



Earth’s Changing Landforms:

Second Grade

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Standards

NVACS – Science Standards

* 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
* 2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
* 2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area
* 2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be a solid or liquid.

Engineering:

* K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
* K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
* K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

ELA:

* W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations.)
* W.2.8: Recall information from experiences or gather information from provided sources to answer a question.
* RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
* RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.
* SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
* SL.2.5: Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.

Materials

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Qty.** |  | **Item** | **Qty.** |
| Computer | 1 |  | BrainPOP/ BrainPOP jr. Logins | |
| Individual white boards | Class set (30) |  | White board markers | Class set (30) |
| Pencils | Class set (30) |  | Science notebooks | Class set (30) |
| Large blue construction paper (12” by 18”) | 1 ream |  | Continent printouts | Class set (30) |
| Crayons | Class set (30) |  | Glue | Class set (30) |
| Scissors | Class set (30) |  | Glasses | Class set (30) |
| Large plastic bowls | 5 |  | Pitchers | 5 |
| Sheets of clear plastic wrap | 3 boxes |  | Ceramic mugs | 5 |
| Microwave (access) | 1 |  | Ice | 2 large bags |
| Salt | 2 containers |  | Spoons | Class set (30) |
| Birthday candles | 1 box |  | Plate | Class set (30) |
| Clear drinking glass | Class set (30) |  | Matches | 1 box |
| Pictures of landforms | 1 set |  | Topographic map | 1 |
| Pictures of mountains and ranges | 1 |  | Different colored towels | Class set (30) |
| Boxes | 10 |  | Pictures of volcanoes | 1 set |
| Plastic egg cartons | 6 |  | Baking soda | 1 box |
| Vinegar | 1 box |  | Squirt bottles | 5 |
| Food coloring | 2 sets |  | Plastic trays | 5 |
| Plastic spoons | Class set (30) |  | Funnels | Class set (30) |
| Pictures of islands | 1 set |  | Clear plastic cups | Class set (30) |
| Small clear plastic vials | Class set (30) |  | Rubber bands | 1 bag |
| Popsicle sticks | 2 Class sets (60) |  | Pictures of peninsulas | 1 set |
| Brown Play-Doh | Class set (30) |  | Sandwich-sized container | Class set (30) |
| Pictures of lakes | 1 set |  | Epson salts | 1 box |
| Cotton string | 1 spool |  | Paperclips | 1 box |
| Pictures of different plains | 1 set |  | Pictures of canyons and valleys | 1 set |
| 3-oz cups | Class set (30) |  | Plastic plates | Class set (30) |
| Paper plates | Class set (30) |  | Kettle (access) | 1 box |
| Binder clips | 1 box |  | Solo plastic cups | Class set (30) |
| Rulers | Class set (30) |  | Small plastic condiment cups | Class set (30) |
| Sticky tack | 1 package |  | Newspaper | 1 |
| Cinnamon | 1 container |  | Paper towels | 5 rolls |
| Cornmeal | 1 box |  | Pushpins | 1 box |
| Permanent markers | Class set (30) |  | Measuring bowls | 5 |
| Measuring cups | 5 sets |  | Pictures of rivers | 1 set |
| Paper | 1 ream |  | Thick washable blue markers | Class set (30) |
| Tape | 5 rolls |  | Plastic tablecloths | 10 |
| Long shallow clear Tupperware | 6 |  | Sand | 3 large bags |
| Aquarium gravel | 5 lbs. |  | Buckets | 5 |
| Pictures of oceans | 1 set |  | Red and blue food coloring | 2 bottles each |
| Flour | 5 lbs. |  | Oil | 1 bottle |
| Green food coloring | 2 bottles |  | Zip-loc bags | 2 boxes |
| Blue plastic plates | Class set (30) |  | Construction paper | 1 ream |
| Toothpicks | 2 boxes |  | Brown tempera paint | 3 bottles |
| Gallon sized Ziploc bags | 3 boxes |  | Shoe boxes | 6 |
| Straws | 1 package |  | Deep, clear, plastic pans | 6 |
| Potting soil | 1 large bag |  | Modeling clay | 1 large container |
| Trays | 5 |  | Styrofoam pieces | Class set (30) |
| Hole punch (teacher use) | 1 |  | Box cutter (teacher use) | 1 |
| Hot glue gun (teacher use) | 1 |  | Milk cartons | Class set (30) |

Books with myON links (if available)

Continents in My World by Ella Cane, myON link: <https://www.myon.com/reader/index.html?a=mw_conti_f13>

There Goes the Water: A Song About the Water Cycle by Laura Purdie Salas, myON link: <https://www.myon.com/reader/index.html?a=ss_water_s10>

U.S. Landforms: What You Need to Know by Linda Crotta Brennan, myON link: <https://www.myon.com/reader/index.html?a=ff_uslnd_f17>

Mountains by Kimberly Hutmacher, myON link: <https://www.myon.com/reader/index.html?a=nw_mount_f10>

Exploring Mountains by Anita Ganeri, myON link: <https://www.myon.com/reader/index.html?a=exha_mount_s14>

Smithsonian Little Explorer: Volcanoes by Martha E.H. Rustad , myON link: <https://www.myon.com/reader/index.html?a=sle_volca_s14>

Exploring Peninsulas by Melody Mis (no myON)

Cave Crawlers by Pam Rosenberg, myON link: <https://www.myon.com/reader/index.html?a=lfadv_cavecraw_f11>

Plains (First Step Nonfiction: Landforms) by Sheila Anderson (no myON)

Living in a Valley by Ellen Labrecque, myON link: <https://www.myon.com/reader/index.html?a=pwl_lvlly_s15>

Canyon Hunters by Anita Ganeri, myON link: <https://www.myon.com/reader/index.html?a=lfadv_canyonhu_f11>

Rivers by Alyse Sweeney, myON link: <https://www.myon.com/reader/index.html?a=nw_river_f10>

Exploring Rivers: A Benjamin Blog and his Inquisitive Dog Investigation by Anita Ganeri, myON link: <https://www.myon.com/reader/index.html?a=exha_river_s14>

Lakes by Diyan Leake, myON link: <https://www.myon.com/reader/index.html?a=wwe_lakes_f14>

Ocean Divers by Anita Ganeri, myON link: <https://www.myon.com/reader/index.html?a=lfadv_oceandiv_f11>

Types of Maps by Jennifer M. Besel, myON link: <https://www.myon.com/reader/index.html?a=map_typem_f13>

Erosion: Changing Earth’s Surface by Robin Koontz, myON link: <https://www.myon.com/reader/index.html?a=as_erosi_f06>

Vocabulary

|  |  |
| --- | --- |
| **Word** | **Definition** |
| Accumulation | Oceans and other bodies of water collect the water that has fallen |
| Active volcano | A volcano that erupts regularly |
| Archaeologist | A scientist who studies people of the past, what they were like, and how they lived |
| Ash | Very small fragments of lava or rock blasted into the air by volcanic explosions |
| Biologist | A scientist who studies living things |
| Canyon | A deep, steep-walled, V-shaped valley cut by a river through resistant rock |
| Cartographer | A person who makes maps |
| Cave | A natural underground chamber or series of chambers open to the surface |
| Coastal Plain | A flat, low-lying land adjacent to a sea coast |
| Condensation | When water vapor in the air turns from a gas back into a liquid and leaves the atmosphere |
| Continental Drift | The very slow movement of continents on the surface of the Earth |
| Creek | A natural stream of water normally smaller than and often tributary to a river |
| Crust | The outermost layer of the planet |
| Cycle | A set of events or actions that happen again and again in the same order |
| Delta | A piece of land in the shape of a triangle or fan made by deposits of mud and sand at the mouth of a river |
| Density | How close the molecules of a substance are, or how much mass a substance has in a given space |
| Deposition | The dropping off or depositing of eroded rock |
| Dormant volcano | A volcano that has not erupted for many years, although there is still some activity deep inside |
| Erosion | The action or process of wearing away by the action of water, wind, or glacial ice |
| Evaporation | When a liquid turns into a gas or vapor |
| Extinct Volcano | A volcano that is no longer active |
| Fold Mountains | Mountains that are formed when two plates run into each other or collide; the force causes the Earth’s crust to crumple and fold |
| Geography | The science that deals with Earth’s surface |
| Geographers | Scientists who study geography; including the Earth’s physical features such as mountains, deserts, rivers, lakes, and oceans |
| Geologist | Scientists that study the Earth and what it is made of |
| Geosphere | The solid earth |
| Glacier | A huge mass of ice slowly floating over a land mass, formed from compacted snow |
| Groundwater | Water that collects or flows beneath the Earth’s surface, filling in the porous spaces in soil, sediment, and rocks |
| Hydrologist | Scientists who study the properties, distribution, and circulation of water on and below Earth’s surface and in the atmosphere |
| Inland Plain | Plains found away from the coast |
| Islands | Any land area surrounded entirely by water |
| Lake | Large bodies of water surrounded by land and not part of an ocean |
| Landform | Any natural foundation of rock and dirt found on Earth |
| Lava | Liquid rock that flows outside of a volcano; it glows red hot to white hot as it flows |
| Levee | A bank built along a river to prevent flooding |
| Limnology | The scientific study of bodies of fresh water, such as lakes |
| Magma | Liquid rock inside a volcano |
| Marine Biologist | A scientist who studies things that live in the ocean: from small organisms such as plankton through very large such as whales |
| Mountain | A natural elevation of Earth’s surface rising abruptly from the surrounding level |
| Ocean | A huge body of salt water covering nearly 71% of Earth’s surface |
| Ocean Current | A vast river within the ocean, flowing from one place to another |
| Oceanographer | Scientists who study the ocean |
| Paleontologist | Scientists that study the remains of ancient organisms or living things |
| Peninsula | Land that extends beyond the mainland and has water on three sides |
| Plain | A large area of flat land without trees |
| Precipitation | The liquid and solid water particles that fall from clouds and reach the ground |
| Reservoir | A usually artificial lake used to store a large supply of water for use in people’s homes, businesses, etc. |
| River | A flowing, moving stream of water, usually feeding into an ocean, lake, pond, or even another river |
| Salinity | The salt content of a body of water |
| Sand Dunes | A pile or mound of sand created by the wind and deposition of sand that was eroded from another location |
| Sediment | Material (as stones or sand) deposited by water, wind, or glaciers |
| Sedimentary rock | Formed when sand, mud, and pebbles get laid down in layers; over time, they are turned into rock |
| Slope | An elevated geological formation |
| Source | The origins of a tributary; the place where the water begins its journey towards the ocean or sea, usually on high ground |
| Spelunker | A person who makes a hobby of exploring or studying caves |
| Speleologist | A scientist who studies or explores caves |
| Stalactite | A deposit of calcium carbonate resembling an icicle hanging from the roof or sides of a cavern or cave |
| Stalagmite | The act or result of dripping; a deposit of calcium carbonate like an inverted stalactite formed on the floor of the cave by a drip of water |
| Stream | A small, flowing body of water such as a brook or a creek |
| Topographic map | A type of map which describes the physical features of an area of land |
| Topography | The physical features of an area or land |
| Tributary | A stream or river that flows into and joins a main river |
| Valley | A long depression or ditch in Earth’s surface, usually between ranges of hills or mountains, formed by rivers that erode soil and rocks |
| Volcano | A mountain that opens downward to a pool of molten rock below the surface of the Earth; when pressure builds up, eruptions occur |
| Water Vapor | Water in the form of vapor, or a gas |
| Waterfall | A place in a river where water spills suddenly downward |
| Watershed | Any area of land that water flows across or through, trickling down and flowing toward a common body of water |
| Weathering | The process where rocks are worn away or broken down into smaller pieces by wind, water, or plants |
| Wind | Air in motion; produced by the uneven heating of the Earth’s surface by the sun |
| Windbreak | Something that serves as a shelter from the wind, usually designed to provide shelter from the wind and to protect soil from erosion |

Lesson 1: What can be found on Earth’s surface?

|  |  |
| --- | --- |
| **Learning Target**  **Objective**  **Standard** | The Earth has different features, such as land and water.  Students will be able to identify the different features of Earth using maps and a globe.  2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, large blue construction paper (12” x 18”), continent printouts, crayons, glue, scissors |
| **Books** | Continents in My World by Ella Cane |
| **Vocabulary** | Cartographer: A person who makes maps |
| **Procedures** | **ENGAGE**  Ask the students: Where do we all live? What do you think makes Earth different from other planets? Give students time to brainstorm different ideas about what is different about the Earth than other planets; including different landforms and bodies of water. As a class, make a circle map about the different types of landforms they have seen.  Video: “How to Remember the Seven Continents!...for Kids!” (6:53): <https://www.youtube.com/watch?v=rCYERpZ4Ujc>  **EXPLORE**  Video: “Top 5 Videos of Planet Earth from Space” (10:13): <https://www.youtube.com/watch?v=Mx2eTWar0eA>  With the class, create a KWL chart discussing the different types of landforms, forms of water, and how they can be changed.  The students will have a chance to become cartographers. A cartographer is a person who studies and makes maps. Cartography combines science, art, and technology. Today, they will be making a very basic world map before they learn about the different types of landforms and bodies of water.  Give each student a large blue piece of construction paper, printouts of each continent (with labels,) crayons, scissors, and glue.  Continent printout: <http://alittlepinchofperfect.com/world-map-geography-activities-for-kids/>  Have the students color the continents and labels different colors. The labels should match the color of the continent. Students should cut out the different continents.  **EXPLAIN**  Asia is the biggest continent. It has the biggest land area and the world’s biggest population. Oceania is the smallest continent. Oceania includes Australia and New Zealand. Africa is the continent with the most countries: there are 54 countries on the African continent. North America is a continent located entirely on the northern and western hemisphere. It includes the United States of America, Canada, Mexico, Greenland, and the Caribbean islands. Europe houses the two smallest countries in the world. Asia has the most languages: over 2,300. South America has the longest mountain range (the Andes,) the highest waterfalls (Angel Falls,) and also the driest place on Earth (the Atacama Desert in Chile.) Antarctica has the smallest population.  Book: Continents in My World by Ella Cane, or use the myON link: <https://www.myon.com/reader/index.html?a=mw_conti_f13> |
| **Enrichment** | **EXTEND**  Ask the students: Do you think the continents on our planet always looked the same? What types of changes do you think may have been made over time? |
| **Closure** | **ELABORATE**  Along with the continents on the planet, there are also five oceans: Pacific, Atlantic, Indian, Arctic, and Southern. These oceans can be added onto the maps.  Video: “Seven Continents Song” (2:02): <https://www.youtube.com/watch?v=K6DSMZ8b3LE> |
| **Assessment** | **EVALUATE**  Formative: Check on students’ maps and their labels of the continents. |

