



GENESIS HOME

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GENESIS KIDS



Blast's Cosmic Carnival

A Hole In One!

Classroom Activity

Teacher Guide

Science Activity

Grades K-4

Background

One of the scientific instruments in the Genesis spacecraft is the ion concentrator. This device is designed to collect specific types of solar wind. It is basically a parabolic mirror which is micro-stepped (or reflect light) and a very fine grid and very thin screens to allow the collection of only ions (positively or negatively charged particles). In this activity students experiment with a parabola and simulate the collection of ions onto the target of the concentrator.

Science Standards

[Science As Inquiry](#)

Abilities necessary to do scientific inquiry
Understandings about scientific inquiry

[Physical Science](#)

Position and motion of objects
Light, heat, electricity, and magnetism

[Science and Technology](#)

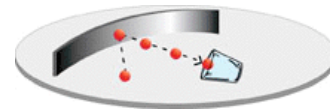
Abilities to distinguish between natural objects and objects made by humans

[Science in Personal and Social Perspectives](#)

Science and technology in local challenges

Student Product

Model of the Genesis spacecraft's concentrator



Materials

- Plastic cup
- Five rubber balls
- One meter curved surface (3/4 inch copper tubing works well)
- Student [activity](#) sheet

Activity

1. Show the class a photo of a satellite dish. Ask students questions similar to the following:
 - What does a satellite dish do? (Students may say that it helps the television receive channels)
 - What does it collect? (Students may suggest television signals, waves or pictures)
 - What shape is the dish? (Students may call this a dish shape, crescent or curve)
 - What are some other instruments that collect light? (telescopes, cameras, mirrors, solar cookers)
2. Explain to students that the Genesis spacecraft has a concentrator that collects special types of atoms from the sun.
3. Explain that they will model how this instrument works by playing a game.
4. Place students into groups of 3 or 4.
5. Distribute the materials to the student groups. Have the groups set up their apparatus as in the diagram.
6. Challenge the students to roll the rubber balls so that they bounce off the curve and go into the cup.

7. Tell students that after a few trials, they may adjust the curve and experiment so that they are able to get the balls in the cup each time.
8. Each student should get at least five turns.
9. Explain to students that in this model the rubber balls represent the solar wind particles as they enter the Genesis solar wind concentrator.
10. Have the students draw a picture that shows the motion of the rubber balls at each step of the game.

Going Further

- Another example of a parabola is a solar cooker. Have interested students build one to cook a hot dog. [Here are](#) the directions for the hot dog cooker assembly in PDF format.
- Older students might be interested in learning more about the [Genesis Concentrator](#).



Resources

http://set.lanl.gov/programs/LASSO/LASSOTchr/Instruments/ion_pool.htm
Original concentrator activity from Los Alamos Space Science Outreach

<http://www.chem4kids.com/>
Chemistry background for kids

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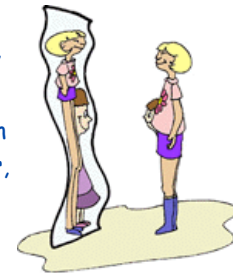
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Have you ever seen yourself in a fun house mirror? Do you remember what you looked like in that funny mirror? It was curved, right? What you saw was your reflection in the mirror, which is the reflection of light. Light is bouncing off of you into the mirror, then into your eye in order for you to see yourself. Curved mirrors have lots of uses. The Genesis spacecraft uses a curved mirror to focus solar wind onto a target.



Next stop: !

Blast's favorite hole looks just like this!
Can you shoot the ball into the cup?

Practice so
that you
can get
your ball into the cup every time.

What You Need:

- Plastic cup
- Five rubber balls
- One meter (the distance from the bottom of a door knob to the floor) curved surface (3/4 inch copper tubing works well)

What You Do:

1. Set up the materials so that it looks like the diagram above.
2. Try to roll the rubber balls so that they bounce off the curve and go into the cup. Each person gets a turn rolling the balls so that everyone gets practice. Everyone can take lots of turns!

3. You may want to fix the curve and experiment so that you can get the balls into the cup every time.
4. Each person gets five tries. Keep track of how many times you can roll the ball into the cup!
5. Draw a picture that shows the motion of the rubber balls at each step.

Did You Know:

The Genesis spacecraft has a special thing called the **concentrator**. It's designed to collect specific types of solar wind. It is a curved mirror that reflects light and allows the collection of only **ions** (basically, they're **charged particles**). In this activity, the rubber balls represent the solar wind particles as they enter the Genesis solar wind **concentrator**. The Genesis **concentrator** is not collecting hydrogen and helium, because most of the sun is made up of these **elements**.

Going Further:

- You can make another type of curved mirror (ok, it's aluminum foil) to cook hot dogs, just by the heat of the sun! It's called a solar cooker. Have interested students build one to cook some hot dogs. Here are the directions for the hot dog cooker assembly in PDF format.
- Older students might be interested in learning more about the Genesis concentrator.

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