# Life-Size Scale of Our Solar System

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Department of Middle Childhood Education

# Purpose

Students struggle with understanding the sheer size of our solar system. This activity impowers a student-centered approach which allows them to manipulate and create a conclusion about the size of our solar system. Students go through multiple explorations of science and mathematics concepts that will help them justify their own specific understandings. The activity will tie examples of real-life experiences which will later help students form their own schema. Students will also get the experiences of learning outside of the classroom and help them create experiences within their own community.

# Learning Objectives

There are three main learning objectives to this scientific experience.

1. To compare the vastness of our solar system to experiences relative to our students
2. To practice converting units of distance and draw a conclusion from this
3. To properly use coordinates on maps to find a specific location.

All of these objectives will be focused on a student approach by implementing student exploration throughout this experience.

# Ohio’s Learning Standards

- 7.ESS.4 The relative patterns of motion and positions of Earth, moon and sun cause solar and lunar eclipses, tides and phases of the moon.
- 8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal notation and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities, e.g., use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology.
- 7.RP.2 Recognize and represent proportional relationships between quantities. a. Decide whether
- 6.SS.4 Latitude and longitude can be used to identify absolute location.

# Educational Theories

- Constructivism: While students work through this activity, they will need to use their prior knowledge of content to help them discover their final outcome. Students will first build up their understanding of the solar system by understanding relative size of each planet and slowly work their way up to the whole solar system itself. Students will also need to use their previous knowledge on distances to use during this to understand where each planet should go compared to one another.
- Vygotsky's Theory of Learning: While this activity is occurring, social learning will happen throughout the whole period of time. Students will be working in groups and bouncing ideas off one another to help them come up with their own schemes of how vast the solar system is to them.

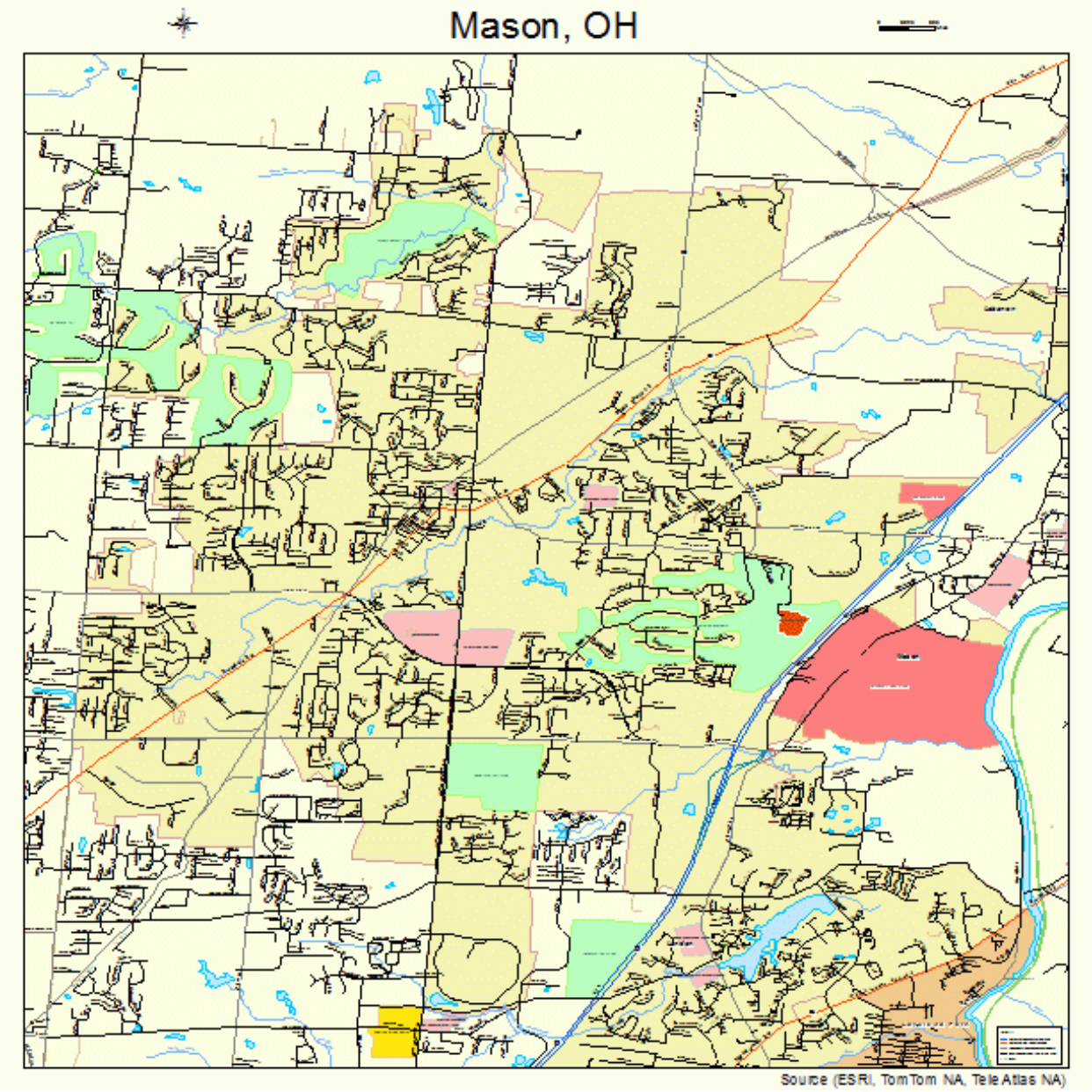
# Student Experience

Students will start by finding objects that are of relative size to each of the planets and in comparison, to one another. They will then need to calculate the distance between each planet and how they can make that of relative size around us.

