Ohio Science - Extended Learning Standards

Grade 4

Earth and Space Science

1 Earth's surface has specific characteristics and landforms that can be identified. About 70 percent of Earth's surface is covered with water, and most of that is the ocean. Only a small portion of Earth's water is freshwater, which is found in rivers, lakes, groundwater, and glaciers. Earth's surface can change due to erosion and deposition of soil, rock, or sediment. Catastrophic events such as flooding, volcanic activity, and earthquakes can also create landforms. 4.ESS.1

Complexity a

a1 Explain how a surface process has changed an area of the Earth's surface. 4.ESS.1.A1

a2 Using a visual or actual field observation, describe specific landform features. 4.ESS.1.A2

Complexity b

b1 Match a surface process to the landform that it creates (e.g., volcanic activity can create an island). 4.ESS.1.B1

b2 Match the names of landforms to a picture or description. 4.ESS.1.B2

Complexity c

c1 Identify a characteristic of the Earth's surface. 4.ESS.1.C1

c2 Identify Earth's landforms. 4.ESS.1.C2

Learning Progression

- Given a series of pictures showing deposition (delta forming, riverbank getting bigger) place them in order. 4.ESS.1.LP.A
- Identify products of deposition (e.g., delta forming, hill, river bank getting bigger). 4.ESS.1.LP.B
- Given a series of pictures showing erosion (mud washing across a road, hill getting smaller) place them in order. 4.ESS.1.LP.C
- Match landforms to the process that formed them. 4.ESS.1.LP.D
- Identify agents of erosion (e.g., wind, water, ice). 4.ESS.1.LP.E
- Go outside the school or watch a video and identify a place where erosion is occurring. 4.ESS.1.LP.F
- Show on a diagram where to find ground water. 4.ESS.1.LP.G
- Choose the picture of Earth which shows the correct distribution of water and land. 4.ESS.1.LP.H
- Match given pictures or descriptions to names of landforms. 4.ESS.1.LP.I
- Identify given pictures of landforms and features (e.g., mountains, volcanoes, lakes, oceans, rivers and their floodplains, islands). 4.ESS.1.LP.J

2 **The surface of Earth changes due to weathering. Rocks change shape, size, and/or form due to water or glacial movement, freeze and thaw, wind, plant growth, acid rain, pollution, and catastrophic events such as earthquakes, flooding, and volcanic activity. Note: Differentiating between chemical and physical weathering is not the focus at this grade level.** 4.ESS.2

Complexity a

a Describe ways that weathering (e.g., freezing/thawing, plant growth, flooding, wind, acid rain, etc.) affects landforms. 4.ESS.2.A

Complexity b

b Match a change in a landform caused by weathering to the type of weathering that occurred (e.g., a crack getting larger from water freezing). 4.ESS.2.B

Complexity c

c Identify an effect of weathering. 4.ESS.2.C

Learning Progression

- Sequence a series of pictures that illustrate weathering (e.g., sidewalk break with plants coming through, statue wearing away due to acid rain). 4.ESS.2.LP.A
- Categorize pictures of weathering into their causes (wind, water, plant growth, freeze-thaw). 4.ESS.2.LP.B
- Describe the effects that catastrophic events have on Earth's surface. 4.ESS.2.LP.C
- Identify types of catastrophic events (e.g., earthquakes, volcanic eruptions, flooding) 4.ESS.2.LP.D
- Identify that repeated freezing and thawing weathers earth materials. 4.ESS.2.LP.E
- Watch a pothole grow throughout the winter (in the community or time lapse video) and describe the process that is causing it grow. 4.ESS.2.LP.F
- Identify that wind and moving water weather earth materials. 4.ESS.2.LP.G
- Recognize that weathering is a process in nature that changes the shape, size and/or form of rocks. 4.ESS.2.LP.H

3 **The surface of Earth changes due to erosion and deposition. Liquid water, wind, and ice physically remove and carry rock, soil, and sediment (erosion) and deposit the material in a new location (deposition). Gravitational force affects movements of water, rock, and soil.** 4.ESS.3