Differentiated Instruction

|  |  |  |
| --- | --- | --- |
| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review the different continents and oceans. Show the student different pictures of the continents and review the different names. | Review the different continents and oceans. Ask the student: Why do you think the oceans were given different names even though they all run together? | Review the different continents and oceans. Ask the student: What would happen if our continents were closer together? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of the different continents described in the lesson, and/or have the student describe the different types of landforms and water forms from the bubble map.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to handle different items with continents, such as a globe or a map. Give them a chance to explore the different continents for understanding.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 3)** | | |
| Ask students: How do you think continents looked a hundred years ago? What about a million years ago? Why do you think it would be the same or different? | | |
| **Interactive Technology** | | |
| App: Geography Master: Education  App: Planet Geo – Fun Games of World Geography: Planet Factory Interactive  Game: Sheppard Software: All About World Geography: <http://www.sheppardsoftware.com/World_Continents.htm>  Game: World Geography Games: <http://world-geography-games.com/> | | |

Lesson 2: Where does water come from?

|  |  |
| --- | --- |
| **Learning Target**  **Objective**  **Standard** | The water cycle is continuous through which water circulates.  Students will be able to identify the process of the water cycle.  2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, large glass or plastic bowls, pitchers, sheets of clear plastic wrap, ceramic mugs, water, access to either a microwave or kettle, ice, salt, spoon, birthday candle, plate, clear drinking glass, match |
| **Books** | There Goes the Water: A Song About the Water Cycle by Laura Purdie Salas |
| **Vocabulary** | Cycle: A set of events or actions that happen again and again in the same order  Water Vapor: Water in the form of a vapor, or gas  Evaporation: When a liquid turns into a gas or vapor  Condensation: When water vapor in the air turns from a gas back into a liquid and leaves the atmosphere  Precipitation: The liquid and solid water particles that fall from clouds and reach the ground  Collection/Accumulation: Oceans and other bodies of water collect the water that has fallen |
| **Procedures** | **ENGAGE**  Ask the students: What are different types of water that you see on Earth? Where does water come from? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about different forms of water (snow, ice, rain), different forms of water (oceans, rivers, lakes), and the different possibilities of how it arrived on Earth. Give students time to discuss how water may have formed in clouds, in oceans, and so on.  Video: “Water Cycle Song” (3:41): <https://www.youtube.com/watch?v=TWb4KlM2vts>  **EXPLORE**  Video: “Where Does Water Come From?” (4:21): <https://www.youtube.com/watch?v=R0K7VKkksyc>  To create the water cycle, have students get into groups of 2-6 (depending on the class size.) Give each group: a large glass or plastic bowl, pitcher, sheet of clear plastic wrap, ceramic mug, salt, ice, and water. Make sure to heat up some water beforehand, either in a microwave or kettle.  Pour the hot water into the bowls until they are about ¼ full. Add some salt to the water and stir it up. This represents the ocean. Place the mug in the center of the bowl. Be careful not to splash any water into it. The mug represents the land. Cover the top of the bowl tightly with plastic wrap. Place 3-4 cubes of ice on top of the plastic wrap. The plastic wrap represents the clouds, and the ice represents the cool atmosphere.  Wait about 5 minutes. Once the hot water from the ocean evaporates, condensation is visible on the “clouds.” Once the condensation cools down from the ice, it will turn into precipitation. On the sides of the bowl, precipitation is also visible as it goes back into the ocean. After another 5 minutes (10 minutes total,) carefully remove the ice cubes from the top of the plastic wrap. Some of the ice may have melted: be careful when removing the plastic wrap that the water from the melted ice doesn’t fall into the bowl. Have the students look inside the mug and see the precipitation that has fallen on the “land.”  Book: There Goes the Water: A Song About the Water Cycle by Laura Purdie Salas, or use the myON link: <https://www.myon.com/reader/index.html?a=ss_water_s10>  Have the students draw the water cycle in their science notebooks, complete with labels.  **EXPLAIN**  Video: “The Great Aqua Adventure: Crash Course Kids #24.1” (4:28): <https://www.youtube.com/watch?v=z5G4NCwWUxY>  The water cycle starts when energy from the sun heats up the surface of the Earth, causing the temperature of the water to rise. When this happens, some of the water evaporates into the air, turning into a gas called water vapor. As the water vapor rises high into the sky, it cools and turns back into a liquid, forming clouds. This process is called condensation. When too much water has condensed, the water droplets in the clouds become too big and heavy for the air to hold them. They fall back to Earth as rain, snow, sleet, or hail; known as precipitation. When the water falls and all stays into one area; such as an ocean, river, lake, or stream; this is called collection.  Video: “Water Cycle – Blazer Fresh/Science Video/GoNoodle” (3:16): <https://www.youtube.com/watch?v=KM-59ljA4Bs> |
| **Enrichment** | **EXTEND**  Water is a chemical. It’s made of hydrogen and oxygen. Water acts like a gas when it evaporates. Using a birthday candle, plate, clear drinking glass, and a match; water can be “created.” This is a teacher demonstration. Set the birthday candle on the plate and light it. Cover the burning candle with a clear glass (it should be large enough to cover the whole candle.) When the candle goes out, look inside the glass.  The tiny drops of liquid in the glass are water. The hydrogen in the candle joined with the oxygen in the air to form water. The candle flame went out when all of the oxygen in the air inside the glass was used up. |
| **Closure** | **ELABORATE**  While the Earth is 71% covered by water, the oceans hold about 97% of it, yet cannot be consumed. Salt is very difficult to remove from water. The energy and technology to remove the salt are both expensive; hence the quote “Water, water everywhere, but not a drop to drink.” |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for understanding of the water cycle and how it works. |

Differentiated Instruction

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| --- | --- | --- |
| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review the water cycle, including the different stages, and check for understanding. Explain the different stages with the student until they are able to repeat them. | Review the water cycle, including the different stages, and check for understanding. Ask the student: What would happen if the cycle didn’t repeat? | Review the water cycle, including the different stages, and check for understanding. Ask the student: What would happen if one of the steps wasn’t in the cycle? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of the water cycle as described in the lesson, and/or have the student describe the different stages of the water cycle and how they work with the other stages.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to experiment with the different stages of the water cycle, or look at pictures.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 3)** | | |
| Ask students: How is the water cycle related to other cycles on the Earth (such as the life cycle?) What would happen if we didn’t have the water cycle? | | |
| **Interactive Technology** | | |
| App: Water Cycle VR – Victory Enterprises    Game: South East Water: Natural water cycle game: <https://www.educationsoutheastwater.com.au/resources/natural-water-cycle-game>  Game: Project Wet: A Trip Through the Water Cycle: <http://www.discoverwater.org/blue-traveler/>  Games: TurtleDiary: Water Cycle Games: <https://www.turtlediary.com/games/water-cycle.html> | | |

Lesson 3: What are the different kinds of landforms on Earth?

|  |  |
| --- | --- |
| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms.  Students will be able to understand the definition of a landform on Earth.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, pictures of different types of landforms (island, mountain, plateau, valley, peninsula, cave, volcano, plain, river, ocean, lake), topographic map |
| **Books** | U.S. Landforms: What You Need to Know by Linda Crotta Brennan |
| **Vocabulary** | Landform: Any natural formation of rock and dirt found on Earth  Geosphere: The solid earth  Topographic map: A type of map which describes the physical features of an area of land |
| **Procedures** | **ENGAGE**  Ask the students: What is a landform? What are different types of landforms that you see on Earth? How do you think they came to be? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about different landforms (mountains, islands, plains, etc.) and the different possibilities of how they were formed. Create a circle map to record the answers about landforms.  **EXPLORE**  Book: U.S. Landforms: What You Need to Know by Linda Crotta Brennan, or use the myON link: <https://www.myon.com/reader/index.html?a=ff_uslnd_f17>  With their partners, give students a chance to explore the different pictures of landforms, as well as a topographic map. Ask the students to compare the similarities and differences in the different landforms on their white boards, and compare with other groups.  Using a topographical map, have the students point out the different landforms in comparison to their flash cards. What do they notice about the colors on the map?  Video: “Landforms, Hey!: Crash Course Kids #17.1” (3:57): <https://www.youtube.com/watch?v=FN6QX43QB4g>  Have the students draw one of the types of landforms that they would like to learn more about in their science notebooks.  **EXPLAIN**  Video: “Landforms Rap/Lessons With Lisa” (2:59): <https://www.youtube.com/watch?v=X_lZH2E6GHQ>  A landform is any natural foundation of rock and dirt, found on Earth. A landform can be as large as a mountain range, or as small as a hill. It can be as large as a continent, or as small as a pond. A scientist called a geologist studies and tries to understand the many landforms on Earth. They record the characteristics of different landforms to compare them to the characteristics of other landforms. Landforms are created by several different types of forces. These forces might include weather, pressure, water, wind, or moving sheets of ice. Landforms are changed by these forces that constantly work on them.  Video: BrainPOP jr.: “Landforms”: <https://jr.brainpop.com/science/land/landforms/> |
| **Enrichment** | **EXTEND**  Ask the students: How would our area be different if the topography was different? For example: in Nevada, what if there wasn’t desert, but mountains instead? How would the weather and/or climate be different? |
| **Closure** | **ELABORATE**  Topographic maps show the three-dimensional shape of the land. Topographic maps are important in geology because they portray the surface of the earth in detail. Keeping track of the topography helps scientists to understand how and if the land areas are changing, and further study changes in climate as well. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for understanding of different types of landforms, as well as what they would like to study. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review different landforms, as well as how they are featured on a topographic map. Go over the different types of landforms, as well as their similarities and differences. | Review different landforms, as well as how they are featured on a topographic map. Ask the student: Why would it be important to know the topography of an area before moving there? | Review different landforms, as well as how they are featured on a topographic map. Ask the student: Do you think a topographic map of another planet would look the same? Why or why not? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of the landforms as described in the lesson, and/or have the student describe the different types of landforms and how they compare to each other.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine the different types of landforms and/or look at pictures of landforms.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about the topography of certain areas? What about the landforms? | | |
| **Interactive Technology** | | |
| App: Plum’s Island Explorer: Land and Water  Game: Mr. Polum’s Landform Game: <https://matchthememory.com/mrpolum>  Game: Learning Liftoff: Landforms: <https://www.learningliftoff.com/1st-grade-science-activity-spot-landforms/> | | |

Lesson 4: What are the different kinds of landforms on Earth? (mountain)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including mountains.  Students will be able to understand the characteristics of mountains and how they are formed.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of different mountains and mountain ranges, different colored towels, boxes |
| **Books** | Mountains by Kimberly Hutmacher  Exploring Mountains by Anita Ganeri |
| **Vocabulary** | Mountain: A natural elevation of the Earth’s surface rising more or less abruptly from the surrounding level  Fold mountains: Mountains that are formed when two plates run into each other or collide; the force causes the Earth’s crust to crumple and fold  Crust: The outermost layer of the planet  Sedimentary: Formed when sand, mud, and pebbles get laid down in layers; over time, they are turned into rock |
| **Procedures** | **ENGAGE**  Ask the students: What is a mountain? Are there any types of mountains that you know? Have you ever visited a mountain? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about mountains, and the different possibilities of how they were formed. Create a tree map to list characteristics about landforms (starting with mountains.)  Book: Mountains by Kimberly Hutmacher, or use the myON link: <https://www.myon.com/reader/index.html?a=nw_mount_f10>  **EXPLORE**  Video: “Make Your Own Mountains! - #sciencegoals” (3:31): <https://www.youtube.com/watch?v=6q7N8-Nh4pA>  Have students get into their partners. Each group will need a stack of towels (at least 4, preferably of different colors from each other) and two boxes. (Boxes are optional.)  Have each pair lay down a stack of towels, each one folded in half. The folds will be more obvious if the towels are different colors. Put a box on either side of the towels. (If no boxes are available, the students can just push the towels.) The boxes (or students) represent the continental plates, while the towels represent the buildup of sediment on the sea bottom.  Ask the students: If you push the boxes (or move closer,) what do you think will happen to the towels? After the students answer, have them push the boxes (or move closer) as the continental plates move towards each other and observe the “mountains” being formed. The process can be repeated several times – the results will be similar.  Have students draw a picture in their science notebooks and label the steps and result of the experiment.  **EXPLAIN**  Video: “Where Do Mountains Come From?” (3:50): <https://www.youtube.com/watch?v=Fd_XqYE2BWY>  Fold mountains are formed when two plates run into each other or collide. The force of the two plates running into each other causes the Earth’s crust to crumple and fold. Many of the world’s mountain ranges are fold mountains, including the Andes, Himalayas, and the Rockies. Around 20 percent of the Earth’s surface is covered with mountains. The scientific study of mountains is called orology.  Book: Exploring Mountains by Anita Ganeri, or use the myON link: <https://www.myon.com/reader/index.html?a=exha_mount_s14> |
| **Enrichment** | **EXTEND**  Ask the students: What would happen if you pushed the towels slowly, or faster? What if you pushed them closer together? Give students an opportunity to try different methods. |
| **Closure** | **ELABORATE**  There are two other types of mountains: fault-block mountains and volcanic mountains. Fault-block mountains are formed along faults where some large blocks of rock are forced upwards, while others are forced down. The Sierra-Nevada mountains are fault-block mountains. Volcanic mountains are caused by volcanic activity. Volcanoes are formed when magma erupts all the way to the surface of the Earth, The magma will harden on the Earth’s surface, forming a mountain. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for understanding of mountains, as well as how fold mountains form. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review what a mountain is, including how fold mountains form. Do the experiment again if necessary to ensure understanding of how fold mountains are formed. | Review what a mountain is, including how fold mountains form. Ask the student: Can mountains get taller after they are formed? Why or why not? | Review what a mountain is, including how fold mountains form. Ask the student: How do you think scientists know what kinds of mountains they are? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of a mountain as described in the lesson, and/or have the student describe the different types of mountains and how they form.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a mountain and how it forms, and/or look at pictures of mountains.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about the different types of mountains? Why do you think different mountains are formed differently in different areas? | | |
| **Interactive Technology** | | |
| App: Plum’s Island Explorer: Land and Water  Game: Plum Landing: “Mountain Scramble”: <http://pbskids.org/plumlanding/games/ecosystem/mountain_scramble.html> | | |

