

Classroom Activity

Grades 2-4

SCALE MODEL SOLAR SYSTEM

Build a Solar System

Materials

- Paper, Styrofoam balls, or any other material of your choice to make the nine planets and the sun
- 1 tape measure
- 1 compass to draw planets if using paper
- 1 pair of scissors
- 1 calculator
- 1 ruler
- Paint, crayons, or markers to color planets and sun models, if desired
- 1 long hallway or outdoor space of at least 110 feet (30.5 meters). You can make a partial model if your space is smaller.
- Pen or pencil
- Solar System – Planetary Data Worksheet
- Computer with Internet access

Procedure

1. Develop a sense of the planets' sizes and their distances from the sun.

How Do Scientists Know the Distances Between the Planets?

http://spaceplace.nasa.gov/en/kids/phonedrmarc/2002_november.shtml

This article describes the important people that helped us determine orbital patterns of the planets and provides a link to an activity to draw a scale of our solar system in your driveway.

2. Use the following website to determine the sizes and distances from the sun for each planet.

Grade 4-6 The School Yard Solar System

http://nssdc.gsfc.nasa.gov/planetary/education/schoolyard_ss/

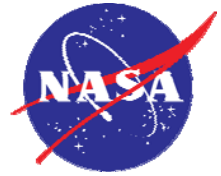
You can determine the sizes and distances from the sun for each planet

3. Determine and record the scale that you will use to:
 - a. Create the planet models' sizes.
 - b. Place the planet models at the correct distance from the sun model
 - c. Remember to include units when you record the scales.
4. Draw or build the planet models to scale.
5. Place the planet models at the correct modeled distances from the sun.
6. Take a picture of your model to show when you present your solar system data.

Student Presentation

Students will be asked to demonstrate their solar system models & worksheets during the video teleconference.

National Aeronautics and Space Administration



Our Solar Neighborhood

A Digital Learning Network Experience



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National Aeronautics and
Space Administration

Designed To Share

NASA Space Exploration

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TEACHER EVENT CHECKLIST OUR SOLAR NEIGHBORHOOD EXPEDITION

Date Completed	PRE-EVENT REQUIREMENTS
	1. Print out a copy of this entire file (color copy preferred). Please note: this document is 12 pages long.
	2. Have students take Pre-Event Quiz (activity #1) on page 5.
	3. Complete all pre-event activities (activity #2-3) with the students on pages 7 to 10.
	4. Teacher to E-mail a minimum of 5 student questions to NASA no later than 3 business days prior to your event.
	5. Review NASA Event Guidelines with students on page 11.
	DAY OF EVENT ACTIVITIES
	1. The students will be asked to share their solar system models, planetary facts, & worksheets with the NASA host.
	2. Provide graph paper for students to participate in graphing activity during event.
	POST EVENT REQUIREMENTS
	1. Have students take Post-Event Quiz to demonstrate knowledge of subject.
	2. Teacher(s) and students to fill out event feedback .
	3. Digital Learning Network will respond to any follow-up questions.

**NASA's Digital Learning Network
Our Solar Neighborhood (Grades 2-4)**

<p><u>Grade Level:</u></p> <p>Grades 2 – 4</p> <p><u>Instructional Goal:</u></p> <p>Upon completion of this learning module, students will be able to describe the characteristics of the planets in our solar system, their size, the distances between them, and the paths that they travel.</p> <p><u>Learning Objectives:</u></p> <ol style="list-style-type: none"> 1. Students will be able to discuss, for each planet in our solar system, the scale and size of each planet and its distance from the sun. 2. Students will be able to identify the inner and outer planets of the solar system. 3. Students will be able to provide physical characteristics of the planets. 4. Students will be able to illustrate the distances planets travel around the Sun by designing and completing a bar graph during the videoconference event. <p><u>Estimated Time requirements:</u></p> <ul style="list-style-type: none"> • Activity Set #1 50 minutes • Activity Set #2 2 x 50 minutes • Activity Set #3 50 minutes • Video Conference 50 minutes <p>STUDENTS WILL BE ASKED TO SHARE THEIR SOLAR SYSTEM MODELS and INFORMATION DURING THE EVENT.</p>	<p><u>National Education Standards</u> <u>Science (NSES)</u></p> <p>Science as Inquiry Abilities necessary to do scientific inquiry Understandings about scientific inquiry</p> <p>Physical Science Properties of objects and materials</p> <p>Life Science Characteristics of organisms</p> <p>Earth and Space Science Objects in the sky</p> <p>Science and Technology Understandings about science and technology Abilities to distinguish between natural and objects made by humans</p> <p>History and Nature of Science Science as a human endeavor</p> <p><u>Mathematics (NCTM)</u></p> <p><u>Distance Graph activity:</u></p> <ul style="list-style-type: none"> • Data analysis and probability • Connections • Representation <p><u>Solar System Scale activity:</u></p> <ul style="list-style-type: none"> • Problem solving • Measurement • Spatial relationships • Representation of a real world situation with models (including the use of scale factors) • Connections <p><u>Texas Essential Knowledge and Skills (TEKS)</u></p> <table border="0"> <thead> <tr> <th><u>Science</u></th> <th><u>Math</u></th> </tr> </thead> <tbody> <tr> <td>2.1 A, B</td> <td>2.9 B, D</td> </tr> <tr> <td>2.2 A, B, C, D, E, F</td> <td>3.11 A</td> </tr> <tr> <td>2.4 A</td> <td>3.15 B</td> </tr> <tr> <td>2.5 B</td> <td>4.1 B</td> </tr> <tr> <td> A, B</td> <td>4.12 B</td> </tr> <tr> <td> A, B, C, D, E, F</td> <td></td> </tr> <tr> <td> A, B</td> <td></td> </tr> <tr> <td>3.11 C, D</td> <td></td> </tr> <tr> <td>4.1 A, B</td> <td></td> </tr> <tr> <td>4.2 A, B, C, D, E, F</td> <td></td> </tr> <tr> <td>4.3 E</td> <td></td> </tr> <tr> <td>4.4 C</td> <td></td> </tr> </tbody> </table>	<u>Science</u>	<u>Math</u>	2.1 A, B	2.9 B, D	2.2 A, B, C, D, E, F	3.11 A	2.4 A	3.15 B	2.5 B	4.1 B	A, B	4.12 B	A, B, C, D, E, F		A, B		3.11 C, D		4.1 A, B		4.2 A, B, C, D, E, F		4.3 E		4.4 C	
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OVERVIEW