Complexity a

a Predict the effect on a landform when a natural force is introduced (e.g., erosion and deposition). 4.ESS.3.A

Complexity b

b Identify a change in a landform that was caused by erosion or deposition (e.g., formation of valleys, sand dunes, etc.). 4.ESS.3.B

Complexity c

c Identify natural forces that can move rock and soil (e.g., erosion and deposition). 4.ESS.3.C

Learning Progression

- Given a natural process predict what effect it will have a particular landform (e.g., a flood will deposit mud on roads in the floodplain, a wind storm will blow mulch out of flowerbeds). 4.ESS.3.LP.A
- Identify features that result from glaciers (e.g., using Google Earth, geologic maps, pictures). 4.ESS.3.LP.B
- Identify geologic features in Ohio (e.g., using topographic maps or aerial photographs). 4.ESS.3.LP.C
- Categorize changes in a landform as deposition or erosion. 4.ESS.3.LP.D
- Trace the path of water in the process of erosion and deposition. 4.ESS.3.LP.E
- List wind, water and ice as agents of erosion and deposition. 4.ESS.3.LP.F
- Recognize that erosion and deposition are processes in nature that move eEarth materials (e.g., soil, rocks). 4.ESS.3.LP.G
- Describe the effects of water running down a pile of sand or soil. 4.ESS.3.LP.H
- Watch a time lapse video of erosion or deposition in action and identify changes that occur. 4.ESS.3.LP.I

Life Science

1 Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful. Ecosystems can change gradually or dramatically. When the environment changes, some plants and animals survive and reproduce and others die or move to new locations. Ecosystems are based on interrelationships among and between biotic and abiotic factors. These include the diversity of other organisms present, the availability of food and other resources, and the physical attributes of the environment. 4.LS.1

Complexity a

a1 Given an ecosystem, describe changes that could be harmful or beneficial to an organism in that ecosystem. 4.LS.1.A1

a2 Describe environmental changes that are sudden or gradual. 4.LS.1.A2

Complexity b

b1 Within a given ecosystem, identify which organisms would benefit or which organisms would be harmed after a change occurs. 4.LS.1.B1

b2 Match environmental changes as sudden or gradual. 4.LS.1.B2

Complexity c

c1 Identify that a given change in an ecosystem can be beneficial or harmful to a specific organism in that ecosystem. 4.LS.1.C1

c2 Identify environmental changes as sudden or gradual. 4.LS.1.C2

Learning Progression

- Given a series of pictures showing deposition (delta forming, riverbank getting bigger) place them in order. 4.LS.1.LP.A
- Identify products of deposition (e.g., delta forming, hill, river bank getting bigger). 4.LS.1.LP.B
- Given a series of pictures showing erosion (mud washing across a road, hill getting smaller) place them in order. 4.LS.1.LP.C
- Match landforms to the process that formed them. 4.LS.1.LP.D
- Identify agents of erosion (e.g., wind, water, ice). 4.LS.1.LP.E
- Go outside the school or watch a video and identify a place where erosion is occurring. 4.LS.1.LP.F
- Show on a diagram where to find ground water. 4.LS.1.LP.G
- Choose the picture of Earth which shows the correct distribution of water and land. 4.LS.1.LP.H
- Match given pictures or descriptions to names of landforms. 4.LS.1.LP.I
- Identify given pictures of landforms and features (mountains, volcanoes, lakes, oceans, rivers and their floodplains, islands). Given a picture of an ecosystem describe a change that would be beneficial to an organism and a change that would be harmful. 4.LS.1.LP.J
- Sort the effects of a change in an ecosystem as harmful or beneficial to a population of organisms. 4.LS.1.LP.K

- Given a series of pictures of environmental changes, identify them as gradual or sudden. 4.LS.1.LP.L
- Identify a connection between an abiotic factor and a living organism in an environment. 4.LS.1.LP.M
- List the resources in the environment that support living things. 4.LS.1.LP.N
- Sort pictures into categories of biotic (living) and abiotic (nonliving). 4.LS.1.LP.O