Lesson 5: What are the different kinds of landforms on Earth? (volcano)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including volcanoes.  Students will be able to understand the characteristics of volcanoes and how they are formed.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of volcanoes, plastic egg cartons, scissors, baking soda, vinegar, squirt bottles, food coloring, plastic trays, plastic spoons, funnels |
| **Books** | Smithsonian Little Explorer: Volcanoes by Martha E.H. Rustad |
| **Vocabulary** | Volcano: A mountain that opens downward to a pool of molten rock below the surface of the Earth; when pressure builds up, eruptions occur  Magma: Liquid rock inside a volcano  Lava: Liquid rock that flows outside of a volcano; it glows red hot to white hot as it flows  Active volcano: A volcano that erupts regularly  Dormant volcano: A volcano that has not erupted for many years, although there is still some activity deep inside  Extinct volcano: A volcano that is no longer active  Ash: Very small fragments of lava or rock blasted into the air by volcanic explosions |
| **Procedures** | **ENGAGE**  Ask the students: What is a volcano? Are there any types of volcanoes that you know? Have you ever visited somewhere with a volcano? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about volcanoes, and the different possibilities of how they were formed. Continue the tree map to list characteristics about volcanoes.  Book: Smithsonian Little Explorer: Volcanoes by Martha E.H. Rustad ,or use the myON link: <https://www.myon.com/reader/index.html?a=sle_volca_s14>  **EXPLORE**  Science Activities for Kids: Mini Volcanoes: <http://www.funlittles.com/science-activities-for-kids-mini-volcanones/>  Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) to form groups of 2-6 depending on the class size. Each group will need: their science notebooks, half of a plastic egg carton, a plastic tray, baking soda, vinegar, squirt bottles, and food coloring.  Students should cut the bottom of each slot from the egg carton using scissors. Snap off the lid. Flip over the carton to make “mini mountains.” Fill up the lid with baking soda, and have the students spoon in the baking soda inside the egg carton slots through the hole (which is now the top.) Make sure they add lots of baking soda to make the eruptions spill over the slots. Fill up the squirt bottles with vinegar using a funnel. Color the vinegar using food coloring. Squirt the vinegar into the mini “volcanoes” and watch the eruptions happen.  Have students document their volcanoes using pictures, labels, and brief descriptions; along with why and how the volcanoes were formed.  **EXPLAIN**  Video: “Volcano Facts for Kids!” (10:34): <https://www.youtube.com/watch?v=x-6bGUffwtA>  The baking soda and vinegar volcano erupts because of an acid-base reaction. When the vinegar hits the baking soda, the carbon dioxide that is given off is a gas. Carbon dioxide is responsible for the fizzing and bubbling during the eruption.  Volcanoes are formed when magma from within the Earth’s upper mantle makes its way to the surface. At the surface, it erupts to form lava flows and ash deposits. Over time as the volcano continues to erupt, it will get bigger and bigger. The Earth’s crust is made up of huge slabs called plates, which fit together like a puzzle. When these plates move, the friction causes earthquakes and volcanic eruptions near the edges of the plates.  Video: “All About Volcanoes: How They Form, Eruptions & More!” (3:04): <https://www.youtube.com/watch?v=K7Oq9_DU1Mc> |
| **Enrichment** | **EXTEND**  Ask the students: What would happen if volcanoes didn’t erupt? How do you think the Earth would react? |
| **Closure** | **ELABORATE**  In early May 2018, hundreds of small earthquakes were detected in Hawaii on the volcano Kilauea’s East zone, leading officials to issue evacuation warnings. On May 3, the volcano erupted after a 5.0 earthquake earlier in the day. By May 31, 87 homes had been destroyed, and cause additional evacuation orders. The erupting volcano also cause additional earthquakes. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for understanding of volcanoes, as well as how volcanoes erupt. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review volcanoes and how they are formed, including how volcanoes get bigger the more often they erupt. Check for understanding. | Review volcanoes and how they are formed, including how volcanoes get bigger the more often they erupt. Ask the student: Are volcanoes related to earthquakes? Why or why not? | Review volcanoes and how they are formed, including how volcanoes get bigger the more often they erupt. Ask the student: Why do you think it’s difficult to predict when volcanoes will erupt? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of a volcano as described in the lesson, and/or have the student describe how a volcano is formed and gets bigger.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a volcano and how it forms, and/or look at pictures of volcanoes.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: How would you apply what you learned to develop a volcano safety kit? Is there a way to stay safe from volcanoes? | | |
| **Interactive Technology** | | |
| App: Volcanoes: Map, Alerts & Ash: The best volcano app!  App: Volcano Updates: Foxy Rocket  App: Volcano 360: Sergey Rumyantsev  Game: Scholastic: Magic School Bus – Blows Its Top: <https://www.scholastic.com/magicschoolbus/games/volcano/index.htm> | | |

Lesson 6: What are the different kinds of landforms on Earth? (island)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including islands.  Students will be able to understand the characteristics of islands and how they are formed.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of different islands, BrainPOP login, water, pitchers, clear plastic cups, small clear plastic vials, popsicle sticks, rubber bands, food coloring (red and blue), ice, mugs |
| **Books** | Islands by Kimberly Hutmacher |
| **Vocabulary** | Islands: Any land area surrounded entirely by water  Density: How close the molecules of a substance are, or how much mass a substance has in a given space |
| **Procedures** | **ENGAGE**  Ask the students: What is an island? Are there any types of islands that you know? Have you ever visited an island? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about islands, and the different possibilities of how they were formed. Continue the tree map to list characteristics about islands.  Book: Islands by Kimberly Hutmacher, or use the myON link: <https://www.myon.com/reader/index.html?a=nw_island_s11>  **EXPLORE**  Video: “How to Make an Underwater Volcano/Science Projects” (7:23): <https://www.youtube.com/watch?v=6q7N8-Nh4pA>  Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) to form groups of 2-6 depending on the class size. Each group will need: their science notebooks, a pitcher of room temperature water, a mug of hot water, a cup of ice water, red food coloring, blue food coloring, a popsicle stick, rubber band, and small vial (or baby food jar.)  Students should fill the clear plastic cup ¾ of the way full with room temperature water. Using the popsicle stick, small vial, and rubber band – wrap the rubber band around the popsicle stick and the vial to create a lowering device (like a dipper.) Add about 6-10 drops of red food coloring to the hot water. Very carefully, fill up the dipper with hot water. Do not tilt the dipper when it is lifted out of the water. Very carefully, lower the hot water dipper (without tilting or pouring it) into the cup filled with room temperature water. Do not let go of the stick. The red hot water should rush to the surface of the room temperature water.  The same experiment can be performed with cold water. Follow the steps exactly from the first part, except use blue food coloring in ice water. Before the students lower the cold water into the room temperature water, ask them to predict what will happen. Once they lower the vial/dipper, they should see that the cold water mostly stays in the dipper.  Have students document their underwater volcanoes using pictures, labels, and brief descriptions; along with why and how the islands were formed.  **EXPLAIN**  Video: BrainPOP: “Volcanoes” (5:06): <https://www.brainpop.com/science/earthsystem/volcanoes/>  The “underwater volcano” is created because hot water rises and cold water sinks. When the vial with hot water was placed in the room temperature water, the hot water rose out of the container because the molecules were moving faster in the hotter water, making it less dense than the surrounding room temperature water. When the cold water was lowered, the molecules were moving slower, making them denser than the room temperature water and causing the cold water to sink.  Video: “A New Time-lapse of an Island Forming in Tonga” (0:56): <https://www.youtube.com/watch?v=sIXyxvSEKFY>  Video: “The Birth of a New Island” (5:27): <https://www.youtube.com/watch?v=Hds1OBxVg4s>  When an underwater volcano erupts enough times, the magma hits the cooler water and hardens into a larger volcano. Over time, the volcano packs enough hardened lava to pop above the ocean surface, forming an island. As the rocky seafloor slab inches along, it carries the island beyond the hot spot, cutting it off from its lava source. |
| **Enrichment** | **EXTEND**  Ask the students: What would happen if the volcanoes in the ocean didn’t erupt? Would we still have islands? Why or why not? |
| **Closure** | **ELABORATE**  All islands have two main characteristics: they are an area of land and completely surrounded by water. However, some islands are not volcanic. Some islands were formed when continental plates collided. When they collide, they push land up, creating an underwater mountain that goes above land. Another way an island can be made is through deposits from sand that came from erosion. When sand and other debris are picked up from a water current through erosion, it can be deposited in certain areas. Over time, this land creates an island. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for understanding of underwater volcanoes, as well as how volcanic islands form. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review underwater volcanoes and how they form islands, including the other ways islands are formed. Review density, including hot magma/water rising and cold water sinking. | Review underwater volcanoes and how they form islands, including the other ways islands are formed. Ask the student: Do you think continental drift applies to islands? Why or why not? | Review underwater volcanoes and how they form islands, including the other ways islands are formed. Ask the student: Can underwater volcanoes erupt more than once? What would happen to an island if they did? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of an island as described in the lesson, and/or have the student describe the different types of islands and how they form.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine an island and how it forms, and/or look at pictures of islands.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about where islands are located? Are they close to continents or far away? What do you think determines their location? | | |
| **Interactive Technology** | | |
| App: Plum’s Island Explorer: Land and Water | | |

Lesson 7: What are the different kinds of landforms on Earth? (peninsula)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including peninsulas.  Students will be able to understand the characteristics of peninsulas and how they are formed.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of different peninsulas, brown Play-Doh (or wet sand), sandwich-sized plastic container |
| **Books** | Exploring Peninsulas by Melody Mis |
| **Vocabulary** | Peninsula: Land that extends beyond the mainland and has water on three sides |
| **Procedures** | **ENGAGE**  Ask the students: What is a peninsula? Are there any types of peninsulas that you know? Have you ever visited a peninsula? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about peninsulas, and the different possibilities of how they were formed. Continue the tree map to list characteristics about peninsulas.  Book: Exploring Peninsulas by Melody Mis  **EXPLORE**  Gift of Curiosity: Montessori landform activities: <https://www.giftofcuriosity.com/montessori-landform-activities/>  Have students return to their partners from the discussion. Each partnership will need: brown Play-Doh (or wet sand) and a sandwich-sized plastic container.  Show the class pictures of different peninsulas (Florida, Michigan, etc.) Ask the students: What do all of these landforms have in common? Give students a chance to discuss the answer. Students should then model their landform after the peninsula in the flashcards they have seen.  Have students document what a peninsula looks like using pictures, labels, and brief descriptions in their science notebooks, including comparing a peninsula to an island.  **EXPLAIN**  Video: “Geography – Landforms: Peninsulas” (0:47): <https://www.youtube.com/watch?v=1CwTI_Qbgz8>  A peninsula is a substantial portion of land that extends from the mainland and has water on three sides. It can be formed by a rising or falling seal level that may expose or cover portions of land to form a peninsula. An uplift or fall of landmass may also help to form a peninsula. A separation of landmasses over millions of years can create a peninsula. It may be a few miles long, or more. It can also be hundreds of miles in length and width. Peninsulas in the United States include Florida and Michigan. In Europe, Italy occupies almost all of the peninsula.  Video: “Tasman Peninsula for Kids” (2:53): <https://www.youtube.com/watch?v=Xi4bDNcfNvA> |
| **Enrichment** | **EXTEND**  Give students an opportunity to make other landforms using the Play-Doh or wet sand. Compare and contrast the landforms learned so far. What is the same? What is different? |
| **Closure** | **ELABORATE**  The world peninsula comes from two words in Latin: “Paena” = almost; “insula” = island. So, a peninsula is something that’s almost an island, but not quite. Michigan is considered to be made up of two peninsulas. Peninsulas can be found on every continent. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for understanding of peninsulas, as well as the model made by the students. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review peninsulas and how they are formed, as well as examples around the world. Check for understanding in student’s notebook and clear up any misconceptions. | Review peninsulas and how they are formed, as well as examples around the world. Ask the student: Can peninsulas change size? Why or why not? | Review peninsulas and how they are formed, as well as examples around the world. Ask the student: Why do you think peninsulas don’t form into islands? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of a peninsula as described in the lesson, and/or have the student describe the different examples of peninsulas as compared to islands.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a peninsula and how it forms, and/or look at pictures of peninsulas.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about where peninsulas are located? Do they have anything in common based on their location? | | |
| **Interactive Technology** | | |
| Game: Match the Memory: Mr. Polum’s Landform Game: <https://matchthememory.com/mrpolum> | | |

Lesson 8: What are the different kinds of landforms on Earth? (cave)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including caves.  Students will be able to understand the characteristics of caves and how they are formed.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of different islands, Epson salts, access to a kettle or microwave, cotton or wool string, paperclips, glasses, paper plates, food coloring, spoons |
| **Books** | Cave Crawlers by Pam Rosenberg |
| **Vocabulary** | Cave: A natural underground chamber or series of chambers open to the surface  Spelunker: A person who makes a hobby of exploring or studying caves  Speleologist: A scientist who studies or explores caves  Stalactite: A deposit of calcium carbonate resembling an icicle hanging from the roof or sides of a cavern or cave  Stalagmite: The act or result of dripping; a deposit of calcium carbonate like an inverted stalactite formed on the floor of a cave by the drip of water |
| **Procedures** | **ENGAGE**  Ask the students: What is a cave? Are there any types of caves that you know? Have you ever visited a cave? Are there any caves in this area? What can be found in a cave? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about caves, and the different possibilities of how they were formed. Continue the tree map to list characteristics about caves.  Book: Cave Crawlers by Pam Rosenberg, or use the myON link: <https://www.myon.com/reader/index.html?a=lfadv_cavecraw_f11>  **EXPLORE**  Science Kids at Home: “Growing Stalactites”: <http://www.sciencekidsathome.com/science_experiments/growing_stalactites.html>  Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) to form groups of 2-6 depending on the class size. Each group will need: their science notebooks, Epsom salts, warm water (poured by the teacher,) cotton or wool string (yarn,) two paperclips, two glasses, paper plate, food coloring, and a spoon. The teacher should have a way to heat up water (kettle, microwave, etc.)  The teacher will fill the glasses about ¾ of the way full with the hot water. Students should add Epsom salts to each glass and stir with a spoon to dissolve. Keep adding Epsom salts and stirring until they don’t dissolve (about 1/3 cup per glass.) Stir in a few drops of food coloring into each glass. Put the glasses a few inches apart. Taking a length of the string (or rope,) tie a paper clip to each end. Submerge the string in the salt water to make it wet first. Let each end of the string sink in each of the glasses. There should be a slight dip in the string between the two glasses. Put a paper plate underneath the string because the water will drip.  After a few days, a stalactite will form on the string between the two glasses. Have the students document what is happening with the stalactite each day in their science journals using labels and pictures. Make sure to write a date on each phase.  There could be quite a few variables to whether the experiment is successful. Students may view other groups’ stalactites. Check the link for possible solutions to complications.  **EXPLAIN**  Video: “Stalactites and Stalagmites” (2:10): <https://www.youtube.com/watch?v=2BJB4o33PuM>  When you add the Epsom salts to the glasses, it is stirred into hot water. Hot water is more accepting of additives like salt, so more can be mixed into hot water than cold.  To start the stalactite formation, the string has to transfer the water and dissolved salt from the glasses to the plate. This principle is called capillary action. Capillary action is the same process that enables plants and trees to transfer water and nutrients from the ground up through their roots and trunks into their leaves, branches, flowers, and fruit. The string uses capillary action to soak itself in the salt water solution until it’s too saturated to hold any more liquid. Once the string is over-saturated, the excess solution begins to drip from the lowest part of the string, right over the plate. As the water cools and drips from the string, it gets rid of some of the excess salt and leaves it attached to the string or deposits it onto the plate below. Eventually, the excess salt forms a pillar.  The rock formations called stalactites result when hard water drips from the ceiling of a cave. Hard water contains a lot of calcium and/or magnesium that the water picks up as it flows over or through limestone, or some other rock that has a lot of calcium or magnesium. As the water evaporates, the calcium carbonate reforms into a solid. If the water drips slowly, a stalactite can form (hanging from the roof of the cave) and a stalagmite can form (“growing” upward from the floor of the cave.)  Optional Video: “Bill Nye the Science Guy S05E12 Caves” (25:41): <https://www.youtube.com/watch?v=J1-kEXKe1K8&t=5s> |
| **Enrichment** | **EXTEND**  Ask the students: Would this experiment work with a different type of string? What about with cold water? How would changing the variables change the outcome?  Optional video: “15 Most Amazing Caves” (7:55): <https://www.youtube.com/watch?v=DElWUeWbuh8> |
| **Closure** | **ELABORATE**  Caves take millions of years to form. Most are formed with marble, limestone, dolomite, and gypsum. These are rocks that can dissolve easily over time. They are usually made when water runs over these rocks. The water has acid in it, which slowly dissolves the limestone. The cave will get bigger and bigger over time. But, if the water finds a different path, the cave is left dry. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the drawings of stalactites and stalagmites, as well as ideas about how a cave is formed. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review caves, including stalactites, stalagmites, and how they are formed. Check the student’s notebook for understanding and documentation of the experiment. | Review caves, including stalactites, stalagmites, and how they are formed. Ask the student: Do you think stalagmites could exist without stalactites? Why or why not? | Review caves, including stalactites, stalagmites, and how they are formed. Ask the student: Based on the experiment, how long do you think it took for the stalactites to form? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of a cave as described in the lesson, as well as stalactites and stalagmites; and/or have the student describe caves, stalactites, and stalagmites; and how they form.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a cave and how it forms, and/or look at pictures of caves.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about how caves are formed? Are they always in the same place in the world? Why or why not? | | |
| **Interactive Technology** | | |
| App: Postcards from Mole Creek Caves: iCardz2go  App: Jenolan Caves – Acoustiguide of Australia Pty.Ltd.  Video: PBS Kids: Nature Cat: “Stalactites and stalagmites” (3:00): <http://pbskids.org/video/nature-cat/2365604656> | | |

