Lesson 2— Understanding the Light On the Phases of the Moon

Strand 6.1 Structure and Motion within the Solar System.	**Standard 6.1.1** Develop and use a model of the Sun-Earth-Moon system to describe the cyclic patterns of lunar phases, eclipses, of the Sun and Moon, and seasons. Examples of models could be physical, graphical, or conceptual.	**Big Idea** The moon appears to change shape over time in a cyclical pattern.

Title: Understanding the Light on the Phases of the Moon	**Time:** 50 minutes	**CCCs:** Patterns	**Practices:** Analyzing and interpreting data

Phenomenon: The moon's appearance changes over time and goes through a cyclical pattern from month to month.

Materials

- Journals
- Model they drew previously of the orbit of the moon around Earth
- Model they drew of the eight different phases of the moon
- The eight moon phase cards
- Video of the actual phases of the moon by NASA: https://www.youtube.com/watch?v=rYt2L__r7Fk;
- Video of the explanation of the phases of the moon: https://www.youtube.com/watch?time_continue=34&v=NCweccNOaqo
- Reading why we always see one side of the moon and never the backside of the moon: https://www.washingtonpost.com/news/speaking-of-science/wp/2015/02/09/nasa-gives-us-an-amazing-look-at-the-dark-side-of-the-moon/?utm_term=.9ca03e6298b7;

Teacher Directions

Starter

1. Start out with a review of what was learned in the last lesson by looking at the models.
2. Show the students the video of the moon changing through all of its phases that has no verbal explanation or words describing what is happening.
    a. It is all silent and only viewing. https://www.youtube.com/watch?v=rYt2L__r7Fk.
    b. They will see a side video on the same screen that shows the moon orbiting the earth and the bigger moon video showing what the moon looks like looking at the moon from Earth.

c. The different positions of the moon around the Earth will show what the moon looks like at those positions.
d. The students will then enter in their journals what they have learned as to how the moon seems to change even though it really stays the same while orbiting the Earth.)
e. Have them notice that we only see one side of the moon at all times during the phases.

3. Without revealing answers, have the students tell what they see happening in the video.
4. Have a discussion of what they think is happening.

Gathering

Obtain Information

1. After a discussion, the students will watch a second video with words to further explain the phenomenon of why the moon seems to change while orbiting the Earth. https://www.youtube.com/watch?time_continue=34&v=NCweccNOaqo
2. The students will write down notes of the video. They are to determine the cause of the cyclical pattern they know about.
3. Have a class discussion about the information that was in the video without revealing the reasons for the moon phases. Have them write them down in their journal.
4. Discuss why we always see the same side of the moon. We never see another part of the moon.

Ask Questions

1. During and after observations, give students time to discuss and ask questions about their observations of the video based on the patterns of the changing appearance of the moon.
2. Have the students record their questions in their journals, and keep a class record to discuss later.

Reasoning

Analyzing Data and Interpret Data

1. After the students write their findings, the students will analyze the data by looking for reasons through patterns why the moon seems to change and why we see different phases of the moon.

Construct an Explanation

1. The students will interpret the information they wrote down to construct an explanation of what causes the cyclical pattern by the Sun-Earth-Moon system.
2. Have them work in partners or small groups to do this.
   The focus is on to explain why we see different moon phases in the moon's cyclical pattern of 29 or 30 days using moon phase cards. They will need the eight moon phase cards, yellow sun, and green earth to model what is happening. (Moon Cards,

Sun Card and Earth Card found on the webpage:
http://elemscience.jordandistrict.org/lessons/6thseed/)

Communicating Information

1. Students will write an explanation of how the Sun-Earth-Moon system causes the moon's appearance to change in a cyclical pattern.
2. Have the students draw pictures of their explanation. (See the Lunar Cycle Chart for what they should have demonstrated: http://elemscience.jordandistrict.org/lessons/6thseed/)

Assessment

1. Students' explanations should demonstrate an understanding of how the sun, moon, and earth interact (rotation and revolution) to cause moon phases.
2. Students' explanations should demonstrate an understanding of how the sun, moon, and earth interact to cause moon phases.

The students do not need to know the names of all the phases of the moon. They will not be assessed on the words. However, they should be able to recognize and name the New Moon, 1st Quarter Moon, Full Moon, and Third/Last Quarter Moon and their positions around the Earth for the sake of reference. Students should be able to describe what is going on as the phases change and the shape the moon should be as it orbits the earth.

