National Aeronautics and
Space Administration

Comet Shoemaker-Levy 9 and the Planet Jupiter

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This composite photograph was assembled from separate images taken of Jupiter and the fragmented comet, Shoemaker-Levy 9. Even though Jupiter was 670 million kilometers from Earth, NASA's Hubble Space Telescope can clearly resolve details in the giant planet's magnificent cloud belts and zones, as small as 320 kilometers across. (The relative sizes and separation of the planet and comet were modified for this composite image.)

The dark spot on the planet is the shadow of Jupiter's moon, Io. This volcanic moon appears as an orange and yellow disk just to the upper right of the shadow. Io is approximately the size of Earth's Moon, but 2,000 times the distance from Earth to the Moon. The chain of 21 comet fragments stretches across 1.1 million kilometers in space, roughly 3 times the distance between the Earth and the Moon.

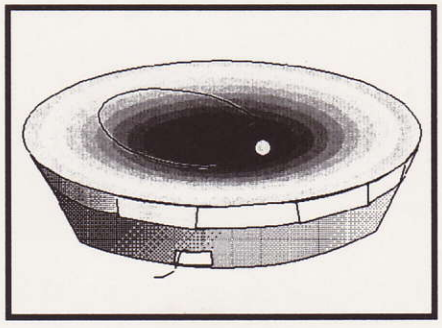
Comet Shoemaker-Levy 9 was discovered by astronomers Eugene and Carolyn Shoemaker and David Levy on a photograph taken the night of March 24, 1993, with a telescope on Palomar Mountain in California. Further observations later showed that the comet was in orbit around Jupiter, and had passed close to the giant planet in July 1992. During this close approach, Jupiter's gravity broke the fragile comet into the many pieces seen in this image. Comets are "dirty snowballs," chunks of dust, and ice that formed when our Solar System was born more than 4 billion years ago. Comet Shoemaker-Levy 9 had orbited Jupiter for dozens of years.

For the Classroom

Investigate comet orbits by constructing a gravity well (spiral vortex). Gravity wells, found at many science and technology museums, are circular basins with a steeply curved hole in the middle. Marbles or coins, rolled across the basin, will orbit the hole for many seconds before dropping through the middle. Gravity wells are ideal tools for modeling comet motions in our solar system. The gravity well described below employs a stretched plastic sheet upon which small marbles, representing comets, are rolled.

To construct the well, you will need the following materials:

- Wooden (or plastic or metal) bowl about 30 centimeters in diameter
- Black plastic trash bag
- Rubber Cement
- Masking tape
- Scissors
- Small bead
- 1/8 inch drill and bit
- String
- Small marble



Drill a hole through the center of the bottom of the bowl. Cut a circle out of the plastic bag slightly larger than the bowl's diameter. Punch a small hole through the center of the plastic circle. Tie a knot in one end of the string and slip the other end through the bead. Feed the string through the hole in the plastic circle, and then through the hole in the bowl. Tape the plastic circle over the bowl drum-head tight. Coat the bottom of the bead and the plastic immediately around the hole for the string with rubber cement. After the cement dries, pull on the string to bond the plastic sheet and the bead together. Pull on the string again to stretch the plastic to form a vortex shape. Tape the string to the bowl's bottom to keep it from slipping. Place the bowl on the level surface and roll the marble across plastic. What is the shape of the marble's orbit? Does it's speed remain constant as it rolls around the well? What does the bead represent in the gravity well? Look up Johannes Kepler's laws of planetary motion in an astronomy book and compare them to the marble's path. What does this activity tell you about the shape of Comet Shoemaker-Levy 9's orbit?

The Hubble Space Telescope is managed by NASA's Goddard Space Flight Center in Greenbelt, Maryland, for the Office of Space Science at NASA Headquarters.

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