Lesson 9: What are the different kinds of landforms on Earth? (plain)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including plains.  Students will be able to understand the characteristics of plains and how they are formed.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of different plains in different locations |
| **Books** | Plains (First Step Nonfiction: Landforms) by Sheila Anderson |
| **Vocabulary** | Plain: A large area of flat land without trees  Coastal plain: A flat, low-lying land adjacent to a sea coast  Inland plain: Plains found away from the coast  Erosion: The action or process of wearing away by the action of water, wind, or glacial ice  Sediment: Material (as stones and sand) deposited by water, wind, or glaciers |
| **Procedures** | **ENGAGE**  Ask the students: What are the plains? Have you ever visited the plains? What does a plain look like? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about the plains, and the different possibilities of how they were formed. Continue the tree map to list characteristics about plains.  Book: Plains (First Step Nonfiction: Landforms) by Sheila Anderson  **EXPLORE**  Video: “Landforms – Plains” (1:35): <https://www.youtube.com/watch?v=pAZXw0YbHiA>  Have students return to their partners. To help students remember the landforms they’ve learned so far, you can teach the students hand gestures. With a closed fist, point out the knuckles. The tall ones are mountains. Open your hand and look at the palm The flat palm makes the plains. After teaching each concepts, chant the names as each motion is made.  For a mountain, put the tips of both hands’ fingers together and form a sharp tall point.  For a volcano, use the mountain shape, and then open a gap between the fingertips for a vent or cone to show where the release of lava or steam occurs.  For a plain, put your hand out flat.  More landforms will be added as the lessons continue.  Video: “Discover America’s heartland, the Great Plains” (4:44): <https://www.youtube.com/watch?v=pQKwzhEXLEo>  Have the students draw a picture of a plain. Discuss the different characteristics of a plain and how it is different from other landforms.  **EXPLAIN**  A plain has three main characteristics: land; broad, flat, or gently rolling areas; and low in elevation. A plain is a landmass that is flat or gently rolling and covers many miles. There are also different types of plains such as prairies, grasslands, and steppes. Scientists believe that the first plains on Earth were created by lava from volcanoes! The lava pushed up though the surface of the Earth and made some areas flat.  Other plains have been formed by erosion, which occurs when air, ice, or water wears away t land and little bits of the land are washed away. Erosion can turn hilly land into flat land.  Grasslands are plains covered with grass. The Great Plains in the center of the United States are grassland plains. Grassland plains provide food for many animals, such as bison, and are also good for farming.  Inland plains are slightly different. One feature of inland plains is that they stretch for many kilometers and are grassy. Grasslands are plains, and in the USA, they are known as prairies. In Asia and Europe, they are known as Steppes. Tropical grasslands are called Savanna. Some plains have forest trees, such as the Tabasco Plain in Mexico.  Plains that are found near the coast are called coastal plains. These plains are very flat near the coast where they meet the ocean, but they gradually become higher as they move inland. They may continue to rise until they meet areas of high ground, such as mountains. An example of a coastal plain is the Atlantic Coastal Plain on the east coast of the United States.  You might be able to tell from their name that flood plains are flat areas around a river. When the water in the river rises, it overflows its banks onto these flat areas.  Kiddle: “Plain”: <https://kids.kiddle.co/Plain> |
| **Enrichment** | **EXTEND**  There are several different types of plains. Plains along the coasts are called coastal plains. Plains found away from the coast are called inland plains. Ask students: Based on where you live, which plain would you be closer to seeing from here? Why? |
| **Closure** | **ELABORATE**  One way a plain is formed is by erosion and the deposition of sediment. Erosion is the gradual wearing away of Earth’s surfaces through the action of wind and water. Sediment is rock debris that is carried from its place of origin by wind, water, or ice. Erosion will be studied further in the unit. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the drawing of the plain, and check the hand motions comparing the types of landforms studied so far. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review plains, including the different types, as well as the hand motions for the landforms studied. Check on the student’s drawing and labels of a plain. | Review plains, including the different types, as well as the hand motions for the landforms studied. Ask the student: Do you think there are plains on every continent? Why or why not? | Review plains, including the different types, as well as the hand motions for the landforms studied. Ask the student: Which of the types of land formation do you think caused the Great Plains? Why? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of a plain as described in the lesson, as well as how they form.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a plain and how it forms, and/or look at pictures of plains.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about how plains are formed? Where do you think they form more often: near the coast, or in the center of a continent? Why? | | |
| **Interactive Technology** | | |
| Game: Learning Liftoff: Spot the Landforms: <https://www.learningliftoff.com/1st-grade-science-activity-spot-landforms/> | | |

Lesson 10: What are the different kinds of landforms on Earth? (canyon/valley)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including canyons and valleys.  Students will be able to understand the characteristics of canyons and valleys, and how they are formed.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of different canyons and valleys, 3-oz cups, spoon, paper plate, plastic plate, binder clips, Solo plastic cups, ruler, small plastic condiment cup, sticky tack, newspaper, cinnamon, water, paper towels, cornmeal, salt, pushpin, permanent marker, measuring bowl, measuring cups |
| **Books** | Living in a Valley by Ellen Labrecque  Canyon Hunters by Anita Ganeri |
| **Vocabulary** | Canyon: A deep, steep-walled, V-shaped valley cut by a river through resistant rock  Valley: A long depression or ditch in Earth’s surface, usually between ranges of hills or mountains, formed by rivers that erode soil and rocks  Erosion: The action or process of wearing away by the action of water, wind, or glacial ice  Geologist: Scientists that study the Earth and what it is made of  Paleontologist: Scientists that study the remains of ancient organisms or living things  Biologist: A scientist who studies living things  Archaeologist: A scientist who studies people of the past, what they were like, and how they lived  Hydrologist: Scientists who study the properties, distribution, and circulation of water on and below Earth’s surface and in the atmosphere |
| **Procedures** | **ENGAGE**  Ask the students: What is a canyon? Have you ever visited the Grand Canyon? What does a canyon look like? What about a valley? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about canyons and valleys; and the different possibilities of how they were formed. Continue the tree map to list characteristics about canyons and valleys.  Book: Living in a Valley by Ellen Labrecque, or use the myON link: <https://www.myon.com/reader/index.html?a=pwl_lvlly_s15>  Book: Canyon Hunters by Anita Ganeri, or use the myON link: <https://www.myon.com/reader/index.html?a=lfadv_canyonhu_f11>  **EXPLORE**  Mystery Science: “What’s strong enough to make a canyon?”: <https://mysteryscience.com/water/mystery-3/erosion-earth-s-surface-landforms/114#slide-id-0>  Have students return to their partners. Each pair needs 4 Dixie cups, 2 spoons, 2 binder clips, 1 paper plate, 1 plastic plate, newspaper, 1 shaker of cinnamon, and one container of 1 ½ cups of “land.” The land mixture is made of 3 parts cornmeal to 1-part salt and 1-part water. The mixture should be a little sticker than wet sand. If it’s too sticky and doesn’t slide out of a cup easily, add more cornmeal; if it’s not sticky enough, add more water.  Use a pushpin to poke a hole in the bottom of the plastic condiment cup. Put the hole close to the side of the cup. Wiggle the pin to make a large hole. Position the cup in the center of the ruler, with the hole extending over the edge, Use sticky tack to hold the cup securely in place. With a permanent marker, draw an arrow on the side of the cup, pointing down at the hole. This will make a “drip stick.” Each group will also need a shaker. Use a pushpin to poke several holes in the bottom of a plastic Solo cup. Turn the cup over and add a teaspoon of cinnamon. To sprinkle, the students tap the side of the cup.  Cover the table with newspaper to protect it from spilled water. Put the paper plate on the plastic plate to build the land. Fill one Dixie cup halfway with your “land.” Use another Dixie cup to squeeze it down. Turn each cup over near the edge of the plate. Tap on the bottom and lift the cup up. Keep making hills until you have four. Carefully push all of them near the edge of the plate. Hold the plastic plate still and push the paper plate up. Have the other person clip the plates together. This way, the water will flow down into the plastic plate and not spill onto the table. Put one spoonful of “land” into the spaces between hills. Smooth it with a spoon. Sprinkle cinnamon on the land. This will help to notice any changes to the land.  Get two plastic cups and the “drip stick” (the condiment cup on top of the ruler.) Turn over the big cups and put the drip stick on them. Push the land under the arrow on the drip cup. What do you think will happen when water is dripped on the land?  Fill the drip cup and watch to see what the water does. Look for small changes in the land. Students should draw a picture in their science notebook about what the water did to the land. Fill the cup again. Draw what happened under the first drawing in your science notebook. Fill the cup again. Draw what happened under the second drawing. Fill the cup for a fourth time, and make a fourth drawing. Make sure to label all drawings.  Have the students discuss the results of the water experiment. What happened to the land?  **EXPLAIN**  Video: “The Grand Canyon!” (4:18): <https://www.youtube.com/watch?v=oZZEJMtLOKU>  The Grand Canyon is gigantic. It is the eleventh largest national park at 277 miles long. The width of the park varies from one end to the other, but in some places it is 18 miles wide. All of the acreage totals 1904 square miles. It averages one mile in depth, but parts of it are much deeper. It is so big and deep, it can be seen from space.  Water is responsible for the creation of the Grand Canyon. Lots of water flows through the Colorado River, and has for a long time. When it rains in the desert of the Grand Canyon, the dirt cannot take in the moisture. The rainwater begins to run down the river, making flash floods common. The flood water moves so fast that it topples rocks and boulders in its path. Dirt is swept along, leaving behind only hard rock formations. During the harsh winters of the region, water seeps in the tiny cracks and crevices of the rocks. When it freezes, it gets bigger and cracks the rocks even more. Wind also adds to the erosion process of the Grand Canyon, which changes every year.  A valley is formed in very much the same way as a canyon. As snow melts and flows down mountains and hills, it creates rivers and streams. These rivers carve out the Earth over millions of years, even moving rock. The steeper the mountain, the faster the water flows. The faster the water flows, the deeper valley it makes. Glaciers, which are huge sheets of ice, make even larger valleys. They slowly move down a mountain, often following a valley already created by a river. They round out the valley so it has a U-shape instead of a V-shape. Valleys are protected from fierce winds and storms.  Video: “How Was the Grand Canyon Formed?” (2:20): <https://www.youtube.com/watch?v=t6IBg4Srb6E> |
| **Enrichment** | **EXTEND**  Try the experiment again, except include some high land or low areas, or changing where the cup will drip and predict what will happen. Students can document the changes they made in their science notebooks and see what differences their variables made. |
| **Closure** | **ELABORATE**  It is hard to differentiate between a valley and a canyon, as they are formed in the same way. Both valleys and canyons are deep grooves in the ground surrounded by mountains on either side. Canyons are nothing but deep valleys made by the action of water with steep slopes on each side, while valleys are lower lands between two mountains with gentler slopes than canyons. Valleys can be either small: a few hundred square miles in area, or large: thousands of square miles. Canyons are smaller in size, but often run deeper. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the drawings of the process of creating a canyon, including discussing how valleys and canyons are similar. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review canyons and valleys, including how they are formed by erosion. Check for understanding by checking the student’s science notebook. | Review canyons and valleys, including how they are formed by erosion. Ask the student: Do people more often live in valleys or canyons? Why? | Review canyons and valleys, including how they are formed by erosion. Ask the student: Why can’t we see erosion working on a daily basis? How long do you think it would take to see a difference? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of a canyon and valley as described in the lesson, as well as how they form. Videos may be used to show the process of erosion.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a canyon and/or valley, and how they form.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about how valleys and canyons are formed? Do you think they can be formed anywhere? Why or why not? | | |
| **Interactive Technology** | | |
| App: Grand Canyon National Park – Visitor Guide  National Park Service: Grand Canyon for kids: <https://www.nps.gov/grca/learn/kidsyouth/index.htm> | | |

