

ASTRONOMY SCIENCE PROJECT

Showing Moon Phases

What You Need:

- An orange (or a Styrofoam ball of a size similar to an orange)
- A pencil
- A desk lamp (or any lamp with a removable shade)
- A room that can easily be made dark
- An adult's help



What You Do:

1. Get an adult to help you push the sharp end of a pencil halfway through the orange; push it far enough to keep it stable when you hold the unsharpened end.
2. Find a room that you can make dark by turning off the lights and closing shades. If you can't make it dark enough, do the experiment when it is dark outside or use blankets to cover windows.
3. Set the lamp on a table or dresser so it is about the same level as your head when you're standing. Turn the lamp on and remove the shade or turn the lamp so that the bulb is facing toward you (if you're using a desk lamp).
4. Stand about 3 feet in front of the lamp and hold the pencil with the orange attached to it out at arm's length. The orange should be between you and the lamp. For this activity, you represent Earth, the lamp is the sun, and the orange is the moon.
5. To see the moon's phases, slowly turn your whole body to the left, keeping your arm straight out in front of you with the orange at eye level. This is how the moon orbits the Earth. Keep turning in the same direction until you have gone in a full circle and are facing the lamp again. Keep your eyes on the orange and watch the shadows on it very carefully to see the phases of the moon as we see them from Earth.

What Happened:

It takes around 29 days for the moon to orbit the Earth once and the same amount of time for the moon to spin around one complete time on its axis. That means that we always see the same side of the Moon! However, we do see the moon changing as it goes through its phases.



While facing the lamp (sun), the surface of the orange (moon) facing you (Earth) was dark, even though the other half of the orange, facing toward the lamp was bright. This is the first phase of the moon, called new moon. We can't see the moon at all during this phase!



As you began to turn away from the lamp, a shadow still covered most of the orange, but you probably saw a small crescent shape of light on the right side of the orange. This phase is called waxing crescent.



The next phase is called the first quarter: the light (sun) shone on the half of the orange (moon) facing it. From Earth, we see half of the light side and half of the dark side during this phase so sometimes it is called a "half moon."



As you continued to turn to the left, the light shone on more of the side of the orange you could see, lighting up all of the orange except for a small crescent. This is the waxing gibbous phase.



Once you had turned halfway around so that the lamp was directly behind you, the light (sun) shone directly on the orange (moon) making the whole side facing you bright. This is a full moon. During a full moon, the side facing away from Earth is dark. This phase is the exact opposite of new moon.

(Note: if the orange isn't fully illuminated, try moving your head or shoulders so you aren't blocking the lamp. If you are blocking it, you've created a lunar eclipse - which happens when the Earth blocks the sun's light from hitting the moon. Normally, the moon is just above or just below Earth so an eclipse doesn't happen every time there is a full moon.)



At this point, the amount of the light side of the moon that we can see begins to decrease, or wane. The next phase is called waning gibbous. Most of the moon is still light during this phase.



Next is the last quarter (also called third quarter) where only half of the illuminated side of the moon is visible. This phase is opposite of first quarter. Notice that your back is facing toward the direction you were facing when you saw the first quarter phase!



The last visible phase is the waning crescent, where only a sliver of light is visible. This phase is opposite the waxing crescent. After this, you will be facing toward the lamp (sun) again, and the orange (moon) will be back to the new moon phase!

If you're having difficulty remembering the difference between waxing and waning moon phases, these rhymes might help:

Waxing: "Moon on the right, getting bigger every night." (Leading to a full moon.)

Waning: "When the moon is waning, it is fading to the left until there's no moon remaining." (Leading to a new moon.)