

Unit Summary

Cluster 1: The Sun's Daily Pattern (Lessons 1-3, 6, 7)

Overview	The children explore their ideas about reasons for daytime and nighttime. They consider the sun as Earth's source of light, and observe the effect sunlight has on Earth in terms of heat and shadows. They observe the sun several times throughout a day and discern how it seems to move across the sky. Finally, they create and use models that explain their observations of daytime and nighttime and the sun's apparent movement across the sky.
Science Content	<ul style="list-style-type: none"> • The sun appears to travel through the sky in a predictable daily pattern. • This pattern can be explained by the rotation of Earth.
Science Center	<ul style="list-style-type: none"> • Make models to explore ideas about what causes day and night. • Use shadow challenge cards. • Look at the shadows cast by different geometrical shapes.
Family Links	<ul style="list-style-type: none"> • Observe and record what is visible in the nighttime sky. • Reflect on models of daytime and nighttime. • Share useful words for solar system models.
Further Science Explorations	<ul style="list-style-type: none"> • Keep a daily "Sky Journal" for one month. • Discuss ideas generated during a science talk. • Use models to reinforce the idea of a spherical Earth. • Track indoor shadows. • Discuss how the sun affects certain animals. • Make a solar oven. • Watch the moon during a day. • Make a sundial. • Measure the sun's position with fists. • Look at web sites with images of daytime and nighttime in different parts of the world.
Cross-Curricular Extensions	<p>Language Arts: Use words that include the roots "sol" and "sun." Read the poem "My Shadow" by R.L. Stevenson. Write an explanation about creating models. Read a myth about the sun.</p> <p>Social Studies: Research how ancient civilizations regarded the sun. Read a compass rose.</p> <p>Mathematics: Define the parts of a circle.</p> <p>Art: Create silhouettes and shadow puppets. Draw arcs. Create physical or pictorial models of daytime and nighttime.</p>

Cluster 2: The Sun's Annual Pattern (Lessons 4, 5, 8, 14-19)

Children observe how the apparent path of the sun slowly changes during the year by using scientific tools to track its position in the fall, winter and spring. They model their observations using flashlights on the scientific tools. They assume the role of class astronomer to collect weekly sunrise and sunset data. They consider the relationship between the apparent height of the sun in the sky and the length of daylight. To culminate this cluster, children use a globe and a lamp to model Earth's orbit around the sun. They observe how the orbit, and the tilt of the earth on its axis, relates to changes in the length of daylight and the apparent path of the sun throughout the year.

Overview

- The sun's path across the sky appears to change throughout the year in a predictable pattern.
- The length of daylight changes throughout the year in a predictable pattern.
- Earth's orbit around the sun causes the changes in the length of daylight and changes in the apparent path of the sun.

Science Content

- Continue to explore shadows by using a flashlight on the shadow-recording tool, a model Earth, and the sky dome.
- Practice finding elapsed time using challenge cards.
- Examine temperature graphs and length of daylight graphs to look for patterns or trends.
- Model Earth's orbit during a year and consider challenge questions.

Science Center

- Make a "sun catcher" to track and record the sun's position in the sky throughout the day.
- Predict sunrise and sunset times for the summer and winter solstices.
- Share with families ideas about the model of Earth orbiting the sun.

Family Links

- Construct shading tools to identify the direction of the sun.
- Create a large sky dome using a geodesic dome play structure.
- Make a treasure map to locate shadow-recording areas covered by snow in the winter.
- Observe shadows before and after school.
- Make a K-W-P-L chart about sunrise and sunset.
- Map sunset directions in relationship to children's homes.
- Experiment with shadows by making mystery shadow objects.
- Compare daylight and seasons with pen pals.
- Create a scale model of Earth's orbit around the sun.

Further Science Explorations

Language Arts: Research the term autumnal equinox. Write a creative story about a shadow that comes to life. Write a story about a nocturnal animal that has to adjust to daylight during the summer solstice. Write a poem describing one of the seasons. Write a paragraph explaining an area with one, two or four seasons.

Social Studies: Read biographies about historical astronomers.

Physical Science: Stretch and manipulate bodies to create shadow creatures.

Mathematics: Calculate the surface area of a shadow using centimeter grid paper. Calculate how many times Earth has rotated since the children were born.