Lesson 11: What are the different kinds of landforms on Earth? (river)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including rivers.  Students will be able to understand the characteristics of rivers and how they are formed.  2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of rivers, paper, thick washable blue markers, tape, plastic tablecloths, spray bottles filled with water |
| **Books** | Rivers by Alyse Sweeney  Exploring Rivers: A Benjamin Blog and his Inquisitive Dog Investigation by Anita Ganeri |
| **Vocabulary** | River: A flowing, moving stream of water; usually feeding into an ocean, lake, pond, or even another river  Creek: A natural stream of water normally smaller than and often tributary to a river  Groundwater: Water that collects or flows beneath the Earth’s surface; filling in the porous spaces in soil, sediment, and rocks  Stream: A small, flowing body of water such as a brook or creek  Waterfall: A place in a river where water spills suddenly downward  Tributary: A stream or river that flows into and joins a main river  Source: The origins of a tributary: the place where the water begins its journey towards the ocean or sea, usually on high ground  Watershed: Any area of land that water flows across or through, trickling down and flowing toward a common body of water  Delta: A piece of land in the shape of a triangle or fan made by deposits of mud and sand at the mouth of a river |
| **Procedures** | **ENGAGE**  Ask the students: What is a river? What does a river look like? What do you notice about rivers? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about rivers, and the different possibilities of how they were formed. Continue the tree map to list characteristics about rivers.  Book: Rivers by Alyse Sweeney, or use the myON link: <https://www.myon.com/reader/index.html?a=nw_river_f10>  Book: Exploring Rivers: A Benjamin Blog and his Inquisitive Dog Investigation by Anita Ganeri, or use the myON link: <https://www.myon.com/reader/index.html?a=exha_river_s14>  **EXPLORE**  Mystery Science: “If you floated down a river, where would you end up?”: <https://mysteryscience.com/water/mystery-1/mapping-earth-s-surface-landforms/112?r=2985720&s=social:pinterest#slide-id-0>  Have students return to their partners. Each pair needs two pieces of paper, white cardstock (or construction paper,) 1 thick washable blue marker, four pieces of tape, a spray bottle filled with water  Cover the table with a plastic tablecloth to protect it from the water. One partner will make a fist. The other partner will stack two pieces of blank paper on top of each other. Crumple the paper over the fist and wrist. Then, have the student remove their fist, and crumple the paper more. Uncrumple the paper and place it on top of a piece of construction paper or cardstock. Tape the top edge of the crumpled paper to the cardstock, about an inch down. Do the same with the bottom, only an inch up. The paper should look like a mountain or hill. Have the student draw a picture of the crumpled piece of paper and make observations. Does the paper look like a mountain?  The spray bottle is going to represent the rain when it is sprayed on the mountain. Give students a minute to discuss: where do you think the water will go when it is sprayed on the mountain? Why? Students should then talk and decide where the highest places on the model are. Using the marker, mark them with thick lines. The highest part can be in more than one place. The partner can use the marker can trace over each line and make it darker. Use a lot of ink. Put the model on the table. Give the model 5 sprays, then stop and watch. After they wait at least a minute, spray it 5 more times. The model may need a few rain showers before the water flows. By waiting a minute between showers, it gives the water more time to pick up more ink.  Have the students discuss the results of the water experiment. What happened when it rained on the model? Why do you think the water went where it did? Did it make anything that looks like a river? Students should draw another picture in their science notebooks of the results.  **EXPLAIN**  Video: BrainPOP: “Rivers” (1:35): <https://www.brainpop.com/science/earthsystem/rivers/>  Whenever rain falls or snow melts, it needs to flow. Taking the easiest route downhill, the natural flow of water carves channels into the landscape, forming a pattern that often looks like the branching of a tree. Drops of water seep into tiny rivulets, which run into large waterways, and eventually into rivers. All the rivulets, creeks, and streams that feed a river are called tributaries. The area of land that feeds a river is called a watershed, or drainage basin. Whether you live in a city, on top of a mountain, in a valley, or even in a desert, every place on Earth is a part of a watershed.  Big rivers are fed by many tributaries. But there is only one “source.” The source is the start of the tributary that is farthest upstream from the river’s end. The source may be a spring, a pond, a melting glacier, or a marsh. The source is often high up in the mountains. Flowing water cuts a channel, usually in the softest ground, for a river to run through. Rivers don’t flow in a straight line, but twist and turn through the landscape, following the “path of least resistance.”  The river ends at a mouth, or delta. As it approaches its mouth, a river loses energy, slows down, and spreads out over a wider and wider area as it flows into a lake, ocean, or wetland. Sediment that’s been carried from upstream is deposited into the delta, and the nutrients from the sediment create healthy soil for plant growth.  Optional Video: “Bill Nye the Science Guy S04E01 Rivers & Streams” (23:07): <https://www.youtube.com/watch?v=Uvr1PyQwipw> |
| **Enrichment** | **EXTEND**  The longest river in the United States is the Mississippi. Check out the interactive website created by the US Geological Survey: <https://txpub.usgs.gov/DSS/streamer/web/>  Take a look at how long the Mississippi river is compared to other rivers. |
| **Closure** | **ELABORATE**  Most settlements were built along major rivers. The great majority of rivers eventually flow into a larger body of water like an ocean, sea, or large lake. Rivers provide food, energy, recreation, transportation routes; as well as water for irrigation and for drinking. Unlike oceans, rivers have fresh water. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the drawings of how the rivers formed on the homemade mountains. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review rivers, including how they are formed by erosion. Check for understanding by checking the student’s science notebook. | Review rivers, including how they are formed by erosion. Ask the student: Why do you think rivers don’t flow in a straight line? | Review rivers, including how they are formed by erosion. Ask the student: What would happen if the river’s source was no longer available? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of rivers as described in the lesson, as well as how they form. Videos may be used to show the process of erosion.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a river and how it forms.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about how rivers are formed? Do you think they can be formed anywhere? Why or why not? | | |
| **Interactive Technology** | | |
| App: RiverApp – River levels: Real-time river conditions  USGS Streamer: <https://txpub.usgs.gov/DSS/streamer/web/> | | |

Lesson 12: What are the different kinds of landforms on Earth? (lake)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including lakes.  Students will be able to understand the characteristics of lakes and how they are formed.  2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of lakes, long shallow clear Tupperware containers, sand, small rocks (aquarium gravel), popsicle sticks, plastic tablecloths, buckets, water |
| **Books** | Lakes by Diyan Leake |
| **Vocabulary** | Lake: Large bodies of water surrounded by land and not part of an ocean  Geography: The science that deals with the Earth’s surface  Geographers: Scientists who study geography; including the Earth’s physical features such as mountains, deserts, rivers, lakes, and oceans  Reservoir: A usually artificial lake used to store a large supply of water for use in people’s homes, in businesses, etc.  Limnology: The scientific study of bodies of fresh water, such as lakes |
| **Procedures** | **ENGAGE**  Ask the students: What is a lake? What does a lake look like? Have you ever visited a lake? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about lakes, and the different possibilities of how they were formed. Continue the tree map to list characteristics about lakes.  Book: Lakes by Diyan Leake, or use the myON link: <https://www.myon.com/reader/index.html?a=wwe_lakes_f14>  **EXPLORE**  PBS Kids: Build a dam: <http://pbskids.org/zoom/activities/sci/buildadam.html>  Have students return to their partners. Each pair needs: a long, shallow, clear Tupperware container; sand; small rocks (aquarium gravel); popsicle sticks; plastic tablecloth; and a bucket of water.  Cover the table with a plastic tablecloth to protect it from the water. Cover the bottom of the Tupperware container with sand. Dig the path of a river in the sand. Choose a spot somewhere along the river to build the dam.  Use popsicle sticks and small rocks to construct a dam that will only a little bit of water to come through, but not too much. Students should keep in mind that the deeper the water and bigger the lake being made, the greater the water pressure. The bottom of the dam will need to support more pressure than the top of the dam. A suggestion might be to build the dam in a triangular shape; then the bottom will be wider and will be able to support more pressure.  Have students test out their dams to see if they can create a lake. Students should draw a picture in their science notebooks of their dams, complete with labels and descriptions.  **EXPLAIN**  Video: “How to Get Resources – Picky Pineapples: Crash Course Kids #2.2” (3:02): <https://www.youtube.com/watch?v=FNOqZVv-qso>  The Colorado River begins as a small mountain stream, but as it picks up more and more melted snow, it swells into a coursing river. About 97% of the water that ends up in Lake Mead begins as precipitation in the mountains. Eventually, after snaking through the Grand Canyon, the river empties into the eastern end of Lake Mead. It takes water 2.6 years to make its way through the entire lake. Along the way, some is piped out for local use: about 90% of the water in Las Vegas comes from Lake Mead. What remains in the lake eventually reaches the Hoover Dam.  Most lakes are not manmade like Lake Mead. Instead, they are an inland body of fairly motionless water that has a river or stream feeding into or draining out of it. There are many natural processes that can form lakes. The advancement and retreat of glaciers over millions of years can leave behind bowl-shaped depressions which fill. Lakes can also form by tectonic related changes of the landscape, or by landslides that cause water blockages. Crater lakes and calderas are formed in volcanic craters. Oxbow lakes are small, crescent-shaped lakes created by the meandering rivers over time. The Great Lakes of North America are located on the border of North America, and contain about 21% of the world’s freshwater supply.  Video: “Great Lakes/Great Lakes Geography/Great Lakes North America” (3:18): <https://www.youtube.com/watch?v=SDRiwn1LlSk&t=39s> |
| **Enrichment** | **EXTEND**  Student can make modifications to their dam and try it again. They can discuss what did not work, and how they can fix it to make it better. Students can then record their changes in their science notebooks. |
| **Closure** | **ELABORATE**  Some lakes are losing its capacity due to a drought in the area. As a result, the areas they are in have made provisions to attempt to slow down the decreasing water levels. Homes in the area are converting to desert landscaping, marinas and boat launch ramps have been closed down, and a new water intake tunnel was built to try and stabilize the water level. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the drawings of dams, as well as discussing how lakes are formed. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review lakes, including how they are formed by dams (manmade) or by other natural methods. Check for understanding by checking the student’s science notebook. | Review lakes, including how they are formed by dams (manmade) or by other natural methods. Ask the student: Do you think it is better to have a lake that is manmade or formed naturally? Why? | Review lakes, including how they are formed by dams (manmade) or by other natural methods. Ask the student: Why do you think some lakes are made of fresh water and some are made of salt water? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of lakes as described in the lesson, as well as how they form. Videos may be used to show the process of dam building  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine a lake and how it forms. Students can also explore how a dam works and creates a manmade lake.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about how lakes are formed? Do you think they can be formed anywhere? Why or why not? | | |
| **Interactive Technology** | | |
| App: Hoover Dam Tour (Lite Version) – GPSmyCity.com, Inc.  Sheppard Software: “U.S.A. Lakes – Learning Level” <http://www.sheppardsoftware.com/USA_Geography/USA-lakes.html>  PBS: Building Big: “The Dam Challenge”: <http://www.pbs.org/wgbh/buildingbig/dam/challenge/> | | |

Lesson 13: What are the different kinds of landforms on Earth? (ocean)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms, including oceans.  Students will be able to understand the characteristics of oceans and their currents.  2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, pictures of oceans, long shallow clear Tupperware containers, cold water, ice, boiling water/access to a microwave or kettle, red and blue food coloring |
| **Books** | Ocean Divers by Anita Ganeri |
| **Vocabulary** | Ocean: A huge body of salt water covering nearly 71% of Earth’s surface  Oceanographer: Scientists who study the ocean  Marine biologist: A scientist who studies things that live in ocean: from small organisms such as plankton through very large such as whales  Ocean current: A vast river within the ocean, flowing from one place to another  Salinity: The salt content of a body of water |
| **Procedures** | **ENGAGE**  Ask the students: What is an ocean? What does an ocean look like? Have you ever visited an ocean? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about oceans, and the different possibilities of how they were formed. Complete the tree map to list characteristics about oceans.  Book: Ocean Divers by Anita Ganeri, or use the myON link: <https://www.myon.com/reader/index.html?a=lfadv_oceandiv_f11>  **EXPLORE**  Life Over C’s: “Ocean Currents Science Experiment”: <https://lifeovercs.com/ocean-currents-science-experiment/>  Video: DisneyVideo: “Catching the EAC” (1:27): <https://video.disney.com/watch/catching-the-eac-4bb39d25a179ea8833003b15>  The ocean is filled with currents, but how do they work? Have students Mix-Freeze-Group to form groups of 2-6 (depending on the class size.) Each group needs: a long, shallow, clear Tupperware container; cold water; ice, red food coloring; blue food coloring, and hot water (provided by the teacher.)  Students should fill the clear Tupperware about 1/3 full with cold water and add a few drops of blue food coloring. Don’t make the blue too dark. Add 1-2 cups of ice to the cold water and stir. Let it set for a few minutes for some of the ice to melt.  While the ice is melting, the water should be boiling (handled by the teacher only.) Add the red food coloring to the boiled water: this should be made darker. Once both sets of water and dye are ready, gently pour some of the boiling water into a corner of the Tupperware filled with cold water. Currents should form in the cold water: the hot water will push through the cold water, creating currents. In the ocean, these are faster moving strips of water (such as the East Australian Current.) Eventually, the water will mix together and form lukewarm (and purple) water, which is also what happens in the ocean.  Students should draw a picture in their science notebooks of the results of the experiment, complete with labels, colors, and descriptions.  Video: “The Water Bodies/The Dr. Bionics Show/Educational Videos For Kids” (3:47): <https://www.youtube.com/watch?v=bNWuQD7QHBc>  **EXPLAIN**  Video: “waves and currents” (3:29): <https://www.youtube.com/watch?v=3qETXLc9mr8>  An ocean current is a continuous flow of water in the ocean. Some currents are surface currents, while other currents are much deeper, flowing hundreds of feet below the surface of the water. Surface currents are usually caused by the wind. As the wind changes, the current may change as well. Currents are also influenced by the rotation of the Earth. This causes currents to flow clockwise in the northern hemisphere, and counter clockwise in the southern hemisphere.  Deep ocean currents are caused by a number of things, including changes in temperature, salinity (how salty the water is), and the density of the water. Ocean currents can have a significant impact on climate. In some areas, warm water is moved from the equator to a colder region, causing the region to be warmer. Some marine animals take advantage of currents to migrate thousands of miles to and from different areas.  Around 71 percent of the Earth is covered in salt water. The ocean is divided into five major oceans, but they are actually all connected together.  Pacific Ocean: the largest of the oceans, covering about 1/3 of the Earth’s surface. It separates Asia and Australia from North and South America.  Atlantic Ocean: the world’s second largest ocean. It separates Europe and Africa from North and South America. The Gulf Stream is a powerful warm current that flows in the Atlantic from the tip of Florida, up the coast of the United States, and then over to Europe.  Indian Ocean: third largest in the world. It lies south of Asia and India, and separates East Africa from Australia. It is the warmest ocean in the world.  Arctic Ocean: northern part of the Earth, primarily around the North Pole. It is the smallest and shallowest of the oceans. A lot of fresh water enters the Arctic from melting ice.  Southern Ocean: the fourth largest, or second smallest of the oceans. It sits at the South Pole and southern part of the Earth.  Optional Video: “Bill Nye the Science Guy S02E09 Ocean Currents” (25:41): <https://www.youtube.com/watch?v=r17rLdL9Nik> |
| **Enrichment** | **EXTEND**  To explore the density of hot and cold water, review the experiment:  Video: “Hot And Cold Water Science Experiment” (3:10): <https://www.youtube.com/watch?v=86ChgK38EIA> |
| **Closure** | **ELABORATE**  The ocean has different layers with hundreds of different creatures living in each area. The deepest known area of the Earth’s oceans is known as the Marina Trench. Its deepest point measures 35,462 feet. The largest mountain range in the world is also found in the ocean. Stretching over 37,000 miles, the Mid-Oceanic Ridge is a mountain chain that runs along the center of the ocean basins. We have only explored about 5% of the world’s oceans. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the drawings of currents, as well as discussing the names of the different oceans. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review oceans and currents, including the names of the oceans and how currents are formed. Check for understanding by checking the student’s science notebook. | Review oceans and currents, including the names of the oceans and how currents are formed. Ask the student: How do you think people could use ocean currents? Could they be used all of the time? Why or why not? | Review oceans and currents, including the names of the oceans and how currents are formed. Ask the student: If the oceans all run into each other, why do you think they have different names? |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of oceans as described in the lesson, as well as a map of the different currents. Videos may be used to show how the currents flow.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine the different oceans and currents. Students can also explore the directions of the different currents.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about oceans and currents? Do you think currents can be formed anywhere? Why or why not? | | |
| **Interactive Technology** | | |
| App: Ocean Watch – Blue Bright Labs LLC  National Geographic Kids: Ocean Portal: <https://kids.nationalgeographic.com/explore/ocean-portal/>  Wild Kratts: Ocean: <http://pbskids.org/wildkratts/habitats/ocean/>  NASA Space Place: “Go with the Flow!”: <https://spaceplace.nasa.gov/ocean-currents/en/> | | |

