RAFT IDEAS

Topics: Planets, Orbits, Solar System

Materials List
- ✓ 3 Spheres with the following dimensions:
  1.25 cm (small decorator marble)
  2.5 cm (small, wooden ball)
  5 cm (large, wooden ball)
- ✓ Meter stick
- ✓ Optional: paints

This activity can be used to teach:
Common Core Math Standards:
- Measurement and units (Measurement and Data, Grade 4, 1; Grade 5, 1)
- Ratios and proportions (Ratios and Proportional Relationships, Grade 6, 1-3; Grade 7, 2)
- Problem Solving and Reasoning (Math Practices Grades 3-8)

Next Generation Science Standards:
- Scale of objects in the Solar system (Middle School, Earth and Space Science 1-3)

raft
resource area for teaching
www.raft.net

Space Stuff to Scale
The Earth, Mars, and the Moon…Scaled to Size

Space is mostly just that: empty space. This planet and Moon scaling activity helps students visualize the distances involved in traveling to our close neighbors.

To Do and Notice
1. Label or note ball/planet assignments according to this scale 5 cm ball = Earth, 2.5 cm ball = Mars, 1.25 cm ball = the Moon. (Optional: paint the spheres to better represent the planets and Moon.) (Scale: 1 cm = 2550 km)
2. Place the Earth ball on a large table. Predict where the Moon would be if the Earth were that size.
3. The Moon is 400,000 km from Earth (on average), 155 cm at the scale in this activity. Measure 155 cm from the Earth ball, and place the Moon ball at this distance. The Moon orbits (goes around) the Earth at the same distance throughout most of its 29-day journey.
4. Given this Earth & Moon model, predict where Mars would be at this scale.
5. The planet Mars also orbits the Sun, so its distance from Earth varies quite a bit. In 2003, Earth and Mars were, essentially, as close as they can get: 56 million km apart, 220 meters at this scale. Measure 220 m from the Earth ball and place the Mars ball at this distance. And this is when the two planets are closest! When they are on opposite sides of the Sun, the scaled distance would be 1475 meters, or nearly a mile!

The Science Behind the Activity
Books cannot easily depict astronomical distances in a way that will fit on a page. This contributes to common misconceptions about the vast emptiness of space. This scale model illustrates this emptiness using two of Earth's closest companions in the Solar System, and can help clear up student misconceptions.

Mars made the headlines in 2003 because of its relative proximity to the Earth, closer than it has been in 60,000 years! Astronomers term these near approaches "perihelic oppositions." When Mars is at perihelion (closest to the Sun in its orbit) and when the Sun and Mars are at opposite sides of the Earth (at opposition), Mars is very close to the Earth, relatively speaking.

Web Resources (Visit www.raft.net/raft-idea?isid=398 for more resources!)
Build an entire Solar System to any scale by visiting this calculating chart, written by Ron Hipshman of the Exploratorium. Follow the links to also find your weight on other worlds and your age on other worlds:
http://www.exploratorium.edu/ronh/solar_system/