

## INTERNATIONAL YEAR OF ASTRONOMY 2009 GALILEO ACTIVITY

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### GRAVITY EXPERIMENT

From *Galileo for Kids: His Life and Ideas* by Richard Panchyk (Chicago Review Press, 2005). There is extensive background information and many more activities in this book recommended by the National Science Teachers Association (NSTA).

### Background

Nicholas Copernicus, Galileo, and many astronomers after them were very interested in how the force of gravity acts on objects, both on Earth and in space. Galileo's fabled work while living in Pisa demonstrated that gravity exerted an equal force on objects of different sizes and weights. An understanding of gravity has been critical for astronomers to discover the laws of the universe and planetary motion. In this experiment, you will attempt to observe Galileo's idea.

### Materials

- Orange
- Dime
- Sheet of paper

### Activity

Stand with the orange in one hand and the dime in the other. Hold your arms straight out in front of you, perpendicular to your body. Drop the orange and coin at the same moment. Observe that they both hit the ground at the same time. Size or weight did not make a difference in the gravitational pull on the objects. Now try the same thing with the orange and the sheet of paper. Which hit the ground first? Why did gravity act differently this time? The answer is that gravity did not act differently, but something interfered with gravity's ability to pull the paper to the ground. The paper's shape and its lightweight allowed it to "float" momentarily. Crumple the paper into a ball and try it again. What happens? Because the earth has an atmosphere made of several gases (what we call "air"), objects such as gliders, parachutes and feathers can seemingly defy the laws of gravity by taking advantage of the properties of the gases that make up air. The paper acts lighter than the air and is buoyed by the air for that moment it floats around before hitting the ground. On a planet with no atmosphere (no gases or air), that sheet of paper would reach the ground at the same time as the orange.

IYA2009 is modern astronomy's quadricentennial and an international celebration of numerous astronomical and scientific milestones. It marks the 400<sup>th</sup> anniversary of Galileo's first use of a telescope to study the skies and Kepler's publication of *Astronomia Nova*.

## Extensions

Lessons and Activities from the NASA Cassini-Huygens Mission to Saturn

- Saturn Educator Guide, Lesson 3: Moons, Rings, and Relationships

<http://saturn.jpl.nasa.gov/Education/EDUCATION58Program/education58guide/>

- Planetary Billiards

<http://saturn.jpl.nasa.gov/Education/EDUCATION58Program/edu58kitchen/>

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