Grade 1 Science, Quarter 2, Unit 2.1

The Sun and Moon

Overview

Number of instructional days: 6 (1 day = 40 minutes)

Content to be learned

- Observe that the sun can only be seen in the daytime.
- Observe that the moon can be seen at night and sometimes during the day.
- Observe that the sun appears to move slowly across the sky.
- Observe that the moon appears to move slowly across the sky.
- Observe that the moon looks slightly different from day to day.

Science processes to be integrated

- Observe and discuss changes that occur over time.
- Record multiple observations using drawings and/or writing.
- Compare observations and data to look for patterns of change.

Essential questions

- How does the appearance of the sun change throughout the day?
- How does the appearance of the moon change over time?
- When can the sun and moon be seen in the sky?

Written Curriculum

Grade-Span Expectations

ESS2 - The earth is part of a solar system, made up of distinct parts that have temporal and spatial interrelationships.

No further targets for EK ESS2 at the K-4 Grade Span

ESS2 (K-2)–7 Students demonstrate an understanding of temporal or positional relationships between or among the Earth, sun, and moon by …

7a observing that the sun can only be seen in the daytime, but the moon can be seen sometimes at night and sometimes during the day.

7b observing that the sun and moon appear to move slowly across the sky.

7c observing that the moon looks slightly different from day to day.

Clarifying the Standards

Prior Learning

In kindergarten, students observed that the sun can only be seen in the daytime, but the moon can be seen sometimes at night and sometimes during the day. They also identified the sun as a source of heat energy and demonstrated when a shadow is created using sunny versus cloudy days.

Current Learning

At the reinforcement level to the drill-and-practice level of instruction, students in grade 1 observe that the sun can only be seen in the daytime and the moon can be seen sometimes at night and sometimes during the day. At the developmental level to the reinforcement level of instruction, students observe that the sun and moon *appear* to move slowly across the sky and that the moon appears slightly different from day to day.

During this unit, first graders are responsible for making and communicating their observations on the sun and moon. Students should make observations of the position of the sun at least three times a day (morning, noon, late afternoon) over a period of 3 to 5 days. Using their observations, students notice a recurring pattern of change in the position of the sun from day to day. Based on their observations and class discussions, they should be able to draw and/or write descriptions of the pattern of change that they observed. In addition, students need time and opportunities to make observations of the daytime sky to see if the moon is visible.

To make observations of the moon at night, students need to make and record observations at home in their journals. Students need to observe and record their observations of the shape of the moon as well as the position of the moon at different times during the evening. Students only need to make nighttime observations over a period of a few weeks (and only a few times each week). As students return their nighttime observations, these data could be incorporated into the daily calendar routine so that students see patterns of change in the position and shape of the moon.

Future Learning

Second graders will observe that the sun and moon appear to move slowly across the sky and that the moon appears slightly different from day to day. Students will observe that there are more stars in the sky that can be easily counted, but they are not scattered evenly and are not all the same in brightness.

In grades 3 and 4, students will demonstrate an understanding of temporal or positional relationships between or among the Earth, sun, and moon by observing that the sun, moon, and stars appear to move slowly across the sky. Students will observe that the moon looks slightly different from day to day, but it looks the same again in about four weeks; they will recognize that the rotation of the Earth on its axis every 24 hours produces the day/night cycle. Students will recognize that the sun is the center of our solar system, the Earth is one of several planets that orbit the sun, and the moon orbits the Earth. Students will also recognize that it takes approximately 365 days for the Earth to orbit the sun.

Additional Findings

During the primary years, learning about objects in the sky should be entirely observational and qualitative because young children are far from ready to understand the magnitudes involved (e.g., size and distance of the moon, sun, and stars) or to make sense out of explanations (e.g., the cause of the seasons, eclipses, and movement of the planets). The priority is to get students noticing and describing what the sky looks like to them at different times. For example, they should observe how the moon appears to change its shape, but it is too soon to name all the moon's phases and much too soon to explain them. (*Benchmarks for Science Literacy*, p. 62)

