DAWN ACTIVITY LEADER GUIDE

ASTEROID MYSTERY BOXES

Goal:

Learn about the nature of asteroids with your hands.

Estimated time:
5-10 minutes

Who to do it with:
Ages: 4–Adult
Numbers: 1 or more!

What you need:

- 3-4 boxes (shoeboxes work well)
- Variety of rocks:
  - Large/small
  - Smooth/rough
  - Round/irregular
  - Different Densities
  - ½ gallon zip bag of puffy cereal/marbles/pebbles (for a rubble pile)
  - Asteroid Belt Tactile Graphic (optional)
    - Glue, Rice or sand, Yarn, Pipe cleaner, Round flat object, Stapler

Advanced preparation:

1. Gather rocks.
2. Make the number of mystery boxes for each feature you want to model.
   a. Go to http://stardustnext.jpl.nasa.gov/education/
   b. Under Comet Activities: Science: What Is a Comet?, click on Comet Mystery Boxes Assembly Directions to download.
   c. Place the rock combinations inside the boxes.
3. Place puffy cereal, pebbles, marbles inside a plastic zip bag to make a rubble pile.
4. Optional:
5. Print 2 tactile graphics of the asteroid belt:
   a. Go to http://dawn.jpl.nasa.gov/DawnCommunity/tg.asp and print the template.
   b. Glue round flat object (bottle cap) in the center to represent Sun
   c. Glue sand or rice in the zone that represents the asteroid belt.

   d. Glue string for Earth and Mars orbit.
   e. Staple pipe cleaner to the graphic on Jupiter's orbit.

How to do it:

1. Place an easy box as the first one (for example, the one holding one large and one small rock).
2. Have participants reach into the box and feel the objects.
3. Ask them to describe the difference between the two objects (not to identify what it is).
4. Repeat with the other boxes.
5. After several people have felt the contents of several boxes, ask them to describe the different characteristics of asteroids:
   a. Some are large, some are small.
   b. Some are smooth, some are rough.
   c. Some are round, some are irregular in shape.
   d. Some are heavier than others.
   e. Some are rubble piles loosely held together.

Optional:

6. Transition to the "Grape or Raisin?" activity to investigate the differences of a Vesta model and a Ceres model.
7. Have participants locate the asteroid belt (between the orbits of Mars and Jupiter) by feeling and seeing the asteroid belt tactile graphic. (Have one tactile graphic in a box and one viewable so kids can see what they are feeling.)

Why do it:

Using the sense of touch is a good way to involve participants with the basic characteristics of asteroids. Asteroids have a wide variety of shapes, sizes, and textures. Vesta and Ceres are among the largest of asteroids in the main asteroid belt. Vesta has about the same diameter as the state of Arizona; Ceres has about the same diameter of the state of Texas. Vesta is dry and volcanic while Ceres may have as much water (in the form of ice) under the surface as there is water on Earth! Yet, these objects formed in relatively the same place in our Solar System. To help us understand how that could happen, the Dawn spacecraft is using its special instruments to investigate Vesta and will investigate Ceres when it arrives there in 2015!