

## Hands on Astronomy Activity 1

**Topic:** Solar System

**Learning Objective:** Students will learn about the different planets in our solar system and their relative sizes and distances from the sun.

### Alignment with NGSS Grades K-2 and 3-5

Science and Engineering Practices

Developing and using Models K-2

- Distinguish between the model and the actual object, process and/or events the model represents.
- Compare models to identify common features and differences.
- Develop and/or use a model to represent amounts, relationships, relative scales, and or patterns in the natural or designed worlds.

Developing and using Models 3-5

- Develop a simple model based on evidence to represent a proposed object or tool.

### Crosscutting Concepts and Connections to Engineering, Technology, and Applications

Crosscutting Concepts Grades K-2

Scale, Proportion, Quantity

- Relative scale allows objects to be compared and described.
- Standard units are used to measure length.

### Materials:

- Cardboard paper
- Colors
- Scissors
- Strings
- Tape
- Rulers

### Detailed Description

- Introduction
  - Introduce our solar system and the different planets within it -you can use the mnemonic device “My Very Educated Mother Just Served Us Nachos” to teach the order of the planets from the sun (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune). Then discuss the difficulties in really picturing the universe and its different components -can they really comprehend how big

143,000 km (the diameter of Jupiter) is? Or how far away 4,497,000,000 km (the distance Neptune is from the sun) is? To help us get a better idea of what these numbers mean, we are going to make scale models of the universe.

- Activity 1

- Students make a scale model of the universe, measuring and representing the relative sizes of the planets
  - Have students make a dot in the center of a piece of cardboard -this dot represents the sun in the center of our solar system
  - Then have them make eight circles around the central dot -these represent the eight planets' orbits around the sun
  - Then, using the scaled dimensions below, have them measure and draw each planet
    - For the second/third graders, you may have to walk them through measuring. Use the doc cam and show them how to find the start line on their ruler, then count how many centimeters they need to measure and have them make a mark at this end point. Then connect those two lines in a circle and have them label which planet they just did.
    - If you want, you can also let them color the planets -they can maybe do some research to see what color each planet is, or find out which one has rings, etc.
  - Give each student eight pieces of string. For each piece of string, tape a planet to one end, and the other end to the cardboard piece. When taping the string to the cardboard, make sure it goes on the corresponding orbit that the students already drew on the cardboard (e.g., the string that has Earth on it would be taped on the third orbit line, because it is the third planet from the sun, Mercury would be on the first, Neptune on the eighth, etc)
  - When they are done, they should have a model universe that demonstrates the relative sizes of the planets -they should be able to see that Jupiter is by far the largest planet, and Mars, Venus, Mercury, and Earth are relatively small

<b>Name of Planet</b>	<b>Actual Diameter of Planet</b>	<b>Scaled Diameter of Planet</b>	<b>Actual Distance From Sun</b>	<b>Scaled Distance From Sun</b>
<b>Sun</b>	1 390 000 km	<b>140 mm</b>	---	---
<b>Mercury</b>	4 900 km	<b>5 mm</b>	58 000 000 km	<b>6 cm</b>
<b>Venus</b>	12 100 km	<b>12 mm</b>	108 000 000 km	<b>11 cm</b>
<b>Earth</b>	12 800 km	<b>13 mm</b>	150 000 000 km	<b>15 cm</b>
<b>Mars</b>	6 800 km	<b>7 mm</b>	228 000 000 km	<b>23 cm</b>
<b>Jupiter</b>	143 000 km	<b>143 mm</b>	778 000 000 km	<b>78 cm</b>
<b>Saturn</b>	125 000 km	<b>125 mm</b>	1 427 000 000 km	<b>143 cm</b>
<b>Uranus</b>	51 100 km	<b>51 mm</b>	2 871 000 000 km	<b>287 cm</b>
<b>Neptune</b>	49 500 km	<b>50 mm</b>	4 497 000 000 km	<b>450 cm</b>

- Activity 2
  - Students will make a scale model of the universe, measuring the relative distances from the sun
    - Have students cut 8x11' paper in half lengthwise and tape them together, end to end, students are trying to make one long strip of paper measuring just over 4.5m
    - On one end of the paper, have them draw a sun, you may need to explain that although the sun is in the center of the universe, we are going to draw and represent the solar system as if all the planets were at the point in their orbit where they all lined up
    - Then using the scaled dimensions above, have them measure and draw each planet its relative distance from the sun
      - Again, you can have them add color/rings/moons -anything else they know about the different planets. \*Fifth graders do their own project on one planet, so they should have some additional knowledge of at least one planet.
      - At the end, they should get a better idea of just how far away Neptune is from both Earth and the sun, and how relatively close the Earth is to the sun compared to some of the other planets
- Conclusion
  - Will conclude each week's activity by allowing each student to come upfront to explain his or her solar system mobile so far.

**What science process skills will this lesson exercise?**

- Communication skills
- Mathematical conversions
- Measuring using a metric scale.

**Safety precautions**

Will be using scissors.