The students will then be instructed to find a place in the town which will allow for each planet to have a place and have the correct distance between one another. Once completed, as a whole class, we will pick locations for each planet together on a large map.

After we find each location, as a class we will go out and place each of our planets (relative sized objects for each) within our city. Each group in class will be designated a planet and place their object in the designated area. When all planets are placed, each student will record the total distance from our starting location (the sun) to their planet. As a class we will compare these distances and see how vast our solar system is compared to what is around us.

# Map



# Student Example

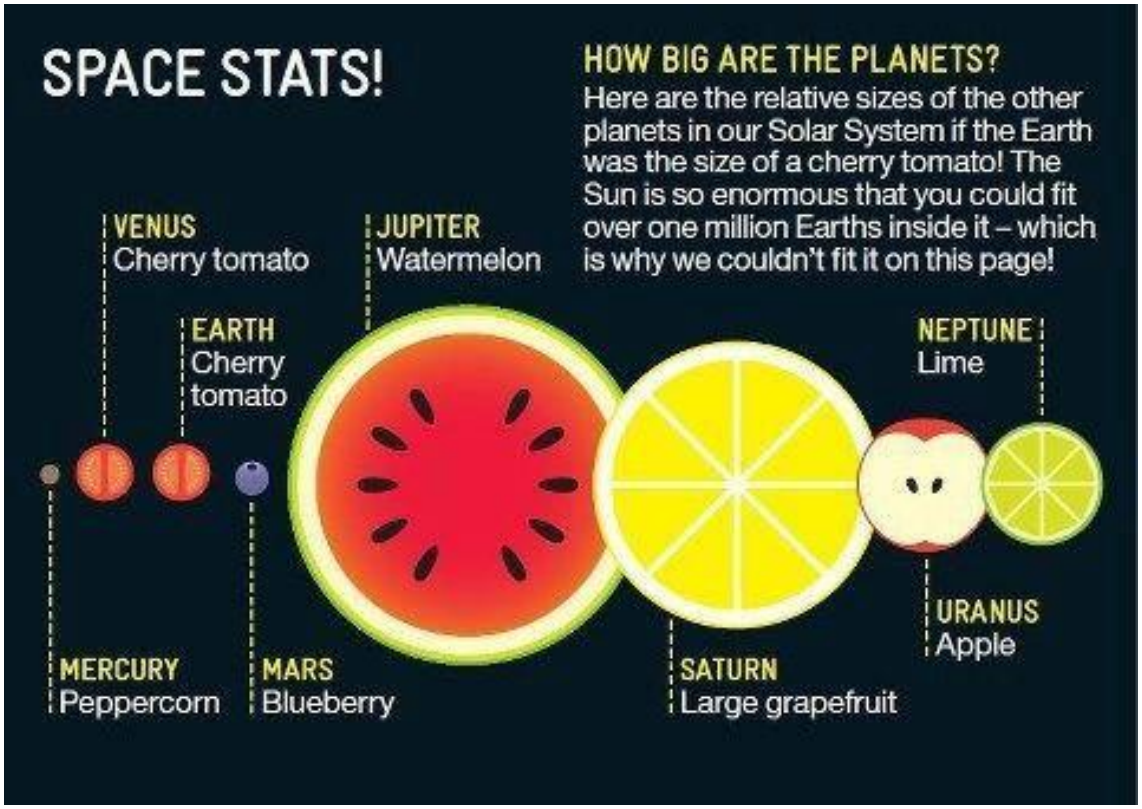
[redacted]

**Distance from the Sun**

| Planet | km from the Sun | Math to Convert | New Distance |
|---|---|---|---|
| Mercury | 57,910,000 km | ÷ 1,000,000 | 57.91 m |
| Venus | 108,200,000 km | ÷ 1,000,000 | 108.2 m |
| Earth | 149,600,000 km | ÷ 1,000,000 | 149.6 m |
| Mars | 227,900,000 km | ÷ 1,000,000 | 227.9 m |
| Jupiter | 778,600,000 km | ÷ 1,000,000 | 778.6 m |
| Saturn | 1,433,000,000 km | ÷ 1,000,000 | 1,433 m |
| Uranus | 2,877,000,000 km | ÷ 1,000,000 | 2,877 m |
| Neptune | 4,503,000,000 km | ÷ 1,000,000 | 4,503 m |

# Objects Used

During this activity, as a class, students are able to pick the objects that represent the planets they would want to use for creating their solar system. The main focus for the sizing of these objects is to have them all relative to each other. An example below shows just one of the many different possibilities for this part of the unit.



