

Group Members:

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## Phases of the Moon

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This lab is designed to lead you to a thorough understanding of why the moon goes through phases. You will be using the observations of the moon from the last three weeks as you do this activity.

### 1) Interpreting your moon log observations.

Use your observations from the last three weeks to summarize the pattern of lunar phases:

a) Describe how the angle of the moon from the sun has changed in the last three weeks.

b) Describe how the amount of the moon that appears to be illuminated has changed in the last three weeks.

c) What does the term “waxing” mean? What does the term “waning” mean? How do these definitions relate to the changing angle of the moon from the sun and to the changing illumination of the moon over the last three weeks?

d) Use your data for your first and last observations of the moon to fill in the following table:

	First observation	Last observation
Date of observation		
Angle and direction of moon from the sun		
# of days between first and last observation		
Angle the moon moved between first and last observation		
# of degrees that the moon moves per day		
Using this data, how long will it take the moon to make one complete orbit of the earth (360°)?		

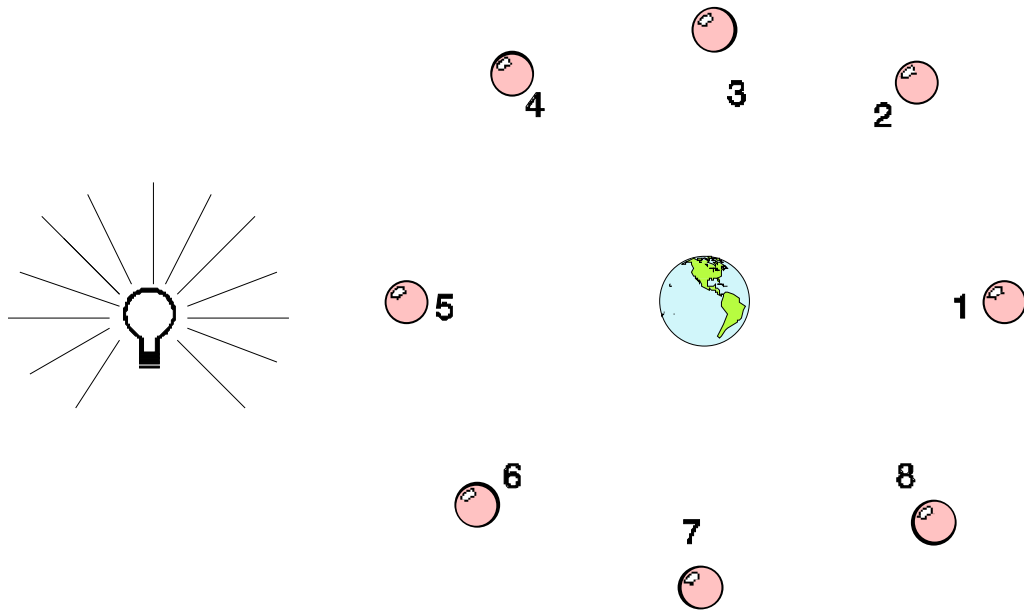
e) Explain how you determined how long it will take the moon to make one complete cycle of phases.

## 2) A Model Showing Phases When One Object Orbits Another.

The following activity is designed to help you understand why any object, such as the moon, which orbits the earth goes through phases. This activity uses a Styrofoam ball and an incandescent light to make a model of the earth, the sun and the moon. ***In this model, the incandescent light represents the sun, the Styrofoam ball represents the moon and your head represents the earth.***

- The incandescent light is hung from the middle of a darkened room.
- Stand anywhere in the room with the Styrofoam ball in your hand.
- Look closely at the Styrofoam ball that should be illuminated by the incandescent light. What fraction of its total surface is illuminated at any one time? Half? More than half? Less than half?
- The earth and the moon are both illuminated by the sun. What fraction of their total surface do you think is illuminated by the sun?
- Now hold the ball at arm's length while facing away from the incandescent light. Slowly rotate your entire body completely around. Observe the illumination of the Styrofoam ball carefully while doing this. *Note: this observation must be done by the person who is holding the ball and*

*rotating!* Fill in the table on the last page with your description of the changes that you see in the illumination of the ball.



- f) Repeat step e. This time, make careful sketches in the table of what the illumination of the Styrofoam ball looks like at each of the eight orbital positions shown on the diagram above. Note that the diagram shows the ball as seen from above.
- g) Explain in your own words why the moon goes through phases. Your explanation should include references to what you learned in this activity.

Position #	What fraction of the surface of the Styrofoam ball is actually illuminated in this position	What fraction of the surface of the Styrofoam ball appears to be illuminated as seen from the center (i.e. from the earth.)	Draw a sketch of what the Styrofoam ball (i.e. the moon) looks like in this position.
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