Lesson 14: What are the different kinds of landforms on Earth? (landform model)

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| **Learning Target**  **Objective**  **Standard** | The Earth has many different types of landforms.  Students will be able to understand how landforms are similar and different.  2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, topographical map, measuring cups, measuring spoons, flour, salt, water, oil, green food coloring, plastic zippered bags, blue plastic plates, construction paper, toothpicks, glue, brown tempera paint, scissors |
| **Books** | U.S. Landforms: What You Need to Know by Linda Crotta Brennan  Types of Maps by Jennifer M. Besel |
| **Vocabulary** | Topography: The physical features of an area of land  Topographic map: A type of map which describes the physical features of an area of land |
| **Procedures** | **ENGAGE**  Review the tree map with the students and the characteristics of all of the different landforms. Now that students have learned about land and water forms, they will be creating a model of the area. Ask the students: If you were to make a model, how do you think you could make landforms? How do you think people represent them in models? How do you think a mountain would be represented? What about rivers and lakes? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about how a map could be created  Book: Types of Maps by Jennifer M. Besel, or use the myON link: <https://www.myon.com/reader/index.html?a=map_typem_f13>  Video: “Learning About Landforms” (4:40): <https://www.youtube.com/watch?v=KWTDmg8OI_Y>  **EXPLORE**  BL Plans: <https://betterlesson.com/lesson/resource/3214227/planning-a-model-of-an-island-recording-sheet?from=resource_title>  BL Plans: [https://betterlesson.com/lesson/635819/making-a-landform-model#](https://betterlesson.com/lesson/635819/making-a-landform-model)  Students will be creating their own islands. Using their science notebooks, have each student plan a model of their island. The models must have an ocean. Models must also include additional items. They can decide whether they want to add a river or a lake. In addition, models must add at least 3 landforms, chosen from the following: mountains, peninsula, canyon, volcano, plain, valley, and hill.  Once students have planned out their islands, they will be creating a model. Students will need: premade salt dough or Playdoh, blue plastic plates, construction paper, toothpicks, glue, and brown tempera paint.  In advance: students can make their own dough at home, or the teacher can make it for them. Salt dough: 3 cups of flour, 1 cup of salt, 1 cup of water, 3 tbsp oil, and green food coloring. Mix the salt and flour in a bowl. Add water gradually to form a ball. Knead until it no longer falls apart. Divide in half. Mix green food coloring in one half and leave the other half plain. Put into a plastic bag and seal well. The plain half of the dough can be mixed with the brown tempera paint.  Students will be using their plans to make their own models. Review the landforms and the ones they decided to create on their islands. Once they have created their own landforms, they must be labeled with flags created by construction paper and toothpicks.  The teacher should hand out seven toothpicks. The students should make the label flags for each of the landforms. They should write the names on a flag: write the name on the flag, fold the flag in half, put glue on both sides, place the toothpick in the middle, and put the sides together.  Hand out the blue plates, making sure the students write their name on the back of the blue plates. The students should create a model of the island. The landforms should look like the real thing, and the size of each landform should be in proportion to the rest of the island. Make the base first with the green clay: roll it into a ball, then place the ball on the desk and push down on it. Then, work around the island to make it look like the one in the plan. From there, using the other clay, make the other landforms based on their plans. They can use whatever clay they have to create their islands. Once they are finished, they should place the flags on their completed landforms.  Have the students draw a picture of their finished product in comparison to their plan. What was the same? What did they decide to change?  **EXPLAIN**  Book: U.S. Landforms: What You Need to Know by Linda Crotta Brennan, or use the myON link: <https://www.myon.com/reader/index.html?a=ff_uslnd_f17>  Topography describes the physical features of an area of land. These features typically include natural formations such as mountains, rivers, lakes, and valleys. Topography often records various elevations of an area using a topographical map. Topography is often used in agriculture to determine how soil can be conserved and how water will flow over the land. It can also help conserve the environment. By understanding the contour of the land, scientists can determine how water and wind may cause erosion. Topography also may have an impact on weather patterns. Meteorologists use information on mountains, valleys, oceans, and lakes to help predict the weather. |
| **Enrichment** | **EXTEND**  Students can participate in Carousel Feedback (<https://www.kaganonline.com/>) to see other students’ models. Ask students to make observations: does anyone’s island look the same? What did a lot of students do? Are the flags correct on models? |
| **Closure** | **ELABORATE**  Video: “What is Topography?” (1:52): <https://www.youtube.com/watch?v=K-UXrpAjyl0>  Discuss what scientists and the students can learn from making topographical maps. Ask the students what the purpose of knowing the elevations of an area would be. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks and models for different landforms and that they are labeled correctly. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review topographical maps and different landforms, as well as the purpose for creating these types of maps. Check for understanding by checking the student’s science notebook and model. | Review topographical maps and different landforms, as well as the purpose for creating these types of maps. Ask the student: How would using a topographical map help if you wanted to go camping, or wanted to build a house? | Review topographical maps and different landforms, as well as the purpose for creating these types of maps. Ask the student: Do you think a topographical map would help with a GPS while you were traveling? Why or why not? |
| **ELL Strategies** | | |
| *Visual Aids:* Review the different landforms as described in the lesson, as well as topographical map of different areas. Show examples of topographical maps.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine the different landforms. Students can also explore the different types of maps and their purpose.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about topographical maps as opposed to other kinds of maps? Do you think topographical maps are always practical? Why or why not? | | |
| **Interactive Technology** | | |
| App: Topo Maps US – David Crawshay  App: Mapster – Syzygy Research & Technology Ltd.  National Geographic: “MapMaker Interactive”: <http://mapmaker.nationalgeographic.org/> | | |

Lesson 15: How can soil on the Earth’s surface be changed? (wind)

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| **Learning Target**  **Objective**  **Standard** | Soil and its components should be identified, as well as how it can be altered by wind.  Students will be able to identify the ways that wind can affect the soil on Earth’s surface.  2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, gallon sized bags, shoe boxes, sand, straws |
| **Books** | Erosion: Changing Earth’s Surface by Robin Koontz |
| **Vocabulary** | Erosion: The action or process of wearing away by the action of water, wind, or glacial ice  Weathering: The process where rocks are worn away or broken down into smaller pieces by wind, water, or plants  Deposition: The dropping off or depositing of eroded rock  Sand Dunes: A pile or mound of sand created by the wind and deposition of sand that was eroded from another location  Wind: Air in motion; produced by the uneven heating of the Earth’s surface by the sun |
| **Procedures** | **ENGAGE**  Review the tree map with the students and the characteristics of the different landforms, specifically focusing on those changed by erosion. Ask the students: What causes erosion? Is there only one answer to this? How do you think different weather causes erosion? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to brainstorm about the different types of erosion.  Book: Erosion: Changing Earth’s Surface by Robin Koontz, or use the myON link: <https://www.myon.com/reader/index.html?a=as_erosi_f06>  **EXPLORE**  Give students a chance to review the vocabulary regarding erosion. Students will continue to work with their partners. Each group needs: their science notebooks, a shoe box, a gallon sized bag of sand, and two straws. Students will be examining how the wind can affect the sand.  Have students spread out the bag of sand along the bottom of the shoebox. Students should then make predictions as to how they think the wind will affect the sand? Have students draw a picture of the sand before they start the experiment in their science notebooks.  Very carefully, have the students use the straw to blow five puffs of air onto the sand. The puffs should be short for the initial experiment. Have the students record the results in their notebook. Give students a chance to try the experiment with varying puffs of air: longer, more, and other combinations to explore the way wind affects the sand.  Video: “Sand Dunes & Wind” (0:32): <https://www.youtube.com/watch?v=OKkRF2sdXb8>  **EXPLAIN**  Video: “Weathering and Erosion: Crash Course Kids #10.2” (4:05): <https://www.youtube.com/watch?v=R-Iak3Wvh9c>  The wind is a powerful force that changes the Earth’s surface through weathering, erosion, and deposition. This is especially true in dry, open areas where strong winds are common and a lot of rock is exposed. Sand is made up of small bits of weathered rocks that are all about the same size. In deserts, wind often causes weathering by blowing sand and other material against cliffs and large rocks. This wears them down and creates more bits of sand and dust. Over time, the rock is scraped and polished away.  Wind also has the ability to erode. When a gust of wind blows, it picks up the sand and other bits of material. It carries these bits with it. Wind can carry pieces the size of sand only for short distances at a time. But over time, tiny pieces of dust can blow thousands of miles away. Wind erosion leads to more weathering. The material the wind carries helps weather rock that it hits, creating more loose material. |
| **Enrichment** | **EXTEND**  Students can try the experiment again using dirt instead of sand. Ask the students: Do they think it will have the same result? What about if there are larger straws used? What about other sources of wind, such as a fan? |
| **Closure** | **ELABORATE**  Although wind is a less powerful force of erosion than moving water, it can still shape landforms, especially in dry regions and in areas that have few or no plants to hold soil in place. Wind can build up dunes, deposit layers of dust, or make a land surface as hard as pavement. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the experiment results, as well as how students defined erosion by the wind. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review erosion by the wind, including what happens when the wind blows on the sand or dirt. Check for understanding by checking the student’s science notebook and model. | Review erosion by the wind, including what happens when the wind blows on the sand or dirt. Ask the student: How long do you think it takes for the wind to completely change the surface of the Earth? Why? | Review erosion by the wind, including what happens when the wind blows on the sand or dirt. Ask the student: Is there a way to make erosion by the wind happen faster, or not happen at all? How would you make this happen? |
| **ELL Strategies** | | |
| *Visual Aids:* Review erosion by wind as described in the lesson, as well the short and long term effects of wind on the Earth’s surface. Show pictures of landforms affected by the wind.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine how wind effects landforms. Students can also explore the fast and slower changes by wind erosion and weathering.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about wind erosion compared to the erosion of canyons and other forms you learned about in the previous lesson? Which do you think takes longer? Why? | | |
| **Interactive Technology** | | |
| Game: Legends of Learning: “Art of Destruction”: <https://games.legendsoflearning.com/games/WyJnYW1lcyIsMTM0MF0>= | | |

Lesson 16: How can soil on the Earth’s surface be changed? (water)

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| **Learning Target**  **Objective**  **Standard** | Soil and its components can be altered by water.  Students will be able to identify the ways that water can affect the soil on Earth’s surface.  2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. |
| **Materials** | Computer; white boards; white board markers; pencils; science notebooks, deep, clear, plastic pans; paper cups; scissors; potting soil; water; newspapers. |
| **Books** | Weathering and Erosion by Torrey Maloof |
| **Vocabulary** | Erosion: The action or process of wearing away by the action of water, wind, or glacial ice  Weathering: The process where rocks are worn away or broken down into smaller pieces by wind, water, or plants  Deposition: The dropping off or depositing of eroded rock  Slope: An elevated geological formation |
| **Procedures** | **ENGAGE**  Review the tree map with the students and the characteristics of the different landforms, specifically focusing on those changed by erosion. Ask the students: What causes erosion? Review erosion by the wind, and explain there are other forms of erosion as well. Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to review wind erosion, as well as brainstorming another form of erosion.  Book: Weathering and Erosion by Torrey Maloof  **EXPLORE**  Video: “Make Your Own Erosion - #sciencegoals” (3:49): <https://www.youtube.com/watch?v=YETdZyZI6es>  Give students a chance to review the vocabulary regarding erosion. Students will continue to work with their partners. Each group needs: their science notebooks; a deep, clear, plastic pan; 3 paper cups; scissors; potting soil; water; and newspapers. One paper cup should be filled with soil (or put in the plastic pan); the other should be filled with water.  Have students spread out newspapers on their table. Each group should fill the plastic pan about halfway full with dirt (or it can be put in the pan beforehand.) The dirt should be in a slope so that one side is higher than the other, allowing water to flow downhill. Students can make different landscapes: a hill, a cliff, or whatever they’d like to so they are able to see what happens when the water flows. Have students draw a picture of what their landscape looks like in their science notebooks, complete with labels.  Students should poke a hole in the bottom of the empty paper cup with scissors. Hold the cup over the side of the pan that has the most dirt. This is the top of the slope. Pour the water into the cup with the hole and watch how the water is dripping down the hole and moving across the landscape. As it moves, students should be able to see the dirt moving along with the water. Once the cup is empty, have students draw a second picture of the landscape. How has it changed? What about the water: is it clear like it was when it started, or has it changed as well?  **EXPLAIN**  Video: “Billy Blue Hair – What is Erosion?” (2:43): <https://www.youtube.com/watch?v=G5Rp9MJJGCU>  The most influential force in erosion is water. Water’s ability to move materials from one location to another, along with the fact that it is found everywhere along the surface of the Earth, make it a superb tool for erosion. As rain begins to fall in a storm, the water is first absorbed by the landscape. As the ground becomes more saturated, the drops begin moving across the landscape above the surface. As this happens, small amounts of dust and dirt are carried with the water. As more and more water falls, the moving water becomes larger and faster. Eventually, the water forms rills. Rills are small channels of water running quickly across the surface of the landscape. Eventually, many rills come together, eventually feeding into streams and rivers.  Rivers and streams are moving bodies of draining water that have a tremendous amount of force. Because of their strength, streams and rivers can cause a great amount of erosion. Dirt and dust carried away leave only pebbles and rocks. The rocks are constantly bumping into each other as the force of the river moves them around. This causes them to break into smaller and smaller pieces. Rivers have been known to carve deep canyons in bedrock in a few hundred thousand years. |
| **Enrichment** | **EXTEND**  Students can try the experiment again with different types of landforms, or using dirt that does not have a slope. Ask the students: Do they think it will have the same result? What if all the water is poured faster, or in a different place? |
| **Closure** | **ELABORATE**  Water is the main cause of erosion on Earth. Although water may not seem powerful at first, it is one of the most powerful forces on the planet. Rainfall can cause erosion both when the rain hits the surface of the earth, and when the raindrops accumulate and flow like small streams. Rivers create a significant amount of erosion over time. They break up particles along the river bottom and carry them downstream. Ocean waves can cause the coastline to erode. The energy and force of the waves cause pieces of rock to break off and change the coastline over time. Large floods can cause erosion to happen very quickly, acting like powerful rivers. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the experiment results, as well as how students defined erosion by the water. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review erosion by the water, including how soil and sand are carried to different locations. Check for understanding by checking the student’s science notebook and model. | Review erosion by the water, including how soil and sand are carried to different locations. Ask the student: How long do you think it takes for the water to completely change the surface of the Earth? Why? | Review erosion by the water, including how soil and sand are carried to different locations. People can make erosion by water happen faster. Ask the student: How do you think people cause erosion? Is it a good thing or not? Why? |
| **ELL Strategies** | | |
| *Visual Aids:* Review erosion by water as described in the lesson, as well the short and long-term effects of water on the Earth’s surface. Show pictures of landforms affected by the water.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine how water effects landforms. Students can also explore the fast and slower changes by wind erosion and weathering.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about water erosion compared to wind erosion and other forms you learned about in the previous lesson? Which do you think takes longer? Why? | | |
| **Interactive Technology** | | |
| Game: Legends of Learning: “Water is Powerful!”: <https://games.legendsoflearning.com/games/WyJnYW1lcyIsODMwXQ>== | | |