# Materials/Resources

- 8 different objects that represent each of our solar systems planets.
- Place holder for your object (planet) when it’s put in your class’s specific location.
- A conversion formula that your class will come up with for the distances of each planet related to your map.
- Large size map of the city or town your school district is located in.
- Transportation to each location you place the planets on your map.
- Parent/guardian chaperon while students travel to each location.
- Distance from the Sun worksheet.

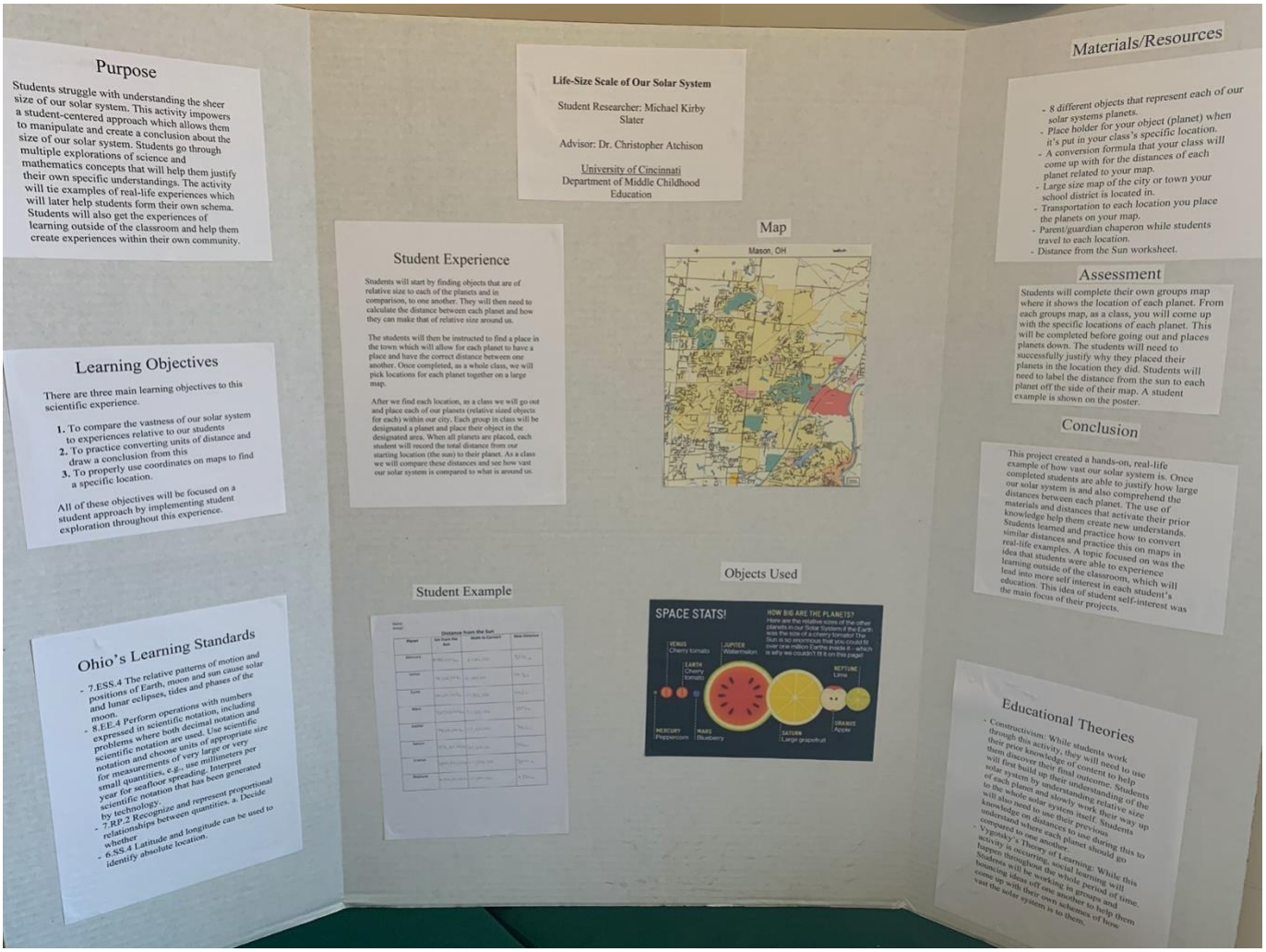
# Assessment

Students will complete their own groups map where it shows the location of each planet. From each groups map, as a class, you will come up with the specific locations of each planet. This will be completed before going out and places planets down. The students will need to successfully justify why they placed their planets in the location they did. Students will need to label the distance from the sun to each planet off the side of their map. A student example is shown on the poster.

# Conclusion

This project created a hands-on, real-life example of how vast our solar system is. Once completed students are able to justify how large our solar system is and also comprehend the distances between each planet. The use of materials and distances that activate their prior knowledge help them create new understands. Students learned and practice how to convert similar distances and practice this on maps in real-life examples. A topic focused on was the idea that students were able to experience learning outside of the classroom, which will lead into more self interest in each student's education. This idea of student self-interest was the main focus of their projects.

# Poster



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## Map




## Student Example



## Objects Used




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