

CHAPTER OVERVIEW

3: Modeling Earth and Moon Together

Our first model of the lunar phases is an easy and exciting place to start, but there is something missing – the Earth! Whenever we talk about a moon in orbit, we automatically assume that there is a planet for the moon to circle around. Early lunar models had the same problem that our model did, they failed to account for the Earth. Rather like a fish ignoring the water that they swim in every day, it is easy for us to ignore the Earth; in spite of it being so large, it is all around us and under our feet every day. People often forget to consider the obvious!

Gravity will also emerge as a major theme of this unit. Most of my astronomy students are astonished at how much gravity affects everything in the cosmos – and the Earth-Moon system is their first introduction to that concept. Although the activities in this unit seem to address many separate facets of the Earth and Moon, gravity unites them all!

Our new models will help students understand that the Earth and Moon are a system – two planet-sized objects bound forever together in space by their mutual gravity. If we wish to understand how the Moon works and how the lunar phases we see every night are produced, then we must take into account the Earth beneath our feet. In fact, because the Earth and Moon are bound together, we cannot understand one without studying both of them together. While it may seem incredible to you, this fundamental scientific truth was not discovered until the late 1960's when we first began to send men and robotic craft out into space to explore the Moon for the first time.

This new model will also begin to take into account the *physical scale* of the Earth-Moon system. The Moon is about $\frac{1}{4}$ the size of the Earth, but very far away – about 30 Earth diameters away. Both the large size of the Moon relative to the Earth and the great distance from the Earth is seldom appreciated. Our new classroom model will be quite large and is best explored outdoors or perhaps in a gymnasium-sized space. Because it is accurate both in terms of *size and distance*, it will correct common errors seen in most models and diagrams of the Earth-Moon system – it is almost certain to surprise and delight your students.

[3.1: Making a Scale Model of the Earth-Moon System](#)

[3.2: Exploring the Moon's Orbit](#)

[3.3: Rotation and Revolution](#)

This page titled [3: Modeling Earth and Moon Together](#) is shared under a [CC BY-NC-SA 4.0](#) license and was authored, remixed, and/or curated by [Daniel E. Barth](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.