SUGGESTED ACTIVITIES

(*How Objects In Space Effect Earth*)

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

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The Cup of Coffee Drop	393	Gravity

From Internet Source:

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Model representing high and low tides	Tides

THE CUP OF COFFEE DROP

A. Question: *Can gravity push water out of a cup?*

B. Materials Needed:

1. A styrofoam cup, a large wide and deep bucket.
2. Coffee or intensely colored water.

C: Procedure:

1. With a pencil point poke a hole near the bottom in the side of the foam cup. Place a finger over it and fill the cup with coffee or colored water (if colored water is used, make sure it is intensely colored).
2. Stand and hold the liquid-filled cup over the bucket, which is placed on the floor in front of you. Let go of your finger over the hole and show that the liquid squirts out of the cup.
3. Place your finger back over the hole and tell students that you are going to drop the whole cup. Let them follow the falling cup and observe closely whether any liquid is squirting out of the hole while the cup is falling. Now drop the cup and simultaneously remove your finger which was covering the hole.

D: Anticipated Results:

Students should observe the liquid squirting out of the cup at the beginning but not when the cup is falling.

E: Thought Questions for Class Discussion:

1. What makes the liquid squirt out of the hole in the beginning?
2. Would the strength of the squirt be the same on the surface of the moon, all other variables being equal?
3. Why did the liquid stop squirting during the fall?
4. What would happen if the finger covering the hole is removed a little sooner than the release of the cup?
5. If this same liquid-filled cup is held in an orbiting satellite, would any liquid squirt out of the hole? Would it be possible to hold the liquid in an open cup?

F: Explanation:

When the liquid-filled cup is held stationary, the liquid is pulled down by the earth's gravity causing a liquid pressure at the point of the opening in the side of the cup, resulting in the squirt. When the cup is falling, the liquid pressure is suddenly eliminated, and no liquid is squirting out.

All variables being equal, when this liquid-filled cup is held on the surface of the moon, the liquid will only squirt about one sixth of the distance from what it was on the earth, as the gravity pull is bout $1/6^{th}$ of the earth's.

In a space satellite, no liquid will come out of the hole at all, just like in the falling cup, all materials actually are weightless. It would be very difficult to keep liquids in an open container in a satellite.

TIDES

www.teachnet-lab.org/ps101/bglasgold/lesson4tides.htm

Make a model representing high and low tides. Depending on the maturity of the students, this can either be a teacher demonstrated lesson or a small group activity.

Materials:

1. Shoebox top
2. Tape
3. Pencil and crayons
4. Circle of white paper with a 5inch circumference
5. Rubber band
6. String
7. Button or quarter

Procedure:

1. Color the circle to represent earth.
2. Push the pencil through the top of the shoebox top, near the far end (the pencil should stand vertically).
3. Paste the earth circle about one inch in front of the pencil, on the top of the box.
4. Place the rubber band around the pencil.
5. Tie the center of the string around the middle of the rubber band at a point directly across from the pencil. Leave two equal lengths of the string left at each end.
6. Place the quarter or button (to represent the moon) on the opposite end of the box top from the pencil.
7. Tape one end of the string to the center of the paper circle. Tape the other end of the string to the quarter.
8. Slowly pull on the quarter in a direction away from the pencil until the string attached to the rubber band is straight. Observe the shape of the rubber band as the quarter is tugged.

Results:

The rubber band is pulled into an oval shape, with one pointed end towards the quarter, the other the pencil. How does this show how the gravitational pull of the moon affects earth's tides?