Cross-Curricular Extensions

Cluster 3: Our Moon's Cycle (Lessons 9-13)

<p>Overview</p>	<p>The children view the moon during the daytime and track its apparent path across the sky. They explore their questions about the moon and brainstorm how to find answers. They conduct a month-long series of daily observations of the moon, recording its changing shape on a class chart. After a month they look at their data and articulate the pattern of the moon's cycle. They record their initial ideas about what they think causes the moon's cycle. Finally, they learn and practice a model that reflects astronomers' understanding about the causes of the moon's cycle.</p>
<p>Science Content</p>	<ul style="list-style-type: none"> • Like the sun, the moon appears to move across the sky daily. Sometimes you can see the moon during the day. • Wondering about the world leads to scientific investigations and research. • The observable shape of the moon changes from day to day in a predictable pattern. • The moon's shape seems to change from day to day because we see different views of the moon's sun-lit portion as the moon orbits around Earth. • The moon's cycle takes about a month, the time it takes for the moon to orbit Earth.
<p>Science Center</p>	<ul style="list-style-type: none"> • Peruse books, photos, and clippings about the moon. (Initially avoid providing materials that explicitly show the moon's phases so the children can discover the pattern through their own observations.) • Make "Question and Answer" challenge cards for friends, based on research about the moon. • Experiment with balls and light sources to try to model the phases of the moon. • Play with Moon Flipbooks created in class. • Use balls and light sources to practice the astronomers' model of the cause of the moon's phases.
<p>Family Links</p>	<ul style="list-style-type: none"> • If needed, the children can observe the moon's path across the sky from home instead of at school. • During the parts of the moon's cycle when the moon is visible in the evening or night sky, record the moon's shape daily from home. • View the moon through binoculars at night. • Share with family members the difference between a waxing moon and a waning moon. • Share a reference sheet showing the moon's phases. • Share initial ideas about the cause of the moon's cycle, and discuss whether these ideas have changed after learning about the astronomers' model.
<p>Further Science Explorations</p>	<ul style="list-style-type: none"> • Go on a "moon quest" by seeing if the moon is visible through windows. • Track the moon's movement by taping moon shapes to the window every hour. • Invite a guest to class to show how to use a telescope. • With teacher supervision, view the moon during the day using binoculars to learn about its shape and surface. • View footage of moon landings and learn about the surface of the moon. • Make "craters" by throwing objects into dirt, flour, or play dough. • Model the cause of the moon's "far side" (the side that cannot be viewed from Earth). • Model the cause of lunar and solar eclipses.
<p>Cross-Curricular Extensions</p>	<p>Language Arts: Learn about the shapes and faces that different cultures have seen in the moon, and make up stories or games about what the children themselves see. Read James Thurber's <i>Many Moons</i>. Write a poem or story that uses ideas about the relative sizes of Earth and the moon, or the distance between them.</p> <p>Social Studies: Read biographies about astronauts. Compare the Chinese, Muslim, or Jewish lunar calendars to the solar calendar.</p> <p>Mathematics: Explore the geometry of spheres and circles. Estimate the distance between Earth and the moon in a model where a person's head represents Earth and a two-inch ball represents the moon.</p>

Cluster 4: Stars and Planets (Lessons 20-26)

Children compare the sizes of scale models of the sun, moon, and Earth. They learn that the sun and moon can appear to be the same size because the sun is much further away. They chart their knowledge and questions about the solar system and what lies beyond it. The children observe how stars appear to move across the nighttime sky and discover why stars aren't visible during the daytime. They study pictures of planets and their changing positions against a stable background of stars. As a project, children research the planets, and create and present reports about the planets. Last, they carry tiny scale models of the planets and pace the immense distances between them.

Overview

- The sun is a star like all other stars. The sun is the center of our solar system, and Earth is one of nine planets that orbit it.
- Wondering about the world leads to scientific investigations and research.
- Like the sun appears to move across a daytime sky, the stars appear to move across the nighttime sky because Earth rotates on its axis.
- Nine planets orbit around our sun. Each planet has unique characteristics that distinguish it from other planets.

Science Content

- Turn on flashlights to further consider stars during the daytime.
- Peruse books, photos, and articles about our solar system and outer space.
- Refer to the K-W-P-L chart.
- Continue to research and read nonfiction books about the planets.
- Post and review reports about planets.
- Compare scale models of the planets.

Science Center

- Look for the constellations of Orion or Big Dipper at home.
- Estimate the number of stars in the sky.
- Observe planets visible to the naked eye.
- Calculate weight on other planets.

Family Links

- Have an amateur astronomer visit class to talk about using telescopes.
- Explore why objects in our solar system orbit the sun.
- Visit a planetarium.
- Make and use a constellation viewer.
- Simulate looking at stars through our atmosphere.
- Research light pollution.
- On an Internet web site, view the movement of constellations.
- Visit a solar system museum model.
- Talk about the relative distances of planets in terms of the amount of time it takes sunlight to reach each planet.

Further Science Explorations

Language Arts: Read aloud the book *Postcards from Pluto*.

Social Studies: Research how and when the planets were discovered. Research stories about constellations from different cultures and times.

Mathematics: Chart planet data. Make bar graphs of planet data. Calculate how far away the nearest star is.

Technology: Build a model of a space station.

Art: Draw or paint pictures of planets. Make a solar system mobile.

Cross-Curricular Extensions