

Grade 1 Science, Quarter 2, Unit 2.1
Rocks, Soil, and Water

Overview

Number of instructional days: 10 (1 day = 45 minutes)

Content to be learned

- Describe, compare, and sort rocks and soils using physical properties (e.g., size, shape, color, texture, smell, weight).
- Use balances to explore the weight of earth materials, including rocks and soil.
- Record observations and data about physical properties of rocks and soil.
- Use physical properties to state why earth materials are grouped together.
- Conduct tests on the capacity of soils to retain water.
- Identify which earth materials are best suited for different uses based on their physical properties (e.g., sand for the sandbox).

Processes to be used

- Use simple tools to explore and identify physical properties of objects.
- Describe, compare, and sort objects using physical properties.
- Record observations and data about physical properties.
- Identify why objects are grouped together.
- Demonstrate safe practices during classroom and field investigations.
- Use scientific processes to conduct investigations, make observations, describe, compare, and sort using physical properties, record and organize data, conduct tests, and build explanations.

Essential questions

- In what ways can rocks be described and sorted?
- In what ways can soils be described and sorted?
- How do we know which materials are best suited for different purposes?

Written Curriculum

Grade Span Expectations

ESS1 - The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

ESS1 (K-4) INQ –1

Given certain earth materials (soils, rocks or minerals) use physical properties to sort, classify, and describe them.

ESS1 (K-2)–1 Students demonstrate an understanding of earth materials by ...

1a describing, comparing, and sorting rocks and soils by similar or different physical properties (e.g., size, shape, color, texture, smell, weight).

PS1 – All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size or amount of substance).

PS1 (K-4) SAE –3

Use measures of weight (data) to demonstrate that the whole equals the sum of its parts.

PS1 (K-2)–3 Students demonstrate an understanding of conservation of matter by ...

3a using simple tools (e.g. balance scale, see-saw) to explore the property of weight.

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

ESS1 (K-4) INQ –1

Given certain earth materials (soils, rocks or minerals) use physical properties to sort, classify, and describe them.

ESS1 (K-2)–1 Students demonstrate an understanding of earth materials by ...

1b recording observations/data about physical properties.

1c using attributes of properties to state why objects are grouped together (e.g., rocks that are shiny or not shiny).

ESS1 (K-4) INQ –2

Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves).

ESS1 (K-2) –2 Students demonstrate an understanding of processes and change over time within earth systems by ...

2a conducting tests on how ~~different~~ soils retain water (e.g., how fast does the water drain through?).

ESS1 (K-4) FAF -6

Given information about earth materials explain how their characteristics lend themselves to specific uses

ESS1 (K-2) –6 Students demonstrate an understanding of properties of earth materials by...

6a identifying which materials are best for different uses (e.g., ~~soils for growing plants~~, sand for the sand box).

Clarifying the Standards

Prior Learning

Kindergarteners were introduced to describing, comparing, and sorting rocks and soil using physical properties. They used simple tools, such as bucket balances, to explore the property of weight. Students used physical properties to state why objects were grouped together. They also identified which rocks were best suited for different uses.

Current Learning

Reinforcement Level (content taught in prior grade)

First-graders continue to describe, compare, and sort rocks and soils using physical properties. They use simple tools to explore the property of weight and use physical properties to state why objects are grouped together. They continue to identify which materials are best suited for different uses.

Developmental Level of Instruction (content new to the grade level)

First-grade students learn to record observations and data about the physical properties of rocks and soil. They also conduct tests to determine how soils retain water. First-graders also identify which soils are best for different uses (e.g., sand for the sandbox) based on their physical properties.

Future Learning

Second-graders will continue to record observations and data about physical properties of earth materials, and they will use physical properties to group earth materials. Students will conduct tests to determine the capacity of different soils to retain water. They will use physical properties to identify the materials best suited for different uses, such as soil for growing plants and sand for the sand box.

Additional Research Findings

According to *Benchmarks for Science Literacy*, students should know that objects can be described in terms of the materials from which they are made and their physical properties (p. 76). Students should have multiple opportunities to work with earth materials in order to understand that some kinds of materials are better than others for different purposes (*Benchmarks*, p. 188).

