

Kindergarten Science, Quarter 2, Unit 2.1
Properties of Objects

Overview

Number of instructional days: 12 (1 day = 30 minutes)

Content to be learned

- Identify objects using physical properties such as size, shape, color, texture, smell, and weight.
- Compare and sort objects using similar or different physical properties such as size, shape, color, texture, smell, and weight.
- Use simple tools, such as balances, to explore the weight of objects.
- Use physical properties to state why objects are grouped together.

Processes to be used

- Describe objects using physical properties.
- Compare and sort objects using physical properties.
- Use balances to explore the physical property of weight.

Essential questions

- In what ways can objects be described?
- In what ways can objects be sorted?

Written Curriculum

Grade Span Expectations

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) INQ –1

Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility).

PS1 (K-2)–1 Students demonstrate an understanding of characteristic properties of matter by ...

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

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.

(Teacher Note: Give lots of opportunities to use balance scales)

PS1 (K-4) INQ –1 [See above]

PS1 (K-2)–1 Students demonstrate an understanding of characteristic properties of matter by ...

1c using attributes of properties to state why objects are grouped together (e.g., things that roll, things that are rough).

Clarifying the Standards

Prior Learning

According to the Rhode Island Early Learning Standards, preschool children have explored the natural and physical world. They used simple tools and their senses to collect objects for the purpose of describing and making observations.

Current Learning

Many students have little experience with formal schooling before entering kindergarten. Therefore, concrete experiences with hands-on materials are essential for developing student understanding, and most, if not all, concepts should be taught at the developmental level of instruction.

In this unit, kindergarteners will build upon their preschool experiences (i.e., using simple tools and senses to collect and describe objects, and to make observations) by comparing and sorting objects using physical properties. Students use tools, including their senses, hand lenses, and balances, as they observe

and describe physical properties such as size, shape, color, texture, smell, and weight. Students then make comparisons based on these properties. It is important to provide students with multiple opportunities to sort objects in order to further their understanding of similarities and differences in physical properties.

Future Learning

In first grade, students will continue to develop an understanding of objects using physical properties. They will continue using tools to explore physical properties of objects and tell why objects are grouped together. In addition, first-graders will begin recording observations/data about physical properties. First-graders will be introduced to the concept of matter using solids and liquids. They will use their five senses to describe properties and to identify and compare solids and liquids.

Additional Research Findings

According to the *National Science Education Standards*, during their early years, children's natural curiosity leads them to explore their environment by observing and manipulating common objects and materials. They compare, describe, and sort as they begin to form explanations of the world. Developing a knowledge base in order to explain and predict the natural world requires many experiences over a long period. Young children bring experiences, understanding, and ideas to school. Teachers provide opportunities to continue children's explorations in focused settings with other children—using simple tools such as magnifiers and measuring devices. 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. Through the observation, manipulation, and classification of common objects, children reflect on the similarities and differences of the objects. As a result, their initial sketches and single-word descriptions lead to increasingly more detailed drawings and richer verbal descriptions. Describing, grouping, and sorting solid objects and materials are possible early in this grade range. By grade 4, distinctions between the properties of objects and materials can be understood in specific contexts, such as a set of rocks or living materials (p. 123).

Additionally, the *NSES* states that objects have observable physical properties and can also be measured using tools such as a balance scale. Objects are made from one or more materials, and the properties of those materials can be used to describe and sort the objects (*NSES*, p.127).

According to the *Atlas of Science Literacy, Volume 1* (Structure of Matter: Conservation of Matter), objects can be described in terms of the materials of which they are made (clay, cloth, paper, etc.) and their physical properties, such as color, size, shape, weight, texture, and flexibility (p. 57).

According to the National Science Digital Library's science literacy maps (Strand map: Designed World / Materials Science K–2; <http://strandmaps.nsd.org/?id=SMS-MAP-1604>), objects can be described in terms of their properties. Some properties, such as hardness and flexibility, depend upon of what material the object is made, and some properties, such as size and shape, do not.

The research found in *Making Sense of Secondary Science* suggests that students need to recognize that objects can fit into more than one group or category when learning to sort and classify objects based on physical properties (p. 78).

Making Sense also indicates that children between the ages of 4 and 7 have difficulty understanding that if an object is cut up or broken apart, it still contains its original physical properties. This is foundational in developing an understanding of conservation of matter (p. 73).

In reference to mass and weight, the book indicates that children before the age of 5 can only focus on either size or weight and are not able to bring the two together in their general awareness of heaviness.

Between the ages of 5 and 7, the notion of density (heavy for size) appears to be added to the child's awareness of weight such that weight and density are not differentiated but included in a general awareness of heaviness (p. 78).

Notes About Resources and Materials

Materials

- Balance scale
- Man-made objects of different sizes, shapes, colors, and weights: clay, wood (blocks), plastic, etc.
- Science journal/recording sheets

Resources

Houghton Mifflin Science Discovery Works—Teaching guide: kindergarten

- Poster Book B6 (Exploring with the Senses)
- Activity Card B8 (Exploring with the Senses)
- Activity Card B8 (Exploring with the Senses)

Books

- Pluckrose, H.A. (1995). *Sorting (Math Counts)*. Danbury, CT: Children's Press.

