

Phases of the Moon

http://www.learner.org/teacherslab/pup/act_moonphaseintro.html

Focus on Inquiry

The student will make observations of an Earth-Moon-Sun model system to describe the phases of the Moon.

Lesson Overview

This activity asks students to use models of Earth, the Sun, and the Moon system to discover why moon phases occur. Students use a Styrofoam ball to represent the Moon, which will be lit by a single light source in the classroom, to observe how different portions of the ball are illuminated as they hold it in various positions. They create a complete series of phases matching the appearance of the Moon. And they relate moon phases to the positions of Earth and the Sun.

Duration 75 minutes	Setting Classroom	Grouping Whole class	PTI Inquiry Subskills 3.3, 5.2, 5.3, 5.8, 7.2, 7.3
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Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
Engage	5 min	None	None	2	Students are engaged in a discussion on the Moon.
Explore	30 min	3.3, 5.8	None	3	Students create a model of the moon phases and go through each phase.
Explain	25 min	5.2, 5.3	None	3	Students go through the lunar phases describing the illumination and identifying the name of the phases.
Expand	10 min	7.2	Internet/TV hook-up	3	Students view a video of the lunar phases and identify which phase is shown.
Evaluate	5 min	3.3, 7.3	None	3	Students organize moon phase cards in the correct order.

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

National Science Education Standards – Inquiry

Use appropriate tools and techniques to gather, analyze, and interpret data.
Think critically and logically to make the relationships between evidence and explanations.
Communicate scientific procedures and explanations.



National Science Education Standards – Earth Science

Most objects in the solar system are in regular and predictable motion. These motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Louisiana Grade Level Expectations – Inquiry

- Gr. 8, Inquiry GLE#6 - Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3)
- Gr. 8, Inquiry GLE#12 - Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
- Gr. 8, Inquiry GLE#14 - Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)
- Gr. 8, Inquiry GLE#16 - Use evidence to make inferences and predict trends (SI-M-A5)
- Gr. 8, Inquiry GLE#19 - Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)



Louisiana Grade Level Expectations Earth Science

- Gr. 8, GLE#40 - Identify and illustrate the relative positions of Earth, the Moon, and the Sun during eclipses and

Materials List

- Styrofoam balls (1 per student)
- Overhead projector or desk lamp with the lamp shade removed.
- Moon index cards (see Advance Preparation, Step 1). 1 set per student (8 index cards per student).

Advance Preparation

1. Download the Lunar Calendar for the month that you will be teaching the lesson. This can be downloaded from StarDate Online, <http://stardate.org/nightsky/moon/>. This can be placed on the top half of a sheet of paper, while the 8 phases of the moon can be placed on the lower half of the sheet. Cut the sheet in half to prepare for the lesson. See **Blackline Master #1** for an example.
2. Obtain small pictures of the 8 phases of the moon (see **Blackline Master #1** – the lower half of the sheet). Cut out each phase and glue/tape it to an unlabeled index card.
3. It is recommended that you laminate a class set of the moon phase cards and lunar calendar to save time and materials.
4. Obtain Styrofoam balls (1-2” in diameter for each student.
5. It is recommended that you go to the activity site and print out a copy of the instructions as you will need them to complete the Explore section listed on this page. To do this, go to http://www.learner.org/teacherslab/pup/act_moonphaseintro.html, and scroll down to the bottom of the page to the sentence that states, “You can access the activity on the Web or as a version ready for printing.” Select the link for the version ready for printing.

Other Information

Objectives

The learner will:

- use an Earth-Moon-Sun model to understand why the moon goes through phases during the lunar month.
- use correct vocabulary for each phases of the moon, including the terms, gibbous, waning, crescent, and quarter moon.

Prior Knowledge Needed by the Students

- None

Procedure

Engage

1. Ask students “Has anyone ever heard the statement “Once in a blue moon”? What does this statement mean when it is used? What is a blue moon? Are there any other statements that you know about the moon? [Example: Crazy things happen around a full moon.] Let students share this they know about common moon mythology.
2. Give students the moon phase cards (in mixed order). Ask them to try to put them in the correct order. Use this activity as a means to assess prior knowledge and any misconceptions students will be bringing to the lesson. Have the students set the cards aside on their desks.

Explore

1. Distribute the Styrofoam balls to students and have students push a pencil or pen about halfway through their ball. Follow the instructions from the Private Universe – Moon Phases Activity beginning with Step 4 under the section entitled “The Activity.” NOTE: Do not do Step 1-3 as stated in the activity, as students will arrive at this information as a result of the activity. (To get these instructions, follow step #5 under Advance Preparation at the top of this page).
2. As students move through the phases of the moon in their model system, have students concentrate on describing what they see in terms of what portion of the Moon’s surface is

illuminated. The first time through the lunar phases, begin with ¼ turns (new, first quarter, full, third quarter). At this point, do not worry about vocabulary, but the descriptive process. Go through the lunar phases at least twice, focusing on description. (The subsequent cycles should have students stopping at 1/8 turns throughout the cycle).

Explain

1. Go through the phases of the moon, this time asking for students to (1) describe the illumination of the moons' face that is seen from the earth, and (2) to supply the correct vocabulary for the lunar phase. As you move through the lunar cycle, ask students to give their own explanations for what is happening at each phase of the lunar month.

