

Topics: Planets, Solar System, Measurement, Calculation

Materials List

- ✓ Long strip of paper, adding machine tape, or equivalent
- ✓ Paper and/or cardboard
- ✓ Tape
- ✓ Drawing compass or the equivalent
- ✓ Scissors
- ✓ Metric ruler
- ✓ Solar System Information Chart
- ✓ Optional: crayons, markers, colored pencils, or paint

This activity can be used to teach:

Next Generation Science:

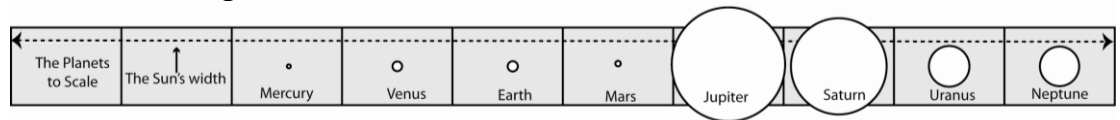
- Scale of solar system objects (Middle School, Earth & Space Science 1-3)

Common Core Math:

- Measurement & units (Measur. & Data, Grade 4, 1; Grade 5, 1)
- Ratios & proportions (Ratios & Proport. Relationships, Grade 6, 1-3; Grade 7, 2)
- Use units to solve problems (High School, Number & Quant, Quantities, 1, 2)
- Problem Solving and Reasoning (Math Practices Grades 3-12)

Sun & Planets to Scale

Modeling the Relative Diameters of the Sun and the Planets



Create a foldable, pocket-sized scaled portrait of the Sun and planets.

Assembly

1. Cut a strip of paper 1 m long to represent the scaled down diameter of the Sun.
2. Mark/fold the strip of paper every 10 cm to create 10 even sections.
3. Starting with the third section, label each section with the name of one of the eight planets (in order). See the illustration at the top of the page.
4. Since there are 100 cm in a meter the diameter for each circle to represent the corresponding planet can be found by multiplying the (**bolded**) relative ratio in the Solar System Information Chart by 1 cm. Round to the nearest mm. Alternately, have students use the planet and Sun diameters to first calculate the relative ratios.
5. With the drawing compass, draw circles of the appropriate diameter to represent each planet on the appropriate section of the strip. If the diameter of a circle is greater than the width of the strip of paper, draw the circle on a wider piece of paper, cut out the circle and attach to the long strip.
6. Optional: Write down facts relating to each planet near or on the planets circle.

Solar System Information Chart

	Diameter in km	Relative Ratio (Sun = 100)
Sun	1,391,000	100
Mercury	4,880	0.35
Venus	12,104	0.87
Earth	12,756	0.92
Mars	6,794	0.49
Jupiter	142,984	10.27
Saturn	120,536	8.67
Uranus	51,118	3.67
Neptune	49,528	3.56

The Science Behind the Activity

Our Solar System contains one star (the Sun), 8 planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune), 10's of satellites (moons) that orbit the planets, dwarf planets (e.g., Pluto, Ceres, and Eris), 1000's of asteroids that orbit the Sun, and at least millions of comets.

The four planets closest to the Sun are called the Terrestrial Planets, they are rocky and are relatively small. The four planets further from the Sun, the Gas Giants, are larger and are composed mostly of hydrogen, helium, and methane gas. The Sun contains about 99% of the mass of the Solar System, all the planets and other bodies make up only about 1% of the solar system's mass.

Taking it Further

- In August 2006 the IAU redefined the term “planet” and classified Pluto, Ceres, and Eris as dwarf planets. Create circles for Pluto (2300 km, relative ratio ~0.2) and Earth’s moon (3500 km ~0.3), compare with the planets and each other. Speculate as to why Pluto was classified as a dwarf planet.
- For each planet find a spherical object with a diameter which approximates the circle’s diameter. Hang or tape the spheres in order.
- Calculate the diameter of the Sun and planets when the Earth is scaled to 2 cm, 5 cm, 10 cm, 1 m, 5 m, or larger.
- Mark the size of the planets and their scaled orbits on the playground or park, RAFT Idea Sheet *Planet Orbit Locations to Scale*.

Web Resources (Visit www.raft.net/raft-idea?isid=590 for more resources!)

