

UNIT OVERVIEW

Looking at a photograph of Earth from space, we see the surface. The Earth's Surface unit helps students explore the land and water that make life on Earth possible. The land is composed of rocks and soil. It is shaped into various landforms by gravity, wind, water, and the movements of Earth's crust. Water covers about 70 percent of Earth's surface. Much of it is salt water found in oceans. Water moves through the water cycle as it evaporates into water vapor, forms clouds, precipitates from clouds to the ground, collects in lakes, flows in rivers, and returns to the sea. Earth's surface provides everything needed for life to thrive, including shelter, food, and water.

Certain reading resources are provided at three reading levels within the unit to support differentiated instruction. Other resources are provided as a set, with different titles offered at each reading level. Dots on student resources indicate the reading level as follows:

- low reading level
- middle reading level
- high reading level

THE BIG IDEA

Earth's surface is the part of our planet that we interact with every day. We may walk or ride a bike on the land. We may swim in or sail on the water. Earth's surface provides all living things—including people—with everything they need for survival. People collect materials such as rocks, metals, and wood from Earth's surface to build homes and to make all the things we use every day. Plants grow in the soil and supply people and other animals with nourishment. Water's unique properties and its abundance make Earth a haven for living organisms. Understanding Earth's surface will help students appreciate the uniqueness of our planet and may encourage them to take action to protect it.

Other topics

This unit also addresses topics such as: cave formation, islands, various bodies of water, valleys, impact craters, and landforms that exist under the ocean.

SPARK

The spark is designed to get students thinking about the unit's topics and to generate curiosity and discussion.

Materials

- scrap paper
- blank paper
- tape measure (optional)
- clipboards
- pencils



Activity

Take students out to the playground as a class or in small groups. Provide each student with a sheet of paper, a clipboard, and a pencil. Ask each student to draw a map of the surface of the playground or one section of it. Explain that the *surface* is the part of the land that they are standing on and can see. Their map should show what the playground would look like from above. Encourage students to observe and include natural features of the land, such as hills, puddles, grassy areas, and trees. Also have them add human-made features to their maps, such as cement sidewalks, gardens, and sports fields.

To help developing learners, provide an outline map of the playground so that students can fill in the surface features they see. For an added challenge, provide tape measures so students can measure features they would like to include and make their maps closer to scale. Back in class, compare maps as a group and discuss specific features of the surface that students included on their maps. The whole class can then help create a large map of the playground's surface to display in the classroom.

Below are questions to spark discussion.

What is a surface?

Which parts of the playground surface are natural, and which parts were built by people?

How is the surface different in certain parts of the playground?

Does the playground's surface always stay the same? What can make it change?

Was there water on the playground surface? If so, how did it get there?

If not, will water ever be there? How will it get there?

Use this activity to begin an introductory discussion about Earth's surface. Explain that maps are a way of showing what Earth's surface looks like. Maps often include both human-made features, such as roads and buildings, and natural features, such as mountains and lakes. Many maps also show water. Throughout this unit, students will learn more about the land and water that make up Earth's surface.

Many of the unit's vocabulary terms are related to the spark activity and can be introduced during the spark. For vocabulary work, see the Vocabulary section in this [Unit Guide](#).

PRIOR KNOWLEDGE



Invite students to explain what they know about Earth's surface. Discuss ways in which people and other living things rely on Earth's surface.

Probing Questions to Think About

Use the following questions to have students begin thinking of what they know about Earth's surface.

- What part of Earth is its *surface*?
- What else has a surface besides Earth?
- Why does the land come in so many different shapes and sizes?
- Where does soil come from?
- Where does water come from? Where does it go when it disappears?
- What are some things on Earth that are living? Nonliving?
- Why do animals and plants need Earth's surface?
- What do you use that comes from Earth's surface?

Tell students they will learn more about these topics soon.

UNIT MATERIALS

Each unit provides a wide variety of resources related to the unit topic. Students may read books and other passages, work in groups to complete hands-on experiments and investigations, discuss science ideas as a class, watch videos, complete writing tasks, and take assessments.

Resources are available for printing or projecting, and many student resources are also available for students to access digitally on **Kids A-Z**.

Selected unit resources are available in more than one language.

For a complete list of materials provided with the unit, see the Earth's Surface unit page on the Science A–Z website.

VOCABULARY



Use the terms below for vocabulary development throughout the unit. They can be found in boldface in the *Nonfiction Book*, the *Quick Reads*, and/or other unit resources. These terms and definitions are available on *Vocabulary Cards* for student practice. Additional vocabulary lists are provided in the teaching tips for *Investigation Packs* and *FOCUS Books*.