Expand

1. View the Lunar Phases video (<http://www.solarviews.com/cap/moon/vmoon2.htm>). As the video progresses through the phases of the lunar month, as students to give the correct terminology to each phases and explain why that part of the Moon's surface is illuminated. Have students use their Styrofoam ball/self/overhead projector model to illustrate each phase.
2. Give students the Lunar Month calendar for the month that you are teaching the lesson. Discuss with the students what phase the moon is currently in and what they can apply to this calendar from what they learned in today's lesson.

Evaluate

1. Have the students pick up the moon phase cards on their desks and ask them to put them in the correct order. Ask them to write the name for each phase of the moon on the card. Check for accuracy.

Blackline Master

1. **Moon Phases**

Supplementary Resources

Teachers

Henes, Donna. (2004). *The Moon Watcher's Companion: Everything You Ever Wanted to Know About the Moon and More*. Marlowe & Company. 144 pp. ISBN-10: 1569244669
Bringing together a wide range of writings about the moon, from Mother Goose to Joseph Campbell, Galileo to Audre Lorde, Sappho to Black Elk, as well as providing a comprehensive encyclopedia of lunar terminology, a timeline of lunar explorations, and three sections that detail the moon's faces, phases, and known facts, author Henes has created a fascinating compendium of lunar science, myth, folklore, poetry, curious facts, and old wives' wisdom culled from cultures throughout the ages.

Students

Fowler, Allan. (1992). *So That's How the Moon Changes Shape* (Rookie Read-About Science Series) Chicago: Children's Press. 31 pp. ISBN: 0516449176
A simple explanation of the moon and why it changes shape throughout the month. Ages 4-8.

Olson, Gillia M. (2006). *Phases of the Moon*. Pebble Plus. 24 pp. ISBN-10: 0736863400
Brilliant and interesting photographs, easily understood diagrams, and a short, informative text. This book explains that the moon only appears to change shape. A clear diagram names each phase, including less familiar words like "gibbous" and "crescent," included in a short glossary at the end and illustrated with a photograph. There are photos of the tiniest sliver which appear after the new moon, which is really no visible moon at all. Ages 9-12.

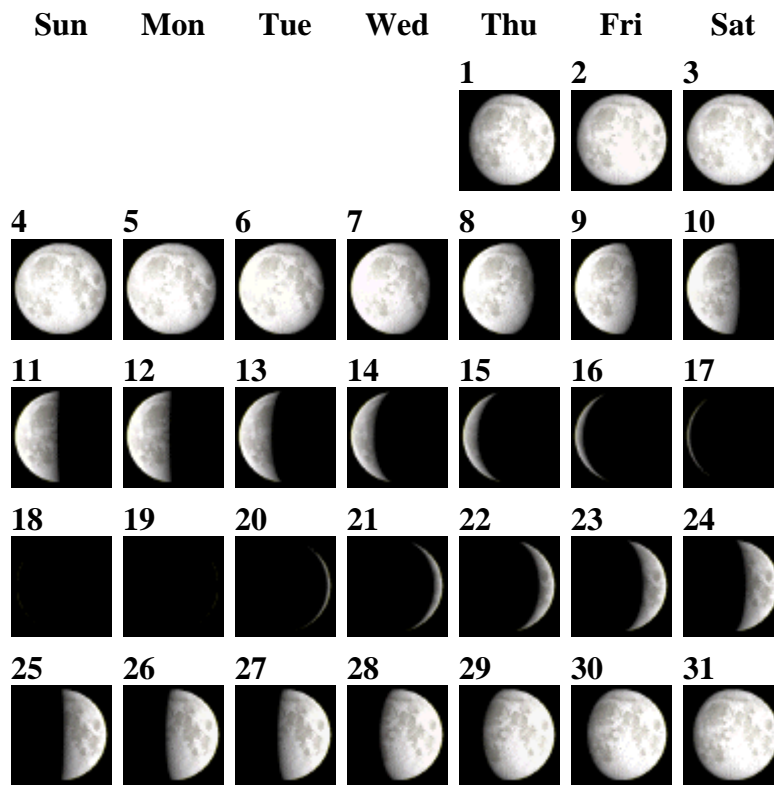
Gibbons, Gail. (1998). *The Moon Book*. Holiday House, Inc. ISBN: 0823413640
Identifies the moon as our only natural satellite, describes its movement and phases, and discusses how we have observed and explored it over the years. Ages 6-8.

Miscellaneous

Moon in My Room by Uncle Milton. ISBN: 1400641527

You can hang this light up moon that is authentically sculpted and detailed on your wall. It is internally lit to realistically illuminate a darkened room. Using an automatic or manual function, the 12 main phases of the moon can be shown. Included are a moon discovery guide with calendar, moon phase charts, instructions, a 15 minute CD tour and IR remote control. The built-in light sensor illuminates the moon when it gets dark and the unit has an automatic shut-off. Cost: ~\$30 (in 2007). Ages 6+

Lunar Phases for March 2007



This tool displays the approximate Moon phases for a given month. For official phase times and dates for this month and past months, check our [Sky Almanac](#). Moon rise and set times are available from the [U.S. Naval Observatory](#).
 Provided by moonguy@googol.com

Moon Phase (index card pieces)

