

Name: _____ Period: _____ Date: _____

Shadow Simulation Lab
Astronomy

Introduction: The shadows produced by the Earth and the Moon are interesting in the way that they cast or block light. Let's see if we can see them on other objects!

Umbra and Penumbra

Materials:

- light source (flashlight app on phones works best)
- a sharpened or mechanical pencil
- Styrofoam ball on a dowel
- 1 sheet of white paper
- ruler
- textbook or binder



Directions:

1. Gather materials.
2. Shut off all lights to make the room as dark as possible.
3. Have one group member stand up the text book on the lab table and place one sheet of white paper in front of it. (It should look like a movie screen.)
4. Measure out 2 feet away from the base of the "screen" and set phone to where the light from the flashlight is shining on the white paper.
5. Beginning with the pencil point, hang the object in front of the light at the distances specified below and draw the shadow that gets casted. Be sure to make a note as to whether an umbra, penumbra, or both were present for each distance measured. Repeat with the pencil eraser and Styrofoam ball and a shadow puppet of your choice!

	Pencil Point	Pencil Eraser	Styrofoam Ball	Shadow Puppet of Your Choice!
Sketch of Shadows 1"				
Shadows Present				
Sketch of Shadows 6"				
Shadows Present				
Sketch of Shadows 12"				
Shadows Present				

Analysis Questions

Each of the following must be answered in several complete sentences for full credit!

1. In part 1, what happens to the shadows of the objects as they move further away from the light source? What is the relation between the umbra and penumbra for each?

2. How do the objects and positions in part 1 resemble the Moon, Earth, and light coming from the Sun in regards to Earth's shadows and their effects? Explain.