

TRACKING THE MOON OVER ONE
COMPLETE CYCLE

TRACKING THE MOON OVER ITS CYCLE

OBJECTIVE: This exercise is designed to acquaint you with the behavior of the moon as moves about the earth during one "moonth" or month of time.

INTRODUCTION

The moon makes a journey about the earth in about 30 days. This timing gives us the divisions on the calendar into time intervals of months. It is interesting to observe the nature of the moon in terms of its position in the sky and its shape as it makes its journey about the heavens. This exercise is designed to allow you to make a study of what the moon looks like and how it appears in different parts of the sky at different times of the month.

You can see how the moon should look by observing the patterns shown in figure 1. Figure 2 shows you how the light of the sun arrives at the moon, is reflected and finally comes to us here on the earth.

The moon revolves about the earth and also turns on its axis. It makes only one turn per month and, thus keeps its face toward the earth viewer. This position allows us to conclude that the moon makes one rotation with respect to space in one lunar cycle. Check this out by using figure 3. Just take a pointer and allow it to point toward the object about which it is rotating and note that the pointer turns one time in your hand as you move it around the object.

Figure 4 demonstrates how we move along the path about the sky in our view of the moon illuminated by the rays of the sun. Our view of the illuminated surface will be one that will give the patterns shown in figure 1 and the ones that you will obtain as you move over the course of 30 days of the month ("moonth").

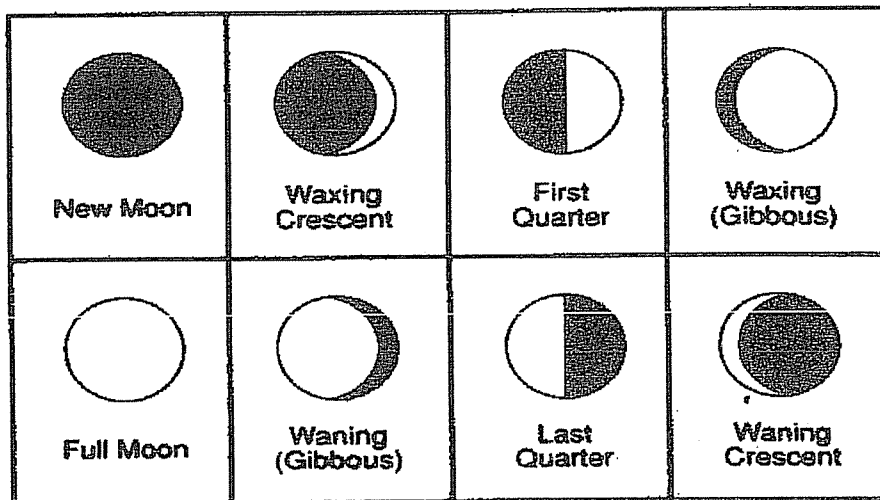


Figure 1. The shape of the moon as seen over a period of one full cycle.

