

Virtual Lab: How do Earth and the moon interact to cause the moon's phases? 1 pt ec printing
http://www.glencoe.com/sites/common_assets/science/virtual_labs/ES22/ES22.html

You have probably noticed that the moon always looks a little different. One night during a month it appears full and another it appears as a thin crescent. The reason for this is that the moon revolves around Earth. How much we see of the moon depends on where it is in relation to Earth. There are times when, even on a clear night, we cannot see the moon at all. This phase of the moon is called a new moon and occurs when the moon is between Earth and the sun. The lighted half of the moon faces the sun and the dark side faces Earth. Not long after a new moon, we can see a small part of the moon. As the moon becomes more visible, it is said to be waxing. The waxing phases of the moon are: new moon, waxing crescent, first quarter, and waxing gibbous. A crescent moon occurs approximately 24 hours after a new moon, and again just before the next new moon. The term crescent refers to the thin slice of the lighted side of the moon that is visible from Earth. A gibbous moon occurs between first quarter and full moon, and again between full moon and the third quarter. During a gibbous moon, more than one half, but less than all, of the side of the moon that faces Earth is lighted. A full moon can be seen when the half of the moon that is facing Earth is visible. This occurs when Earth is between the moon and the sun. After a full moon we begin to see less of the moon each night. In this phase, the moon is waning. The waning phases of the moon are: full moon, waning gibbous, third quarter, and waning crescent. In this Virtual Lab you will explore the different phases of the moon using an animated model of the Earth-moon system.

Objectives:

Recognize eight different phases of the moon within an animated model of the Earth-moon system.

- Investigate the appearance of the moon from Earth at different positions of the animated Earth-moon system.
- Investigate the appearance of Earth from the moon at different positions of the animated Earth-moon system.

Procedure:

Note: The relative sizes of Earth, the moon, and the sun, and the distances between them, are not to scale

1. Click Play to see an animated model of the Earth-moon system. Click Pause to pause the animation and examine the position of Earth and the moon in relation to the sun.
2. Click the phase that you think represents the current phase of the moon shown on the screen. If you made an incorrect selection, click another phase button or click Play to resume the animation.
3. If you made a correct selection, click the View Moon button to view the moon from Earth. Then click the View Earth button to see Earth from the moon.
4. Repeat the activity several times. Record your observations in the Journal.

Journal Questions:

1. Label & draw each phase of the moon in order, and describe the characteristics of the Earth and moon for each phase

1. New Moon	2.	3.	4.
5.	6.	7.	8.

2. How does the appearance of each phase of the moon relate to the moon's position relative to Earth and the sun?

Phase 1: New Moon: _____

Phase 2: _____

Phase 3: _____

Phase 4: _____

Phase 5: _____

Phase 6: _____

Phase 7: _____

Phase 8: _____

3. How does the revolution of the moon affect its appearance?

Virtual Moon Lab #2: Lunar Phases Interactive:

http://highered.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Lunar_Nav.swf::Lunar%20Phases%20Interactive

Read introduction:

Is the Moon only visible at night? Why does it sometimes look like a crescent? Why does the first quarter appear after sunset, but the last quarter before sunrise? You have undoubtedly seen different phases of the Moon, but how well do you understand their cause?

This interactive gives you a chance to view the Moon from a usual place- standing on the ground in the northern hemisphere, looking south- and, simultaneously, from an unusual place- in space, far above the Moon's location in its orbit, its appearance in the sky, and the time of day.

As the Moon moves around the Earth in its orbit, the view from the ground will show it changing phase: growing from the invisible New Moon to a thin crescent, then to First Quarter, waxing gibbous, and finally Full Moon. It will then gradually diminish back to waning gibbous, Third Quarter, waning crescent, and new Moon again. But if you watch from the vantage above the Earth's North Pole, you'll see something quite different: a spherical ball which is always half-lit but the Sun. Why do we ordinary observers on the ground see changing phases?

There are times when the Moon appears to be directly between the Earth and Sun, or directly behind the Earth. Shouldn't an eclipse occur at these times? If the orbit of the Moon lay in the plane of the Earth-Sun line(as it appears in the view from above), then yes, it should. But in real life, the orbit of the Moon is tilted away from the Earth-Sun line: that means that shadows of the Earth and Moon pass above or below each other. If you look closely at the sky around the New Moon, you can see the Moon passing below the Sun. Only once or twice a year, when the Moon's line of nodes points along the Earth-Sun line, would you see an eclipse.

