Science- Grade 2

Unit 1 Title: Landscape Shapes

Unit Overview

In this unit, students explore the many landforms and bodies of water that cover Earth's surface. They learn that maps are models of these features and discover that relationships between land and water can be shown in maps. Students learn about the impact of weather on landscapes through observations and informational reading. Through observation and modeling different landscapes, they apply their knowledge of land and water features to models of background settings used for landscapes in animations. Throughout the unit, students dive deeper and use their observational skills to analyze how maps show the relationships between land and water. They learn about drought and study real-life situations showing why water is an important resource for all living things. Throughout the unit, students view videos, images, and simulations and conduct Hands-On Investigations to make their own maps of familiar places. At the conclusion of the unit, students design a system to capture stormwater runoff to help an area experiencing drought.

PA Academic Standards Science:

3.3.2.A4 Explore and describe that water exists in solid (ice) and liquid (water) form. Explain and illustrate evaporation and condensation.

3.2.2.B2 Explore and describe how different forms of energy cause changes. (e.g., sunlight, heat, wind)

NGSS Disciplinary Core Ideas:

ESS2.B: Maps show where things are located. One can map the shapes and kinds of land and water in any area.

ESS2.C: Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.

Core Standards Literacy

W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.

W.2.8 Recall information from experiences or gather information from provided sources to answer a question.

Content:

- Local Landscapes
  - Landforms
  - Water features on earth
- Mapping Landscapes
  - Representing landforms and water features
- The relationships between land and water
  - How water flows across land.
  - Impacts of flowing water.
  - Causes of drought.

Skills:

- Develop a model to represent the shapes and kinds of land and bodies of water in an area.
- Obtain information to identify where water is found on Earth and that it can be solid or liquid.

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- Analyze land elevations to apprise how scale and proportion relate to slope.
- Use observations and data sources to describe the size and scale of landforms compared to bodies of water.
- Create a model to illustrate different landforms and their features.
- Develop an argument, using evidence, to assess a map as an effective model of an existing real-world object.
- Use models to summarize how bodies of water are interconnected to form a larger water system.

Inquiry Questions: (*include factual, conceptual, debatable)*

- **Factual:**
  What are the many different kinds of landforms and water features on Earth's surface? How are different bodies of water shown on maps? How does water flow across landforms? How can you show the location of landforms and water features? What are the landscapes made of?
- **Conceptual:**
  How can we describe the shape of land and water on Earth? How are landforms and bodies of water alike and different? How do maps show relationships between water and land? How can we describe the shape of land and water on Earth? How does water flow across landforms? How do dams change the landscape and affect plants and animals?
- **Debatable:**
  Do landscapes change or move?

Resources:

"Unit 1: Landscape Shapes." *Discovery Education Grade 2 Science Techbook*, Discovery Education, https://app.discoveryeducation.com/learn/techbook/units/99dee058-58cc-4360-8e6a-1218a4a43be3.

"Work of Water." *Mystery Science*, Mystery.org, https://mysteryscience.com/water/.

Unit 2	**Title: Earth's Materials**

Unit Overview

In this unit, students explore different materials and discover that properties of materials often define how the materials are used. Throughout the unit, students explore natural and human-made materials and investigate how these materials can be changed—and whether or not the changes can be reversed. Students build upon their understanding by investigating various objects made with small parts that can be disassembled and reassembled to serve a different function. Students view videos, images, and simulations, and also conduct Hands-On Investigations by first predicting how materials change. Students conduct Hands-On Engineering activities by first asking questions about designing solutions. At the conclusion of the unit, students take apart an object, observe how its parts work together, and design an object that performs a similar function using recycled or reused materials.

PA Academic Standards Science:

3.2.2.A3 Demonstrate how heating and cooling may cause changes in the properties of materials.

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3.2.2.A4 Experiment and explain what happens when two or more substances are combined (e.g. mixing, dissolving, and separated (e.g. filtering, evaporation).
3.2.2.A5 Recognize that everything is made of matter.
3.2.2.B6 Recognize that light from the sun is an important source of energy for living and nonliving systems and some source of energy is needed for all organisms to stay alive and grow.