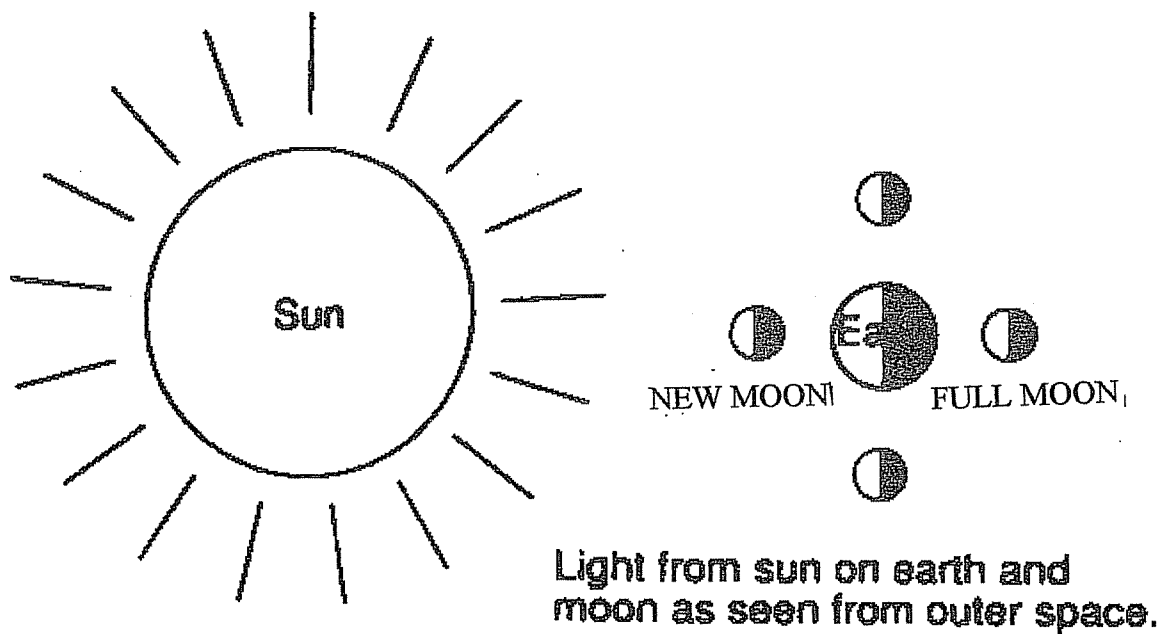


Figure 2. The nature of the motion of the moon and sun as viewed from space to produce the patterns of light on the lunar surface.

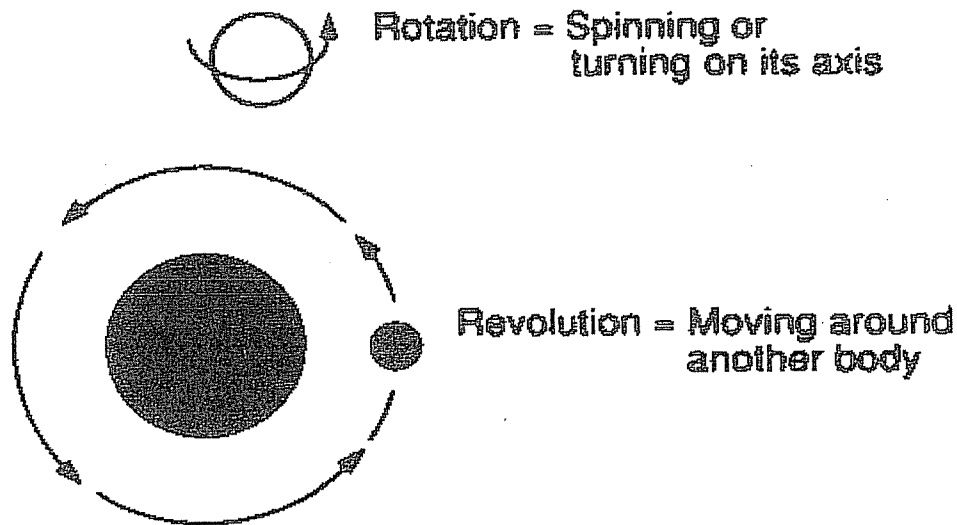


Figure 3. The nature of rotation and circulation of the moon, earth and sun system to allow the surface of the moon to be illuminated in various patterns.