By observing the day and night sky regularly, children in grades K–4 learn to identify sequences of changes and look for patterns in these changes. As they observe changes (e.g., the movement of an object's shadow during the course of a day, the positions of the sun and moon), students find patterns in these movements. They can draw the moon's shape for each evening on a calendar and then determine the pattern in the shapes over several weeks. These understandings should be confined to observations, descriptions, and finding patterns. Attempting to extend this understanding into explanations using models is limited by the inability of young children to understand the reason for many of the phenomena that are observed in the sky. (*National Science Education Standards*, pp. 130 and 134)

Young children also have little understanding of gravity and usually have misconceptions about the properties of light that allow them to see objects such as the moon. Although children will say that they live on a ball, probing questions reveal that their thinking may be different. Therefore, emphasis in grades K–4 should be on developing observation and description skills and the explanations based on observations. Younger children should be encouraged to talk about and draw what they see and think. Older students can keep journals, use instruments, and record their observations and measurements. (*National Science Education Standards*, p. 134)

Even for older students, explanations of the day-night cycle, phases of the moon, and seasons are very challenging. To understand these phenomena, students should first master the idea of a spherical Earth, itself a challenging task. Similarly, students must understand the concept of "light reflection" and how the moon gets its light from the sun before they can understand the phases of the moon. Finally, students may not be able to understand explanations of any of these phenomena before they reasonably understand the relative size, motion, and distance of the sun, moon and the Earth. (*Atlas of Science Literacy*, Volume 1, p. 44)

Notes About Resources and Materials

Books

- Anton, W. (1998). *Light and Shadow.* Marlborough, MA: Newbridge Discovery Links.
- Branley, F. M. (1987). *The Moon Seems to Change.* New York: HarperCollins.
- Branley, F. M. (1986). *What Makes Day and Night.* New York: HarperCollins.
- Canizares, S. (1998). *Sun.* New York: Scholastic.
- Eckart, E. (2004). *Watching the Moon.* New York: Scholastic.
- Eckart, E. (2004). *Watching the Sun.* New York: Scholastic.
- Fowler, A. (1994). *When You Look Up at the Moon.* New York: Scholastic.
- Hanson, M. P. (2007). *Sleepy Sun.* Charleston, SC: Booksurge Publishing.
- Seymour, S. (2003). *The Moon* (Revised ed.). New York: Simon & Schuster.
- Simon, S. (1989). *The Sun.* New York: HarperCollins.

Helpful Websites

- www.BeaconLearningCenter.com/WebLessons/AsTheEarthTurns/turn02.htm
- www.Internet4Classrooms.com
- www.Scholastic.com
- http://science-es.discoveryeducation.com

Lesson Plans

- www.uen.org/Lessonplan/preview.cgi?LPid=28158
- www.uen.org/Lessonplan/preview?LPid=28498
- http://sciencenetlinks.com/lessons/lunar-cycle
- http://sciencenetlinks.com/lessons/sky-4-the-moon

Grade 1 Science, Quarter 2, Unit 2.2

Weather

Overview

Number of instructional days: 16 (1 day = 40 minutes)

Content to be learned

- Observe, record, and summarize local weather data.
- Observe how clouds are related to forms of precipitation.
- Use scientific tools to extend senses and gather data about weather.
- Observe and record seasonal and weather changes throughout the school year.
- Identify the sun as a source of heat energy.
- Explain that the sun warms land and water.
- Demonstrate when a shadow will be created using sunny versus cloudy days.

Science processes to be integrated

- Observe, collect, and record data.
- Summarize data collected over time.
- Make predictions based on observations and data.
- Use scientific tools to extend the senses and collect data.
- Conduct investigations to make observations, collect data, make predictions, and identify and describe phenomena.
- Describe and summarize patterns found in data.

Essential questions

- Why/how do scientists use weather tools?
- How does weather change over time?
- How are clouds related to forms of precipitation?
- What kinds of changes occur from season to season?
- What are the effects of the sun on land and water?
- How are shadows formed?

Written Curriculum

Grade-Span Expectations

Note: The concepts taught as part of this unit are revisited throughout the school year.

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) POC–5

Based on data collected from daily weather observations, describe weather changes or weather patterns.

