# Scale Model of the Solar System

**Overview:**
Using a variety of objects, students will predict which objects best represent the relative sizes of the eight planets (Pluto is no longer classified as a planet). Using the diameters of the planets (chart below) they will create a scale model of each of the planets.

**Supplies:**
- grapefruit
- poppy seeds
- candy sprinkles
- popcorn kernels
- Skittles
- Marbles
- index cards
- chart: "Planets' Diameters"

**Procedure:**

1. In groups, students are told that a grapefruit represents the Sun and, using poppy seeds, candy sprinkles, popcorn kernels, Skittles or small marbles, they are to estimate the relative sizes of the eight planets.

2. Each group predicts which item might represent the size of each planet. This item is taped to an index card with the planet's name on it.

**Objective:**
To determine each planet's size relative to the earth.

**Key Concepts**

- The sun is considerably larger than the planets.
- Jupiter and Saturn are the two largest planets in the solar system.
- Jupiter is the largest planet and Mercury is the smallest planet.
- Mercury, Venus and Mars are smaller than the earth. Jupiter, Saturn, Uranus and Neptune are larger than the earth.
- The earth is a relatively small planet.

3. Results create a pictograph on the board. Groups are to justify their decisions.

1. Students are then given the diameter chart and must round each planet's diameter to the nearest 1000 km and then determine the scaled size for each planet.

   Example:
   - Mercury is 4, 878 km. Round this diameter to the nearest thousand (5 000). Determine the scaled size of the planet using the scale of 10 000 km = 1 mm. Mercury's scaled diameter would equal 0.5 mm

   - This scale is essentially the same scale we use in the "Relative Distances of the Planets" lesson. (10 billion meters = 1 meter).

2. Using these scaled diameters, students draw a diagram of the Sun and each of the planets.

3. Using their scaled diameters and diagrams, students look at which planets are of similar sizes. How do these results compare to the object choices they made at the beginning of the lesson? How do the planets' diameters compare to the earth's diameter?

4. To determine how many "earths" it would take to stretch across the diameter of the other planets, students will need to divide the real diameter of the Sun/planet by the real diameter of the earth. Record results in the chart and discuss findings.

5. Students will add their data sheet to their Astronomy Journal and summarize what they have discovered by doing this activity.

# PLANET DIAMETERS

| PLANET | REAL DIAMETER (km) | DIAMETER (rounded to the nearest thousand kilometers) | SCALED DIAMETER (1 mm = 10 000 km) | EARTH DIAMETERS |
|---|---|---|---|---|
| **SUN** | 1 392 000 | 1 392 000 | 139.2 mm | 109 |
| **MERCURY** | 4 878 | | | |
| **VENUS** | 12 104 | | | |
| **EARTH** | 12 756 | | | |
| **MARS** | 6 794 | | | |
| **JUPITER** | 142 796 | | | |
| **SATURN** | 120 660 | | | |
| **URANUS** | 51 118 | | | |
| **NEPTUNE** | 49 523 | | | |

* Scale factor is 1 to 10 billion

# PLANET DIAMETERS - ANSWERS

| | **REAL DIAMETER** (km) | **DIAMETER** (rounded to the nearest thousand kilometers) | **SCALED DIAMETER** (1 mm = 10 000 km) | **EARTH DIAMETERS** |
|---|---|---|---|---|
| **SUN** | 1 392 000 | 1 392 000 | 139.2 mm | 109 |
| **MERCURY** | 4 878 | 5 000 | 0.5 mm | 0.38 |
| **VENUS** | 12 104 | 12 000 | 1.2 mm | 0.95 |
| **EARTH** | 12 756 | 13 000 | 1.3 mm | 1 |
| **MARS** | 6 794 | 7 000 | 0.7 mm | 0.53 |
| **JUPITER** | 142 796 | 143 000 | 14.3 mm | 11 |
| **SATURN** | 120 660 | 121 000 | 12.1 mm | 9 |
| **URANUS** | 51 118 | 51 000 | 5.1 mm | 4 |
| **NEPTUNE** | 49 523 | 50 000 | 5.0 mm | 4 |

* Scale factor is 1 to 10 billion