Come take a trip through our solar neighborhood. Students will create their own model of the solar system while they learn about scale, orbits, and the physical characteristics of the planets.

INSTRUCTIONAL STRATEGY

Pre-Event Classroom Component

Class Activity # 1

1. Students take [Pre-Event Quiz](#) on page 5 to test their knowledge prior to these lessons about Astronomy. Students keep these quizzes on file to compare to their Post-Event Quiz.

Class Activity # 2

1. [Solar Model](#) on page 7. Have students work individually or in teams to build their scale model solar system. **Students will be asked to present their ideas, results, and models during the video teleconference.**

Class Activity # 3

1. [Planet Facts](#) on page 9. Have students work individually or in teams to list interesting facts about each planet. **Students will be asked to present their facts during the video teleconference.**
2. Student Questions – A Desire To Explore Further
 - Develop at least 5 questions from the class on astronomy
 - These questions should go beyond the basic information within the program
 - These questions should attempt to demonstrate “higher cognitive involvement” by the students
 - E-mail your questions at least 3 business days prior to your event with NASA
 - E-mail address is: jsc-dislearn@mail.nasa.gov
3. Prepare the students for their participation in a live, interactive video teleconference with the NASA’s Digital Learning Network.

Our Solar Neighborhood Vocabulary

The following is a list of words and definitions that your students need to be familiar with because the words are used throughout the activities and video teleconference. They will be asked to explain the meaning of these terms **in their own words** during the teleconference.

- Astronomy** - all the matter-energy in the universe: its distribution, composition, physical states, movements, and evolution.
- Solar System** - the sun together with the group of celestial bodies that are held by its attraction and revolve around it
- Mass** - the property of a body that is a measure of its inertia and that is commonly taken as a measure of the amount of material it contains and causes it to have weight in a gravitational field
- Diameter** - the length of a straight line through the center of an object
- Orbit** - a path described by one body in its revolution about another (as by the earth about the sun or by an electron about an atomic nucleus)
- Planet** - a body that revolves around the Sun in the solar system, is shaped in a sphere, and has a clear orbital neighborhood
- Dwarf Planet** - a small body that revolves around the Sun, whose gravity is not strong enough to clear its surrounding orbital neighborhood

Classroom Activity #1

Our Solar Neighborhood Pre/Post Quiz

Name: _____ Class: _____ Date: _____

1) Astronomy is the study of:

2) Name one of the early astronomers and what they contributed to the study of astronomy.

3) Name the planets in order from the Sun and list at least two facts about each one. (Post Quiz – add an interesting fact you learned during the program.)

Planet #1 –

Planet #2 –

Planet #3 –

Planet #4 –

Planet #5 –

Planet #6 –

Planet #7 –

Planet #8 –

Dwarf Planets –

4) Besides Earth, where would you explore to discover life in our Solar System, and why?

Our Solar Neighborhood Pre/Post Quiz

ANSWER KEY – Please do not share with your students. Answers should be similar to:

1) *Astronomy is the study of:*

All the matter-energy in the universe: its distribution, composition, physical states, movements, and evolution.

2) *Name one of the early astronomers and what they contributed to the study of astronomy.*

There are many correct answers to this question.

3) *Name the 9 planets in order from the Sun and list at least two facts about each one. (Post Quiz – add an interesting fact you learned during the program.)*

Planet #1 – Mercury

Planet #2 – Venus

Planet #3 – Earth

Planet #4 – Mars

Planet #5 – Jupiter

There are several possible facts for each planet.