ESS1 (K-2)–5 Students demonstrate an understanding of processes and change over time within earth systems by …

5a observing, recording, and summarizing local weather data.

5b observe how clouds are related to forms of precipitation (e.g., rain, sleet, snow).

ESS 1 (K-4) NOS–3

Explain how the use of scientific tools helps to extend senses and gather data about weather. (i.e., weather/wind vane: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter sticks/rulers: snow depth; rain gauges: rain amount in inches).

ESS 1(K-2)–3 Students demonstrate an understanding of how the use of scientific tools helps to extend senses and gather data by…

3a using scientific tools to extend senses and gather data about weather (e.g., weather/wind vane: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter sticks/rulers: snow depth; rain gauges: rain amount in inches).

ESS1 (K-4) INQ+SAE–4

Explain how wind, water, or ice shape and reshape the earth.

ESS1 (K-2)–4 Students demonstrate an understanding of processes and change over time within earth systems by …

4a observing and recording seasonal and weather changes throughout the school year.

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.

PS2 (K-4) SAE – 5

Use observations of light in relation to other objects/substances to describe the properties of light (can be reflected, refracted, or absorbed).

PS2 (K-2)-5 Students demonstrate an understanding of energy by…

5a demonstrating when a shadow will be created using sunny versus cloudy days.

Clarifying the Standards

Prior Learning

In kindergarten, students observed, recorded, and summarized local weather data. Students used scientific tools to extend the senses and gather data about weather, and they observed seasonal and weather changes throughout the school year. Students identified the sun as a source of heat energy and demonstrated when a shadow will be created using sunny versus cloudy days.

Current Learning

At the reinforcement level of instruction, first graders observe, record and summarize local weather data. They use scientific tools to extend senses and gather data about weather (e.g., weather/wind vanes: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter stick/ruler: snow depth; rain gauges: rain amount in inches). Students also observe and record seasonal and weather changes throughout the school year. At the developmental level through reinforcement level of instruction, students observe how clouds are related to forms of precipitation (e.g., rain, sleet, snow). It is important for first graders to use their senses and weather tools to gather weather data throughout the school year. If weather tools are not available, directions for making many of the tools can be found at various websites. Be aware that student-made tools are not as accurate as weather tools that can be purchased from science equipment suppliers. However, the goal is to give students experiences in collecting and recording weather data over time in order to begin to understand the relationship between cloud formation and precipitation, to summarize local weather data, and to use data to describe weather and seasonal changes that occur throughout the school year.

In addition, during this unit of study, students demonstrate when a shadow is created using sunny versus cloudy days and identify the sun as a source of heat energy, which are taught at the reinforcement level of instruction. At the developmental level through reinforcement level of instruction, students explain that the sun warms land and water. Again, students need to spend time outside conducting investigations and recording their observations. Students need time to record temperature changes in both land and water caused by the sun. Time should also be provided for students to investigate how shadows are created and to observe the pattern of change that occurs in shadows as the sun appears to move across the sky. The resource section of this unit contains additional links to lessons that may be helpful in teaching these concepts.

The weather concepts that are taught during this unit of study should be reinforced throughout the school year during calendar/morning meeting. Individual/class graphs (e.g., bar graphs or pictographs) can be used to record local temperature and weather conditions daily. Students can periodically analyze the data to find patterns, draw conclusions, and make predictions about the weather.

Future Learning

In grade 2, students will use scientific tools to extend the senses and gather data about weather (e.g., weather/wind vanes: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter stick/ruler: snow depth; rain gauges: rain amount in inches). They will observe and record seasonal and weather changes throughout the school year.

In grades 3 and 4, students will explain how the use of scientific tools help extend the senses and gather data about weather (e.g., weather/wind vanes: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter stick/ruler: snow depth; rain gauges: rain amount in inches). They will select appropriate tools for a given task and describe the information they will provide. Students will investigate local landforms and how wind, water, or ice has shaped and reshaped them (e.g., severe weather), and they will identify sudden changes such as floods that affect the Earth. Students will demonstrate an understanding of processes and change over time within the Earth systems by observing, recording, comparing, and analyzing weather data to describe weather changes for weather patterns. Students will describe water as it changes into vapor in the air and reappears as a liquid when it is cooled, and they will explain how the water cycle relates to weather and the formation of clouds.