NGSS Disciplinary Core Ideas:

PS1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.
PS1.A Different properties are suited to different purposes.
PS1.A A great variety of objects can be built up from a small set of pieces.
ETS1.C Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Core Standards Literacy

RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
RI.2.8 Describe how reasons support specific points the author makes in a text.
W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.

Content:

- Properties of materials
    - Patterns in different materials found in the landscape.
    - Materials can be sorted and described based on their properties.
- Changing Materials
    - Creating and separating mixtures.
    - How temperatures affect materials.
    - Changes in materials can be reversible or irreversible.
- Using Materials
    - Materials used can impact the environment
    - Different material properties can serve different purposes.

Skills:

- Plan and conduct an investigation to compare, classify, and describe different kinds of materials by their observable properties.
- Construct an argument with evidence that some changes in matter, caused by mixing, heating, or cooling can be reversed and some cannot.
- Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
- Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
- 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.
- 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.

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Inquiry Questions: (*include factual, conceptual, debatable)*

- **Factual:**
  How are materials similar to and different from one another? How can we describe different materials? How are materials similar and different from one another? What sort of changes can happen to materials? What kinds of materials are used in different parts of a house, such as the walls and roof? Why are some materials used in design instead of others?
- **Conceptual:**
  How are materials chosen for designs? What sort of changes can happen to materials? How can the materials we use affect the environment? How do the properties of the materials relate to their use? Which materials that humans use have a lasting impact on the environment? What kinds of materials are the strongest for buildings? How does the ground a building is on affect how long it lasts? How can we use what we know about materials to lessen our impact on the environment?
- **Debatable:**
  Why should we consider materials when building?

Resources:

"Unit 2: Materials from the Land." *Discovery Education Grade 2 Science Techbook*, Discovery Education, https://app.discoveryeducation.com/learn/techbook/units/58ab59e2-89e1-4ab6-ab1e-455b196078a1.

"Material Magic." *Mystery Science*, Mystery.org, https://mysteryscience.com/materials/.

Unit 3	**Title: How Landscapes Change**

Unit Overview

In this unit, students are introduced to how people react to natural processes that shape Earth quickly, such as volcano eruptions. Students begin by thinking about ways to reduce or prevent changes to landscape. Throughout the unit, students dive deeper and use their observational skills to analyze the causes and effects of landscape changes due to earthquakes, mudslides, heavy rainfall, and volcanoes. They build upon their understanding by examining the power of erosion by water in the context of a breaking dam. Students view videos, images, and simulations; develop models; and conduct hands-on investigations by first predicting how changes affect landforms. At the conclusion of the unit, students conduct a hands-on engineering activity and design a solution that reduces or prevents landscape erosion. They analyze how well their design prevents or reduces erosion and then consider ways to improve their design.

PA Academic Standards Science:

3.2.2.A3 Demonstrate how heating and cooling may cause changes in the properties of materials.
3.2.2.A4 Experiment and explain what happens when two or more substances are combined (e.g. mixing, dissolving, and separated (e.g. filtering, evaporation).
3.2.2.A5 Recognize that everything is made of matter.
3.2.2.B6 Recognize that light from the sun is an important source of energy for living and nonliving systems and some source of energy is needed for all organisms to stay alive and grow.
3.3.2.A4 Explore and describe that water exists in solid (ice) and liquid (water) form. Explain and illustrate evaporation and condensation.

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NGSS Disciplinary Core Ideas:

ESS1.C Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

ESS2.A Wind and water can change the shape of the land.

ESS2.C Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.

ETS1.C Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Core Standards Literacy

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.2.9 Compare and contrast the most important points presented by two texts on the same topic.

W.2.8 Recall information from experiences or gather information from provided sources to answer a question.

Content:

- Changing Landscapes
    - Earth changes can happen quickly or slowly.
    - The shape of Earth is evidence of natural processes.
- Solving problems caused by landscape changes
    - Erosion
    - Earthquakes

Skills:

- Compare multiple solutions designed to slow or prevent changes to the shape of the land.
- 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.
- Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
- Use observations to establish patterns on how a landscape can change due to the forces of water or wind and cite evidence and observations to construct an explanation for landscape changes that happen quickly.
- Critique the effectiveness of multiple solutions designed to slow or prevent wind and water erosion.
- Develop a simple sketch, drawing, or physical model to illustrate how the shape or construction of an object can help solve problems caused by landscape changes.

