

# RAFT IDEAS

**Topics:** Moon Phases, Solar System, Reflection

## Materials List

- ✓ Ball, Styrofoam, highly reflective ~5 cm (2”), or equivalent
- ✓ Stir-straw, or narrow straw or stick ~ 2 mm in diameter
- ✓ Light source (lamp without lampshade or overhead projector), one per class

This activity can be used to teach:

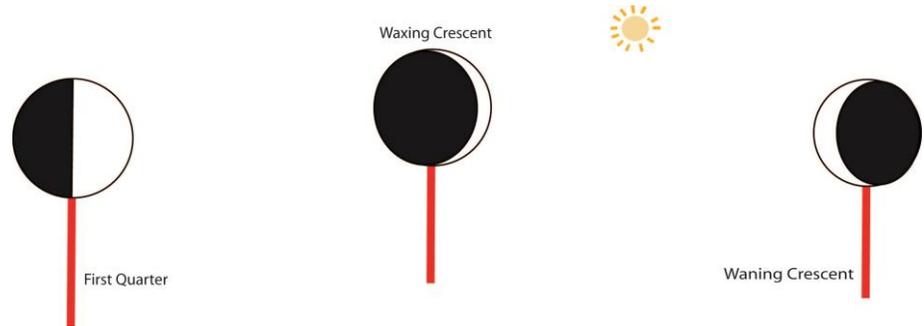
Next Generation Science Standards:

- Patterns of the Moon (Grade 1, Earth and Space Science 1-1)
- Earth Sun Moon System (Middle School, Earth and Space Science 1-1)
- Effect of light on an object (Grade 1, Physical Science 4-3, Grade 4, Physical Science 4-2)
- Science & Engineering Practices (Grades K-12)



# Holding the Moon in Your Hand

## Moon Phases on a Stick



This model demonstrates how the Moon’s phases occur as the Moon orbits the Earth.

### Assembly

1. Push straw into the center of the ball ~2½ cm (1”) deep so that the ball is secure.

### To Do and Notice

1. Place the lamp in the center of the room or place the overhead projector in the corner of the room. Turn on the lamp or projector; turn off any other lights and cover windows to darken the room. The lamp/projector represents the “Sun”.
2. Stand in a circle or an arc, so that everyone has an unobstructed view of the light.
3. Hold the ball (the “Moon”) at arm’s length between the head (the “Earth”) and the light (the “Sun”). In this position, the light shines on the side of the Moon away from the Earth - this models the New Moon phase.
4. Keeping the Moon at arm’s length, slowly turn the whole body a little to the left (counter-clockwise as seen from above) until a little light can be seen on the Ball Moon. What shape is the light? What happens to the shape of the lighted portion as the turning continues until the position is 90° from the starting point (New Moon)? This interval is the Waxing (growing) Crescent. The First Quarter is the exact point (90°) when the right half of the Moon’s visible portion is illuminated.
5. Continuing to turn slowly to the left, note how the lighted portion changes, this increasing phase is the Waxing Gibbous interval. The point at 180° when all of visible portion of Moon is illuminated is the Full Moon.
6. Turning slowly to the left, note the Waning (diminishing) Gibbous interval, then the Last Quarter at 270° - when the left half is lighted, the Waning Crescent interval, and finally return to the New Moon position.