- Solar System information - www.jpl.nasa.gov/solar_system/index.cfm
- Sun & planets - http://solarsystem.nasa.gov/multimedia/display.cfm?IM_ID=178
- In August, 2006 the IAU redefined the term "planet" and classified Pluto, Ceres, and Eris as dwarf planets - <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Pluto>
- Teacher designed math courses from the New Jersey Center for Teaching & Learning – <https://njctl.org/courses/math>



Mercury



Venus

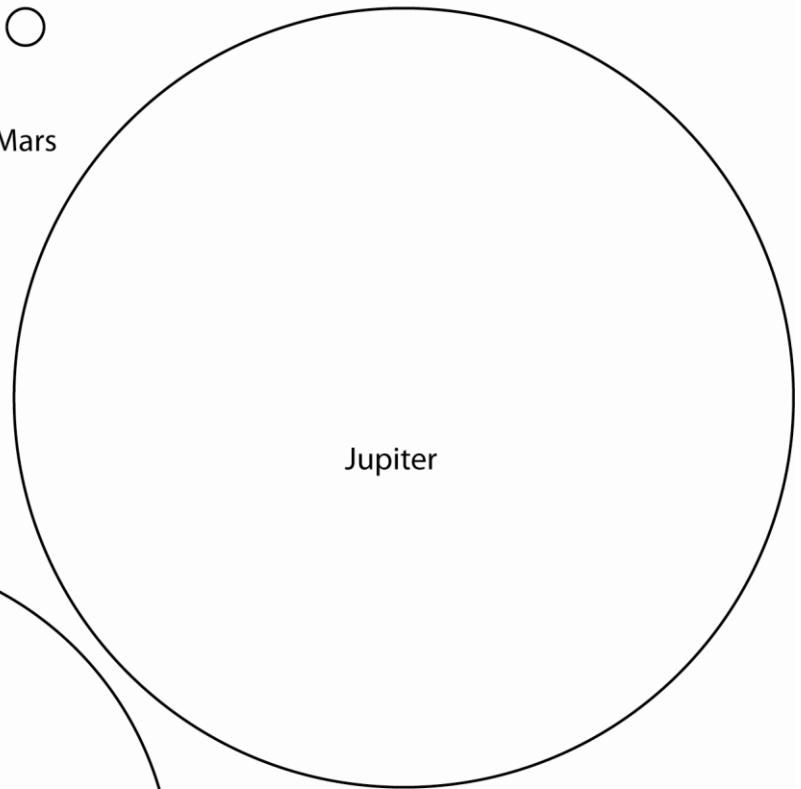


Earth

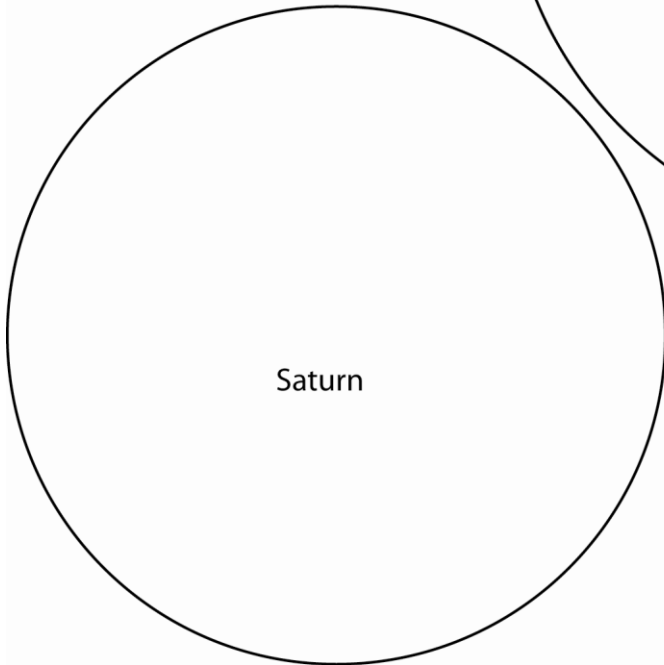


Mars

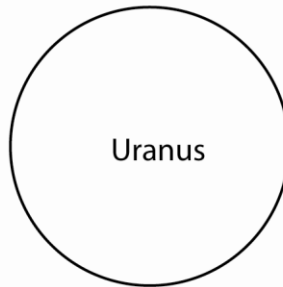
Planets to Scale (Sun = 1m)



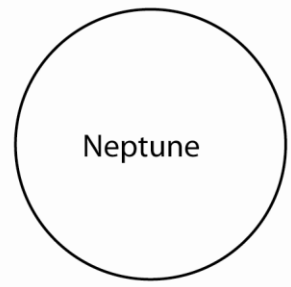
Jupiter



Saturn



Uranus



Neptune