Inquiry Questions: (*include factual, conceptual, debatable)*

- **Factual**:
  What can be done to prevent the damage caused by changes to the landscape? What evidence do natural processes leave behind as they shape Earth? How do the material properties of rocks affect what happens to them in landscapes? What are some different events that can change the landscape? Are all landscape changes dangerous?
- **Conceptual**:
  What can you do to be ready for landscape changes? How does the changing landscape affect human use? What would cause a house to fall? How did different cliffs and rocks get their shape? What landscape changes have happened where I live?
- **Debatable:**
  How can the speed of changes to landscapes over time impact those landscapes?

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Resources:

"Unit 3: How Landscapes Change." *Discovery Education Grade 2 Science Techbook*, Discovery Education, https://app.discoveryeducation.com/learn/techbook/units/c45f0e63-30cd-41de-9b63-874ef4779367.

"Work of Water." *Mystery Science*, Mystery.org, https://mysteryscience.com/water/.

Unit 4 Title: Biodiversity in Habitats

Unit Overview

In this unit, students explore the plants and animals found in habitats, discover how plants and animals meet their needs, and gather evidence for the interdependence of plants and animals. Students are challenged to generate ideas for eco-friendly areas, and they begin to think about the questions they will need to answer in order to solve the problem. Throughout the unit, students observe and collect data on organisms to learn how organisms meet their needs in their local habitat. Students use information about how human activities harm habitats in order to propose solutions. Hands-On Engineering activities and designing solutions that reduce or prevent harm to plants and animals gives students an opportunity to solve the problems of habitat destruction and resource reduction caused by human development.

PA Academic Standards Science:

3.1.2.A3 Identify similarities and differences in the life cycles of plants and animals.
3.1.2.A5 Explain how different parts of a plant work together to make the organism function.
3.1.2.C2 Explain that living things can only survive if their needs are being met.
3.1.2.C3 Describe some plants and animals that once lived on Earth, (e.g., dinosaurs) but cannot be found anymore. Compare them to now living things that resemble them in some way (e.g. lizards and birds).

NGSS Disciplinary Core Ideas:

LS4.D1 There are many different kinds of living things in any area, and they exist in different places on land and in water.
LS2.A1 Plants depend on water and light to grow.
LS2.A2 Plants depend on animals for pollination or to move their seeds around.
ETS1.B Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.)

Core Standards Literacy

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).
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.

Content:

- Living Landscapes
    - Plants and animals live and thrive in areas that best meet their needs.
    - Some areas have greater biodiversity than others.

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- Plant & Animal relationships
    - Plants and animals depend on one another
    - Human activities can change a habitat.

Skills:

- Collect data and apply mathematical thinking to count the variety of living things in an environment.
- Design and conduct investigations to determine the environmental needs of plants and plants need sunlight and water to grow.
- Make observations of plants and animals to compare the diversity of life in different habitats.
- Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
- Obtain and communicate evidence about how animals obtain their energy needs in a habitat.
- Argue, with evidence, that plants and animals are interdependent on one another.
- Synthesize information about the cause-and-effect relationships that exist among humans, plants, and animals in a habitat.

Inquiry Questions: (*include factual, conceptual, debatable)*

- **Factual**:
  What plants and animals can be found where we live? How do plants and animals meet their needs in a habitat? What determines if an animal lives in the water or on land? What are different habitats?
- **Conceptual**:
  How can we determine what plants need to grow? How do plants depend on animals? How many types of living things live in a place? How does the area where I live and play affect plants and animals? How can we be eco friendly while going about our daily activities? How can we determine what plants need to grow?
- **Debatable**:
  To what extent can plants survive without animals? or animals survive without plants?

Resources:

"Unit 4: Biodiversity in Habitats" *Discovery Education Grade 2 Science Techbook*, Discovery Education, https://app.discoveryeducation.com/learn/techbook/units/c4b1c697-9459-435f-a721-25a454c72253.

"Plant Adventures" *Mystery Science*, Mystery.org, https://mysteryscience.com/plants/.

"Animal Adventures" *Mystery Science*, Mystery.org, https://mysteryscience.com/biodiversity/.