# MGA: The Phases of the Moon & and the Phases and Size of Venus

The idea of "phases", of either the Moon or of Venus, has appeared several times in this class. In this assignment, you will replicate these phases, which arise because of the changing positions of the Moon (or Venus) relative to Earth, and because the Moon (or Venus) is half illuminated by the Sun. There is no better way to understand a science concept than by reproducing it yourself, and while we can't do that with every concept we encounter in this class, we can with phases.

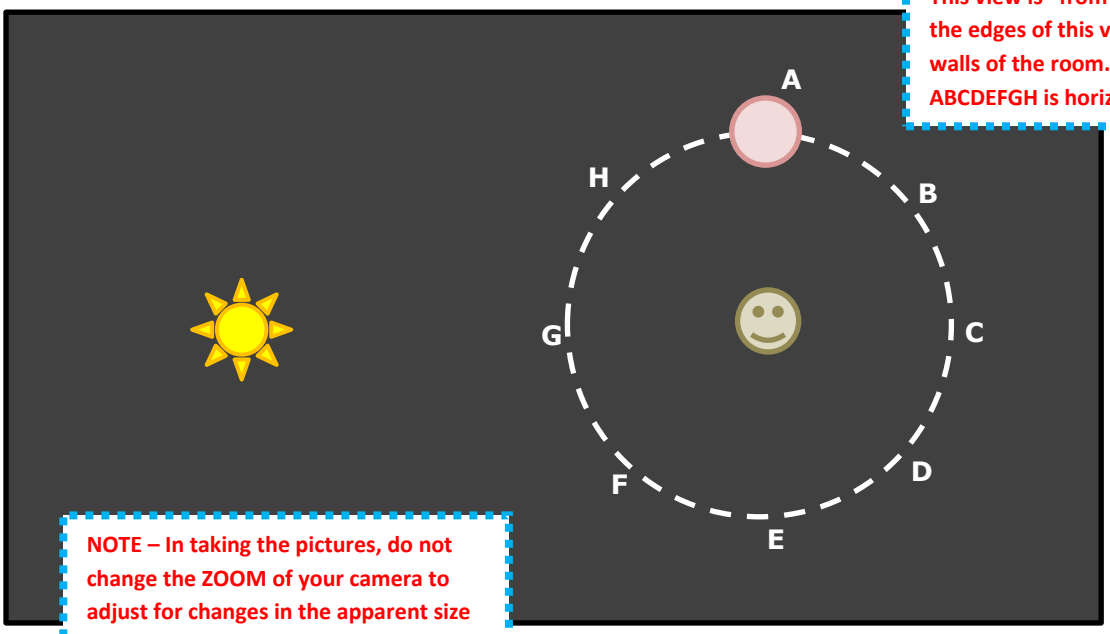
For this assignment, which you will do at home, you will need some basic equipment:

1. A dark room.
2. A light source – such as a lamp with no shade (just a bare bulb). 
3. A ball. 
   *A ball with a rough surface, like a baseball, is best. Do not use a ball with a smooth, shiny surface, like a glass Christmas Tree ornament. If you do not have a ball easily at hand, a nice round orange will work as a cheap substitute.*
4. A camera (even a cheap-o cell phone camera will usually work). **NO FLASH**
5. Your head. 
6. Maybe a helper.
   *The helper can be another AST 101 student, in which case you can do this assignment as a two-person team (larger teams are **not** acceptable).*

## Part I – Moon Phases

In this part, the light is the Sun, the ball is the Moon, and your head is the Earth.

Set up your light (the "Sun") in the dark room, as shown below. There should be no other significant light sources in the room (**note – turn off the camera flash**). Position the ball (the "Moon") at **A**, or have a helper hold it. Hold the camera close to your face (your head is the "Earth"), so *the camera sees the same thing you see with your eyes*. Take a photo of what the "Moon" looks like from "Earth" when it is at **A**. Repeat for the "Moon" at B, C (make sure the shadow of your head does not eclipse the "Moon"), D, E, F, G (make sure the "Moon" does not block the "Sun"), and H.