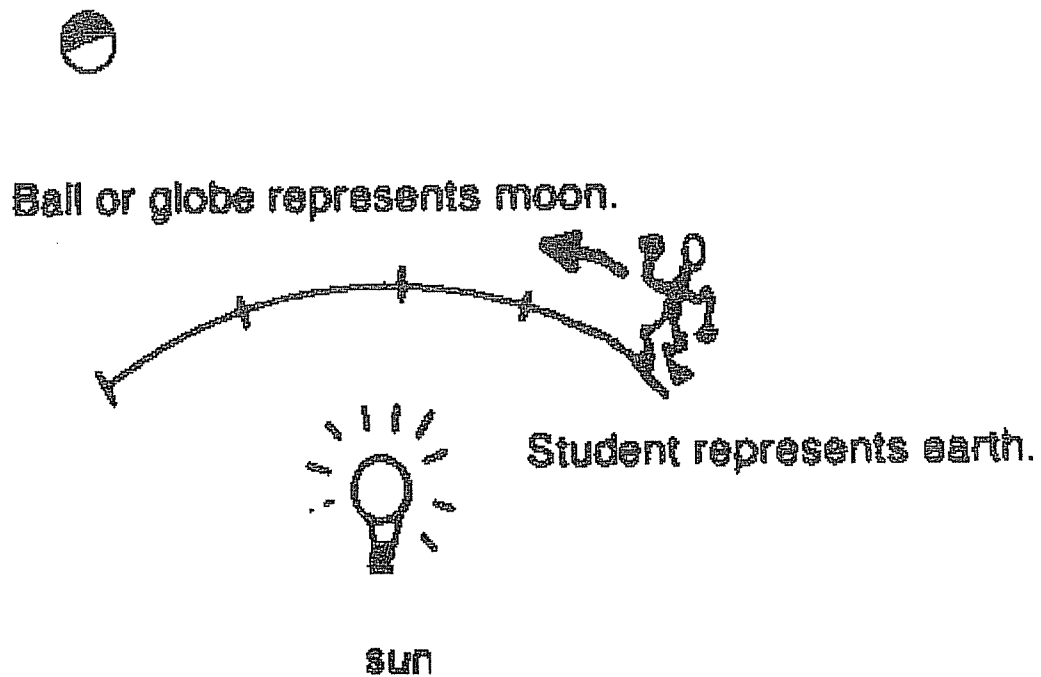


Figure 4. A schematic of the nature of our motion across the heavens with respect to the sun and moon to allow us to perceive phases in the light coming to us from reflection on the surface of the moon.

PROCEDURE FOR OBSERVING THE MOON

The sextant that you constructed in another exercise can be used to determine the angular location of the moon in the sky. You should plan to make your observations about the same time each night to establish a relative pattern for the motion of the moon. You will be able to summarize your results and draw conclusions about the moon when you review the data that you obtain. The data are put in the calendar sheets included in this exercise. You should be sure to write in the time of night, day of the month, the angle above the horizon, approximate declination North and South of the position directly overhead and sketch the shape of the moon's disk.

Take the sextant and go out on a clear, or nearly clear night, and locate the moon in the sky. Determine the angle that the line of sight makes with the horizon plane. Estimate also the angle North or South of the latitude drawn directly overhead for the record. Record your results in the appropriate block in the data sheets. You will need to specify the time of the observation, the date of the observation and sketch the shape for a complete set of data. Be sure to specify whether the angle measured is in a Westerly direction or an Easterly direction from the vertical, i. e., do you have to look East or West of your vantage point to find the moon in the sky? The calendar blocks are not labelled for the days of the month in that you may choose to observe the moon for a specific month and can begin the exercise any time during a month. This does not remove the need to be sure and label the date for the right day of the month in the calendar. Remember that anything after local midnight becomes the next day on the calendar entry.

When you choose the month and date to make the observations, enter those results into the calendar provided. Be careful to sketch the shape of the moon with the proper direction of the lune

shape. This is an important part of your observation.

When you locate the moon in the sky, you should make note of any bright objects that lie in the sky near the moon. If you know what these objects are, please label them in your drawing.

When you have completed one complete cycle, about 28 days, you have completed the data collecting part of the exercise. You are now ready to make some observations and answer some questions about the moon.

Record sheet for the position and shape of the moon during its cycle.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY

THURSDAY

FRIDAY

SATURDAY

SUNDAY

THURSDAY	FRIDAY	SATURDAY	SUNDAY

QUESTIONS

1. How many days does it take for the moon to return to the same phase?
2. When the moon shows a crescent shape (you have probably had one of the croissant breads), what do you notice about the direction of the "horns" of the crescent?
3. Is the time interval of the moon's cycle about the earth a good measure of the passage of time?
4. Your diagrams show a change in size of the moon as it progresses across the sky. We know there is no change in the size of the object. Sketch some figures to show how the moon is made to appear as it does to us?
5. The American Indians counted the ages of their children as "so many moons". Is this a good way to reckon time? Explain.

6. The calendar has 12 months in it but these do not have equal numbers of days in them. Can you give an explanation of why this is so?

7. Did you notice any distinguishing features about the moon when you could see some of its surface?

8. If you can visually recall the apparent size of the sun at sunrise or sunset, how does the size of the moon compare with it?