When you load this interactive, you should see several things happening at once. On the left side of the screen you look down on the Earth and Moon from far above the North Pole. You can see the Earth rotate on its axis: it takes 24 hours in real life, but only 20 seconds or so in this accelerated simulation. You can also watch as the Moon revolves around the Earth. On the right side of the screen is a panel showing the view of an observer standing on the Earth. When the observer is on the sunlit side of the Earth, the panel shows blue skies and a typical daytime scene: when the Earth rotates to take the observer to the dark side of the Earth, the panel changes to night. Below the panel are 2 indicators of time: a clock and a calendar.

Compare the clock to the position of the observer on the rotating Earth. At what time is the observer pointing directly towards the Sun? Does that make sense? Look carefully at the relative positions of the observer and the Moon on the left side of the screen, and the position of the moon in the sky in the panel on the right.

If you want to think things over for a moment, click the Pause Time button at the bottom of the panel. Clicking it again will resume the ordinary march of time. While time is stopped, you can make 2 kinds of adjustments. First, by clicking on any square on the calendar, you can jump forward or back in time to that day. Second, left-clicking the hand of the clock and dragging it, you can modify the time of day. In both cases, you can watch the consequences of these actions, both in the view from space and in the landscape.

Answer the following questions:

1. At what time of day does the observer leave the dark side of the Earth and enter the sunlit side?

2. Describe the relative positions of the observer and the Moon:
 - a) when the Moon is just rising in the landscape view: _____
 - b) when the Moon is at its peak altitude in the landscape view: _____
 - c) when the Moon is about to set in the landscape view: _____
3. How many days are there between New Moon and Full Moon? _____
How many days are there between New Moon and Third Quarter? _____
4. Is it ever possible to see the Moon at noon? _____
5. Pause the march of time, and set the clock to midnight. Click on the days of the calendar to answer these questions:
 - a) on what day is the Moon first visible at midnight? _____
 - b) for how many days is the moon visible at midnight? _____
6. You go outside at midnight tonight and see the Moon low in the sky to the west. If you go outside at midnight tomorrow, where will the Moon be? _____
7. According to someone who watches the sky from midnight to 3am tonight, which way does the Moon appear to move?

According to someone who takes snapshots of the Moon at midnight only, and compares their snapshots on successive nights, which way does the Moon appear to move? _____

Can you explain why these two answers are different? _____

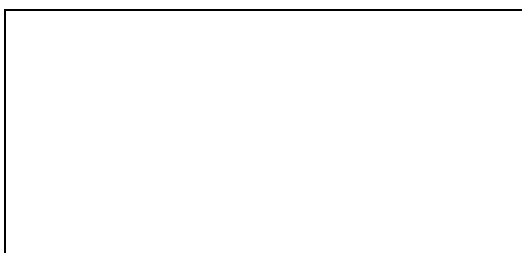
8. Is the word "calendar" really an accurate description of the arrangement of days in the panel on the right?

Virtual Lab #3 **Moon Phases Lab**

Write your answers on this lab sheet.

