I. Objectives

1. Record the appearance and location of the Moon relative to the Sun for at least a month.
2. Explain the relationship between the location and appearance of the Moon and the location of the Sun relative to the Earth.
3. Describe the locations of the Sun, Moon and Earth that are necessary for an eclipse to occur.

II. Introduction

Throughout history, the relationships among the Sun, Moon and Earth have been important. Ancient priests and astronomers used their knowledge of the motions of these three bodies to calculate solar eclipses and lunar eclipses, ancient people used the positions of the Sun and Moon and their passage relative to monuments and temples to decide when to plant and harvest crops, and even today, the motions of the Sun and Moon remain important. Their motions are often overlooked, however, because we no longer depend on them to provide us with the kinds of information that were vital to the survival of the ancients. The sidereal period and synodic period of the Moon are accurately known and with a few observations taken throughout a month we can estimate them.

III. Prelab Definitions

1. solar eclipse

2. lunar eclipse

3. umbra

4. penumbra

5. sidereal period

6. synodic period

7. Callipic cycle

8. Hipparchic cycle

9. Metonic cycle

10. Saros cycle

11. gravitational locking

12. tidal coupling

IV. Prelab Questions

1. What is the sidereal period of the Moon in days?

2. What is the synodic period of the Moon in days?

3. Explain how Earth’s revolution causes the Moon's sidereal and synodic periods to be different.

4. In what positions do the Sun, Moon and Earth need to be for a solar eclipse to occur? Include a labeled diagram that shows the positions of the Earth, Moon and Sun. Shade the dark side of the Moon.

5. In what positions do the Sun, Moon and Earth need to be for a lunar eclipse to occur? Include a labeled diagram that shows the positions of the Earth, Moon and Sun. Shade the dark side of the Moon.

6. Summarize the information shown in the slides on the Moon Observation Lab Images site.

V. Lab Procedure

1. Observe the Moon at least twice each week for at least a month and record your obsevations in the *Moon Observation Data* table below. Be sure that you make an observation on or near each of the 8 phases: new, waxing crescent, first quarter, waxing gibbous, full, waning gibbous, third quarter, and waning crescent.

   Use the following terms, not specific clock times, to describe the Moon's location in the various parts of the sky:

   - sunrise
   - between sunrise and noon
   - noon
   - between noon and sunset
   - sunset
   - between sunset and midnight
   - midnight
   - between midnight and sunrise

Moon Observation Data

Phase	Rises	Highest in sky	Sets

VI. Lab Discussion

1. Neatly draw a diagram with the Sun and the Earth and **label** each of them. On the same diagram draw the 8 phases of the Moon, label each of the phases, and shade **ONLY** the dark side, the side not lit by the Sun, of each of the 8 Moons.

2. Your observations should provide evidence that the Earth is not flat. What is that evidence?

3. Does the Moon rotate? Explain your answer.