Teaching geological facts about how the earth changes serves little purpose in the primary years. Students may hold the view that the world was always as it is now. Young children need to focus on becoming familiar with the objects, such as rocks and soils, and organisms in their immediate surroundings (*Benchmarks*, p. 72). Students can learn about things through careful observation. Describing things as accurately as possible is important in science because it enables students to compare their observations with those of others (*Benchmarks*, p. 10).

Primary students need repeated practice with classifying objects according to the materials of which they are made and comparing physical properties of materials (*Atlas of Science Literacy*, Vol. 2, p. 54). It is

necessary to allow ample time for recording data and discussion of observations to strengthen students' understanding of these concepts (*Making Sense*, p. 9; *Benchmarks*, p. 9).

One common misconception young children have is that soil is “just dirt” or “any stuff from the ground.” Most children agree that soil is a medium which is useful for plant growth. They are aware that there are living organisms in the soil, and these were assumed to be “eating the soil.” For the most part, children seem to be largely unaware of the role, as well as the identity, of living organisms in soil. In some cases, children distinguished “dirt” from soil by saying that “soil has more goodness in it.” (*Making Sense*, p.114).

Notes About Resources and Materials

General Resources

Houghton Mifflin Science Discovery Works, Unit D

Related to ESS1 (K-4) INQ –1, 1a, 1b, 1c

Houghton Mifflin Science Discovery Works, Unit D

- Teacher Guide, Lesson 1 (including poster book), pp. D17–23
- Teacher Guide, Lesson 6 (including poster book), pp. D 58–65
- Teacher Guide, Lesson 7 (including poster book), pp. D66–73
- Teacher Guide, Lesson 8 (including poster book), pp. D74–81

Related to PS1 (K-4) SAE–3, 3a

Resources are difficult to find for this topic, however students need repeated exposure and practice with the concept of the parts equal whole.

Related to ESS1 (K-4) INQ –2, 2a

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Houghton Mifflin Science Discovery Works, Unit D

- Teacher Guide, Lesson 3 (including poster book), pp. D32–39
- Teacher Guide, Lesson 4 (including poster book), pp. D40–47
- Teacher Guide, Lesson 5 (including poster book), pp. D48–57

Related to ESS1 (K-4) FAF–6, 6a

Houghton Mifflin Science Discovery Works, Unit D

- Teacher Guide, Lesson 3 (including poster book), pp. D32–39

Books

- Gans, R. (1991). *Let's Go Rock Collecting*. New York: Harper Collins.
- Baylor, B. (1985). *Everybody Needs a Rock*. Fullerton, CA: Aladdin Books.
- Cipriano, J. (2004). *Let's Look at Rocks*. Mankato, MN: Red Brick Learning.
- Lindeen, C. (2008). *Rock Basics*. Mankato, MN: Capstone Press.
- Lionni, Leo (1961). *On My Beach There Are Many Pebbles*. New York: Harper Collins.
- Christian, P. (2000). *If You Find a Rock*. Boston, MA: Houghton Mifflin Harcourt.
- Parkes, B. (1999). *Rocks*. Marlborough, MA: Newbridge Educational Publishing.
- Murphy, P.J. (2002). *Back and Forth*. Danbury, CT: Children's Press.
- Murphy, P.J. (2002). *Around and Around*. Danbury, CT: Children's Press.

Helpful Websites

- <http://42explore.com/rocks>
- www.atozteacherstuff.com
- www.teachersdomain.org
- www.rocksforkids.com
- www.rockhoundskids.com
- www.sciencepppst.com
- www.fossweb.com (various science units covered)

Grade 1 Science, Quarter 2, Unit 2.2
Pushes and Pulls

Overview

Number of instructional days: 6 (1 day = 45 minutes)

Content to be learned

- Observe how objects interact with magnets.
- Sort objects based on the physical property of magnetism.
- Show how pushes and pulls affect the motion of an object.
- Predict the direction an object will or will not move when a force is applied to the object.

Processes to be used

- Sort objects using physical properties.
- Identify and describe the interactions that occur within systems.
- Make predictions based on prior knowledge.
- Demonstrate safe practices during classroom investigations.
- Conduct investigations using scientific processes, including observing, describing, comparing, sorting, and recording and organizing data.

Essential questions

- How can a magnet be used to sort objects?
- What happens to an object when a force (pushes, pulls, magnetism) is applied?

Written Curriculum

Grade Span Expectations

PS 3 - The motion of an object is affected by forces.

