**5E Lesson Plan: Modeling Moon Phases**

**Grade Level:** 4th Grade  
**SOL:** 4.6c - The student will investigate and understand that there are relationships among Earth, the moon, and the sun, including the causes for the four major phases of the moon and their relationship to tide cycles.

**Objectives:**

* Model the phases of the moon using a foam board and ping pong balls to demonstrate how the moon's position relative to Earth and the sun causes its changing appearance.
* Explain how sunlight reflects off the moon’s surface, creating the four major phases: new moon, first quarter, full moon, and last (third) quarter.
* Observe and describe how the visible portion of the moon changes as students rotate within the model.
* Discuss how the moon phases relate to tide cycles on Earth.

**Lesson Breakdown (60 minutes total)**

**1. Setup Before the Lesson**

* Prepare the moon phases model ahead of time using a **foam board, ping pong balls, and black paint/markers**.
* Ensure the **large hole in the center** is big enough for a student’s head to fit through.
* Position the **"moon" ping pong balls** correctly around the hole, with the **white sides all facing the light source** (representing the Sun).
* (Optional) Attach or **draw a representation of the Sun** on one side of the board.
* **Set up the document camera** so that it can be placed in the hole to capture the moon phases from the student’s perspective.

**2. Engage (10 min) – Introduce the Concept**

* Ask students: *Have you ever noticed that the moon looks different each night? Why do you think that happens?*
* Show pictures or a video of the **moon’s changing phases** over a month.
* Explain: *Today, I will demonstrate why the moon appears to change shape by using this special model.*

**3. Explore (15 min) – Demonstration of the Model with the Document Camera**

* **Step 1: First Student Volunteer**
  + Invite a student to stand behind the board and place their head through the hole.
  + **Slowly rotate the board counterclockwise** (the direction of the moon's revolution around Earth).
  + Ask: *What do you notice about the moon as I turn the board?*
  + *Why does part of the moon appear dark while part stays bright?*
  + Repeat with another student to get additional observations.
* **Step 2: Document Camera Demonstration**
  + Place the **document camera inside the hole** and **rotate the board counterclockwise** to simulate the student’s experience.
  + Show the camera feed on the classroom screen so **all students** can clearly see what happens from that perspective.
  + Narrate as you rotate:
    - "Here, you can see the **New Moon**—the side of the moon facing Earth is completely dark."
    - "As I keep turning, we reach the **First Quarter Moon**—half of the moon is lit."
    - "Now we have the **Full Moon**, when the entire side facing Earth is bright."
    - "Finally, we reach the **Last Quarter Moon** before cycling back to the New Moon."

**4. Explain (15 min) – Discussion & Concept Reinforcement**

* Ask students:
  + *Why does one side of the moon always stay lit?* (Answer: The sun’s light is always shining on half of the moon.)
  + *Why do we see different moon phases on different nights?* (Answer: The moon orbits Earth, changing how we see the lit side.)
  + *Which phase happens when we see no light at all?* (New Moon)
* Use a **diagram or digital animation** to reinforce how the moon moves in its orbit.

**5. Elaborate (15 min) – Real-World Connections**

* Relate the phases of the moon to **tide changes** on Earth.
* Challenge students: *Observe the moon for the next few nights and describe what phase you see!*

**6. Evaluate (5 min) – Check for Understanding**

✅ **Exit Ticket or Discussion Questions:**

* *What causes the moon phases?*
* *Which phase happens when the moon is completely lit?* (Full Moon)
* *Why do we always see the same side of the moon?* (The moon rotates at the same speed it orbits Earth.)

**Student Directions (What They Will Do)**

1. **Watch as the teacher demonstrates the moon phases model.**
2. **Observe the model through the document camera** and compare it to what they see when students place their heads inside the board.
3. **Volunteer to stand behind the board** and place their head through the hole to experience the moon phases firsthand.
4. **Describe what they see** as the teacher rotates the board.
5. **Participate in class discussions** about why the moon changes shape.
6. **Answer exit ticket questions** or share observations about the moon’s phases.