

## Phases of the Moon Lab Exercise

Before we look at the Moon's phases let's think about the rotation of the Moon around Earth. We all know it takes a month for the Moon to rotate around the Earth but what exactly is "a month"? In fact, the time it takes the Moon to orbit the Earth is 27.3 days (this is called a sidereal month, sidereal means 'in relation to the stars'). But the time it takes the Moon to complete one complete cycle of phases (from full moon back to full moon) is 29.5 days (this is called a synodic month, synodic means 'in relation to the Sun'). Why is there a difference?

Watch this YouTube video: '[Difference between Sidereal & Synodic Month](https://www.youtube.com/watch?v=IAoCHt3xro0)' by Michel van Biezen . URL: <https://www.youtube.com/watch?v=IAoCHt3xro0>

Question 1 (20 pts.). In the video the diagram Michel van Biezen has drawn on his white board has the Earth/Moon/Sun represented as if we are looking from a particular viewpoint or viewing position. Where are we viewing the system from? Write your answer on the Answer Sheet (final page of this document).

Is there really a "dark" side of the Moon? Well, no, but one side of the Moon does always face away from Earth. Look at the full Moon at any month of the year and you will see the same features, the same impact craters, the same mare, the same highlands. Why is that? Watch this YouTube video: '[Why Do We Only See One Side of the Moon?](https://www.youtube.com/watch?v=s7KjFD0Kw-4)' by Michel van Biezen . URL: <https://www.youtube.com/watch?v=s7KjFD0Kw-4>

Question 2 (16 pts.). Michel explains that certain forces acting on the Moon due to Earth's gravitational pull have caused the Moon's rotational speed to slow down over the past ~4 billion years, so that today the Moon has a synchronous orbit. What are these forces called? Write your answer on the Answer Sheet (final page of this document).

The Answer Sheet (final page of this document) has a set of three diagrams on it. Diagram 1 is a view of the Earth-Moon-Sun system as viewed from space way above the north pole. Diagram 2 is a set of eight views of the Moon as seen from Earth. And diagram 3 is a set of four views of Earth as seen from the Moon. Use the diagrams or any household objects you have available (a lamp for the Sun, an orange for Earth and a ping-pong ball for the Moon works) to model the Earth-Moon-Sun system and answer the following questions. Here is a link to a YouTube video '[The Phases of the Moon Explained](https://www.youtube.com/watch?v=TNzj2HgSNek)' by Michel van Biezen that will help. URL: <https://www.youtube.com/watch?v=TNzj2HgSNek> .

Question 3 (16 pts.). Shade the open circles numbered one to eight in Diagram 1 (The Moon in Orbit As Viewed From Above), with a dark side and a lit side. Remember this diagram is a view from way out in space looking down on Earth's north pole, the Moon is orbiting in a counter-clockwise direction and the Sun is always at the bottom of the page. The big clue here is to look at the dark side and lit side of the Earth.

Question 4 (32 pts.). Shade the open circles in Diagram 2 (The Moon Viewed From The Earth), with the phases of the Moon as we see them from Earth. Underneath on the lines next to the numbers 1-8 write the name of the phase.

Question 5 (16 pts.). Shade the open circles in Diagram 3 (The Earth Viewed From The Moon), with the phases of Earth as an astronaut on the Moon would see them. Make up appropriate names for the phases and write them in the numbered spaces (1, 3, 5, 7) below.

**Answer Sheet**

By entering my name below, I agree to abide by all copyright regulations regarding this document.

**Name:** \_\_\_\_\_

Q.1 Answer: \_\_\_\_\_

Q. 2 Answer: \_\_\_\_\_