PS3 (K-4) INQ+ SAE –8

Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect)

PS3 (K-2)–8 Students demonstrate an understanding of (magnetic) force by ...

8a observing and sorting objects that are and are not attracted to magnets.

PS3 (K-4)-INQ+SAE –7

Use data to predict how a change in force (greater/less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls).

PS3 (K-2) –7 Students demonstrate an understanding of motion by...

7a showing how pushing/pulling moves or does not move an object.

7b predicting the direction an object will or will not move if a force is applied to it.

Clarifying the Standards

Prior Learning

In kindergarten, students observed how various objects interacted with magnets and recorded their observations. They also demonstrated how pushes or pulls caused objects to move. In kindergarten and prior units in grade 1, students sorted objects using physical attributes/properties.

Current Learning

Reinforcement Level (content taught in prior grade) to Drill-and-Practice Level of Instruction

In first grade, students continue to observe how various objects interact with magnets and record their observations. They continue to demonstrate how a push or a pull can cause an object to move. Since these two concepts are not addressed in subsequent grades, they are taught to the drill-and-practice level of instruction.

Developmental Level of Instruction (content new to the grade level)

First-grade students begin to predict the direction an object will or will not move if a force is applied to it.

Future Learning

In second grade, students will continue to predict the direction an object will or will not move if a force is applied to it. Additionally, they will demonstrate an understanding of motion by showing that different objects fall to earth unless something is holding them up.

Additional Research Findings

When teaching force and motion in K–2, teachers should focus on encouraging children to be observant about when and how things move or do not move. Young students should observe motion everywhere, making lists of different kinds of motion and which things move in similar ways. Gravity and magnetism are forces that young students can begin to explore as they attempt to understand the world around them. They should learn that things near the earth fall to the ground unless something holds them up, and that magnets can be used to make some things move without being touched. Children should use magnets to get things to move without touching them, and thereby learn that forces can act at a distance with nothing in between. Students need multiple opportunities to observe and describe how forces cause change to the behavior of objects (*Benchmarks for Science Literacy*, p. 94).

When students describe and manipulate objects, they begin to focus on the position and movement of objects—describing location using words such as *up*, *down*, *in front of*, or *behind*, and discovering the various kinds of motion and forces required to move or control objects. By experimenting with magnetism, students begin to understand that phenomena can be observed, measured, and controlled in various ways (*National Science Education Standards*, p. 126).

Younger students, between 7–9 years, were found to think of force in terms of anger or feelings. Children naturally bring to their learning alternate meanings of “force,” and many studies have reported “force” as being associated with coercion or opposing resistance. In addition, forces are frequently associated with physical activity and muscular strength of living things. Teachers should recognize that students might have difficulty developing a conceptual understanding of forces and how they interact with objects because students have established alternative meanings for words that teachers use in a scientific sense (*Making Sense of Secondary Science*, pp. 148–151).

Research shows that children tend to see objects as either at rest or moving. Children less frequently focus on the period of change when an object speeds up or slows down (*Making Sense*, p. 155). Teachers may need to encourage students to describe the motion of objects as they change position and how the motion changes over time.

Notes About Resources and Materials

General Resources

Houghton Mifflin Science Discovery Works, Unit C

- Teacher Resource Book, Explore at Home C4
- Teacher Resource Book, Science Notebook C15
- Teacher Resource Book, Alternative Activity #1 C26

PS3 (K-2) –7, 7a, 7b

Houghton Mifflin Science Discovery Works, Unit C

- Teaching Guide, Lesson 1 (including poster book), pp. C16–23
- Teaching Guide, Lesson 2 (including poster book), pp. C24–31

Books

- Bradley, K. (2005). *Forces Make Things Move*. New York: Harper Collins.
- Branley, F. (1996). *What Makes a Magnet?* New York: Harper Collins.
- Fowler, A. (1995). *What Magnets Can Do*. Danbury, CT: Children's Press.
- Parkes, B. (1998). *Magnets*. Marlborough, MA: Newbridge Educational Publishing.

Helpful Websites

- www.atozteacherstuff.com

Grade 1 Science, Quarter 2, Unit 2.3
Heat Energy

Overview

Number of instructional days: 3 (1 day = 45 minutes)

Content to be learned

- Identify the sun as a source of heat energy.
- Describe that the sun warms land and water.
- Describe that objects change in temperature by adding heat.