Student Sheet **Name _____**

Understanding the Light We See on the Phases of the Moon

Answer these questions.

1. What is happening to the light on the moon as we see it from Earth as the moon orbits around the Earth away from the Sun toward the full moon phase?

_____

_____

2. What is happening to the light on the moon as we see it from Earth as the moon orbits around the Earth back toward from the Sun toward the new moon phase?

_____

_____

3. How much light do we see on the moon at the new moon phase position?

_____

_____

4. How much light do we see on the moon at the full moon phase position?

_____

_____

5. How much light do we see on the moon at the first and third quarter moon phase positions?

_____

_____

6. On the first and third quarter moon phases, why is the light on opposite sides of each other?

_____

_____

7. Below, if the moon looked like the picture on the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.

8. Below, if the moon looked like the picture on the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.

9. Below, if the moon looked like the picture on the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.

(We can't see the light on this moon phase.)

10. Below, if the moon look liked the picture on the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.

Student Sheet **Name** _____

Understanding the Light We See on Phases of the Moon

Answer these questions.

1. What is happening to the light on the moon as we see it from Earth as the moon orbits around the Earth away from the Sun toward the full moon phase?

   We see that the light seems to be growing on the moon.

2. What is happening to the light on the moon as we see it from Earth as the moon orbits around the Earth back toward from the Sun toward the new moon phase?

   We see that the light seem to be decreasing on the moon.

3. How much light do we see on the moon at the new moon phase position?

   We see no light on the moon.

4. How much light do we see on the moon at the full moon phase position?

   We see all the light on the moon. The moon is all filled up with light.

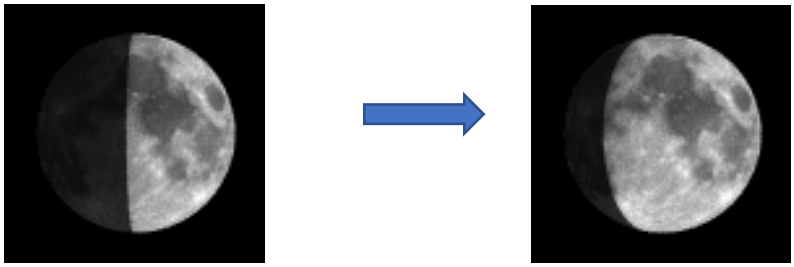
5. How much light do we see on the moon at the first and third quarter moon phases?

   We see half the moon lit up with light.

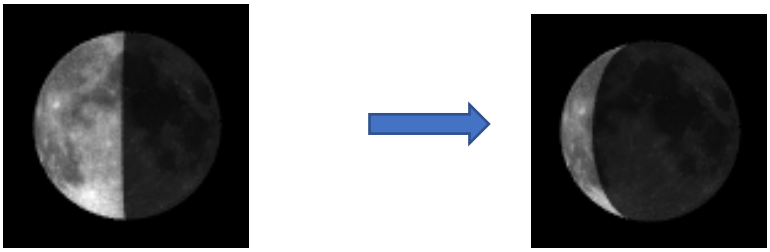
6. On the first and third quarter moon phases, how is the light different on the moon?

   The first quarter moon phase is on the right side and the third quarter moon phase is on the left side.

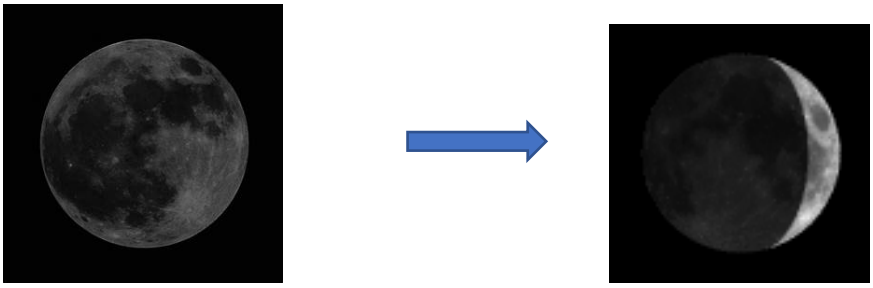
7. Below, if the moon looked like the picture to the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.



8. Below if the moon looked like the picture to the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.



9. If the moon looked like the picture to the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.



(We can't see the light on this moon phase.)

10. Below, if the moon look liked the picture on the left, draw what the next phase would look like on the right. You do not need to name it, just draw it.