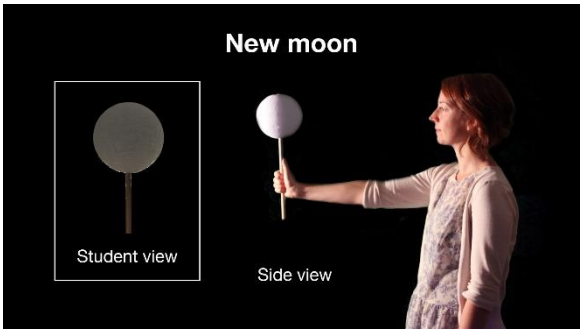
MOON PHASES

BIG IDEA:

- The Moon's phase is the lit-up shape of the Moon that is visible to us on Earth.
- As the Moon orbits the Earth, different amounts of the Moon are visible to us, making the Moon appear to change shape.

AUDIENCE:

- Families
- Students, 1st grade and older



WHAT YOU NEED:

*This activity needs a dark location and access to electricity.

- Styrofoam balls, 2 inches (5 cm) or larger
- Sharpened pencils or skewers
- Bright light source, such as a lamp (shade removed) with 100W or higher bulb
- Moon Basics sheet (page 2) (English/Spanish)
- Moon Phases sheet (English)

SET-UP:

- Poke a skewer or sharpened pencil into each Styrofoam ball to create Moon models.
- Set up the light source in a location where participants can safely walk around it.
- You may want to practice making different phases with the lamp and Moon model until you are comfortable with which positions produce each Moon phase. See the source activity for pictures and descriptions for making each phase.

WHAT TO DO:

1. Ask participants to think about their experience seeing the Moon in the sky. You could use the Moon Basics sheet to spark discussion.
    - Have you seen the Moon in the sky? What did it look like?
    - What different shapes of Moon have you seen?
    - Why do you think the Moon seems to change shape?

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2. Give participants the Moon model(s) and demonstrate how to hold it out and slightly above eye level (so it doesn't block the lamp). Explain that in this model, the lamp is the Sun, the Styrofoam ball is the Moon, and their head is the Earth.
3. Invite participants to explore making different Moon phases. Demonstrate how to rotate your body while keeping the Moon model directly in front of you. You could use the Moon Phases sheet for reference.
    - What does the bright part of your Moon look like to you now?
    - How can you make the Moon look half bright and half dark?
    - Where should you stand so the Moon looks all dark to you?
    - How could you make a crescent Moon?
4. Ask participants to model a full Moon phase cycle. Stop at the positions listed below and introduce the names of each phase. Ask them to notice where the Sun (lamp), Moon, and Earth (their head) are in relation to each other. Help them connect those positions to the Moon phase they see on the Moon model.
   New Moon: Hold model directly toward the lamp, but slightly above it.
   Waxing Crescent Moon: Turn 45 degrees counterclockwise.
   First Quarter Moon: Keep turning to 90 degrees (one quarter of the way) from starting position.
   Waxing Gibbous Moon: Continue turning another 45 degrees.
   Full Moon: Face 180 degrees away from the lamp, holding the Moon directly opposite (but high enough that their head doesn't block the "sunlight".)
   Waning Gibbous Moon: Continue turning counterclockwise another 45 degrees.
   Last Quarter Moon: Turn to 270 degrees (three-quarters of the way) from the starting position.
   New Moon: Return to starting position.
5. Ask participants to think about how this Moon phase model connects to real life:
    - What did you notice about how the bright part of your Moon model changed as you rotated? Have you seen any of those Moon shapes in the sky?
    - If you see a quarter Moon in the sky, what does that tell you about where the Sun is?
    - If you were an astronaut living on the Moon, what do you think the Earth would look like? Would it have phases like the Moon does here?

TIPS & TRICKS:

- You can also use this activity to model a solar eclipse. Stand in the "New Moon" position (Moon model directly facing the lamp). Instead of holding the model above eye level, hold it so that the Moon blocks the lamp from view.

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- See the Mission2Mars Additional Resources document for related videos, printable resources, and other activities.

WHAT TO KNOW:

- The Moon doesn't produce any light of its own. What we see in the sky is sunlight reflecting off the Moon's surface.
- As the Moon orbits the Earth, it moves into different positions between the Earth and the Sun, so different portions of the reflected sunlight are visible to people on Earth. This creates the changing shapes, or phases, of the Moon.
- It takes the Moon about 27 days to orbit the Earth, so it will also go through one complete Moon phase cycle every 27 days.
- Moon phase terms:
  Full – The entire disk of the Moon is bright
  Quarter – Half of the Moon's disk is bright
  New – None of the Moon is visible
  Crescent – Less than half of the Moon is bright (between New and Quarter)
  Gibbous – More than half of the Moon is bright (between Quarter and Full)
  Waxing – Getting bigger; moving towards Full
  Waning – Getting smaller; moving towards New
- Astronauts living on the Moon would see the Earth go through phases, too, but they are always almost exactly the opposite of the Moon's phases on Earth. When we see a full Moon on Earth, people on the Moon would see just a thin crescent Earth, and vice versa.

SOURCE: JPL, Moon Phases; NISENet, Observe the Moon

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