Lesson: Sun and Moon

Grade Level: 1
Subject Area: Earth Science; Physical Science
Core Area: Exploring the Sun and Moon; Exploring Light and Shadows

Lesson Objectives: Students will compare and contrast properties of the Sun and Moon and will create an accurate model of the Earth-Moon-Sun system (scale of 1”=20,000 mi.) using playdough and other materials. Students will make observations and conduct investigations that help them discover how the Sun and Moon appear to move, how shadows change over time, and how the Moon’s shape changes over time. They will use their new knowledge to write endings to the stories “Where are the Acorns?” and “Moon Tricks.” Students will use their bodies to discover how the motions of the Earth and Moon cause day and night, months and years, and the changing phases of the Moon.

2005 Standards Correlation:
Grade 1 Sun and Moon
Standard 1-3: The student will demonstrate an understanding of the features of the sky and the patterns of the Sun and the Moon. (Earth Science)

Indicators:
1-3.1 Compare the features of the day and night sky.
1-3.2 Recall that the Sun is a source of heat and light for Earth.
1-3.3 Recognize that the Sun and the Moon appear to rise and set.

2014 Standards Correlation:
Grade 1 Earth Science: Exploring the Sun and Moon
Standard 1.E.3: The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun’s effect on Earth.

1.E.3A. Conceptual Understanding: Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.

Performance Indicators: Students who demonstrate this understanding can:
1.E.3A.1 Use, analyze, and interpret data from observations to describe and predict seasonal patterns of sunrise and sunset.
1.E.3A.2 Use data from personal observations to describe, predict, and develop models to exemplify how the appearance of the moon changes over time in a predictable pattern.
1.E.3A.3 Obtain and communicate information to describe how technology has enabled the study of the Sun, the Moon, planets, and stars.
1.E.3A.4 Conduct structured investigations to answer questions about the effect of sunlight on Earth’s surface.

Grade 1 Physical Science: Exploring Light and Shadows
**Standard 1.P.2:** The student will demonstrate an understanding of the properties of light and how shadows are formed.

1.P.2A. **Conceptual Understanding:** Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.

**Performance Indicators:** Students who demonstrate this understanding can:

1.P.2A.1 Obtain and communicate information to describe how light is required to make objects visible.
1.P.2A.2 Analyze and interpret data from observations to compare how light behaves when it shines on different materials.
1.P.2A.3 Conduct structured investigations to answer questions about how shadows change when the position of the light source changes.

**Materials:**

**Activities: 7Es, Science and Engineering Practices, and Cross Cutting Concepts**

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<thead>
<tr>
<th>7E</th>
<th>Procedures</th>
<th>SEPs</th>
<th>CrossCut</th>
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| Elicit | **Sunrise Sunset Probe**  
**Objects in the Sky Probe**  
**Compare and contrast the Sun and Moon**  
Use white boards and a double bubble map | **Ask questions & define problems**  
**Obtain, evaluate, & communicate info** | **Structure & function**               |
| Engage | **Model the Sun-Earth-Moon system**  
Use a 40 to 44-inch ball or the arm span of a first grader as the Sun. Students work in pairs to make correct-size Earth and Moon models from playdough. Each pair chooses a piece of yarn to show distance between Earth and Moon models. Compare models; show correct models. | **Develop and use models**  
**Use mathematical/computational thinking** | **Systems & Models**  
**Scale, Proportion, Quantity** |
| Explore | **Read the short story - “Where are the Acorns?”**  
1. Record ideas about shadows on chart paper.  
2. Change statements to questions.  
3. Plan how students will gather and record data on shadows during a day and throughout the year. | **Obtain, evaluate, & communicate info**  
**Ask questions & define problems**  
**Plan and conduct investigations** | **Cause & Effect**  
**Structure & Function** |
| **Go Outside to observe Sun and Shadows**  
1. Use a plunger as a gnomon. Note time and position of shadow on sidewalk or poster board.  
2. Measure and record shadow length, or cut a piece of black ribbon the length of the shadow and attach this to graph.  
3. Draw a line where you think the shadow will be in an hour and predict how long the shadow will be.  
4. Where is the Sun? Mark the position of the Sun on a drawing that includes an object in your foreground. Also, determine Sun’s position as opposite the gnomon’s shadow. | **Plan and conduct investigations**  
**Develop and use models**  
**Use mathematical/computational thinking** | **Systems & Models**  
**Scale, Proportion, Quantity**  
**Cause & Effect**  
**Structure & Function** |
| Explain | As students complete and discuss investigations, make sure they understand the following concepts:  
**Analyze and interpret data** | **Energy and Matter** |
1. Sun provides light and heat to the Earth
2. Sun is the closest star to Earth
3. Sun is too bright to safely look at directly
4. Sun rises in the east and sets in the west
5. Sun rises earlier and sets later in the summer than in the winter
6. Shadows are shortest in the middle of the day when the Sun is highest in the sky. Shadows are longest near sunrise and sunset when the Sun is low in the sky.
7. Shadow lengths and positions aren’t the same in the winter as they are in the summer because the Sun doesn’t get as high in the sky.
8. Sun is 100 times wider than Earth and 400 times wider than the Moon. Sun is 400 times farther away from Earth than the Moon.
9. The Moon appears to change shape in a predictable pattern each month.
10. Moon orbits the Earth once every month
11. Moon doesn’t make light but shines with the reflected light of the Sun.

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<tr>
<th>Elaborate</th>
<th>Construct explanations/design solutions</th>
<th>Structure &amp; function</th>
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<tbody>
<tr>
<td>1. Create graphs of Shadow Length vs. Time and look for daily and annual patterns</td>
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<td>2. Read the story “Moon Tricks” to the children then have them draw the Moon each day for a month. Look for patterns in its shape and position in the sky.</td>
<td>Analyze and interpret data</td>
<td>Stability &amp; change</td>
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<td>3. Do Kinesthetic Astronomy activities – you are the Earth, light bulb is Sun, Styrofoam ball is Moon. Demonstrate how Earth’s rotation causes day and night and how the Moon goes through phases as it orbits the Earth.</td>
<td>Construct explanations/design solutions</td>
<td>Cause &amp; effect</td>
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<td>4. Create a Moon phase diagram with a moving Moon.</td>
<td>Engage in scientific argument from evidence</td>
<td>Patterns</td>
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<tr>
<th>Evaluate</th>
<th>Obtain, evaluate, and communicate information</th>
<th>Cause &amp; Effect</th>
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<tr>
<td>1. Write an ending to the story “Where are the Acorns?” in which you correctly explain where the acorns are.</td>
<td>Construct explanations</td>
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<td>2. Create Moon phases with Oreo cookies and put them in the correct order on a paper plate.</td>
<td>Engage in scientific argument from evidence</td>
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<td>3. Correctly explain the observations of the Moon described by the boy in “Moon Tricks.”</td>
<td>Develop and use models</td>
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<tr>
<td>1. Graph sunrise and sunset times during the year.</td>
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<td>2. Discuss changing length of daytime and nighttime.</td>
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<td>3. Observe the Moon through binoculars and telescopes; observe the Sun using solar-filtered telescopes and/or a Sunspotter.</td>
<td>Design solutions</td>
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