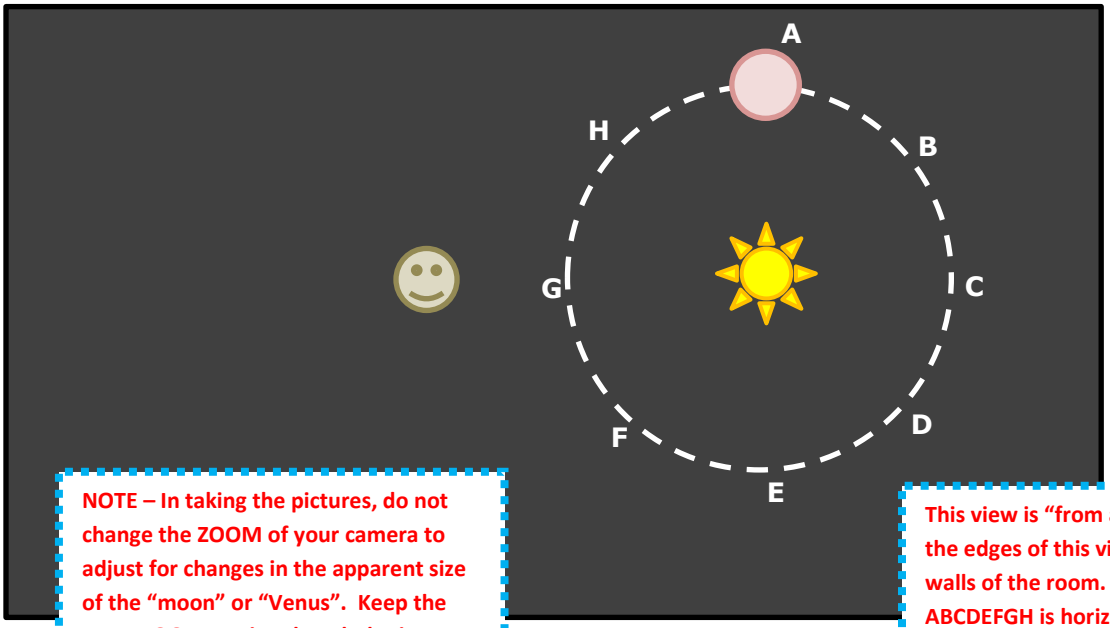

**This view is "from above" and the edges of this view are walls of the room. The circle ABCDEFGH is horizontal.**

**NOTE – In taking the pictures, do not change the ZOOM of your camera to adjust for changes in the apparent size of the "moon" or "Venus". Keep the same ZOOM setting the whole time.**

**Part II – Venus Phases (and Sizes)**

In this part, the light is the Sun, the ball is Venus, and your head is the Earth.

Set up your light (the "Sun") in the dark room, as shown below. There should be no other significant light sources in the room (**note – turn off the camera flash**). Position the ball ("Venus") at **A**, or have a helper hold it. Hold the camera close to your face (your head is the "Earth"), so *the camera sees the same thing you see with your eyes*. Take a photo of what "Venus" looks like from "Earth" when it is at **A**. Repeat for the "Venus" at B, C, D, E, F, G, and H.




Lastly, take a picture of you, together with your ball and light source. (If you are doing this as a team, include both teammates in the picture.)

**What to Turn In – Written Option**

Arrange the "Moon" photos in order, with letters to identify what position the photo shows (i.e. "A", "B", etc.). Also with each photo include identification of what phase of the "Moon" is illustrated in the photo (i.e. "quarter", "full", etc.).

Arrange the "Venus" photos in order, with letters to identify what position the photo shows (i.e. "A", "B", etc.).

Include the photo of you with the ball and light source.

In a typed paragraph (150 words or more), discuss what you learned from this assignment. Turn in all this material, in hardcopy form, by the due date. Do not turn it in electronically.

**What to Turn In – YouTube Option**

Rather than using still photos, you may opt instead to make this into a video. To see an attempt to do this with Moon phases, see https://www.youtube.com/watch?v=1_RXWzXPxus (but this guy's room is not really dark enough – and he doesn't do Venus).

The video should first show the Moon phases, and in the video you must identify each phase of the Moon (i.e. "quarter", "full", etc.). The video should then show the Venus phases. It should also show you with your light and ball. The video should also include in a closing statement that discusses what you learned from this assignment (150 words minimum—must be within the video itself).

Post the video to YouTube, and send me the link via e-mail (christopher.graney@kctcs.edu) by the due date.