National Aeronautics and Space Administration

Educational Product	
Educators & Students	Grades 1–4

EB-2001-12-012-JPL

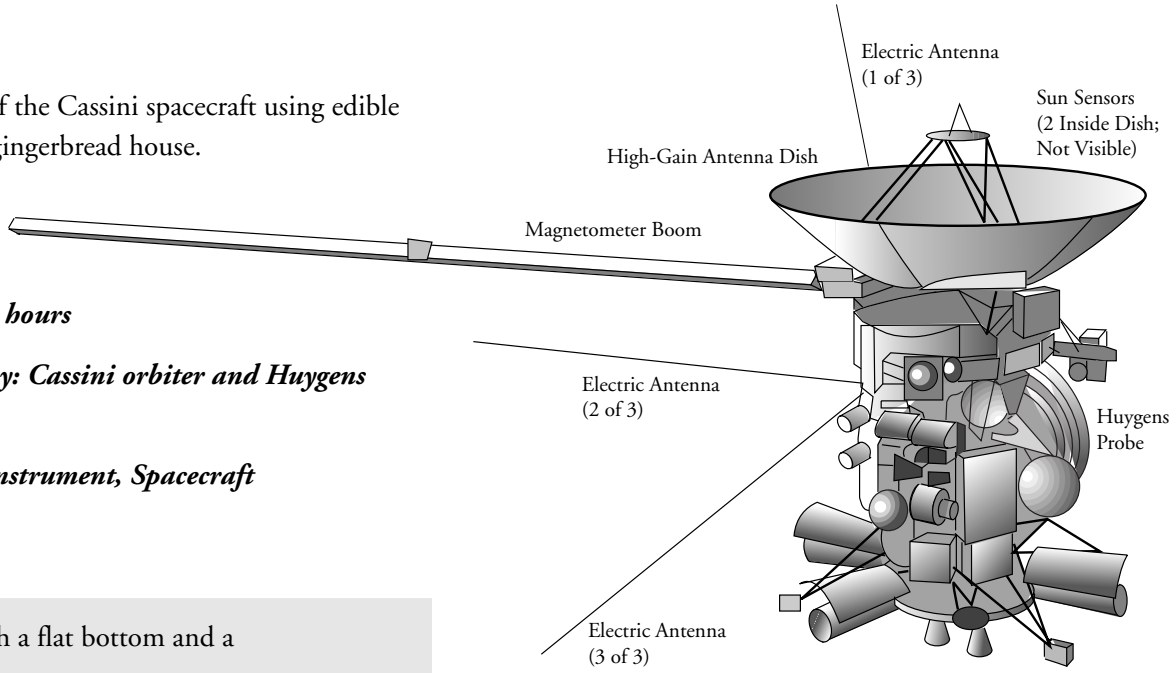
Educational Brief

CASSINI SCIENCE INVESTIGATION

Gingerbread Spacecraft

Objective

To construct a model of the Cassini spacecraft using edible products, much like a gingerbread house.



Time Required: 1 to 2 hours

Saturn System Analogy: Cassini orbiter and Huygens probe

Keywords: Antenna, Instrument, Spacecraft

MATERIALS

- Ice cream cone with a flat bottom and a cup-like top
- Cake mix (made according to box instructions)
- Cake frosting — or "ornamental" frosting (gingerbread house frosting), which adheres more effectively than standard cake frosting
- Chocolate wafer candy bar
- Candy mint still in its wrapping (preferably a metallic wrapping, or wrap it in aluminum foil)
- Small marshmallows
- Piece of licorice
- Small, disk-shaped candies (e.g., M&M's®)

Discussion

Major portions of a spacecraft can be easily modeled using edible components. In this activity, students "construct" an edible "spacecraft" featuring some of the major components of the real thing. As illustrated, the Cassini spacecraft features a large dish antenna for communicating with Earth mounted on the main body of the spacecraft. A long boom out the side carries a magnetometer, an extremely sophisticated compass for measuring the direction and strength of a planetary magnetic field. It represents one of many scientific instruments aboard. Sun sensors near the main antenna represent one of the engineering subsystems on the spacecraft.

Procedure

1. Fill the ice cream cone 2/3 full of cake mix. Bake according to the cake mix instructions, just as for a cupcake.
2. Place a layer of frosting on top of the "cake."
3. Fold the licorice in half and poke the ends into the cake. The licorice should make an inverted V sticking out of the cake. This represents the support structure on the interior of Cassini's high-gain antenna dish.
4. Using frosting as glue, place two disk candies around the inside of the top of the ice cream cone. These represent the Sun sensors that tell the spacecraft where the Sun is.
5. Cut a hole in the ice cream cone right under the cake "antenna." Insert the chocolate wafer into the cone. Using frosting as glue, place a marshmallow on the end of the chocolate wafer. This represents the magnetometer boom.
6. Holding the cone with the chocolate wafer pointing to the right, take the candy mint and attach it to the side of the cone that is facing you. Use frosting as glue. This represents the Huygens probe.

Extension

Using a diagram of the spacecraft and some imagination, add additional instruments and engineering components onto your spacecraft. For a more detailed listing of Cassini's subsystems, visit *http://saturn.jpl.nasa.gov/cassini/english/spacecraft/* or order a copy of the "Ways of Seeing" CD-ROM at *http://saturn.jpl.nasa.gov/cassini/english/products/*. The "Saturn Educator Guide" (available for download at *http://saturn.jpl.nasa.gov/cassini/english/teachers/activities.shtml*) includes an activity associating Cassini's subsystems with analogs from everyday life.

Technology Standards

A visit to the URL http://www.mcrel.org *yielded the following standards and included benchmarks that may be applicable to this activity.*

4. Understands the nature of technological design.

LEVEL 1 (GRADES K–2)

Knows that both objects and systems occur in nature (e.g., stars and the solar system), but people can also design and make objects and systems (e.g., telephones and communication systems) to solve a problem and to improve the quality of life.

5. Understands the nature and operation of systems.

LEVEL 2 (GRADES 3–5)

Knows that when things are made up of many parts, the parts usually affect one another.

Understands the relationships between elements (i.e., components, such as people or parts) in systems.

Teachers — Please take a moment to evaluate this product at http://ehb2.gsfc.nasa.gov/edcats/educational_brief.
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