Lesson 17: How can soil on the Earth’s surface be changed? (ice)

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| **Learning Target**  **Objective**  **Standard** | Soil and its components can be altered by ice.  Students will be able to identify the ways that ice can affect the soil on Earth’s surface.  2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid. |
| **Materials** | Computer; white boards; white board markers; pencils; science notebooks, ice cubes, modeling clay (not Play-Doh,) trays, sand, paper towels |
| **Books** | Icebergs, Ice Caps, and Glaciers by Allan Fowler |
| **Vocabulary** | Erosion: The action or process of wearing away by the action of water, wind, or glacial ice Glacier: A huge mass of ice slowly floating over a land mass, formed from compacted snow  Sediment: Material (as stones or sand) deposited by water, wind, or glaciers  Levee: A bank built along a river to prevent flooding |
| **Procedures** | **ENGAGE**  Review the tree map with the students and the characteristics of the different landforms, specifically focusing on those changed by erosion. Ask the students: What causes erosion? Review erosion by the wind and water, and explain there are other forms of erosion as well. Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to get into partners to review water and wind erosion, as well as brainstorming another form of erosion.    Video: “Melting Glacier – Ice Breaking off” (3:05): <https://www.neok12.com/video/Glaciers/zX430a77675e62684243605d.htm>  **EXPLORE**  “Teach Engineering: Hands-on Activity: Glaciers, Water, and Wind, Oh My!”: <https://www.teachengineering.org/activities/view/cub_earth_lesson5_activity1>  Give students a chance to review the vocabulary regarding erosion. Students will continue to work with their partners. Each group needs: their science notebooks, a tray, ice cubes, modeling clay (not Play-Doh,) sand, and paper towels.  Have each group take some clay – a ball that is 1-2 inches in diameter. Flatten the clay onto the surface of the tray. Press an ice cube against the flattened clay and move it back and forth several times. Students should record their observations. What happens to the clay when the ice cube is rubbed on it?  Place a small pile of sand on the clay. Place an ice cube on top of the sand for 1-2 minutes. Pick up the ice cube and observe the surface of the cube that was touching the sand. Record observations: What does the bottom of the ice cube look like? Place the same side of the ice cube on the sandy part of the clay and move it back and forth several times. Remove the ice cube and wipe away the sand from the surface of the clay. Record observations: What does the texture of the surface of the clay feel like?  **EXPLAIN**  Video: “All About Glaciers for Kids: How Glaciers Form and Erode to Create Landforms – FreeSchool” (3:59): <https://www.youtube.com/watch?v=PbYXiJsF5mw>  A glacier is a thick mass of ice that covers a large area of land. Around 10% of the world’s land area is covered by glaciers. Most glaciers are located near the North or South Poles, but glaciers also exist high in mountain ranges. Glaciers form from snow that doesn’t melt, even during the summer. When enough snow builds up, the weight of the snow will compress and turn into solid ice. It can take hundreds of years for a large glacier to form.  Although glaciers are made of ice and appear to be sitting still, they are actually moving. The weight of a glacier will cause it to slowly move downhill, sort of like a very slow moving river. The speed of glaciers varies widely with some moving as slow as a few feet a year, while others may move several feet a day. When glaciers move, they change the land by creating geological features. Because of friction, the top of a glacier moves faster than the bottom. |
| **Enrichment** | **EXTEND**  Students can try the experiment again with the ice cube moving at different speeds. Does it make a difference to move the ice faster or slower? What about if it didn’t move at all? Have students make the ice move in different ways, recording their results. |
| **Closure** | **ELABORATE**  Scientists study erosion so they can protect the environment, structures, landmarks, and people’s lives. Engineers intentionally develop designs that help to protect people from landslides and flooding, like levees and barriers. Engineers are also involved in protecting existing land formations and landmarks that people want to keep around, such as ancient pyramids and national monuments. |
| **Assessment** | **EVALUATE**  Formative: Check science notebooks for the experiment results, as well as how students defined erosion by ice. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Review erosion by the ice, including how soil and sand are carried to different locations. Check for understanding by checking the student’s science notebook and model. | Review erosion by the ice, including how soil and sand are carried to different locations. Ask the student: How long do you think it takes for the ice to change the surface of the Earth? Why? | Review erosion by the ice, including how soil and sand are carried to different locations. Ask the student: How do you think ice changes the land over time? Is it a good thing or not? Why? |
| **ELL Strategies** | | |
| *Visual Aids:* Review erosion by ice as described in the lesson, as well the short and long-term effects of ice moving on the Earth’s surface. Show pictures of landforms affected by the ice. See: Glaciers Change the Land: <https://www.ducksters.com/science/earth_science/glaciers.php>  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to examine how ice effects landforms. Students can also explore the fast and slower changes by ice erosion and weathering.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: What do you notice about ice erosion compared to water and wind erosion and other forms you learned about in the previous lesson? Which do you think takes longer? Why? | | |
| **Interactive Technology** | | |
| Glaciers - Interactive: https://www.neok12.com/Glaciers.htm | | |

**Earth Science Unit Assessment**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Label the different landforms:

















2. Using two of the landforms identified, list three things they have in common, and three things that are

different; including formation, origin, and one other characteristic.

3. What are three of the types of erosion? List one characteristic about each one that is different from the

others.

4. Identify three places where water is found on Earth. (Hint: One must be a solid.)

Student Research Project: What do different landforms look like, and what are their characteristics?

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| **Learning Target**  **Objective**  **Standard** | Each landform has distinct characteristics that make it unique from others.  Students will pick a landform or body of water to research and present it to the class, along with a model of the object.  2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.  2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.  2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be a solid or liquid.  W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations.)  W.2.8: Recall information from experiences or gather information from provided sources to answer a question.  RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.  RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.  SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.  SL.2.5: Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. |
| **Materials** | Computer, white boards, white board markers, science journals, pencils, crayons, access to the Internet for students |
| **Books** | Previous text materials from unit lesson |
| **Vocabulary** | Landform: Any natural formation of rock and dirt found on Earth |
| **Procedures** | **ENGAGE**  Ask the students: What are the different landforms? Review what has been learned so far about the landforms and bodies of water. Go over a few similarities and differences between the different types.  Ask the students: How would you tell the different landforms or bodies of water apart if you were describing them to people? For example, how would you describe a mountain as opposed to describing the ocean? Ask students to Mix-Pair-Share (<https://www.kaganonline.com/>) to brainstorm about the different characteristics of each object and how it is distinguished from the others.  **EXPLORE**  Give the students an opportunity to choose which object they would like to study. Objects may include, but are not limited to: mountain, volcano, island, peninsula, cave, plain, canyon, river, lake, or ocean. Two students may need to study each object depending on the class  Introduce the different websites and books the students will be able to use to write their research.  Kids Geology: https://kidsgeo.com/geology-for-kids/landforms/  Kiddle: Landform facts: <https://kids.kiddle.co/Landform>  National Geographic: Landforms: <https://www.nationalgeographic.org/topics/landforms/>  Face of the Earth: Landforms: <http://www.edu.pe.ca/southernkings/landforms.htm>  Students may also use any of the previous books used throughout the unit.  Once the students have chosen an object, they will conduct research on the object. Students can work in pairs or independently depending on the teacher’s discretion. Students should take notes regarding the landform or body of water they chose, and include the following information:   * The name of the landform or body of water * Features of the object (size, color) * Geographic location * How it was formed * How long it took to form (days, weeks, years, etc.) * Three other interesting facts   Based on their research, the paper should be about a page long, with more than one source used and listed. Students may use an outline to take notes on their object.  The students will also be asked to give a presentation to the class. They may want to practice this several times. They must be able to describe their landform or body of water, including the different features they researched. Once they finish their research, they should draw and color a picture based on what they have discovered.  Students may need several days to complete the research activity.  **EXPLAIN**  A landform is any nature formation of rock and dirt, found on Earth. A landform can be as small as a hill, large as a continent, or as small as a pond. Geologists study how landforms are created, and how they interact with each other. Water found on the surface of continents and islands is referred to as surface water. Surface water makes up only one fourth of one percent of the total water found on Earth. This water is found in rivers, streams, lakes, springs, and is extremely important to the lives of all land dwelling animals, including humans. The ocean can extend in some places down to the depths of several miles. However, most of the movement takes place in the first couple hundred feet. Below this depth it is too dark, cold, and murky for much to happen. Most of the Earth’s water is found in the oceans. |
| **Enrichment** | **EXTEND**  Have the students create a model at home of the object they studied. The model can either be 2-dimensional (poster) or 3-dimensional. The model should be an accurate representation of the landform or body of water. It should be easy to see from a distance and easy to present. The model should be able to be identified without using much prior knowledge about it (i.e. a “mountain” should look like a “mountain.”) If the student decides to do a poster, they only need to have the picture and a name of the object, although it may include a few interesting facts. The object does not have to be complicated, but does need to be the student’s original work. Materials may be purchased to build the object, but the object should not be bought from the store already completed. |
| **Closure** | **ELABORATE**  Understanding landforms is important in understanding how they are formed and what processes affect them. This allows people to make better judgment on where to build surface structures and how landscapes will evolve over time. Landforms are constantly changing. Some pose hazards to existing structures and planned structures. Major disasters can be avoided if we know and understand the threats posed by understanding the changes and the processes that are underway. |
| **Assessment** | **EVALUATE**  Summative: See rubric |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the different types of landforms and bodies of water. Student may require assistance in writing or drawing and can be paired up with a student at a higher level. | Discuss the different types of landforms and bodies of water. Student may be able to work more independently with teacher support. | Discuss the different types of landforms and bodies of water. Student may be able to work completely independently, as well as being paired with a student of a lower ability level. |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student discuss different landforms and bodies of water, and why they should be studied.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore different landforms and bodies of water. Repeat going over the different objects until they can be repeated and explained.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 2)** | | |
| Ask students: How could you organize the different landforms and bodies of water? Do you think there are other types of landforms or bodies of water we have not yet discovered? Why or why not? | | |
| **Interactive Technology** | | |
| Videos: “Bill Nye: Landforms”: <https://www.youtube.com/results?search_query=bill+nye+landforms>  Video: Flocabulary: “Landforms & Bodies of Water” (2:52): <https://www.flocabulary.com/unit/landforms-bodies-of-water/> | | |

Second Grade Writing Rubric

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| **Standard** | **Exceeds Expectations - 3** | **Meets Expectations - 2** | **Below Expectations - 1** |
| 2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly. | Student included details about how their landform or body of water was formed. | Student included some details about how their landform or body of water was formed. | Student included few or no details about how their landform or body of water was formed. |
| 2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.  2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be a solid or liquid. | Student created a 2- or 3-dimensional representation of their object that closely resembled their topic. | Student created a 2- or 3-dimensional representation of their object that somewhat resembled their topic. | Student did not create a representation of their object, or the object does not resemble their topic. |
| W.2.7: Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations.) | Student participated fully in research. | Student somewhat participated in research. | Student did not participate in class research. |
| W.2.8: Recall information from experiences or gather information from provided sources to answer a question. | Student used at least 2 sources to find information about their landform or body of water. | Student used one source to find information about their landform or body of water. | Student did not use sources to find out information about their landform or body of water. |
| RI.2.3: Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. | Student used two sources to connect information about their landform or body of water. | Student used one source to locate information about their landform or body of water or did not make a connection. | Student did not use sources or make a connection for information about their landform or body of water. |
| RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text. | Student found many similarities in at least two sources regarding information and pictures/diagrams about their landform or body of water. | Student found some similarities in at least two sources regarding information and pictures/diagrams about their landform or body of water | Student did not find similarities regarding information and pictures/diagrams about their landform or body of water. |
| SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. | Student is able to recall at least three details and present them orally regarding their object. | Student is able to recall one to two details and present them orally regarding their object. | Student is not able to recall details or present them orally regarding their object. |
| SL.2.5: Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. | Student was able to clearly add to their drawing or object to express the facts learned. | Student was somewhat able to add to their drawing or object to express the facts learned. | Student was unable to add to their drawing or object to express the facts learned. |

Points: \_\_\_\_\_\_ / \_\_\_\_\_\_\_= \_\_\_\_\_\_\_\_% Comments:

STEM/Engineering Unit Project

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| **Learning Target**  **Objective**  **Standards** | Engineering design is a process used to solve real world problems. Students will use the five-step engineering design process to solve a problem.  Students will build a windbreak designed to prevent the wind from changing the shape of the land.  K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.  K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.  K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.  2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. |
| **Materials** | Computer, BrainPop login, science notebooks, rocks, popsicle sticks, Play-Doh, shoe box, sand, Styrofoam rectangle pieces, hole punchers, box cutter, hot glue gun, straws, milk carton |
| **Books** |  |
| **Vocabulary** | Windbreak: Something that serves as a shelter from the wind, usually designed to provide shelter from the wind and to protect soil from erosion |
| **Design Process** | **ASK**  Identify the problem. Identify the constraints  **IMAGINE** Identify some possible solutions  **PLAN** Draw a plan and identify the materials  **CREATE** Use the plan and create. Test it!  **IMPROVE** Modify your design to make it better. Test it out! |
| **Procedures** | **ASK**  Review erosion with the students. Tell students: You are going to move to the desert, and you need to block your house from wind erosion. Brainstorm materials they could use and create to block the wind. The challenge is to design and build a prototype of a windbreak that is made using the provided materials. A windbreak is a structure that reduces the wind’s effect on a surface.  Video: “Wind Erosion: The Problem” (2:32):  <https://www.youtube.com/watch?v=ETRK0tUKMjA>  BL: Wind Erosion: <https://betterlesson.com/lesson/637474/preventing-wind-erosion>  **IMAGINE**  Video: “Bill Nye The Science Guy on Wind (Full Clip)” (1:53): <https://www.youtube.com/watch?v=uBqohRu2RRk>  Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) in groups of 3-5 (depending on class size.) Students should explore the given materials: rocks, popsicle, sticks, Play-Doh, Styrofoam rectangles, straws, and a milk carton. Students can begin by decorating their milk carton like a house. Once the house is decorated, they can put the house on one side of a shoebox, and a cup of sand poured out on the other side. Give students a chance to look at pictures of windbreaks and see how they might protect houses.  Houzz: Windbreaker Screen: <https://www.houzz.com/windbreaker-screen>  **PLAN**  Have students draw a picture of what they want to build. Have the students label the parts of the windbreaker, including what materials they want to use. Drawings can be basic but should show an understanding of making something that will block the wind.  **CREATE**  Students should use the drawings to make a replica of their windbreak. Explain to students that scientists often make mistakes, and it is only in these mistakes that we can learn and grow. They can use any materials that they would like. To add another challenge, prices can be added to the materials, and a budget given. Have students participate in Carousel Feedback (<https://www.kaganonline.com/>) to give others ideas of what can be changed before the windbreakers are tested. The teacher may provide assistance with the hot glue gun, hole punch, or box cutter as needed. Have students draw a picture of their windbreak complete with labels.  To test the windbreak, students should use the straws to blow the sand against the windbreak. Record the results. What happened? Did the windbreak work?  **IMPROVE**  Once the windbreaks have been tested, some of them may end up breaking. Students may make modifications based on feedback from peers, or feedback from the teacher. Materials can be added or taken away. Ask the students: If you had different materials, what else would you add? How would you make it better? |
| **Enrichment** | Discuss other materials that could be used to make windbreaks, such as wood or bricks, as in the pictures they saw. Ask the students: Could the materials in class be supersized to make a full-sized windbreak? |
| **Closure** | Discuss how knowing the properties of materials assisted in the students creating the windbreaks. What additional materials would they want to use? What materials would they not want to use? |
| **Assessment** | Students should be graded based on the rubric. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| As the students are working, some may need help with construction and/or evaluating whether the designs were successful or not. Students can be paired based on ability. | Students should be able to create a windbreaker either independently or with a partner. Students may need prompting to identify and adjust for any problems with the windbreaker. | Students should be able to successfully create a windbreaker, and identify any problems it had, as well as identifying a solution to the problem. They should also be able to assist students who are struggling. |
| **ELL Strategies** | | |
| *Visual Aids:* Show the student pictures of the different types of windbreaks, as well as exploring the different windbreaks made during the lesson.  *Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to test out the different windbreaks and how they work. Describe the differences between them, and what makes each one effective.  *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. | | |
| **DOK Question (Level 3)** | | |
| Ask students: How would you test a windbreak like this if it was full sized? Would straws work, or would you need something stronger? Would you test a model or a full sized version first? Why? | | |
| **Interactive Technology** | | |
| Video: “Things To Consider When Designing a Windbreak” (2:33): <https://www.youtube.com/watch?v=ouFtxqp-xxk> | | |

