

Lesson Implementation and Reflection: Solar System Bead Activity

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## LESSON IMPLEMENTATION AND REFLECTION 2

### Lesson Implementation and Reflection: Solar System Bead Activity

The lesson implemented for this course assignment was conducted with fourth grade students in Northern Virginia. Fourth graders in Virginia are expected to cover the science strand Earth Patterns, Cycles and Change, which is labeled science standard 4.7. Within this state standard, the student will investigate and understand the organization of the solar system. Key concepts include: a) the planets in the solar system; b) the order of the planets in the solar system; and c) the relative sizes of the planets [ CITATION Vir18 \l 1033 ]. In terms of national standards, the lesson covers the following Next Generation Science Standard: MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system [ CITATION Nex18 \l 1033 ]. To meet these objectives, students completed the Solar System Bead Activity lesson developed by the NASA Jet Propulsion Laboratory [ CITATION NAS18 \l 1033 ]. The purpose of the lesson was to emphasize proportions and ratios of our solar system using concrete objects and scaled distances.

### **Lesson Implementation**

This lesson is towards the beginning of the space unit taught to Virginia students. This was a two-part lesson implemented over two days. On the first day, students spent time applying mathematical skills involving decimals and scaling the distances of each planet using a factor of 10 (see Appendix A for a sample student worksheet). Students required guided practice review of multiplying with decimals before completing the sheet. Once students demonstrated proficiency with practice items, they completed the math worksheet via Google Classroom.

The following day, students took what they learned from the math lesson and they calculated the scaled distances with a scale factor of 100. This lesson modification was put in place so that students could recreate the increased scaled distances outside (see Appendix B for

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activity photographs). This afforded students the opportunity to independently apply the math concept taught the previous day so that they could apply their new understanding to the modified lesson activity. Once students had their new scaled distances, they used string and long-distance measuring tape to create a scaled model of the solar system.

### **Lesson Reflection**

Concepts related to space systems can be quite difficult and abstract for most students in fourth grade. As students conducted this activity, learners at all levels of understanding were fully engaged and participatory in creating the scaled solar system. More particularly, this lesson worked well with our English Language Learners (ELL) and special education students. The math application of the content was challenging for some, but taking that math and applying it in a concrete way aided lower performing student in grasping the concept with more meaning and authenticity.

One of the best aspects of the lesson is the interaction of learning across content areas. In addition to the use of scale and ratio, students were also exposed to measurement concepts. Having students use math in an applicable and necessary capacity enabled them to see the purposefulness of the activity overall. After conducting the lesson, imparting literacy would be very easy and complementary to the content being covered. There are many opportunities for vocabulary scaffolding, oral language applications and application of writing skills. For younger students, it would be suggested that they focus only on a scale model of the Earth, Moon and Sun as a means of scaffolding their learning for future space concepts they will encounter in forthcoming grade levels.

## LESSON IMPLEMENTATION AND REFLECTION 4

### References

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# Planet Distance Chart

Calculate the scale value for each Solar System object using a scale factor of 10 centimeters per astronomical unit (AU). 1 AU is equal to about 150 million kilometers (93 million miles)!

Object	AU	Scale Value (centimeters)	Bead Color
Sun	0.0 AU	.00cm	Yellow
Mercury	0.4 AU	4.0cm	Solid Red
Venus	0.7 AU	7.0	Cream
Earth	1.0 AU	10.0	Clear Blue
Mars	1.5 AU	15.0	Clear Red
Asteroid Belt	2.8 AU	28.0	Black
Jupiter	5.2 AU	52	Orange
Saturn	9.6 AU	96	Clear Gold
Uranus	19.2 AU	192	Dark Blue
Neptune			Light Blue
Pluto (average)			Brown

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