

Sunny Castleberry

Endeavor: Math Connections in a STEM Classroom

Assignment: Data...and Math Are Everywhere

1. Data Image

## **Solar System Sizes and Distances**

Distance from the Sun to planets in astronomical units (au):

<b>Planet</b>	<b>Distance from Sun (au)</b>
Mercury	0.39
Venus	0.72
Earth	1
Mars	1.52
Jupiter	5.2
Saturn	9.54
Uranus	19.2
Neptune	30.06

Source: [https://www.jpl.nasa.gov/edu/pdfs/scaless\\_reference.pdf](https://www.jpl.nasa.gov/edu/pdfs/scaless_reference.pdf)

Diameter of planets and their distance from the Sun in kilometers (km):

Planet	Diameter (km)	Distance from Sun (km)
Sun	1,391,400	-
Mercury	4,879	57,900,000
Venus	12,104	108,200,000
Earth	12,756	149,600,000
Mars	6,792	227,900,000
Jupiter	142,984	778,600,000
Saturn	120,536	1,433,500,000
Uranus	51,118	2,872,500,000
Neptune	49,528	4,495,100,000

2. How does this data serve as an engaging context for the math concepts you teach?

Students love space! They have not seen it since grade school and middle school is the perfect time to bring it back. Student thinking skills are higher and there are more complex mathematical concepts that can be applied to space at a middle school level, such as exponents as well as ratios and proportions.

3. What is the measurable objective of the activity?

- A. Students will be able to determine how many kilometers equals 1 astronomical unit and will use this ratio to determine planetary distance from the sun in kilometers.
- B. Students will be able to rewrite numbers from standard notation into scientific notation and make observations about the exponents and distance.
- C. Students will be able to develop questions about the solar system that require adding, subtracting, multiplying and dividing numbers in scientific notation.
- D. Student will be able to add, subtract, multiply and divide using scientific notation.

- E. After researching information about planets and surface area of spheres, students will be able to calculate the volume of the planets, and then compare and contrast diameters and volumes of the planets to discover their relationship.

#### 4. CCSM-Principals addressed

[CCSS.MATH.CONTENT.8.EE.A.3](#)

Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

[CCSS.MATH.CONTENT.8.EE.A.4](#)

Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology

[CCSS.MATH.CONTENT.8.G.C.9](#)

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

#### 5. Collect evidence regarding the use of data in the classroom

It is the end of the year...we are all online and we have already covered scientific notation in class. However, I will use this as an activity for the volume of a sphere one day the last two weeks of school. My assessment would be the Guided Volume Activity linked below. I think students would be interested to explore the planets on their own a bit, have a little mini lesson on volume of a sphere and then fill out a chart on the diameter and volumes of all the planets, including the sun, and then see what we can find regarding patterns. A basic google slides and worksheet for students to focus on Volume is linked below :- ) (This covers only part of what is talked about above)

1. [Google Slides Planetary Exploration](#)
2. [Guided Volume Activity](#) (mini video of volume explanation not included just yet).