2 **Fossils can be compared to one another and to present-day organisms according to their similarities and differences. The concept of biodiversity is expanded to include different classification schemes based upon shared internal and external characteristics of organisms. Most species that have lived on Earth are extinct. Fossils provide a point of comparison between the types of organisms that lived long ago and those existing today** 4.LS.2

Complexity a

a1 Explain the pre-historic environment that a fossil organism may have lived in and compare that to the present day environment where the fossil was found. 4.LS.2.A1

a2 Given a set of fossils and present day organisms, explain why some fossil organisms do not have a present day representative. 4.LS.2.A2

Complexity b

b1 Given a fossil organism, identify the prehistoric environment it would have lived in, and compare that to the present day environment where the fossil was found. 4.LS.2.B1

b2 Given a set of fossils and present day organisms, sort them by similar characteristics. 4.LS.2.B2

Complexity c

c1 Match a fossil to an ecosystem that it would have lived in. 4.LS.2.C1

c2 Match a fossil with a representation of the organism. 4.LS.2.C2

Learning Progression

- Explain why we have found fossils of some animals that no longer exist. 4.LS.2.LP.A
- Match a fossil to an environment where it may have lived. 4.LS.2.LP.B
- Recognize that environments change (compare prehistoric fossil environments to current day environments). 4.LS.2.LP.C
- Match pictures of extinct organisms to modern organisms that are similar 4.LS.2.LP.D
- Identify differences between pictures of extinct organisms to modern organisms that are similar 4.LS.2.LP.E
- Recognize that some types of organisms that lived in the past no longer exist. 4.LS.2.LP.F
- Compare a fossil to a representation of the organism. 4.LS.2.LP.G
- Identify a fossil. 4.LS.2.LP.H
- Note: Introductory material about fossils can be found in 2.LS.2 for students who need an earlier entry point.Sequence a series of pictures that illustrate weathering (e.g., sidewalk break with plants coming through, statue wearing away due to acid rain). 4.LS.2.LP.I

- Categorize pictures of weathering into their causes (wind, water, plant growth, freeze-thaw). 4.LS.2.LP.J
- Describe the effects that catastrophic events have on Earth's surface. 4.LS.2.LP.K
- Identify types of catastrophic events (e.g., earthquakes, volcanic eruptions, flooding) 4.LS.2.LP.L
- Identify that repeated freezing and thawing weathers earth materials. 4.LS.2.LP.M
- Watch a pothole grow throughout the winter (in the community or time lapse video) and describe the process that is causing it grow. 4.LS.2.LP.N
- Identify that wind and moving water weather earth materials. 4.LS.2.LP.O
- Recognize that weathering is a process in nature that changes the shape, size and/or form of rocks. 4.LS.2.LP.P

Physical Science

1 **When objects break into smaller pieces, dissolve, or change state, the total amount of matter is conserved. When an object is broken into smaller pieces, when a solid is dissolved in a liquid, or when matter changes state (solid, liquid, gas), the total amount of matter remains constant. Note: Differentiation between mass and weight is not necessary at this grade level.** 4.PS.1

Complexity a

a Make a prediction about what will happen to the mass of an object after a change of state occurs. 4.PS.1.A

Complexity b

b When given multiple objects, make changes to their physical state and measure the mass before and after the changes are made to determine conservation of mass. 4.PS.1.B

Complexity c

c Recognize that the mass of a given object remains the same before and after a physical change is made to that object. 4.PS.1.C