Processes to be used

- Demonstrate safe practices during classroom and field investigations.
- Use scientific thinking processes to make hypotheses, conduct investigations, make observations, record, conduct tests, and build explanations.

Essential questions

- How does the sun affect land and water?
- How does the sun affect objects?

Written Curriculum

Grade Span Expectations

PS 2 - Energy is necessary for change to occur in matter. Energy can be stored, transferred, and transformed, but cannot be destroyed.

PS2 (K-4) SAE -4

Given a specific example or illustration (e.g., simple closed circuit, rubbing hands together), predict the observable effects of energy (i.e., light bulb lights, a bell rings, hands warm up (e.g., a test item might ask, "what will happen when...?").

PS2 (K-2)-4 Students demonstrate an understanding of energy by...

4c identifying the sun as a source of heat energy.

PS2 (K-4) SAE+INQ – 6

Experiment, observe, or predict how heat might move from one object to another.

PS2 (K-2)-6 Students demonstrate an understanding of energy by...

6a describing that the sun warms land and water.

6b describing that objects change in temperature by adding or subtracting heat.

Clarifying the Standards

Prior Learning

In kindergarten, students identified the sun as a source of heat energy. In kindergarten and in prior units in first grade, students demonstrated when a shadow was created.

Current Learning

Reinforcement Level of Instruction (content taught in prior grade)

First-grade students continue to identify the sun as a source of heat energy.

Developmental Level of Instruction (content new to the grade level)

First-grade students describe that the sun warms land and water and that objects change in temperature when heat is added.

Drill and Practice Level of Instruction (content will not be taught in subsequent grade level)

Students understand that the sun is a source of heat energy.

Future Learning

Second-grade students will make predictions about the changes in the state of matter when adding or taking away heat.

Additional Research Findings

According to the *National Science Education Standards*, physical science in grades K–4 includes topics that give students a chance to increase their understanding of the characteristics of objects and materials that they encounter daily. Young children begin their study of matter by examining and qualitatively describing objects and their behavior. By the end of K–4, students should know that some common materials, such as water, can change from one state to another by heating or cooling (pp. 123, 126, 127).

A fundamental concept for K–4 students is that the sun provides the light and heat necessary to maintain the temperature of the earth (*NSES*, pp. 123, 126, 127, 134). *Benchmarks for Science Literacy* states that, by the end of grade 2, students should know that the sun warms the land, air, and water (p. 83).

Young children tend to associate the term *energy* with moving around a lot. They are likely to know sources of energy by what they are used for—electricity gives people light or cooks their food; the sun melts snow or makes some calculators work; and moving air makes a pinwheel turn and helps some boats move. But young children probably don't see heat and light as forms of energy, and do not need to understand that energy comes in many forms. The emphasis for young children should be on familiarizing them with a wide variety of phenomena that result from moving water, wind, burning fuel, or connecting to batteries and wall sockets (*Benchmarks*, pp. 83, 193). Since young children understand energy in terms of motion, heat, light, sound, etc., it is appropriate to refer to the sun's energy as "heat" or "light."

Notes About Resources and Materials

General Resources

Houghton Mifflin Science Discovery Works, Unit B

PS2(K-4) SAE-4, 4c PS2(K-4) SAE+INQ – 6, 6a, 6b

- Teacher Guide, Lesson 2 (including poster book) pp. B24–31
- Teacher Guide, Lesson 3 (including poster book) pp. B32–39
- Teacher Resource Book alternate activity 3, p. B31

Trade Books

- Daley, M. (1997). *Amazing Sun Fun Activities*. Columbus, OH: McGraw Hill.
- Fowler, A. (1998). *Energy From The Sun*. Danbury, CT: Children's Press.
- Freeman, M. (1999). *Watching the Weather*. Marlborough, MA: Newbridge Educational Publishing.
- Parkes, B. (1998). *The Sun*. Marlborough, MA: Newbridge Educational Publishing.
- Walker, S. (2006). *Heat (Early Bird Energy)*. Minneapolis, MN: Lerner Classroom.

Helpful Websites

- TLC > Guides > Family > Family Fun & Crafts > Family & Kids' Crafts > Holiday and Seasonal Crafts > Spring Crafts > Sun Activities for Kids

<<http://tlc.howstuffworks.com/family/sun-activities.hm/printable>>

Sun activities and experiments for grade 1.

