

## Lunar Phase Wheel Instructions

The lunar phase wheel shows a geocentric view of the Sun-Moon-Earth system. Imagine the wheel represents your view of the sky. When the Sun or the Moon are below the Horizon line, they will not be visible in the sky.

### Materials

- [Lunar Phase Wheel Page 1](#)
- [Lunar Phase Wheel Page 2](#)
- brad-style fastener
- scissors

**Procedures:** Follow the instructions outlines on the Lunar Phase Wheel pages then complete the following.

### Time of day on the wheel is determined by the position of the Sun.

- 1) Set the time to sunrise. Where is the Sun relative to the horizon line?
  
- 2) Keep the wheel with the Sun in the position for sunrise. Turn the window on the phase wheel until you find the full moon. Where is the full moon relative to the horizon line?
  
- 3) Turn the window on the phase wheel to the first quarter position. Where is the first quarter moon in the sky at sunrise?
  
- 4) Turn the window on the phase wheel to the new moon position. Where is the new moon in the sky at sunrise?
  
- 5) Turn the window on the phase wheel to the 3<sup>rd</sup> quarter position. Is the 3<sup>rd</sup> quarter moon visible at sunrise? Why or why not?

### Moonrise and Moonset

- 6) Turn the window on the phase wheel until you find the full moon. Now keeping the window on the full moon, move the Sun from sunrise through to sunset to model a day. Is the Moon above the horizon line (visible) during the day?
  
- 7) Keep turning the Sun wheel from sunset to sunrise while keeping the lunar phase window on the full moon. What do you notice about the relative position of the Sun and Moon?

- 8) Move the phase window to new moon. Repeat steps 6 and 7 for each of the phases on the wheel, moving counterclockwise with the window from new moon to waxing crescent, etc. What do you notice about the relative positions of the Sun and Moon for each phase?
  
- 9) What does the turning of the Sun wheel represent? (The Sun appears to move in our sky, but what is the cause of this apparent motion?)

### **Appearance of the Moon in the Sky**

- 10) Move the phase window to the waxing crescent phase. Next move the Sun wheel until the waxing crescent phase is at its highest point above the horizon. Draw the crescent moon below.
  
- 11) Keeping the phase window on the waxing crescent phase, move the Sun wheel to just after sunset (and right before moonset). Now draw the crescent moon as it appears in the phase window. Explain the difference between your drawing of the waxing crescent at its highest point in the sky and when it is just about to set.
  
- 12) Move the lunar phase window to the 1<sup>st</sup> quarter moon, and move the Sun wheel to bring the 1<sup>st</sup> quarter moon to its highest point in the sky. Draw what you see in the lunar phase window. Add an arrow to indicate the direction of the Sun when the 1<sup>st</sup> quarter moon is in this position.

- 13) Move the lunar phase window to the 3<sup>rd</sup> quarter moon, and move the Sun wheel to bring the 3<sup>rd</sup> quarter moon to its highest point in the sky. Draw what you see in the lunar phase window. Add an arrow to indicate the direction of the Sun when the 3<sup>rd</sup> quarter moon is in this position.
- 14) Using your drawings for questions 12 and 13, explain why the 1<sup>st</sup> and 3<sup>rd</sup> quarter moons appear illuminated on opposite sides (are mirror images of one another.)

### **Finding the Moon**

- 15) How can you use this lunar phase wheel to help you find the Moon in the sky? What information do you need to know for the lunar phase wheel to be useful in finding the Moon?

### **Model a Phase Cycle.**

- 16) Set the time to sunset with the sun wheel. Move the phase window to new moon. Now keeping the time of day constant, model the orbit of the Moon around the Earth by moving the phase window through each phase until you reach new moon again. Which matches the lunar phase cycle, moving the phase window clockwise or moving the phase window counterclockwise?
- 17) How does the direction of motion for question 16 relate to the orbit of the Moon around the Earth?

## ~ ANSWER KEY ~

Time of day on the wheel is determined by the position of the Sun.

- 1) Set the time to sunrise. Where is the Sun relative to the horizon line?  
**Technically, sunrise occurs the moment the 1<sup>st</sup> part of the sun becomes visible above the horizon. Anything about the sun touching the eastern horizon would be acceptable.**
- 2) Keep the wheel with the Sun in the position for sunrise. Turn the window on the phase wheel until you find the full moon. Where is the full moon relative to the horizon line?  
**It is on the western horizon, "moonset".**
- 3) Turn the window on the phase wheel to the first quarter position. Where is the first quarter moon in the sky at sunrise?  
**Not visible below the horizon, on the opposite side of the planet**
- 4) Turn the window on the phase wheel to the new moon position. Where is the new moon in the sky at sunrise?  
**Eastern horizon, also "moonrise"; but not visible since no sunlight is being reflected off the Moon back to Earth**
- 5) Turn the window on the phase wheel to the 3<sup>rd</sup> quarter position. Is the 3<sup>rd</sup> quarter moon visible at sunrise? Why or why not?  
**Yes, it would be high in the sky (noon position)**

### Moonrise and Moonset

- 6) Turn the window on the phase wheel until you find the full moon. Now keeping the window on the full moon, move the Sun from sunrise through to sunset to model a day. Is the Moon above the horizon line (visible) during the day?  
**It may be visible on the horizon, however, this is not technically during the day...it is called twilight.**
- 7) Keep turning the Sun wheel from sunset to sunrise while keeping the lunar phase window on the full moon. What do you notice about the relative position of the Sun and Moon?  
**They stay on opposite sides of the Earth from each other.**
- 8) Move the phase window to new moon. Repeat steps 6 and 7 for each of the phases on the wheel, moving counterclockwise with the window from new moon to waxing crescent, etc. What do you notice about the relative positions of the Sun and Moon for each phase?  
**The new moon is always in the same position as the Sun; the waxing crescent follows the Sun's position.**
- 9) What does the turning of the Sun wheel represent? (The Sun appears to move in our sky, but what is the cause of this apparent motion?)  
**Rotation of the Earth**

### Appearance of the Moon in the Sky

- 10) Move the phase window to the waxing crescent phase. Next move the Sun wheel until the waxing crescent phase is at its highest point above the horizon. Draw the crescent moon below.

