Lesson 4: 28 Days and the Dark/Far Side of the Moon

(Taken from Episode 3: 6.1.1—28 Days and the Dark Side 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 **28 Days and the Dark/Far Side of the Moon**	Time **40 minutes**	CCCs **Cause and Effect**	Practices **Develop model**

Phenomenon: ***: The moon changes shape in a cyclical pattern over the course of 28 days, but, on Earth, we only see one side of the moon.***

Materials

- The Moon Complete Cycle Chart Complete Moon Phases Chart
- Youtube Video: Watch the video: https://www.youtube.com/watch?v=j91XTV_p9pc
- Web page: *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/*
- Journal

Teacher Directions

Gathering

Obtain Information

1. Pass out or show on a screen the Complete Moon Phases Chart. Students will make observations from the Complete Moon Phases Chart and then discuss their observations with partners.
2. Watch the video: https://www.youtube.com/watch?v=j91XTV_p9pc https://www.youtube.com/watch?v=j91XTV_p9pc and then discuss their observations with partners.

Ask Questions

1. During and after observations, give students time to discuss and ask questions about their observations based on what they see that is the same on all the moon phases.
2. Have students record their questions in their journals, and keep a class record to discuss later.

Reasoning

Construct an Explanation

1. In previous episodes, students figured out that the moon has a cyclical pattern and that the cyclical pattern is caused by the Sun-Earth-Moon system.
2. In this episode, students will work with partners or small groups to construct an explanation from their observations of patterns for why the moon's cyclical pattern is 28 days and why we only see one side of the moon. Students' explanations will include their models of the Sun-Earth-Moon system.

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.

Argue From Evidence

1. Using their observations and constructed explanations, students will argue from evidence that the moon's cyclical pattern is 28 days.
2. Students will also argue from evidence why we only see one side of the moon. Watch the video: https://www.youtube.com/watch?v=j91XTV_p9pc
3. *Teacher Support: Show the following YouTube video to introduce students to the "dark side"/"far side" of the moon. Watch the video first by yourself as the teacher and listen to the narration. When showing it to students, play the video without sound. Doing so will set up the phenomena in a way that will allow students to start crafting their explanations of the system. 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/*

Communicating

Construct an Explanation

1. Individually, students will write an explanation of how the Sun-Earth-Moon system causes the moon's cyclical pattern to be 28 days and why we only see one side of the moon from Earth. Students may want to include drawings to help explain their models.
2. *Teacher Support: Student constructed explanations will be the formative assessment for moon phases.*

Assessment

1. Students' explanations should demonstrate an understanding of how the sun, moon, and earth interact (rotation and revolution) to cause moon phases and why they last about 28 days.
2. Students' explanation should demonstrate an understanding of why we only see one side of the moon.

Student Sheet **Name _____**

28 Days and the Dark/Far Side of the Moon

Answer these questions (Look at the end of this student sheet to see the different moon phases to figure out the answers.)

1. About how many days does it take for the moon to make a full orbit around the Earth—from New Moon to New Moon?

_____

2. About how many days does it take for the moon to make a half orbit around the Earth—from New Moon to Full Moon?

_____

3. About how many days does it take the moon to move from the New Moon position to the 1st Quarter Moon position?

_____

4. About how many days does it take the moon to move from the New Moon position to the 3rd Quarter Moon position?

_____

5. About how many days does it take the moon to move from the 1st Quarter Moon position to the 3rd Quarter Moon position?

_____

6. About how many days does it take the moon to move from the Full Moon position to the 3rd Quarter Moon position?

_____

7. About how many days does it take the moon to move from the Full Moon position to the 1st Quarter Moon position?

_____

8. About how many days does the Waxing Crescent, Waxing Gibbous, Waning Gibbous, or Waning Crescent Moon all last?

_____

9. Why do we see the same side of the moon during the whole lunar cycle?

_____

_____

10. Does light shine on the dark/far side of the moon? _____

If so, how much of the Earth is always lit up by the sun? _____

11. Explain your reasoning to answer #10.

_____

_____

Phases of the Moon in Order

Waxing means Growing in Light
Waning means Decreasing in Light

New Moon

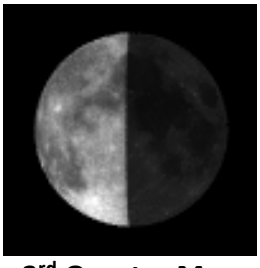
Waxing Crescent Moon

1st Quarter Moon

Waxing Gibbous Moon

Full Moon

Waning Gibbous Moon



3rd Quarter Moon

Waning Crescent Moon

New Moon
Starts the new Cycle

Student Sheet **Name _____**

28 Days and the Dark/Far Side of the Moon

Answer these questions (Look at the end of this student sheet to see the different moon phases to figure out the answers.)

1. About how many days does it take for the moon to make a full orbit around the Earth—from New Moon to New Moon?

   28 days

2. About how many days does it take for the moon to make a half orbit around the Earth—from New Moon to Full Moon?

   14 days

3. About how many days does it take the moon to move from the New Moon position to the 1st Quarter Moon position?

   7 days

4. About how many days does it take the moon to move from the New Moon position to the 3rd Quarter Moon position?

   7 days

5. About how many days does it take the moon to move from the 1st Quarter Moon position to the 3rd Quarter Moon position?

   14 days

6. About how many days does it take the moon to move from the Full Moon position to the 3rd Quarter Moon position?

   21 days

7. About how many days does it take the moon to move from the Full Moon position to the 1st Quarter Moon position?

   21 days

8. About how many days does the Waxing Crescent, Waxing Gibbous, Waning Gibbous, or Waning Crescent Moon all last?

   7 days

9. Why do we see the same side of the moon during the whole lunar cycle?

   The gravitational pull of the Earth on the Moon keeps the moon from rotating.

10. Does light shine on the dark/far side of the moon? **Yes**

    If so, how much of the Earth is always lit up by the sun? **Half the Moon is always lit up.**

11. Explain your reasoning to answer #10.

    When the sun is shining on the moon, half the moon is lit up. We may not see all the light though. The position of the moon to the Earth makes it so we can only see part of the light most of the time except when we see a full moon.