

# SOLAR SYSTEM SCALE LAB

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This lab is designed to demonstrate to students the vastness of the universe. A model solar system can be easily constructed on school grounds. In this outdoor lab, students walk between planets answering a series of questions from a worksheet. The solar system is scaled down so that the Sun is the size of a standard 9.5-inch basketball (scale is approximately 1 inch = 91,000 miles). See chart below.

The lab works well with other introductory lessons on the solar system. The scaled planets are mounted on dowel rods that have information cards and pictures attached. Information and pictures are available from: <http://solarsystem.nasa.gov/planets/index.cfm>

	<i>Actual Equatorial Diameter**</i>	<i>Actual Distance to Sun**</i>	Scaled #1 Equatorial Diameter	Scaled #1 Distance to Sun
<b>Sun</b>	<b>864,400 mi</b>	<b>0 mi</b>	<b>9.5 in</b>	<b>0 ft</b>
Mercury	3,032 mi	35,983,095 mi	0.033 in	33 ft
Venus	7,520 mi	67,237,910 mi	0.083 in	62 ft
Earth	7,926 mi	92,955,820 mi	0.087 in	85 ft
Mars	4,222 mi	141,633,260 mi	0.046 in	130 ft
Jupiter	88,846 mi	483,682,810 mi	0.976 in	443 ft
Saturn	74,898 mi	885,904,700 mi	0.823 in	811 ft
Uranus*	31,764 mi	1,783,939,400 mi	0.349 in	1,634 ft
Neptune*	30,776 mi	2,795,084,800 mi	0.338 in	2,560 ft
Pluto*	1,430 mi	3,760,050,000 mi	0.016 in	3,443 ft

*\*Please note that while Uranus, Neptune, and Pluto are listed in the chart, these planets are not used in this exercise because of size constraints.*

*\*\*All distances were found at: <http://solarsystem.nasa.gov/planets/index.cfm>*

## **Materials**

- Sun: 9.5-inch (standard size) basketball
- Mercury: <2 salt grains
- Venus: slightly less than head of a pin
- Earth: head of a pin
- Mars: sand grain
- Jupiter: Make with Play-Doh® or similar
- Saturn: Make with Play-Doh® or similar
- 7 dowel rods (or up to 10 depending on available space\*)
- Long (outdoor reel-style) measuring tape
- Information cards & optional photos
- Student worksheet

## Set-Up

1. Mount the “planets” on the top of the dowel rods.
2. Tape the information cards and the pictures onto the dowel rods.
3. On school grounds, determine the best location for your Sun-basketball. Depending on the size of the area available, you may wish to have the planets in a single file line, or spread out in positions that resemble orbiting paths.
4. Measure out the distance from the Sun to each planet (or from planet to planet) as listed in the chart.
5. Insert the dowel rods into the ground at the appropriate sites, so that each stands vertically.
6. Your solar system model is now lab-ready!

## Information Cards

### EARTH

- Equatorial diameter = 7,926 mi
- Actual distance from Sun = 92,955,820 mi

If the Sun is scaled down to 9.5 inches in diameter, the Earth is about the size of the head of a pin:

- 0.087 inches in diameter
- 85 feet from the Sun

*\*Approximately **1.3 million** Earths could fit inside the Sun.  
In Greek mythology, Earth (or Gaia) was married to Uranus.*

Source: <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Earth>

## SUN

- In this model 1 inch is the equivalent of 91,000 miles in the real world.
- Actual equatorial diameter = 864,400 mi
- Scaled diameter = 9.5 inches
- The temperature at the surface of the sun is about 10,000° Fahrenheit. The temperature rises from the surface of the sun inward towards the very hot center of the sun where it reaches about 27,000,000° Fahrenheit.
- The Sun's mass is approximately 99.8% of our Solar System.

*\*The Sun is also known as Sol.*

Source: <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun>

## MERCURY

- Equatorial diameter = 3,032 mi
- Actual distance from Sun = 35,983,095 mi

If the Sun is scaled down to 9.5 inches in diameter, then Mercury is less than 2 salt grains in size.

- 0.033 inches in diameter
- 33 feet from the Sun

*\*Mercury has less gravity than Earth. An object that weighs 100lbs on Earth only weighs 38lbs on Mercury.*

Source: <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Mercury>

## **VENUS**

- Equatorial diameter = 7,520 mi
- Actual distance from Sun = 67,237,910 mi

If the Sun is scaled down to 9.5 inches in diameter, then Venus is slightly smaller than the head of a pin.

- 0.083 inches in diameter
- 62 feet from the Sun

*\*Venus is closest in size to Earth; its actual diameter is “only” about 400 miles less than the Earth’s. The Greek name for the Roman goddess Venus is Aphrodite.*

Source: <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Venus>

## **MARS**

- Equatorial diameter = 4,222 mi
- Actual distance from Sun = 141,633,260 mi

If the Sun is scaled down to 9.5 inches in diameter, then Mars is roughly the size of a large sand grain.

- 0.046 inches in diameter
- 130 feet from the Sun

*\*Mars’ orbit takes it just inside the Asteroid Belt; Mars travels around the Sun in ~687 Earth days. Mars is also known as the Red Planet.*

Source: <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Mars>

## **JUPITER**

- Equatorial diameter = 88,846 mi
- Actual distance from Sun = 483,682,810 mi

If the Sun is scaled down to 9.5 inches in diameter, then Jupiter is:

- 0.976 inches in diameter
- 443 feet from the Sun

*\* In mythology, Jupiter (Zeus) overthrew his father, Saturn, to become king of gods. He then split the Universe with his brothers Neptune and Pluto.*

Source: <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Jupiter>

## **SATURN**

- Equatorial diameter = 74,898 mi
- Actual distance from Sun = 885,904,700 mi

If the Sun is scaled down to 9.5 inches in diameter, then Saturn is:

- 0.823 inches in diameter
- 811 feet from the Sun

*\* Saturn's rings span about 175,000 miles, but are only about 3,200 feet thick. Saturn has the most moons of any planet in our Solar System. Another name for Saturn is Cronus.*

Source: <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Saturn>