**Schoolyard Solar System 5E Lesson Plan**

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| **Teachers: Ms. Baker, Ms. Cortinas, Ms. Moore, Ms. Stevens,** |
| **Date:** March 24th, 2016 (STEM Thursday) |
| **Subject / grade level:** 6th Grade Science |
| **Materials:**1. **Card sorts (6 sets per class)**
2. **Sidewalk chalk**
3. **Pictures of planets laminated**
4. **Labsheet to make conversions**
5. **Poster board**
6. **post it notes**
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| **TEKS:****(9) Earth and space. The student knows components of our solar system. The student is expected to:****(A) analyze the characteristics of objects in our solar system that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere;**  |
| **ENGAGEMENT**1. **Tell the students that today we will be exploring distances in our solar system.**
2. [**https://www.youtube.com/watch?v=97Ob0xR0Ut8**](https://www.youtube.com/watch?v=97Ob0xR0Ut8) **video includes Pluto. Don’t tell students this in advance.**
3. **As the students watch the video, they can write down the distances in meters from the sun to each planet.**
4. **How do you know this video wasn’t made in the last ten years?**
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| **EXPLORATION** 1. **Students will match planets to their description (length of rotation/revolution, number of moons, atmosphere, temperature, surface).**
2. **Questions:**
* **How did you go about sorting these cards? What information was most helpful?**
* **Was there any information that was surprising to you?**
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| **EXPLANATION**1. **The teacher will explain that in order to understand the distances that each planet is from the sun, we are going to create a scaled model.**
2. **Questions:**
* **What do we need to do to convert from AU to cm? to m?**

**Schoolyard Solar System** **Scientists use astronomical units (AU) when measuring distances in the solar system, simply because distances measured in kilometers can get very large. Look at the following table to get an idea of the vast size of our solar system. As you can see, one astronomical unit is interpreted as the distance of the Earth from the Sun. Making a scale model of the solar system is easy if you remember to use each planet’s distance from the sun, measured in AU. Directions: Complete the chart below using the following scales:****Scale for hallway model: 1 AU=10 centimeters** **Scale for Schoolyard model: 1 AU= 2.5 meters**

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| **Planet** | **Distance from planet/Sun (km)** | **Distance from sun (AU)** | **Scale Distance from Sunfor hallway solar system (cm)** | **Scale Distance from sun for schoolyard (m)** |
| **Mercury** | **58,000,000** | **.39** |  |  |
| **Venus** | **108,000,000** | **.72** |  |  |
| **Earth** | **150,000,000** | **1** |  |  |
| **Mars** | **228,000,000** | **1.52** |  |  |
| **Jupiter** | **778,000,000** | **5.2** |  |  |
| **Saturn** | **1,430,000,000** | **9.54** |  |  |
| **Uranus** | **4,500,000,000** | **30.1** |  |  |
| **Neptune** | **5,900,000,000** | **39.4** |  |  |

**Did you know? The star system nearest to our solar system is the three star system called Alpha Centauri. Its distance from the solar system compared to our scale model is approximately 4400 km away. That’s about the same distance as from New York to Los Angeles!** |
| **ELABORATION (Veronica and Allison)**1. **Find an area to walk in a straight line to pace out the entire Solar System. Students will create and pace out their own model Solar System as groups. The number of groups depends on the number of model Solar Systems that can be paced out side-by side. The number of groups will therefore depend on the width of the path available. Place students in groups.**
2. **Before taking the class outside, introduce the “pace” as the “ruler” for this model Solar System. Define a pace as two steps, one with each foot. Put a few parallel strips of masking tape on the floor, one meter apart, and ask students to walk back and forth, getting used to the size of a meter pace. For taller students, define a pace as one step.**
3. **Tell students as teams or groups they will create their own one to ten billion scale model of the Solar System outdoors. The students will need to take with them their worksheet, a pencil, and a book or something solid to support the worksheet while they write.**
4. **Take the class outside to walk the length of the model Solar System. Allow the group members who are the Suns to line up as the starting point.**
5. **Tell students to guess the number of paces to Mercury. Allow time for students to share their thoughts and then tell students the paces (or meters) between the model Sun and the model Mercury. Explore whether or not students are surprised. Students will write this number in the second column on their Model Distance Charts worksheet.**
6. **Students will pace it out with their team and place their model of Mercury at the correct location. They will calculate the total distance they are from the model Sun and write it down in the third column. Students will repeat pacing for each planet and calculate the distance for each.**

**Questions:*** **Did anything surprise you as you ‘walked the distance’ between the planets?**
* **What is a model?**
* **What is the difference between the pictures/models you normally see of our solar system and the model we made today?**
* **What is the same between the pictures/models you normally see of our solar system and the model we made today?**
* **Do you think our model was completely accurate? Why or why not?**

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| **EVALUATION**1. **On a post-it, students will write one thing that they learned during the lesson that they think will ‘stick with them.’**
2. **Students will put their post-it on a class poster titled, “What stuck with us.”**

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