

SOLAR SYSTEM SCALE MODEL

ABOUT OUR SOLAR SYSTEM

Our solar system is a pretty big place; containing a collection of one star (Sun), eight major planets, five dwarf planets and an uncountable amount of comets and asteroids. Our solar system was created from collapsed cloud of dust and gas that began to spin in the form of a disk nearly 4.6 billion years ago. Over time material gathered within the center of the disk eventually causing Nuclear Fusion to occur and thus the birth of the Sun. The Sun accounts for nearly 99.8% of the all mass in the solar system. After the Sun the left over 0.2% of the solar system is all the planets, dwarf planets and other celestial bodies. The planets section of the solar system is made up of two major sections, the inner solar system and outer solar system. Heavy elements condensed towards the inner portion of the cloud forming the rocky planets: Mercury, Venus, Earth and Mars. The outer solar system was left with mainly lighter elements and some rock forming the gas giants: Jupiter, Saturn, Uranus and Neptune. After the final planets were arranged left over material condensed in three major areas known as the Asteroid Belt (between Mars & Jupiter), the Kuiper Belt (around the orbit of Pluto) and the Oort cloud (very edge of the solar system, mainly composed of comets). Once completed our solar system had a diameter of nearly 100,000 *Astronomical Units* (1 *Astronomical unit (AU)* is 93 million miles, the distance between the Earth and the Sun).

THE MODEL

Because the solar system is such a big place it can be hard to get a real grasp on the actual size. Because of this we have made this solar system scale model. We have taken the Sun (normally 864,575 miles in diameter) and shrunk it down to only 9", about the size of a basketball. To keep the model simple we will only be covering the eight major planets. At this size Earth is only 2mm in diameter where Jupiter is 23.4mm in diameter. While the model may seem small it will still cover a very large area so you may not be able to realistically use all the planets.

Within this packet you will find everything you need to get started on building this scale model. Focus has taken the time to measure out and size everything to make this a quick and fun lesson to share with your students. This model is a great outdoor activity for schools or other educational groups. It gives students a chance to get a feel of how large the solar system really is. If you are interest in hand outs and other activities such as this please visit our website listed in the bottom right corner of this page. Go out and have some fun exploring the wonders of the universe!

To get started see the following Instruction page and follow the steps to begin.



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INSTRUCTIONS OVERVIEW

In this scale model we will be covering only the eight major planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. At this scale the diameter of this model is roughly a mile. Because of this size we may not use all the planets which is ok. Many times we ourselves are only able to go out to the distance of Mercury so don't feel as if you have to use everything for this to work.

In this packet you will find the following pages: Instructions (Page 2), Information Key (Page 3), Planet Cards (Page 4) and Sun Card (Page 5). All you have to do is print out this packet and cut out the required cards. Below are a list of materials you will need in order to build the model.

Required Materials:

- Printed Solar System Scale Model Packet
- A large open area that is at least 32 feet long.
- 9" diameter ball (if you do not have one cut out the Sun Card on page 5).
- Measuring tape (we recommend a 60' measuring tape).
- Scissors

Recommended Tips:

- Print this packet on 110lbs Card Stock to allow your Planet Cards to be more durable.
- If you need to save ink print the cards in black and white.
- Laminating your Planet Cards can ensure they last longer.
- Mounting each planet card on a stick for the students to hold onto (such as Popsicle sticks).
- You do not need the Sun Card if you already have a Sun representation.

INSTRUCTIONS

- 1) Locate the Planet Cards on Page 4. Carefully cut out each card along the dotted lines.
- 2) Find a large open location that is at least 32 feet in length, bigger the better.
- 3) Find the center of your model, this will be the location of the Sun, everything centers on this point.
- 4) From the Sun's position measure out the position of the first planet (Mercury). All measurements for each planet can be found on the Information Key on Page 3.
- 5) Measure out as many planets as you can from the Sun's position. A football field will allow you to go almost all the way to Jupiter.
- 6) Hand the cards out to as many students as possible and have them move to their preset positions.

Go out and have fun!

SOURCES FOR THIS ACTIVITY

Explorium: Solar System Calculator

www.exploratorium.edu/ronh/solar_system/

NASA JPL: Image Credit

www.nasa.gov

INFORMATION KEY

On this page you will find all the correct distant measurements for each planet in the model. These are the measurements you will want to use in order to correct space each object from the Sun. Besides the planets we have also given some other celestial objects if you would like to move into some further objects such a nearby stars and galaxies.

PLANETS

<u>Name:</u>	<u>Diameter (in the model):</u>	<u>Distance from the Sun (in model)</u>
Mercury	0.7mm	31' 2.7" (9.5 meters)
Venus	1.9mm	58' 3" (17.7 meters)
Earth	2mm	80' 7.1" (24.5 meters)
Mars	1.1mm	122' 9.2" (37.4 meters)
Jupiter	23.4mm	419' 3.4" (127.8 meters)
Saturn	19.1mm	768' 10.95" (234.3 meters)
Uranus	7.7mm	1546' 7.3" (471.4 meters)
Neptune	7.4mm	2424' 8.2" (739 meters)

OTHER CELESTIAL OBJECTS

The objects below are additional celestial objects to help build a further frame of reference. These objects will show other solar system objects as well as nearby stars and galaxies. All measurements are based off the Sun.

In this section we mention *Light Years*. In reality one Light Year equals 6 trillion miles. This is the distance that light travels in the course of one year. In the model one light year is 965 miles in length.

<u>Object Name:</u>	<u>Object Type:</u>	<u>Distance (in the model)</u>	<u>Distance (in reality)</u>
Pluto	Dwarf Planet	3186' 1.35" (971.1 meters)	3.67 billion miles
Alpha Centauri	Closest Star	4122.5 miles	4.35 light years
Sirius	Brightest Star	8341.5 miles	8.6 light tears

Size Comparison

Betelgeuse	Red Giant	640 light years
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Betelgeuse is a massive red giant star in the constellation of Orion. Remember that our Sun in this scale model is 9" in diameter. The massive star Betelgeuse in this scale would be 281' in diameter!

PLANET CARDS

MERCURY

Distance from Sun:
35.98 million miles

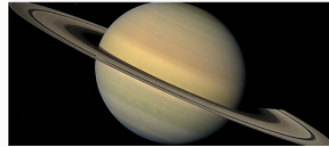


JUPITER

Distance from Sun:
483.8 million miles

VENUS

Distance from Sun:
67.24 million miles



SATURN

Distance from Sun:
888.2 million miles

EARTH

Distance from Sun:
93 million miles



URANUS

Distance from Sun:
1.78 billion miles

MARS

Distance from Sun:
141.6 million miles



NEPTUNE

Distance from Sun:
2.79 billion miles

SUN CARD (ONLY PRINT IF NEEDED)

