

SUGGESTED ACTIVITIES

(The Universe)

From *Invitations to Science Inquiry 2nd Edition* by Tik L. Liem:

<u>Activity</u>	<u>Page Number</u>	<u>Concept</u>
The Spinning Planets	388	Rotation of planets

From Internet Source:

<u>Activity</u>	<u>Concept</u>
Paper Comet Model	Becoming familiar with a comet by making a comet model
Charting the Orbits of Comets	Shape of a Comet's Orbit

THE SPINNING PLANETS

A. Question: *What do all spinning objects spin around?*

B. Materials Needed:

1. An aluminum or copper rod or tube (1cm diameter, 50cm long).
2. A large and a small Styrofoam ball, string.

C: Procedure:

1. Stuff one end of the tube with the lead (solder wire would do fine) and attach the larger ball to the weighted end and the smaller one to the other end of the tube.
2. Find the balance point of the tube and mark the center of gravity by drawing a line around the tube with a marker.
3. Tie the string to the geometric center of the tube and show that the tube cannot balance horizontally at that point. Ask: "How can I balance the tube horizontally from the string?"
4. Now spin the tube while holding the string with the other hand, and keep spinning the tube around (the tube is now hanging horizontally from the string). Observe the marked center of mass/gravity!

D: Anticipated Results:

Students should notice that while the tube was spun, the marked spot stayed at the same place.

E: Thought Questions for Class Discussion:

1. Did the geometric center stay in the middle of the rotating system?
2. Around what point did the system spin?
3. What kept the pipe hanging horizontally from the string?

F: Explanation:

All spinning objects spin around their center of mass, and this is why the marked spot stayed at the same place while the tube was spun. The geometric center, not being the center of mass, because the tube was weighted at one end, had to spin around the center of mass. This is the reason why we could keep the tube spinning. As the tube was spinning in a horizontal plane, it was actually kept horizontal and hanging horizontally from the string, even though it was not hanging from its center of balance (center of mass/gravity). The plane of rotation of the tube happened to be in a horizontal plane. If the tube could be spun at a higher speed, this plane of rotation could take up any position.

PAPER COMET MODEL

www.nasa.gov/audience/forkids/activities/A_Paper_Comet.html

The Deep Impact mission is going to a comet. A small spacecraft is going to Comet Tempel 1. The spacecraft will make a small crater. Another spacecraft will take pictures. We hope to find out what is inside the comet.

You can make your own model of a comet using things you have in the classroom.

Materials Needed:

1. One sheet of paper
2. Two long strips of shiny filler for gift bags
3. One 2-inch strip of tape
4. One drinking straw (not a bendy straw)
5. Blow dryer
6. One marker
7. Scissors
8. Adult helper

Procedures:

1. Cut slits in the paper from each corner leaving a space in the middle.
2. Lay the strips across the paper over the slits to make an "X".
3. Put a piece of tape across the "X" to hold the strips on to the paper.
4. Crumple the paper into a comet shape. Make sure that your strips stay on the outside.
5. Use the scissors to poke a hole through the comet.
6. Push the straw into the hole.
7. Hold the comet by the straw.
8. Use a hairdryer to show how the sun's energy makes parts of the comet blow off to a tail.
9. Here is something you can do with a friend. He or she can be the sun. Walk around the sun holding the comet. The sun's energy should blow on your comet as you walk.
10. See how the tail moves as you get closer to the sun.

CHARTING THE ORBITS OF COMETS

http://spaceplace.nasa.gov/en/educators/comet_orbits_cnsr.pdf

One of the many things that makes a comet different from a planet is its orbit - that is, the path it takes around the sun. Planets tend to orbit their parent star in nearly circular paths. Comets however, have very elongated orbits, with one end coming very near the sun and the other very far from the sun.

In this activity, we will see how the orbits of comets compare to the orbits of the planets.

Materials Needed:

1. Piece of corrugated cardboard at least 10 inches square.
2. String
3. Ruler
4. Pencil
5. 2 pins or push pins

Procedure:

1. Tie an 8-inch length of string into a loop. Push a pin into a piece of cardboard. Place the loop of string around the pin. Use a pencil inside the loop to trace out a shape as you pull the loop tight. What shape is made with one pin at the center?
2. Place a second pin 2-inches from the first pin. With the loop of string enclosing both pins, trace another shape with the pencil. This shape is called an ellipse. How is this shape different from the first shape? A circle has a single center, but an ellipse has two centers, called foci. The pins represent the foci of the ellipse you have drawn.