

Ages:
12- adult

Duration:
15 minutes

Materials:
none

~ LPI EDUCATION/PUBLIC OUTREACH SCIENCE ACTIVITIES ~

THE MOON DANCE

BASED UPON A PRESENTATION BY ROD THOMPSON, GLPA 1991 CONFERENCE

OVERVIEW —

The students create kinesthetic models of the Sun and Moon in the sky to better understand the relationship between lunar phases and the time of day.

OBJECTIVE —

The students will:

- Be able to demonstrate the relative position of the Sun and Moon in the sky for various lunar phases.
- Be able to use the model to predict the time that the New, Full, First Quarter, and Third Quarter moon rises and sets.

BEFORE YOU START: *The students should be familiar with the names of various phases and the cause of lunar phases.*

ACTIVITY —

Ask the students to stand up and spread out so that each student can extend his or her arms without bumping into other students.

1. Have all students face the same direction, and face that same direction yourself so that they will easily follow right and left with minimal confusion.
2. Describe the setting: let the students know that they will be making a model of the position of the Sun and Moon in the sky. Share that you are all facing south, so that east is to the left, and west is to the right. (Optional: add signs for North, East, South, and West to the walls.)
3. Start with holding out your right hand to the west, fingers spread wide, and share that it will represent the Sun. Ask your students to position their Sun setting in the west (held straight out to your right).
4. Hold up your left hand as a fist, and share that it represents the Moon. The Moon should always be closer to your head than the Sun—the Moon is never behind the Sun.
5. Model the New Moon—move it to the right (west), positioned in front of the “Sun” (the right hand). *Which side of the Moon is the Sun (wiggle the fingers of your right hand) shining on? (the far side of the Moon, which we can't see) Where is the New Moon at sunset? (also setting in the west)*
 - Ask the students to move the Sun, keeping the same angle between the Sun and Moon: move the Sun lunchtime, by holding your right hand, with fingers still spread out, high above you, and move your left hand (a fist) to high above you and in front of the “Sun.” *Where is the New Moon at noon? (high in the sky)*
 - Ask the students to move the Sun to sunrise, moving your right hand (fingers spread out) to the left, and your left hand (fist) to the left, still between you and the “Sun”. *Where is the New Moon at sunrise? (rising in the east)*
6. Modeling First Quarter Moon—put the “Sun” (right hand, fingers spread out) in the west (to the right), and position the “Moon” (left hand, in a fist) high overhead. *Which side of the “Moon” is my “Sun” (wiggle your fingers on your right hand) shining on? (the right side of the Moon) When the Sun is setting, where is this phase of the Moon? (high in the sky) Which phase is this? (First Quarter)*
 - Ask the students to keep this angle between the Sun and Moon and to move the Sun lunchtime: move your right hand, with fingers still spread out, to high above you, and simultaneously move your left hand (a fist) to the left. *Where is the First Quarter Moon at lunchtime? (rising in the east)*

- Ask the students to keep this angle between the Sun and Moon and move the Sun to sunrise, moving your right hand (fingers spread out) to the left, and your left hand (fist) down towards your feet. *Where is the First Quarter Moon at sunrise? (below the Earth)*
7. Modeling Full Moon—put the “Sun” (right hand, fingers spread out) in the west (to the right), and position the “Moon” (left hand, in a fist) to the east (to the left). *Which side of the “Moon” is my “Sun” (wiggle your fingers on your right hand) shining on? (the side facing us) Which phase is this? (Full Moon) When the Sun is setting in the west, where is the Full Moon? (rising in the east)*
- Ask the students to keep this angle between the Sun and Moon and to move the Sun lunchtime: move your right hand, with fingers still spread out, high above you, and simultaneously move your left hand (a fist) down toward your feet. *Where is the Full Moon at lunchtime? (on the other side of the Earth)*
 - Ask the students to keep this angle between the Sun and Moon and move the Sun to sunrise, moving your right hand (fingers spread out) to the left, and your left hand (fist) toward the right. *Where is the Full Moon at sunrise? (setting in the west)*
8. Modeling Third (Last) Quarter Moon—Let the students know you will need to switch hands for this last phase, so that the Sun will be your left hand. Put the “Sun” (left hand, fingers spread out) in the east (to the left), and position the “Moon” (right hand, in a fist) high overhead. *Which side of the “Moon” is my “Sun” (wiggle your fingers on your left hand) shining on? (the left side) Which phase is this? (Third or Last Quarter Moon) When the Sun is rising in the east, where is the Third Quarter Moon? (high in the sky)*
- Ask the students to keep this angle between the Sun and Moon and to move the Sun lunchtime: move your left hand, with fingers spread out, high above you, and simultaneously move your right hand (a fist) to the right. *Where is the Third Quarter Moon at lunchtime? (setting in the west)*
 - Ask the students to keep this angle between the Sun and Moon and move the Sun to sunset, moving your left hand (fingers spread out) to the right, and your right hand (fist) toward your feet. *Where is the Third Quarter Moon at sunset? (on the other side of the Earth)*

To allow your students more time to use this model and to test their reasoning, you may want to shift to the back of the room and invite the students to position their hands based on your verbal directions, as you provide them with the time of day and the Moon phase, or have some of your students practice leading the other students through it again. To assess, ask your students to predict answers to questions like these:

- *What time does the Full Moon set?*
- *Where is the First Quarter Moon at noon?*
- *What time does the Third Quarter Moon rise?*
- *Where is the New Moon at sunrise?*
- *What time does the First Quarter Moon reach its highest point in the sky?*

TIES TO STANDARDS —

Texas Essential Knowledge and Skills for Science

8 (7) Earth and space. The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon. The student is expected to: (B) demonstrate and predict the sequence of events in the lunar cycle.

Next Generation Science Standards

MS.Space Systems: Students who demonstrate understanding can: MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

Crosscutting Concepts:

Patterns: Patterns can be used to identify cause and effect relationships. (MS-ESS1-1)

Scale, Proportion, and Quantity: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3)

Systems and System Models: Models can be used to represent systems and their interactions. (MS-ESS1-2)

Disciplinary Core Ideas

ESS1.A: The Universe and Its Stars: Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1)

Science and Engineering Practices

Developing and Using Models: Develop and use a model to describe phenomena. (MS-ESS1-1),(MS-ESS1-2)