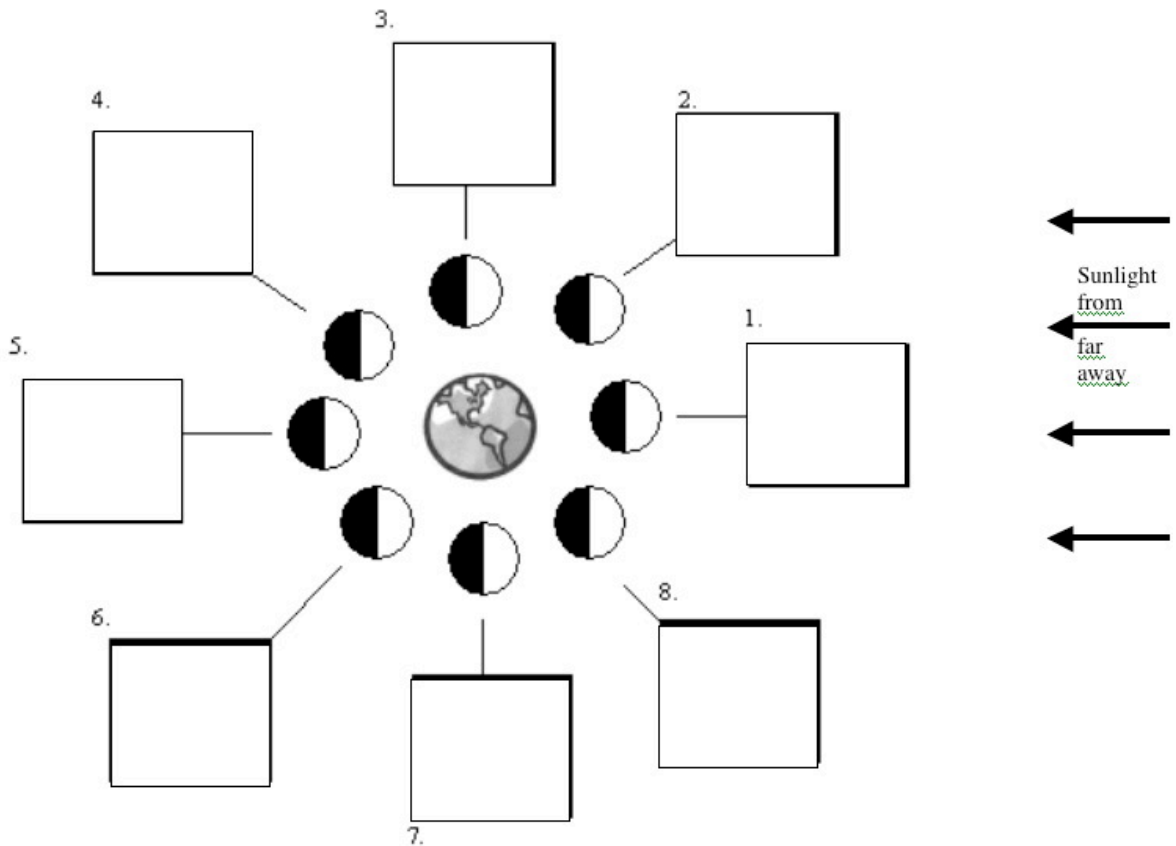
1. Before you visit any of the websites listed below, write an explanation in your own words of why you think we see different phases of the moon.

2. Click the [Virtual Reality Moon Phase Pictures](http://tycho.usno.navy.mil/vphase.html) link. <http://tycho.usno.navy.mil/vphase.html>
Enter your birthday and the year you were born. You don't need to enter the hour and time zone.
Draw "your moon" in the box below, then color darkness around it.



Click the [moon diagram](http://www.sciencekids.co.nz/pictures/space/moonphases.html) link.
<http://www.sciencekids.co.nz/pictures/space/moonphases.html>
Use the diagram to figure out the name of "your moon"
What phase was your moon in when you were born?

3. Using this moon diagram, complete the phases of the moon and what we see on earth in the drawing to the right.



4. Click [The Moon's Phases](http://www.sumanasinc.com/webcontent/animations/content/moonphase.html) link. <http://www.sumanasinc.com/webcontent/animations/content/moonphase.html>
 Press the "play" and "stop" buttons until it shows the full moon. How much of the moon circle do we see during a full moon? _____
 Draw the positions of the sun, earth, and moon during the full moon (you must have all 3!!!!!!).

Press the "play" and "stop" buttons until it shows the new moon. How much of the moon circle do we see during a new moon? _____

5. How long are the Phases of the Moon? Click the [ExploreLearning](#) link.

<http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=613&ClassID=2505882>

Class code: GVGFMGHH6X to get to phases of the moon. If you aren't taken directly to this: In the search box (upper right), type "phases of the moon" and hit enter. Then find the "Phases of the Moon" gizmo (probably the 2nd one). Click "Launch Gizmo". Check the "Show Viewing Area" box.

Press the play button to make the moon start to move around the Earth. How many days does it take for the moon to complete one lunar cycle? _____

This animation is drawn as if we were in a spaceship floating high above the north pole. Does the moon seem to change from our spaceship view? _____

Why does the moon go through different phases when we look at it from Earth? _____