Core Science Terms

These terms are crucial to understanding the unit.

fresh water	water that is not salty, found in rivers and most lakes
lake	a large body of water with land all around it
land	the solid part of Earth's surface
landform	a natural feature of Earth's surface, such as a valley, mountain, or hill

ocean	the salt water that covers most of Earth's surface or one of its main sections
river	a large stream of water that flows downhill across land
rock	the hard, solid material that makes up Earth's land
salt water	water that has salt in it, found in oceans and some lakes
soil	the top layer of the ground, in which plants grow
surface	the outside or top part of a thing; the part of water or land that touches the air above it

Other Key Science Terms

The following vocabulary is not essential for comprehending the unit but may enrich students' vocabulary.

canyon	a deep valley with steep sides that is usually formed by a river
cave	a large hole that formed naturally in the land
cliff	a high, steep surface made of rock, soil, or ice
earthquake	the sudden shaking of part of Earth's land caused by underground movement
erosion	the wearing away and moving of rocks or soil by water, wind, ice, or gravity
gravity	the natural force that pulls objects toward each other, such as objects being pulled toward the center of Earth
hill	an area of land that is taller than the land around it but not as tall as a mountain
ice sheet	a very thick area of ice that covers a large section of land
island	an area of land, smaller than a continent, that has water all around it
mountain	a high area of land that is much taller than the land around it and bigger than a hill
survive	to stay alive; to keep living
valley	a low area of land between hills or mountains
volcano	a mountain with a hole that sometimes sends out rocks, gases, ash, or lava

Vocabulary Activities

You may choose to introduce all the terms that will be encountered in the unit before assigning any of the reading components. *Vocabulary Cards* with the key science terms and definitions are provided. Dots on the cards indicate the reading levels of the *Nonfiction Book* or the *Quick Reads* in which each term can be found. If all level dots appear, the term may come from another resource in the unit. Students can use these cards to review and practice the terms in small groups or pairs. The cards can also be used for center activity games such as Concentration.



The *Word Work* activity sheets offer fun puzzles and practice with key vocabulary terms from the unit. For further vocabulary practice and reinforcement, you can choose from the vocabulary *Graphic Organizers*. To build customized vocabulary lessons with terms related to the topic, see *Vocabulary A-Z*.

Students can use the *Word Smart* vocabulary *Graphic Organizer* to organize information on the science terms. You may want to assign each student one to three words to share his or her *Word Smart* knowledge with classmates. Students who have the same word should first compare their *Word Smart* sheets with each other and then report to the larger group.

The science terms can be used in oral practice. Have students use each term in a spoken sentence.

As students read, encourage them to create a science dictionary by recording new vocabulary terms and definitions in their *SAZ Journal*.

BACKGROUND AND MISCONCEPTIONS

Use this section as a resource for more background knowledge on unit content and to clarify the content for students if misconceptions arise. Refer to Using the Internet below for more ways to extend the learning.

Q: *Is Earth's surface the same as Earth's crust?*

A: No. In this unit, Earth's *surface* is defined as the part of the water or land that touches the air above it. The surface is the part of Earth we interact with. The *crust* is the outermost layer of rock that surrounds Earth's mantle. The crust covers the entire planet, including the part that lies under the ocean. Earth's crust is broken up into plates that can move, causing earthquakes.



Q: *Are all rocks the same?*

A: No. Rocks are categorized as one of three main types—sedimentary, igneous, or metamorphic—depending on how they form. Sedimentary rocks, such as limestone, are layered rocks that build up over time. Igneous rock, such as granite, forms when lava or magma cools and turns solid. Heat and pressure turn an existing rock into a metamorphic rock. Marble is an example of a metamorphic rock. Most rocks are made up of different kinds of minerals, such as calcite, feldspar, and quartz. The amount and ratio of minerals in a rock, along with the way it formed, define its characteristics. Some rocks, such as coal, are made up of organic materials that solidified over millions of years.

Q: *Why is soil so important for life?*

A: Although we may not be able to see them, many living organisms, such as earthworms, bacteria, and fungi, make their home in soil. These organisms are recyclers that keep Earth's surface clean by breaking down dead animals and plants into nutrients that growing plants need in order to survive. Plants absorb these nutrients through their roots, which grow in the soil. The soil also holds water, which plants absorb as well. In addition, soil provides a foundation in which plants can grow. Because plants are at the bottom of many food chains, they support every level of consumer, all the way up to top predators.

