

LCM Formal Loop

LCM Lesson Plan: What causes the phases of the Moon?

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Science Standards: A-4, B-2

Math Standards: B-4, D-3, D-4, E-3

Cultural Standards: A-3, B-2, E-1

Grade level 4th-8th

Science concept:

Explore why the phases of the moon occur.

This phenomenon is often misunderstood and it is possible that the lesson will need to be repeated in order for students to overcome misconceptions.

<p>Gear- Up Assess student knowledge. What do they know about the moon? Record answers.</p> <p>Watch the phases of the moon “Lunation” movie http://aa.usno.navy.mil/faq/docs/moon_phases.html</p> <p>Continue with questions: How and why do the phases occur?</p>	<p><u>Process Skills</u> Communication Observation</p>	<p><u>Materials</u> Access to Internet connected computer Worksheet with 8 same size circles Wire coat hangers String or thread Light source - (sun) (projector, lamps, or flashlights) Paper Black markers Encyclopedia</p>
<p>Explore</p> <p>Using the worksheet, students will refer to books or the encyclopedia to draw the moon’s phases. Each phase should be clearly labeled. Using terms such as sunny side and shadowy side helps with understanding.</p> <p>Cut out each FULL circle and hang in correct order from the coat hanger.</p> <p>Extras: Have students manipulate earth and moon model.</p> <p>Create “Moon Phase” shoebox. Punch holes in sides, hang a small ball in the center, use strong flashlight on one end to represent the sun. Students peek through the different holes to observe the different phases. From “Invitations to Science Inquiry” by Tik L. Liem</p>		<p>Moon books Globe or ball (earth) Small ball for moon</p> <p>Extras: Earth and Moon model</p>
<p>Generalize:</p> <p>How can students take their drawings and test it three-dimensionally?</p> <p>How would this support their drawings?</p> <p>How should findings be recorded?</p>		<p>Vocabulary</p> <p>Lunar Crescent Waxing (growing) Quarter Gibbous Waning (shrinking)</p>

<p>Experiment:</p> <p>Working in teams students are to create the phases of the moon by using a light source (sun), a ball for the (moon), and their head to represent the earth.</p> <p>Students are to record their observations.</p> <p>Repeat tests until students are satisfied with their results.</p>		
<p>Interpret:</p> <p>Each group should write a short paragraph that will discuss their results and explain what they learned from their observations and model.</p> <p>Reflect on experiment and possible improvements.</p> <p>Question students about their results and review for misconceptions.</p>		
<p>Apply/Assess:</p> <p>Students should understand why the phases of the moon occur.</p> <p>Students should be able to name and draw the different phases of the moon.</p> <p>Have students create a chart to daily (or weekly) document the moon's phases. Include drawings of the sun, earth, and the position of the moon, by considering the phase.</p> <p>Have students add the phase of moon to the classroom daily schedule.</p> <p>Follow up is necessary to ensure students have not fallen back on their misconceptions.</p>		

Extensions:

Science:

Resource guide: [Astronomical Society of the Pacific](http://128.241.173.3/education/family/resources/moonguide.html)
<http://128.241.173.3/education/family/resources/moonguide.html>

Explore Moon and solar eclipses.

Explore the orbit of the moon around the earth and its effect on bodies of water (tides).

Explore how planets orbit around the sun

Math:

Compare the size of the earth to the size of the moon, using proportions.

Estimate the distance between the moon and earth using models.

History:

Study the “race” to the moon (United States and Russia).

Study the astronauts (Neil Armstrong and Edwin Aldrin) who flew Apollo 11 to the moon, July 24, 1969.

Cultural:

What are other cultures traditions / myths / stories about the Moon? Eskimo Raven Tales, Chinese Moon Festival, tales from Africa, and Greek Mythology. Read books from the library.

Lunar and Planetary Institute

http://www.lpi.usra.edu/education/skytellers/moon_phases/

Language Arts:

Using moon books for resources have students write poems. Try using different poetry forms: cinquain, haiku, acrostic, and diamante.

Recommended books:

[Why Does the Moon Change Shape?](#) by Patricia J. Murphy

[Reaching for the Moon](#) by Buzz Aldrin

[The Moon and You](#) by E.C. Krupp

[The Best Book of the Moon](#) by Ian Graham

[Moontellers: Myths of the Moon from Around the World](#)
by Lynn Moroney

Notes:

Every 29 1/2 days, the moon goes through several phases, or appearances as seen from Earth. The phases occur because of changes in the location of the moon relative to the earth and sun. The sun always shines on half the moon. But different amounts of sunlight are reflected to Earth as the moon changes its location. On Day 1 of a 29 1/2 day cycle, we see no reflected sunlight. The moon is in its new moon phase. On Day 5, the moon is in its waxing crescent phase. Waxing means growing. On Day 8, the moon is in its first quarter. On Day 11, the moon is in its waxing gibbous phase. Gibbous means in the shape of a hump. On Day 15, a full moon occurs. On Day 21, the moon is in its waning gibbous stage. Waning means shrinking. On Day 23, the moon is in its last quarter. On Day 26, the moon is in its waning crescent phase.

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Phases of the Moon

Name : _____

	New Moon 1 point	Waxing Moon 2 points	Gibbous Moon 3 points	Full Moon 4 points
Group discussions	Did not participate	Participated occasionally	Participated most of time	Participated fully.
Phases of the Moon worksheet	The phases of the moon worksheet was not attempted	The phases of the moon worksheet was partially completed	The phases of the moon worksheet was completed, but work is not neat and/or phases are out of order	The phases of the moon worksheet was completely neatly and in phase order
Use of Encyclopedia and/or Moon books	Did not use books	Used books but did not label worksheet	Used books but incorrectly labeled worksheet	Used books and correctly labeled worksheet
Participation with team while conducting experiment	Student did not participate	Student participated occasionally	Student participated most of the time	Student participated all of the time and put extra work into it
Written Paragraph	Did not write paragraph	Wrote paragraph, is not understandable	Wrote paragraph explaining what student learned, mostly understandable	Wrote paragraph clearly explaining what student learned
Classroom safety rules	Safety rules not followed	Safety rules followed most of the time	Safety rules followed most of the time	Safety rules followed all of the time
Totals:				

Worksheet

