

# Moon Phases

## Background Information

Watching the night sky, primitive civilizations believed that the Moon actually changed shape over the course of a month. These changes in apparent shape are known as the phases of the Moon.

Like all of the planets in the Solar System, only one-half of the Moon can receive sunlight at a given time. As the Moon revolves around Earth, its appearance changes from day to day, depending upon its location in orbit. Sometimes the sunlit side of the Moon is facing away from Earth. This is referred to as the New Moon. During the New Moon, the Moon cannot be seen from Earth with the naked eye because the dark side is facing us. The New Moon rises near the time of sunrise and sets near sunset.

When the sunlit side of the Moon faces Earth, a Full Moon is seen. For this to occur, the Moon must rise and set opposite the Sun. Therefore, when the Sun is setting in the evening (say, about 6:00), the Full Moon is rising in the east. Use the diagram to see why this must be the case.

In between the New and Full Moons, when only half of the side facing the Earth is illuminated, First and Third Quarter Moons are said to be seen. First and Third Quarter Moons get their name from their orbital “stage”. If the New Moon is the beginning of the orbital cycle, then the Moon has completed one-fourth of its cycle at First Quarter. Halfway through the cycle, the Full Moon might as easily be called a Second Quarter Moon. Three quarters of the way through the cycle, the Third Quarter Moon is seen. The end of the cycle is also the beginning of a new one – the New Moon. Again, use the diagram to help you visualize how this works.

A more tangible way of appreciating the cause of the phases of the Moon is to make a person-sized, three-dimensional model.

## Objectives

By the end of this activity, students will be able to:

- explain the phases of the Moon through modeling.
- observe how the Moon’s phases change.
- explain the meaning of moon phase vocabulary.

## Instruction Time

45 Minutes

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## Materials

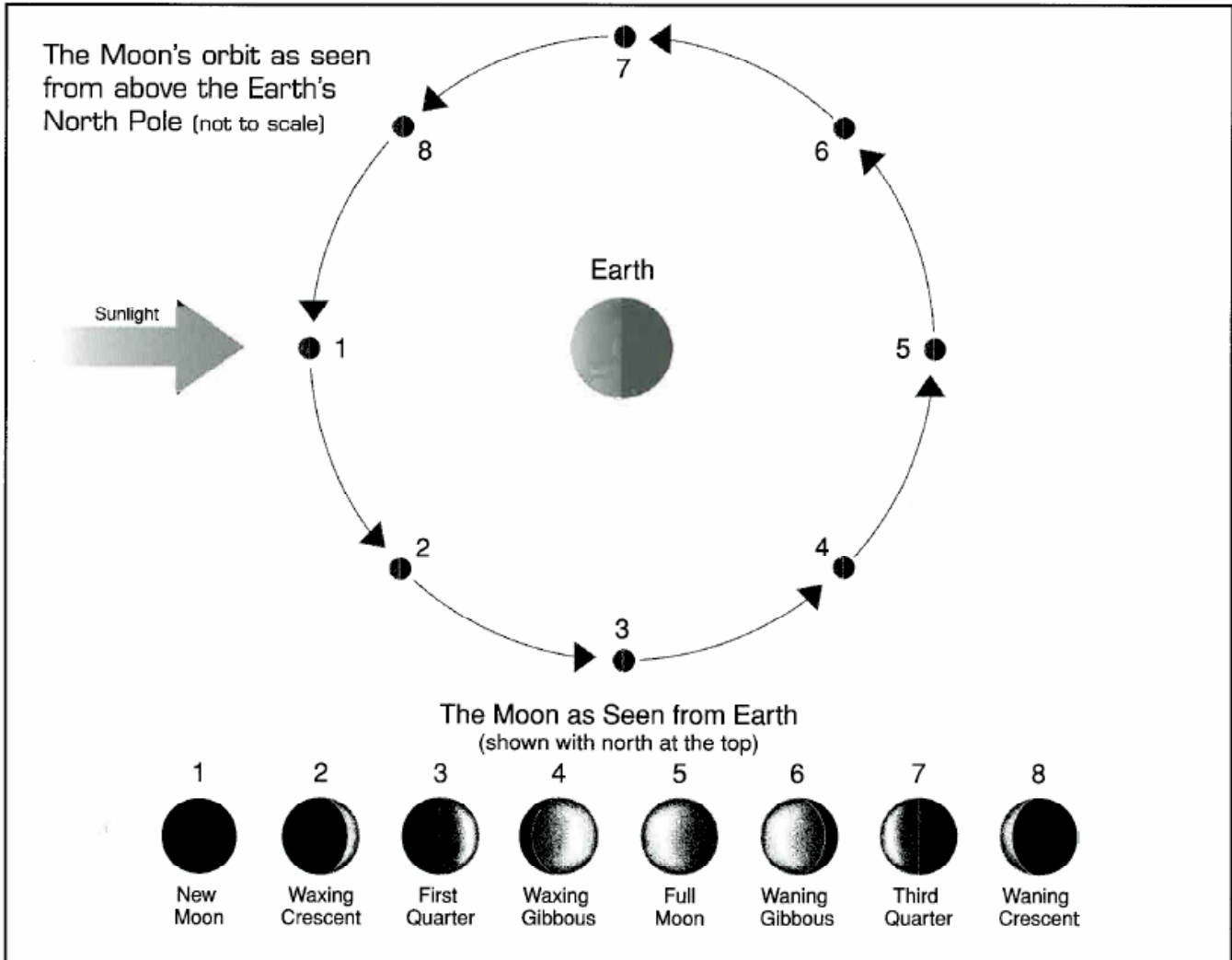
- Astronomer Journal page 20 – 21
- Tennis balls – 1/2 of each tennis ball painted black (1 per pair of students)

## Procedure

1. Divide class into groups of two.
2. Give one student a tennis ball while the other sits in a chair facing the front of the class. The front wall of the class is the Sun.
3. The student with the tennis ball walks in a circle around the other student, stopping at eight even intervals of 45 degrees. **NOTE:** You will need to guide students through this activity so that they know where they should stop to make observations. If possible mark the locations by placing a piece of tape on the floor.
4. As they walk in a circle, the student holding the tennis ball positions the ball with the painted black surface facing away from the front wall (Sun).
5. The seated student draws on the worksheet (in the Astronomer Journal) a picture of the ball exactly as it appears, showing both the light and dark sides at each of the eight locations.
6. Have the students look at the phases of the Moon diagram in their Astronomer Journals to verify their work.
7. Discuss the terms *waxing*, *waning*, *gibbous*, and *crescent* and how they apply to the Moon's phases.

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**DIAGRAM:** Students will use this diagram to verify their work.



Rotation: Day/Night – Apparent Motion – Revolution: Year – Seasons – **Moon Phases**

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