Q: *Why is water so important to life?*

A: There are so many reasons; let's just focus on a few. As far as we know, all living things need some amount of water to survive. Scientists looking for life on other planets often begin their search with water or evidence of water in any state. Water is unique because it is liquid at most temperatures found on Earth's surface. Water in oceans helps control the air temperature on Earth by absorbing and releasing heat from the Sun's rays, which keeps Earth at a suitable temperature for diverse life forms. Also, because water is a *solvent*, many important nutrients dissolve in it. When nutrients dissolve in water, they can be easily transported to tissues and cells of plants and animals. Lastly, when water is in its gaseous state, it moves around in the form of vapor in the air, bringing moisture to otherwise dry areas of Earth's surface.

Q: Does water disappear?

A: No—water evaporates. When it does, it sometimes appears as though the water is disappearing. However, during evaporation, water changes from its liquid state to an invisible gaseous state. This water vapor remains in the air as humidity. If the water vapor near Earth's surface cools, it turns back into liquid and forms fog or collects on surfaces as dew. Rising air masses cool and expand as they reach the atmosphere; then water vapor condenses during cloud formation. Eventually, the water droplets in the clouds become too heavy and fall to the ground as precipitation. Water exists in solid, liquid, or gaseous form, but it never disappears.

Q: Why does Earth look so smooth from space if it has such big mountains and canyons?

A: Earth's surface is dynamic, variable, and ever changing. But the scale at which you are observing it can dramatically change your view. When viewed from space, most surface features are not visible because the image is taken from very far away. Even giant mountain ranges appear as small bumps compared to the vast size of Earth. Similarly, a basketball viewed from across a room would appear very smooth, but under a hand lens, one can see valleys, bumps, and other features. In fact, Earth's atmosphere rises much higher than Mount Everest, yet from outer space it looks like a thin film around the sphere of Earth.

Q: Is Earth's surface still changing?

A: Absolutely! Earth is a dynamic planet that is constantly changing. Earth's surface is changed by gravity, wind, ice, water, and the movement of tectonic plates. In addition, people change Earth's surface every day. These erosional forces wear away and move soil and rocks, then deposit them in new places. Volcanic eruptions and earthquakes can dramatically change Earth's surface in a short period of time. Areas that were once covered with water can be as dry as a desert due to shifting weather patterns. Some areas that were once covered in ice are now lush pine forests due to changes in climate. The same processes that have changed Earth in the past will continue to shape Earth's surface.

EXTENSION
ACTIVITIES

Using the Internet

Most search engines will yield many results when the term *Earth's surface*, *land*, or *water* is entered. You can also perform a more specific search, such as *geology of Earth's surface*. Be aware that some sites may not be educational or intended for the elementary classroom. More specific inquiries are recommended, such as:

- earth science (or geology) for kids
- photographs of Earth from space
- rocky planets
- saltwater vs. freshwater animals
- wind erosion examples
- types of soil
- bodies of water in Vermont
- landforms of China

Projects and Activities



- **Project:** Place students in small groups. Have each group build a model of a common landform, such as a mountain, island, canyon, or river valley. Provide students with materials, such as clay, sand, twigs, or potting soil. As they are working, discuss with groups the features that define each type of landform and encourage them to incorporate those features into their model.
- **Project/Home Connection:** Ask students to collect soil samples from around their home or neighborhood and bring them into the classroom. As a group, examine the soil samples. Provide gloves, dust masks, magnifying glasses, sieves, and water so that students can study and compare the different types of soil. Encourage students to write and draw their observations in their science notebooks.
- **Project/Home Connection/Research:** Have students collect rocks around their home or neighborhood. Challenge them to build an organized rock collection by sorting rocks based on various properties. As a challenge, ask students to use library and online research tools to identify their rocks.
- **Arts:** Have students make a paperweight or pet rock by painting or otherwise decorating a rock found in their neighborhood.
- **Writing:** Invite students to write or dictate a story about a drop of water traveling around Earth. Have them start and end their story in the same location, such as a cloud or an ocean. Review the primary steps in the water cycle that they should include in their story. For extensive writing instruction, visit [Writing A-Z](#).

- **Guest:** Invite an earth scientist to the classroom to discuss geologic issues such as how people have changed Earth's surface and the impact of those changes on other living things.



- **Technology:** Have students conduct a supervised Internet search to find out what materials from Earth's surface are found in familiar objects such bicycles, pencils, or soccer balls.
- **Research/Home Connection:** Students can conduct research as a family/home project or in the library/media center to extend the learning about a topic in one of the *Quick Reads* or other unit resources.