Additional Findings

There are many ways to acquaint young children with Earth-related phenomena that they will come to understand later as being cyclic. For instance, students can keep daily records of temperature and precipitation and plot them by week, month, and years. It is enough for students to spot the pattern of ups and downs without getting deeply into the nature of climate. (*Benchmarks for Science Literacy*, p. 67)

When collecting and observing the things around them, students can look for what changes and what does not and question where things come from and where things go. Such activities can sharpen students' observation and communication skills and instill in them a growing sense that many different kinds of change go on all the time. Students should be encouraged to make, record, and display counts and simple measurements of things over time. This activity can provide them with many opportunities to learn and use elementary mathematics. (*Benchmarks for Science Literacy,* p. 272)

Young children are naturally interested in everything they see around them—rain, snow, clouds, rainbows, and the sun. During the first years of school, students should be encouraged to closely observe the objects and materials in their environment, note the properties, distinguish one from another, and develop their own explanations or how things became the way they are. As children become more familiar with their world, they can be guided to observe changes, including cyclic changes such as day and night and the seasons, predictable trends such as growth and decay, and less consistent changes such as weather. By observing the daytime sky regularly, children learn to identify sequences of change and look for patterns in these changes. As they observe changes (e.g., the movement of an object's shadow during the course of a day, the position of the sun), they find patterns in these movements. (*National Science Education Standards,* p. 130)

During the K–4 years, students should have opportunities to observe weather changes from day to day and over the seasons. Weather can be described by measurable quantities such as temperature, wind direction and speed, and precipitation. Students can discover patterns of weather changes during the year by keeping a journal. Younger students can draw a daily weather picture based on what they see out a window or at recess; older students can make simple charts and graphs from data they collect at a simple school weather station. Emphasis in grades K–4 should be on developing observation and description skills and the explanations based on observations. Younger children should be encouraged to talk about and draw what they see and think. Older students can keep journals, use instruments, and record their observations and measurements. (*National Science Education Standards,* p. 134)

No effort should be made to introduce energy as a scientific idea in these first years. (*Benchmarks for Science Literacy*, p. 83) Young children tend to associate the term *energy* with motion. 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. However, young children probably do not see heat and light as forms of energy and need not be asked to (*Benchmarks for Science Literacy*, p. 193).

Notes About Resources and Materials

Additional Resources

- Breen, M. & Friestad, K. (2008). *The Kids' Book of Weather Forecasting.* Carmel, NY: Ideals Books.
- Chen, K. K. & Haggerty, T. (illustrators). (2006). *Weather.* Eveleth, MN: Usbourne Beginners.
- DeWitt, L. (2002). *What Will The Weather Be?* New York: HarperCollins.
- Eckart, E. (2004). *Watching the Weather.* New York: Scholastic.
- Eckart, E. (2004). *Watching the Seasons.* New York: Scholastic.
- Gibbons, G. (1993). *Weather Forecasting.* Fullerton, CA: Aladdin Books.
- Gibbons, G. (1992). *Weather Words and What They Mean.* New York: Holiday House Books.
- Miles, E. (2005). *Sunshine (Watching the Weather).* Chicago: Heinemann-Raintree.
- Owen, A. & Ashwell, M. (2000). *Watching The Weather (What is Weather).* Chicago: Heinemann-Raintree.
- Rabe, T. (2004). *Oh Say, Can You Say What's The Weather Today?* New York: Random House.

Helpful Websites

- www.Internet4Classrooms.com
- www.TeacherVision.fen.com
- Making Your Own Weather Station:
  http://www.fi.edu/weather/todo/todo.html
- Weather Scope—Making a Weather Station:
  http://www.k12science.org/curriculum/weatherproj2/en/activity1.shtml

Lesson Plans

- http://sciencenetlinks.com/lessons/the-warmth-of-the-sun
- http://sciencenetlinks.com/lessons/sky-3-modeling-shadows
- http://sciencenetlinks.com/lessons/cooler-in-the-shadows
- http://sciencenetlinks.com/lessons/weather-1-weather-patterns