



Scaling a Solar Eclipse – Teacher Guide

Maintaining scale

The main learning goal for this activity is for students to appreciate the spatial orientation of the Sun, Earth and moon during a solar eclipse. A second, is to learn the relative sizes of, and distance between these bodies. We attempted to use components (see Suggested material resources) for our model that would approximate the following relative diameter proportions:

110 Earths = 1 sun

4 moons = 1 Earth

30 Earth diameters (approximately 15" (or 38-40 cm) from Earth to the moon.*

*The pearl head pin held at a slightly bent elbow armlength (15 in or 38 cm) from the eye will approximate the Earth-moon distance at this scale.

Suggested material sources

Item	Source	Link
Balloon (5-6 foot)	Amazon	https://bit.ly/3Q8uJKc
Balloon clamp	Menards	https://bit.ly/45RhhAf
Air pump	Amazon	https://bit.ly/46QCNXa
Pearl head pins (black)	Amazon	https://bit.ly/49buXJp
Pencils with eraser	Amazon	https://bit.ly/3FDct7e
Marbles (approx. 5/8 in)		

In practice

1. Depending on the actual size of the Sun balloon, the distance required to complete the model will be in the vicinity of 1 ½ to 2 football fields (400-500 feet), giving students a spectacular visual of the Earth-Sun-moon distances to scale, corresponding to the approximate sizes of the objects we are using.
2. The pearl head on the pin and the marble approximate the relative sizes of the moon and Earth, respectively, with the Earth being 4 moons across. We use a standard pencil and have students stick the pin into the eraser for safe handling; wine corks or lab corks could work as well, but the pencil is easy to grasp and hold onto.
3. While the marble provides a scale Earth relative to the pin head, our reference to the eyeball is for the purpose of position rather than diameter. Holding the pinhead 15 inches from the eye can be modeled, with the pinhead and marble the same distance apart, the marble representing the eye. The human eye is actually closer to a diameter of 1 inch, but a marble of 5/8-3/4 inch better matches the scale of our model.

4. Bear in mind, the dimensions of the balloon, pin head and eyeball Earth are approximate, and are intended to model the bodies portrayed, for the sole purpose of giving students an experience to appreciate and remember.
5. Positioning and securing the balloon, particularly on a windy day can be an issue. We recruit one or two volunteers to hold the balloon in position while students complete their experiment.
6. Inflating the balloon can be done in advance, although it is really part of the fun for student to observe and take part in approximating the diameter of the balloon as it inflates to the required diameter.
7. An interesting comparison, is to think about the distance in this scale model between the Earth and the sun as one scale AU. The model distance can be measured, scaled to the proportions of the model and compared to the actual distances.