Learning Progression

- Given the mass before dissolving, breaking or a phase change, predict the mass after the change. 4.PS.1.LP.A
- Explain why the mass before and after a change are the same (all the same materials are still there). 4.PS.1.LP.B
- Recognize that the total mass does not change when substances are dissolved (e.g., measure the mass of water plus salt while separated and after the salt is dissolved in the water). 4.PS.1.LP.C
- Recognize that mass does not change when physical changes occur (e.g., measure the mass before and after breaking an object into pieces, melting ice, or rearranged Legos into a new structure). 4.PS.1.LP.D
- Note: Measuring mass was introduced in 3.PS.1.Given a natural process predict what effect it will have a particular landform (e.g., a flood will deposit mud on roads in the floodplain, a wind storm will blow mulch out of flowerbeds). 4.PS.1.LP.E
- Identify features that result from glaciers (e.g., using Google Earth, geologic maps, pictures). 4.PS.1.LP.F
- Identify geologic features in Ohio (e.g., using topographic maps or aerial photographs). 4.PS.1.LP.G
- Categorize changes in a landform as deposition or erosion. 4.PS.1.LP.H
- Trace the path of water in the process of erosion and deposition. 4.PS.1.LP.I
- List wind, water and ice as agents of erosion and deposition. 4.PS.1.LP.J
- Recognize that erosion and deposition are processes in nature that move Earth materials (e.g., soil, rocks). 4.PS.1.LP.K
- Describe the effects of water running down a pile of sand or soil. 4.PS.1.LP.L

- Watch a time lapse video of erosion or deposition in action and identify changes that occur. 4.PS.1.LP.M

2 Energy can be transferred from one location to another or can be transformed from one form to another. Energy transfers from hot objects to cold objects as heat, resulting in a temperature change. Electric circuits require a complete loop of conducting materials through which an electrical energy can be transferred. Electrical energy in circuits can be transformed to other forms of energy, including light, heat, sound, and motion. Electricity and magnetism are closely related. 4.PS.2

Complexity a

a1 Sort objects by whether or not they transfer energy. 4.PS.2.A1

a2 Describe how one form of energy is transformed to another form. 4.PS.2.A2

Complexity b

b1 Identify examples of how different types of energy may be transferred or how different types of energy may not be transferred. 4.PS.2.B1

b2 Demonstrate how energy can be transformed. 4.PS.2.B2

Complexity c

c1 Identify an example of energy transfer (e.g., the handle of a pot on the stove may become hot to the touch, showing transfer of thermal energy from the pot to your hand). 4.PS.2.C1

c2 Identify an example of how a type of energy can transform to another type of energy (e.g., electricity transforms to light energy when a lamp is turned on). 4.PS.2.C2

Learning Progression

- Demonstrate how an electromagnet shows that electricity causes a magnetic field. 4.PS.2.LP.A
- Demonstrate how a complete electric circuit can cause an energy transformation (e.g., light a bulb, ring a buzzer). 4.PS.2.LP.B
- Identify that some materials transfer electrical energy better than others (e.g., copper versus rubber). 4.PS.2.LP.C
- Recognize that a complete loop is need for electric energy to flow in a circuit. 4.PS.2.LP.D
- Design a way to determine which materials will keep a drink hot or cold the longest. 4.PS.2.LP.E
- Identify that some materials transfer heat energy more easily than others (e.g., styrofoam versus metal). 4.PS.2.LP.F
- Identify examples of energy transfers and energy transformations (e.g., watch a machine or video where energy transfers are occurring such as a Rube Goldberg device and identify locations where energy is transferred or transformed). 4.PS.2.LP.G
- Identify that energy can change from one form to another (e.g, measure the temperature of a substance (water, air) before and after the sun shines on it and identify that light energy has changed to heat). 4.PS.2.LP.H

- Identify that energy can move from place to place. (e.g. measure the temperature of hot water as it cools on a tabletop and identify that heat is leaving the water and entering the air). 4.PS.2.LP.I
- Note: Forms of energy are introduced in 3.PS.3.Given a picture of an ecosystem describe a change that would be beneficial to an organism and a change that would be harmful. 4.PS.2.LP.J
- Sort the effects of a change in an ecosystem as harmful or beneficial to a population of organisms. 4.PS.2.LP.K
- Given a series of pictures of environmental changes, identify them as gradual or sudden. 4.PS.2.LP.L
- Identify a connection between an abiotic factor and a living organism in an environment. 4.PS.2.LP.M
- List the resources in the environment that support living things. 4.PS.2.LP.N
- Sort pictures into categories of biotic (living) and abiotic (nonliving). 4.PS.2.LP.O