Planet #6 – Saturn

Planet #7 – Uranus

Planet #8 – Neptune

Dwarf Planets – Ceres, Pluto, Makemake, and Eris

4) *Besides Earth, where would you explore to discover life in our Solar System, and why?*

Mars because it appears that it may have resembled Earth in many ways long ago, and therefore could have been able to sustain life.

Classroom Activity #2

Grades 2-4

SCALE MODEL SOLAR SYSTEM

Build a Solar System

Materials

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Student Presentation

Students will be asked to demonstrate their solar system models & worksheets during the video teleconference.

Classroom Activity #3

Grades 2-4

PLANET FACT SEARCH

Materials

- Computer with internet access
- Text and reference books
- Pen or pencil
- Paper

Procedure

1. Have students visit this web site: A Learning Center for Young Astronomers: <http://starchild.gsfc.nasa.gov/docs/StarChild/> and list interesting facts about each planet.
 - a. Go to 'Level 1' then go to 'Planets.' There are many good facts and questions for the students to research.
2. Depending on the learning abilities, explore other levels and locations within this site.
3. Student Questions – A Desire To Explore Further
 - Develop at least 5 questions from the class on astronomy
 - These questions should go beyond the basic information within the program
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 - E-mail your questions at least 3 business days prior to your event with NASA
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Student Presentation

Students will be asked to present planetary facts to NASA during the video teleconference.

Solar System - Planetary Data Worksheet

Planet Scale Used: _____

Distance from the Sun Scale Used: _____

Planet	Actual Planet Diameter	Scaled Planet Diameter	Actual Distance from the Sun	Scaled Distance from the Sun
Mercury				
Venus				
Earth				
Mars				
Jupiter				
Saturn				
Uranus				
Neptune				
Pluto				

Discussion questions:

1. Why did you have to use **different scales** for the sizes and distances of the planets from the sun?
2. How do the planet sizes and the distances between the planets vary?
3. a. Which scale was **greater** (circle)? Planet Scale Distance from Sun Scale

 b. What does that tell you about our solar system and what it consists of?
4. What do you think is between the planets? Explain in some detail. How do you know?
5. Why do you think it is important to include the **units** in the table that you created?

NASA Event Guidelines

Review the following points with your students prior to the video teleconference event:

1. A video teleconference is a two-way event. Students and NASA presenters can see and hear one another.
2. Students are representing their school; they should be on their best behavior.
3. Students should be prepared to give brief presentations, ask questions and respond to the NASA presenters.
4. A Teacher(s) or other site facilitator should moderate students' questions and answers.
5. Students should speak into the microphone in a loud, clear voice.

**Get Ready, Be Ready, and have fun with your
Digital Learning Network with NASA!**

Post Event Teacher – Student Evaluation

1. **We need your help and support!** We welcome any input that you have. Providing us with feedback usually takes teachers and students **less than 10 minutes** to complete. Choose the appropriate feedback form at the following site: <http://dln.nasa.gov/dln/content/feedback/>
2. Students and Teachers are **welcome to e-mail the Digital Learning Network** with any follow-up questions from the event at: jsc-dislearn@mail.nasa.gov
3. **Please send** us any photos, video, web page link, newspapers articles, etc. of your event. We will be glad to post them on our web page!

Extended Activities for Our Solar Neighborhood

1. **Cassini-Huygens: Mission to Saturn & Titan**

Want to learn more about Saturn and its moons? Learn with NASA scientists as the Cassini-Huygens spacecraft explores Saturn, Titan, and more!

Grades 1-2: <http://saturn.jpl.nasa.gov/education/edu-k4-12a.cfm>

Grades 3-4: <http://saturn.jpl.nasa.gov/education/edu-k4-34a.cfm>

2. **Find out our weight and age on the planets.**

Have you wanted to weigh more or less? Are you tired of being a kid and want to be older or much younger? Find out how much you'd weigh or how old you'd be on other planets!

<http://vathena.arc.nasa.gov/curric/space/planets/agewt.html>

3. **More Astronomy Activities**

Want to be an astronomer? Want to explore more of the solar system and universe? Look no further than StarChild: A Learning Center for Young Astronomers!

<http://starchild.gsfc.nasa.gov/docs/StarChild/>.

NASA Space Place: Come on in and check out our games, animations, projects, and fun facts about Earth, space, and technology!

<http://spaceplace.jpl.nasa.gov/index.shtml>

Cosmic Kids study Hubble Space Telescope

We know astronomers have telescopes here on Earth to study space, but did you know there is also a telescope in space orbiting the Earth? Find out why at

<http://sm3a.gsfc.nasa.gov/classrm.html>

Ask an Astronomer

You have explored so much of the solar system, and you probably have a lot of new questions.

Ask an astronomer your questions at <http://image.gsfc.nasa.gov/poetry/ask/askmag.html>

Classroom Activity

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PLANET FACT SEARCH

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- Computer with internet access
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