sample Formative Assessment Tasks/Questions

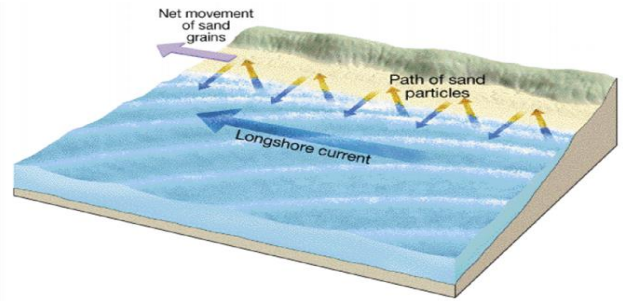
Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- 5.E.3B.1
  - Fill in the table with at least one effect each natural process has on the earth's surface.

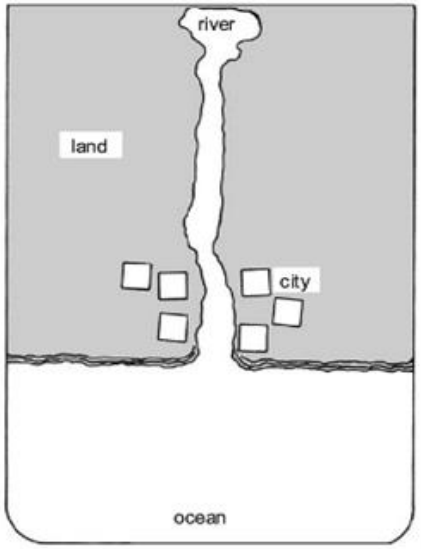
Natural process	Effect on the earth's surface
Weathering	
Erosion	
Deposition	
Earthquake	
Tsunami	
Hurricanes	
Storms	

- 5.E.3B.2
  - Observe the picture below of an ocean shore zone. Explain the effect that waves, tides and currents have on each feature identified.

- 5.E.3B.3
  - Problems have occurred in Charleston Harbor and its waterways leading to the Atlantic Ocean because of natural process and human activities. The amount of fish and shellfish available in the area has decreased over the years. Erosion is occurring along our shore and waterways. List three human and natural processes that may have contributed to these problems and describe some solutions to reduce these problems.
    Problem and Solution 1:
    Problem and Solution 2:
    Problem and Solution 3:
- 5.E.3B.4
  - The diagram below shows a coastal shore zone affected by currents. Explain what can happen to the shape of the coastline and sand as a result of currents that run along a shoreline.



- The diagram below shows homes located near a coastal shore zone. A river empties into the ocean near the homes. Choose a place along the river to build a dam that you believe would keep the homes safe from flooding. Mark the place on the diagram. Explain any positive and negative results that might occur as a result of this dam being built.



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