Websites

- Bentham, P. *KindergartenLessons*. Science Center Materials.
<www.kindergarten-lessons.com/science-center-materials.html>
- Brooks, S. and Byles, B. *Internet4Classrooms*. Kindergarten, Physical Science. (May require some guidance.)
<www.internet4classrooms.com>

Kindergarten Science, Quarter 2, Unit 2.2

Rocks and Soil

Overview

Number of instructional days: 12 (1 day = 30 minutes)

Content to be learned

- Describe rocks and soils using physical properties such as size, shape, color, texture, smell, and weight.
- Compare and sort rocks and soils using physical properties such as size, shape, color, texture, smell, and weight.
- Use balances to explore the weight of rocks and soils.
- Use physical properties to state why objects are grouped together.
- Identify rocks that are best suited for different uses.

Essential questions

- In what ways can rocks and soils be described and sorted?

Processes to be used

- Describe objects using physical properties.
 - Compare and sort objects using physical properties.
 - Use balances to explore the physical property of weight.
 - Demonstrate safe practices during classroom and field investigations.
 - Use scientific processes to conduct investigations, make observations, communicate findings, organize and compare data, and build explanations.
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- How do we know which kinds of rocks 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 ...

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

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

According to the Rhode Island Early Learning Standards, preschool children learned about the development of the natural and physical world. They used their senses and simple tools to collect objects for the purpose of describing them and making simple observations.

Current Learning

Many students have little experience with formal schooling before entering kindergarten. Therefore, concrete experiences with hands-on materials are essential for developing student understanding, and most, if not all, concepts should be taught at the developmental level of instruction.

In this unit, kindergarteners will build upon their preschool experiences (i.e., using simple tools and senses to collect and describe objects, and to make observations) by observing, describing, comparing, and sorting rocks and soils by similar and different physical properties. Students use tools, such as balances, magnifying lenses, and their senses, to explore and interact with a variety of rocks and soils. They describe the physical properties of earth materials and make comparisons. It is important to provide a variety of sorting opportunities in order to further students' understanding of the similarities and differences in the physical properties among these earth materials so that students can begin to identify which kinds of rocks are best suited for different purposes.

Future Learning

In first grade, students will continue to develop an understanding of earth materials using physical properties. They will continue using tools to explore physical properties of objects. They will also tell why objects are grouped together and identify which soils are best for different uses. First-graders will begin recording observations/data about physical properties and will conduct tests on how soils retain water.

Additional Research Findings

According to the *National Science Education Standards*, children come to school aware that the earth's surface is composed of rocks, soils, water, and living organisms, but a closer look will help them identify many additional properties of earth materials. By carefully observing and describing the properties of various rocks, children will begin to see that some rocks are made of a single substance, but most are made of several substances (p. 130). In addition, natural resources are things that we get from the living and nonliving environment to meet the needs and wants of a population. Some resources are basic materials—such as air, water, and soil (p. 140).

The *NSES* also state that earth materials have different physical and chemical properties, which make them useful in different ways. For example, earth materials can be used in construction; they can be sources of fuel; or they can grow the plants we use as food. Earth materials provide many of the resources that humans use. Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply (*NSES*, p. 134).

According to the National Science Digital Library's science literacy maps (Strand map: Designed World / Materials Science K–2; <http://strandmaps.nsdlib.org/?id=SMS-MAP-1604>), objects can be described in terms of their properties. Some properties—such as hardness and flexibility—depend upon the materials that make up the object, while other properties—such as size and shape—do not. Students should

understand that some kinds of materials are better than others for making any particular thing. Materials that are better in some ways may be worse in other ways.

Making Sense of Secondary Science indicates that children between the ages of 4 and 7 have difficulty understanding that, if an object is cut up or broken apart, it still contains its original physical properties. This is foundational in developing an understanding of conservation of matter (p. 73).

The Atlas of Science Literacy Volume 1, (Processes that Shape the Earth: Changes in the Earth's Surface), states that chunks of rocks come in many sizes and shapes, from boulders to grains of sand, and even smaller. (p. 51)

Although water is not listed as one of the earth's resources in the GSE, it is considered to be a basic earth material that has physical properties, including weight. It is appropriate for young children to explore the physical properties of water when learning about earth materials.

Notes About Resources and Materials

Suggested materials:

- Balance scale
- Magnifying glasses
- Non-standard measuring cups
- Rocks
- Sand
- Sand/water table (bins)
- Science journal/recording sheets (Venn diagram/balance scale worksheet)
- Seeds
- Soil
- Spray bottles
- Venn circles for sorting (hula hoops)

Resource Books:

- Ditchfield, C. (2003). *Soil*. Danbury, CT: Children's Press.
- Dussling, J. (2001). *Looking at Rocks*. New York: Grosset & Dunlap/Penguin Group.
- Guillain, C. (2008). *Rocks and Soil (Investigate)*. Portsmouth, NH: Heinemann Educational Books.
- Prager, E. (2006). *Jump into Science: Sand*. Des Moines, Iowa: National Geographic Children's Books.
- Rosinsky, N. (2004). *Rocks: Hard, Soft, Smooth and Rough*. Mankato, MN: Picture Window Books.
- Rosinsky, N. (2002). *Dirt: The Scoop on Soil*. Mankato, MN: Picture Window Books.