### The Science Behind the Activity

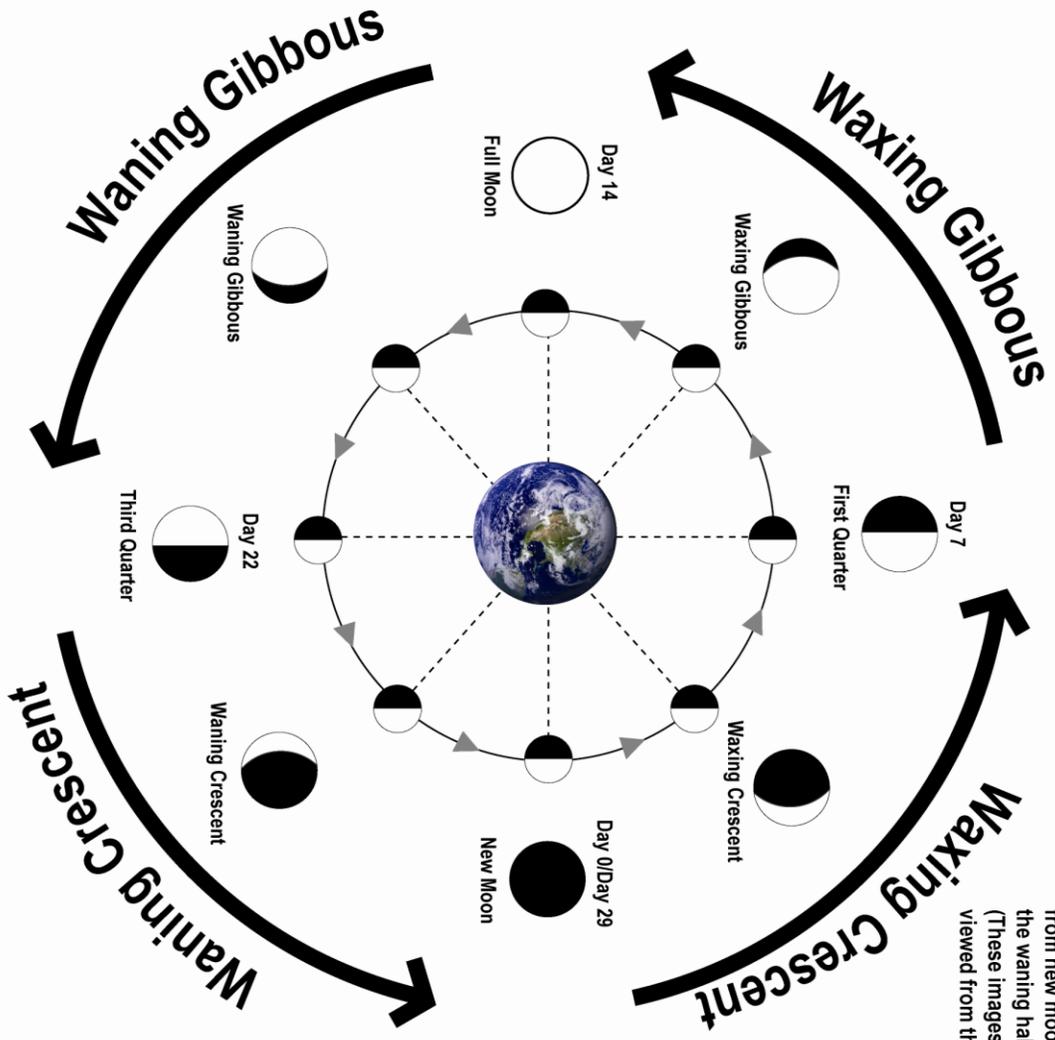
Half of the Moon’s surface is always illuminated by the Sun except on the rare occasions when the Moon enters the Earth’s shadow. When seen from the Earth the Moon seems to cycle from being in total darkness (a new moon) to being fully illuminated (a full moon) and back again. The changing area of illumination is the result of our seeing varying parts of the constantly illuminated half of the Moon as the Moon circles the Earth. The cycle of varying illumination is divided into 4 exact points (**new moon, first quarter, full moon, and third quarter**) and the 4 intervals between the exact points (**waxing crescent, waxing gibbous, waning gibbous and waning crescent**), are collectively called “the Phases of the Moon”.

### Taking it Further

Use the model to demonstrate how Solar Eclipses can occur only during the New Moon phase and Lunar Eclipses can only occur during the Full Moon phase.

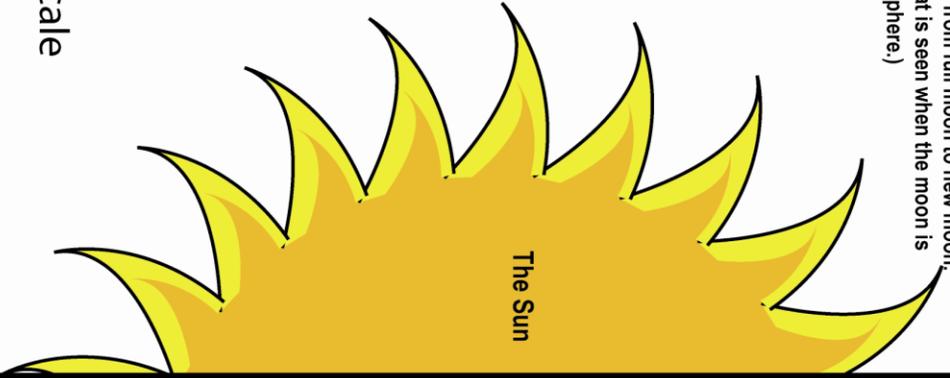
**Web Resources** (Visit [www.raft.net/raft-idea?isid=106](http://www.raft.net/raft-idea?isid=106) for more resources!)

# PHASES OF EARTH'S MOON



The moon has a phase cycle of 29.5 days. The cycle starts at the "New Moon" and each subsequent point in the cycle is described by counting the number of days that have passed from that point. The first half of the cycle is known as the waxing half which runs from new moon up to full moon. The second half of the cycle is the waning half which continues from full moon to new moon. (These images are based on what is seen when the moon is viewed from the Northern Hemisphere.)

Not to Scale



The Sun

Copyright 2008 RAFT