Earth and Space Science	
Activity Plan	**Not Your Elementary School Solar System!**

Summary:
This activity and powerpoint lessoned is designed to engage the students' interests in visual design and creating scale diagrams of the Solar System, while at the same time learning about the basic elements in the Solar System. Though originally designed as a computer-based activity, teachers can have students create 3D or 4D solar system models on or with paper materials. The activity engages the students to choose their own elements and perspective for the model, which allows creativity and basics into design process in science and engineering.

Standards:

Texas	**National**
Science: 6-8.1 (A) Demonstrate safe practices during field and lab investigations 6-8.2 (A) Plan and implement investigative procedures 6-8.2 (C) Analyze and interpret information to construct reasonable explanations	**Science:** A: Science as inquiry, abilities necessary to do inquiry E: Science and Technology, Abilities of Technological Design F: Science in Personal and Social Perspectives

Grade Level: Target Grade: 6-8

Time Required: 2 days – 1 week (depending on the length and extension of the design)

Activity Team/Group Size: 1-3 individuals

Costs: Material costs should be minimal, since most of the supplies are currently in classrooms

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Materials:

- Computers (if choosing to use Sketch-Up)
- Paper (construction, white, poster, magazines, etc)
- Geometric stencils or models (cylinders, spheres)
- Scissors
- Glue, tape
- Markers, pens, pencils

Learning Objectives:

- The structure and function of the Solar System, including the role of gravity
- Major features in the Solar System
- Classification within the Solar System
- Design process in building a model (Layout to Building)

Lesson Introduction / Motivation:
Ask students to share their current knowledge of the Solar System with paying particular attention to how perceptions about space change, i.e. Pluto no longer considered a planet. Ask students ideas on how science changes as the technology improves and why is it important to always test historical theories. Finally, transition into having students define the important concepts in building models to help represent the science (scale, drawing first, building, ratios, etc.). A common example to think about is having the students think about what is involved in building a full-size ship, plane, or car for a model-kit.

Lesson Plan:
After the lesson introduction, students should be thinking about the Solar System and modeling the Solar System. Introduce the powerpoint presentation and direct the students to pay close attention to the backgrounds and the different types of models shown throughout. Ask the students to take notes and follow along in the worksheet, as well as jot down ideas and what they think is the strongest model in the presentation. At the end of the presentation, introduce the opportunity for students to now act as the designers to create a new prototype of the Solar System model, especially challenging the students to think in 3 and 4 dimensions. Pay particularly close attention to developing a scale and whether students are thinking about a vertical versus horizontal scale. Once again, make reference to models that currently exist such as model airplanes. Have the students think about trying to represent the distance between planets versus the size of the planets and why scale is important.

Procedure:

1. Refer to the document, SolarSketch-Up.doc. If the students are not using on the computers, then the directions are self-explanatory. However, if students are using a computer program, such as Powerpoint or Google SketchUp, you will have to go through a quick tutorial in how to create spheres, use a ruler function for scaling, or more complicated feature depending on the program. Remember, the goal of the

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lesson is to utilize the students' creativity and have them think outside-the-box to come up with unique models.

2. Students are required to fill out the form: SolarSketchUp_ConversionTable. This will really cause the students to think about scale and create their own mathematically correct scale for the model. Students will also have to think about the size of the planets and features versus the distance between. You can provoke the students by asking them to think about what the model would look like if the planets were too small, Jupiter was too big, and the distance between was in meters. Use features in the classroom to highlight the differences in scale. Also, highlight that the model needs to be useful and visually appealing. The students would not want to move into a house in the future if the scale was in centimeters….use these types of examples and also images in the powerpoint.
3. The rubric is to help you grade and for the students to know how the model will be graded. This can be changed as needed to fit the needs of the students and the time given to complete the project.

Lesson Closure:

If time permits, have the students share and explain their models. Have the remaining class critique the scale and visual appeal of the models.

Assessment:

Refer to the Rubric document and also to the student worksheet. If time does not permit for the activity, you can partner with the math teacher for this activity since scale is a TEK covered in math. This will help allow more time to the model building, while scale is still focused on in the other class.

Optional:

As mentioned earlier, the activity can be done in a variety of computer programs. This activity was used at Stephen F. Austin Middle School with Google SketchUp and was extremely successful. Students can also Powerpoint and Microsoft Paint as alternative programs.

Background and Concepts for Teachers:

- The Solar System
- Model Design (primarily computer programs)

Other documents:

- SolarSketchUp.doc
- SolarSketchUp_ConversionTable.doc
- SolarSketchUp_Rubric.doc
- SolarSystems.ppt
- SketchUp7Help.pdf

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References:

- Google SketchUp7Help.pdf

Keywords:

- Solar System
- Milky Way
- Planets
- Model and Design
- Space
- Gravity

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Please email us your comments on this lesson:
E-mail to ljohnson@cvm.tamu.edu
Please include the title of the lesson, whether you are a teacher, resident scientist or college faculty and what grade you used it for.

Teacher's Comments:

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