Modeling the Earth & Moon Relationship (Size and Distance)

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Warm Up: Does the full moon always appear to be the same size in the sky? Explain your thinking.

Lesson:

1. Students are shown an assortment of balls with varying diameters as well as deflated balloon. Explain that the balloons can be used to create a size if students feel there is not an appropriate sized ball to represent either the Earth or Moon.
2. Students are asked to choose 2 balls – one to represent the Earth, the other to represent the Moon. Emphasize that we are seeking accuracy in creating a scale model of relative sizes.
3. On their data sheets, students record which balls were selected and give justification as to why those particular balls were chosen.
4. Give students the actual diameters of the Earth and Moon. [Earth = 7,918 miles (12,742 km); Moon = 2,159.2 miles (3,475 km)] Students record these diameters on their data sheets.
5. Ask students to find the diameters of their selected balls and record those diameters on their data sheets. (Ask students for suggestions as to how we will find diameters. Guide them to using a pencil to mark each edge of a ball, then measuring the distance between the marks.)
6. Give students the opportunity to reselect balls (Earth, Moon, or both) based on the information given (E, M diameters) and calculations made (diameters of balls chosen).
7. On their data sheets, students record new ball choices or state that ball choice remained the same and give justification as to why.
8. Guide students to find a ratio to represent the Earth-Moon diameter comparison. Record this ratio on data sheet.
9. Students measure the diameters of their balls (if new ball(s) were selected) and calculate the ratio of the diameters of their balls. Record all information on data sheet.
10. Ask students to compare the Earth-Moon ratio to their balls ratio. Record on data sheet. Give students one final opportunity to change ball selection. Students record and justify final ball selection on data sheet.
11. Ask students to place their Earth & Moon what they consider to be the appropriate distance apart from each other and measure how far apart that the balls were place. Record information on data sheet with justification as to why this distance was chosen.

12. Give students the actual distance between Earth & Moon (384,400 km). Ask for ideas to figure out how we can use this data to calculate information for our model. Have them to calculate the ratio (Moon's distance):(Earth's diameter) on the worksheet. The ratio is about 30 indicating that the 30 Earth objects laid in a straight line.
13. Guide students to estimate how many Earth objects (their model Earth) would fit in a line between the Earth and the Moon.
14. Tell students that 30 Earth objects laid in a straight line represent the distance between Earth and the Moon. Have the students separate their Earth and Moon so that the distance between them is correct.
15. After students have placed their Earth and Moon models at the appropriate distance, ask them if they are surprised and if they have any other observations or questions.
16. Exit Slip: How Big is the Moon? (Round 2)

Homework: Where is the furthest place that you've traveled to? What is the distance (in km) between us and that location? Feel free to ask your family members about your travels and use the internet for distance in km.

Extension Activity: Use the distance gathered in the homework assignment to calculate how many of each student's longest trip on Earth it would take to travel to the moon.