Lesson Plan Six

Phenomenon: Planets have their own size in the Solar System.

JSD 3D Learning Activity Template

Grade: 6th Grade	**Title:** Finding the scale and proportion of the planets compared to Earth.

Utah Science with Engineering Education Standard (SEEd):

6.1.3: Use computational thinking to analyze data and determine the scale and properties of objects in the solar system. Examples of scale could include size and distance. Examples of properties could include layers, temperature, surface features, and orbital radius. Data sources could include Earth and space-based instruments such as telescopes and satellites. Types of data could include graphs, data tables, drawings, photographs and models.

Key crosscutting concept(s) (CCC): Scale and Proportion

Key science and engineering practice(s) (SEP): Analyzing and Interpreting Data

Materials:

Diameters (size) of planets data; bulletin board paper; compass for drawing circles

Time: 45 minute session

Teacher background, key content information and hints:

1. The planets are different sizes. For the students to be able to comprehend these sizes, the sizes need to be brought down to a level scale for students to understand their sizes.
2. Students should be able to know how to divide the size (number) of one object into the size (number) of another object to compare the size to each other.
3. Students can then look at the numbers and determine a scale.

Prior knowledge that students need:

1. Students would need to know how to mathematically find how big or small sizes of objects are compared to each other in decimal form by dividing the size of one object into the size of another object and know what it means.
2. Students would need to use those sizes to create a scale of all the objects compared to each other.

Learning Activity Plan

These three aspects of a lesson should be identified in your learning activity.

Gathering: *(Obtain Information, Ask Questions/Define Problems, Plan & Carry Out Investigations, Use Models to Gather Data and Information, Use Mathematics/Computational Thinking.)*	***Reasoning:*** *(Evaluate Information, Analyze Data, Use Mathematics/Computational Thinking, Construct Explanations/Solve Problems, Develop Arguments from Evidence, Use Models to Predict & Develop Evidence.)*	***Communicating:*** *(Communicate Information, Argue from Evidence (written & oral), Use Models to Communicate).*
Students can find out the sizes in diameter of all the planets (even including Pluto and the sun). Then by a simple process of	After the students have found the different sizes of the planets compared to Earth, the students will carry out an investigation of	The students will communicate their findings of how big the planets are compared to each other and argue their evidences as to the sizes of the planets in space compared to Earth. They will show their model during this communication.

mathematics using Earth as the constant divisor, they can find out how big each of the plants and sun are in decimal form compared to Earth.	finding out the decimal size of the planets compared to Earth in order of the planets in the solar system. Then given any size of Earth, the students can figure out how big the other planets are and the sun. The students will make a model of their own thinking by picking any size they want of Earth and then figure out the size of the other planets and the sun respectively.	

Phenomenon: How big are the other planets compared to the size of Earth?

Learning Activity:

As we look into space, we really can't see how big the planets are. Scientists through the use of technology have been able to give us data as to how big these planets are in miles and kilometers. We know how big our planet is and how long it takes to get to places by walking, by car, by train, and by airplane. Our planet seems big to us.

We want to know how big or how small in scale and proportion other planets are compared to the size of Earth. This will then give us a sense of how big or small they really are.

The students will need to gather information about the size of each planet and the sun. They will need to work out some mathematical formula of how big or small each planet is compared to Earth in decimal form. It is best to do this in kilometers

When the students have found how big the planets and sun are to Earth in decimal form, they are to pick a size of earth (e.g. 1 cm) and figure out how big each planet would be compared to Earth. The students can then draw the sizes of each of the planets on big bulletin board paper to compare the sizes with earth.

The students will communicate their findings and how they were able to figure out the sizes of the planets and defend their model and results.

Assessment of student learning

Short description of the evidence the teacher is willing to accept that a student is proficient with the performance expectations.
This may be a rubric, narrative, or other set of descriptors that are useful for distinguishing proficient from non-proficient performances.

1. Student was able to use a mathematical formula to find the sizes of each planet and sun compared to earth. (0-10 points)
2. Student was able to calculate the results accurately. (0-10 points)
3. Student was able to show that he/she knew how to use the raw calculated data to show the sizes of the planets and sun to any size given to Earth. (0-10 points)
4. Student was able to draw with a compass the sizes of the planets neatly and accurately. (0-10 points)
5. Student was able to explain the process he/she used for calculating the sizes of the planets to Earth, how he/she showed how the scale works that he/she chose, and explain his/her model. (0-10 points)

Name_____

Title: Finding the scale and proportion of the planets compared to Earth.

Introduction: Our solar system is made of up planets of different sizes. We are not quite sure why they are different sizes. Since the diameter sizes of the planets are very large for us to fathom, it is sometimes hard for use to understand their sizes. For us to understand how massively big they are it is best to look at them in a smaller size. This is done by making them small on paper, but still keeping them proportionally to each other. That is our goal today to look at the planets smaller, but still keeping them in proportion.

Materials: Diameters (size) of planets and the sun data; bulletin board paper; compass for drawing circles

Procedure:

1. Find data on the sizes in diameter of the planets and he sun in the metric system and write them down.

2. Figure out a formula to use to see how much bigger or smaller each planet and the sun are than earth (the earth being 1.0). The answers will be in decimals and not fractions.

3. Pick out any number for the size of the earth in the metric system (e.g. 1 cm) and figure out what the size of the other planets will be in centimeters.

4. By using a compass, make a model of the sizes of the planets and the sun you have chosen on a sheet of bulletin board paper. Cut them out and lay them out on the floor.

Analysis:

1. What do you see about the sizes of the planets that you didn't know before?

2. Why was it helpful to put them to scale to find their proportions?

3. Explain your model and the scale you used to be able to understand their sizes better as compared to the earth.

4. Explain what your model would be like if you changed the size of the earth.

5. Explain what would be the same and what would be different?

Conclusion: Describe in a paragraph what you learned in this activity.