**Investigating Data on the “SuperMoon” in the Earth-Moon System**

**Purpose:**

 The lesson explores the idea of a SuperMoon and is designed to demonstrate that the Moon’s orbit around the Sun is not circular but elliptical.

**Objectives:**

* Students will analyze data
* Students will create visual representations of data to best represent pattern(s)
* Students will determine the properties of the Moon’s orbital path
* Students will evaluate scientific claims from media

**Pennsylvania Standards:**

3.3.6.B1 Explain why the planets orbit the Sun in nearly circular paths

**Pre-assessment:**

 Students will be asked to draw a picture that reveals their understanding of a SuperMoon (words are not permitted). Assess students’ understanding while they interpret each other’s drawing. [Art Gallery Walk]

**Set Induction:**

 Distribute the SuperMoon article (retrieved here -- <http://www.accuweather.com/en/outdoor-articles/astronomy/extreme-super-full-moon-to-cause-chaos/46417>) and allow students a few minutes to read silently. Chart the big ideas from the article and paraphrase main points. Set the stage by sharing we want to determine why is a potential “SuperMoon” even possible?

**Instructions:**

1. Create an Earth-Moon scale model that fits within the classroom. This model will be used to better

 understand ‘apogee’ and ‘perigee’.

1. Reveal Starry Night software and demonstrate how data were obtained.
2. Regroup students into groups of three. Each group is to analyze the data for patterns and

 then determine the best way to visualize any pattern(s).

1. After students complete graphs, allow them to share what they learned about the three data

 sets: angular measurement and distance, thirty consecutive days, and thirty consecutive full

 moons.

Some key ideas to make explicit – the change in measurement of the apparent diameter of the Moon is a function of its distance from Earth and the changing distance is best explained by an elliptical orbit.

**Closure:**

 Revisit the Earth-Moon model and determine where the Moon’s apogee and perigee are in the model. Use the model to revisit the question about whether the SuperMoon is super, that is, is there any large deviation in the Moon’s distance beyond its normal perigee? Then reinforce that any Earth-based naked eye observation of the Moon can be blocked by the width of an index finger held from an extended arm. Exit ticket is an index card with a three sentence minimum answer to the cause of the Moon’s changing angular size and a mention of the SuperMoon question with evidence to support claims.

**Adaptations/accommodations for diverse learners:**

 Students may have the article read to them. Calculators may assist students during the modeling activity. The measurements for the model may also be determined by the teacher in advance. Students struggling with creating visual representations of the data may refer to a newspaper like USA Today, which contains many creative visual interpretations of data.

**Follow-up Activity:**

 Other items may be added to the model, such as the International Space Station (ISS) or Mars to compare programs from NASA’s human spaceflight efforts. Another follow-up activity is to ask the students to write an article in response to the SuperMoon article to counter the claims presented by that author.

**Connections to real-world contexts:**

 Media may promote non-scientific understanding of phenomena. Equipping students with critical thinking skills may allow them to be more critical readers.

**Materials needed:**

**Evaluation:**

1. A check sheet will be used to determine whether each student engages in the analysis of data.
2. Groups will create visual representations of data on chart paper.
3. Exit ticket that contain short paragraphs with answer to the nature of the Moon’s orbit and

 the SuperMoon question with evidence to support the students’ claims.