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|  | Unsatisfactory Effort (0 points) | Effort Needs Improvement (1 point) | Satisfactory Effort (2 points) | Outstanding Effort (3 points) |
| I contributed to the team work. |  |  |  |  |
| I exhibited scientific thinking. |  |  |  |  |
| I maintained a positive attitude. |  |  |  |  |
| I completed the building task. |  |  |  |  |
| I reflected on my work. |  |  |  |  |

Grading Myself

Grading My Team

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| --- | --- | --- | --- | --- |
|  | Unsatisfactory Effort (0 points) | Effort Needs Improvement (1 point) | Satisfactory Effort (2 points) | Outstanding Effort (3 points) |
| My team worked well together. |  |  |  |  |
| My team displayed problem-solving skills. |  |  |  |  |
| My team had a positive attitude. |  |  |  |  |
| My team completed the building task. |  |  |  |  |
| My team discussed and reflected on our work. |  |  |  |  |

Graded by my Teacher

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Unsatisfactory Effort (0 points) | Effort Needs Improvement (1 point) | Satisfactory Effort (2 points) | Outstanding Effort (3 points) |
| Student cooperated with team. |  |  |  |  |
| Student exhibited scientific thinking. |  |  |  |  |
| Student maintained a positive attitude. |  |  |  |  |
| Team completed the building task. |  |  |  |  |
| Student reflected on work. |  |  |  |  |

<http://www.morethanaworksheet.com/wp-content/uploads/2015/07/STEM-Rubric.pdf>

Websites/Videos

Mirriam-Webster Word Central: <http://www.wordcentral.com/>

Kagan: <https://www.kaganonline.com/>

Geology for Kids: <https://kidsgeo.com/geology-for-kids/water-erosion/>

Ducksters: Erosion: <https://www.ducksters.com/science/earth_science/erosion.php>

Ducksters: Glaciers: <https://www.ducksters.com/science/earth_science/glaciers.php>

Quora: Why is the study of landforms important? <https://www.quora.com/Why-is-the-study-of-landforms-important>

“7 Continents Song/Seven Continents Song”: <https://www.youtube.com/watch?v=7yXDYvWSswI>

“Space Shuttle – Beauty of the Earth (HD)”: <https://www.youtube.com/watch?v=vZ50yRcvqjs>

Continent printout: <http://alittlepinchofperfect.com/world-map-geography-activities-for-kids/>

“Continental Drift 101/National Geographic”: <https://www.youtube.com/watch?v=Wq9kLzm36h0>

Continental Drift Animation: <https://kids.kiddle.co/Continental_drift>

“Bill Nye Plate Tectonics, Volcanoes and Earthquakes” (7:18): <https://www.youtube.com/watch?v=1PVMs2NSdmc>

Sheppard Software: All About World Geography: <http://www.sheppardsoftware.com/World_Continents.htm>

World Geography Games: <http://world-geography-games.com/>

“Water Cycle Song”: <https://www.youtube.com/watch?v=TWb4KlM2vts>

“Where Does Water Come From?”: <https://www.youtube.com/watch?v=R0K7VKkksyc>

“The Great Aqua Adventure: Crash Course Kids #24.1”: <https://www.youtube.com/watch?v=z5G4NCwWUxY>

“Water Cycle – Blazer Fresh/Science Video/GoNoodle”: <https://www.youtube.com/watch?v=KM-59ljA4Bs>

South East Water: Natural water cycle game: <https://www.educationsoutheastwater.com.au/resources/natural-water-cycle-game>

Project Wet: A Trip Through the Water Cycle: <http://www.discoverwater.org/blue-traveler/>

TurtleDiary: Water Cycle Games: <https://www.turtlediary.com/games/water-cycle.html>

“Landforms, Hey!: Crash Course Kids #17.1”: <https://www.youtube.com/watch?v=FN6QX43QB4g>

“Landforms Rap/Lessons With Lisa”: <https://www.youtube.com/watch?v=X_lZH2E6GHQ>

BrainPOP jr.: “Landforms”: <https://jr.brainpop.com/science/land/landforms/>

Mr. Polum’s Landform Game: <https://matchthememory.com/mrpolum>

Learning Liftoff: Landforms: <https://www.learningliftoff.com/1st-grade-science-activity-spot-landforms/>

“Make Your Own Mountains! - #sciencegoals”: <https://www.youtube.com/watch?v=6q7N8-Nh4pA>

“Where Do Mountains Come From?”: <https://www.youtube.com/watch?v=Fd_XqYE2BWY>

Plum Landing: “Mountain Scramble”: <http://pbskids.org/plumlanding/games/ecosystem/mountain_scramble.html>

Science Activities for Kids: Mini Volcanoes: <http://www.funlittles.com/science-activities-for-kids-mini-volcanones/>

“Volcano Facts for Kids!”: <https://www.youtube.com/watch?v=x-6bGUffwtA>

“All About Volcanoes: How They Form, Eruptions & More!”: <https://www.youtube.com/watch?v=K7Oq9_DU1Mc>

Scholastic: Magic School Bus – Blows Its Top: <https://www.scholastic.com/magicschoolbus/games/volcano/index.htm>

“How to Make an Underwater Volcano/Science Projects”: <https://www.youtube.com/watch?v=6q7N8-Nh4pA>

BrainPOP: “Volcanoes”: <https://www.brainpop.com/science/earthsystem/volcanoes/>

“A New Time-lapse of an Island Forming in Tonga”: <https://www.youtube.com/watch?v=sIXyxvSEKFY>

“The Birth of a New Island”: <https://www.youtube.com/watch?v=Hds1OBxVg4s>

Gift of Curiosity: Montessori landform activities: <https://www.giftofcuriosity.com/montessori-landform-activities/>

“Geography – Landforms: Peninsulas”: <https://www.youtube.com/watch?v=1CwTI_Qbgz8>

“Tasman Peninsula for Kids”: <https://www.youtube.com/watch?v=Xi4bDNcfNvA>

Match the Memory: Mr. Polum’s Landform Game: <https://matchthememory.com/mrpolum>

Science Kids at Home: “Growing Stalactites”: <http://www.sciencekidsathome.com/science_experiments/growing_stalactites.html>

“Stalactites and Stalagmites”: <https://www.youtube.com/watch?v=2BJB4o33PuM>

“Bill Nye the Science Guy S05E12 Caves”: <https://www.youtube.com/watch?v=J1-kEXKe1K8&t=5s>

“15 Most Amazing Caves”: <https://www.youtube.com/watch?v=DElWUeWbuh8>

PBS Kids: Nature Cat: “Stalactites and stalagmites”: <http://pbskids.org/video/nature-cat/2365604656>

“Landforms – Plains”: <https://www.youtube.com/watch?v=pAZXw0YbHiA>

“Discover America’s heartland, the Great Plains”: <https://www.youtube.com/watch?v=pQKwzhEXLEo>

Kiddle: “Plain”: <https://kids.kiddle.co/Plain>

Learning Liftoff: Spot the Landforms: <https://www.learningliftoff.com/1st-grade-science-activity-spot-landforms/>

Mystery Science: “What’s strong enough to make a canyon?”: <https://mysteryscience.com/water/mystery-3/erosion-earth-s-surface-landforms/114#slide-id-0>

“The Grand Canyon!”: <https://www.youtube.com/watch?v=oZZEJMtLOKU>

“How Was the Grand Canyon Formed?”: <https://www.youtube.com/watch?v=t6IBg4Srb6E>

National Park Service: Grand Canyon for kids: <https://www.nps.gov/grca/learn/kidsyouth/index.htm>

Mystery Science: “If you floated down a river, where would you end up?”: <https://mysteryscience.com/water/mystery-1/mapping-earth-s-surface-landforms/112?r=2985720&s=social:pinterest#slide-id-0>

BrainPOP: “Rivers”: <https://www.brainpop.com/science/earthsystem/rivers/>

US Geological Survey: <https://txpub.usgs.gov/DSS/streamer/web/>

USGS Streamer: <https://txpub.usgs.gov/DSS/streamer/web/>

PBS Kids: Build a dam: <http://pbskids.org/zoom/activities/sci/buildadam.html>

“How to Get Resources – Picky Pineapples: Crash Course Kids #2.2”: <https://www.youtube.com/watch?v=FNOqZVv-qso>

“Great Lakes/Great Lakes Geography/Great Lakes North America”: <https://www.youtube.com/watch?v=SDRiwn1LlSk&t=39s>

Sheppard Software: “U.S.A. Lakes – Learning Level” <http://www.sheppardsoftware.com/USA_Geography/USA-lakes.html>

PBS: Building Big: “The Dam Challenge”: <http://www.pbs.org/wgbh/buildingbig/dam/challenge/>

Life Over C’s: “Ocean Currents Science Experiment”: <https://lifeovercs.com/ocean-currents-science-experiment/>

DisneyVideo: “Catching the EAC”: <https://video.disney.com/watch/catching-the-eac-4bb39d25a179ea8833003b15>

“The Water Bodies/The Dr. Bionics Show/Educational Videos For Kids”: <https://www.youtube.com/watch?v=bNWuQD7QHBc>

“waves and currents”: <https://www.youtube.com/watch?v=3qETXLc9mr8>

“Bill Nye the Science Guy S02E09 Ocean Currents”: <https://www.youtube.com/watch?v=r17rLdL9Nik>

“Hot And Cold Water Science Experiment”: <https://www.youtube.com/watch?v=86ChgK38EIA>

National Geographic Kids: Ocean Portal: <https://kids.nationalgeographic.com/explore/ocean-portal/>

Wild Kratts: Ocean: <http://pbskids.org/wildkratts/habitats/ocean/>

NASA Space Place: “Go with the Flow!”: <https://spaceplace.nasa.gov/ocean-currents/en/>

“Learning About Landforms”: <https://www.youtube.com/watch?v=KWTDmg8OI_Y>

BL Plans: <https://betterlesson.com/lesson/resource/3214227/planning-a-model-of-an-island-recording-sheet?from=resource_title>

BL Plans: [https://betterlesson.com/lesson/635819/making-a-landform-model#](https://betterlesson.com/lesson/635819/making-a-landform-model)

“What is Topography?”: <https://www.youtube.com/watch?v=K-UXrpAjyl0>

National Geographic: “MapMaker Interactive”: <http://mapmaker.nationalgeographic.org/>

“Weathering and Erosion: Crash Course Kids #10.2”: <https://www.youtube.com/watch?v=R-Iak3Wvh9c>

Legends of Learning: “Art of Destruction”: <https://games.legendsoflearning.com/games/WyJnYW1lcyIsMTM0MF0>=

“Make Your Own Erosion - #sciencegoals”: <https://www.youtube.com/watch?v=YETdZyZI6es>

“Billy Blue Hair – What is Erosion?”: <https://www.youtube.com/watch?v=G5Rp9MJJGCU>

Legends of Learning: “Water is Powerful!”: <https://games.legendsoflearning.com/games/WyJnYW1lcyIsODMwXQ>==

“Melting Glacier – Ice Breaking off”: <https://www.neok12.com/video/Glaciers/zX430a77675e62684243605d.htm>

“Teach Engineering: Hands-on Activity: Glaciers, Water, and Wind, Oh My!”: <https://www.teachengineering.org/activities/view/cub_earth_lesson5_activity1>

“All About Glaciers for Kids: How Glaciers Form and Erode to Create Landforms – FreeSchool” (3:59): <https://www.youtube.com/watch?v=PbYXiJsF5mw>

Glaciers Change the Land: <https://www.ducksters.com/science/earth_science/glaciers.php>

Glaciers - Interactive: https://www.neok12.com/Glaciers.htm

Kids Geology: https://kidsgeo.com/geology-for-kids/landforms/

Kiddle: Landform facts: <https://kids.kiddle.co/Landform>

National Geographic: Landforms: <https://www.nationalgeographic.org/topics/landforms/>

Face of the Earth: Landforms: <http://www.edu.pe.ca/southernkings/landforms.htm>

“Bill Nye: Landforms”: <https://www.youtube.com/results?search_query=bill+nye+landforms>

Flocabulary: “Landforms & Bodies of Water”: <https://www.flocabulary.com/unit/landforms-bodies-of-water/>

“Wind Erosion: The Problem” (2:32): <https://www.youtube.com/watch?v=ETRK0tUKMjA>

BL: Wind Erosion: <https://betterlesson.com/lesson/637474/preventing-wind-erosion>

“Bill Nye The Science Guy on Wind (Full Clip)”: <https://www.youtube.com/watch?v=uBqohRu2RRk>

Houzz: Windbreaker Screen: <https://www.houzz.com/windbreaker-screen>

STEM Rubric: <http://www.morethanaworksheet.com/wp-content/uploads/2015/07/STEM-Rubric.pdf>

Software Applications (Apps)

Geography Master: Education

Planet Geo – Fun Games of World Geography: Planet Factory Interactive

Water Cycle VR – Victory Enterprises

Plum’s Island Explorer: Land and Water

Volcanoes: Map, Alerts & Ash: The best volcano app!

Volcano Updates: Foxy Rocket

Volcano 360: Sergey Rumyantsev

Postcards from Mole Creek Caves: iCardz2go

Jenolan Caves” – Acoustiguide of Australia Pty.Ltd.

Grand Canyon National Park – Visitor Guide

RiverApp – River levels: Real-time river conditions

Hoover Dam Tour (Lite Version) – GPSmyCity.com, Inc.

Ocean Watch – Blue Bright Labs LLC

Topo Maps US – David Crawshay

Mapster – Syzygy Research & Technology Ltd.