



Rings and Things

Middle grades

Lesson Summary

Students observe how light from a flashlight scatters off baby powder and ice cubes to simulate how sunlight interacts with Saturn's rings.

Prior Knowledge & Skills

- Saturn's rings
- Nature of sunlight

NSES Science Standards

Physical Science: Transfer of energy

Why Should We Care?

We can only see objects when they reflect or emit light. Just like our eyes, telescopes, cameras and the like work by capturing the light that objects give off. This activity demonstrates how reflected sunlight illuminates Saturn's rings.

Suggested background reading

Saturn data sheet

Scientists Solve Mystery of Jupiter's Rings

Teaching Time: 30 minutes

Materials

To share with the entire class

- Flashlight
- Baby powder in a plastic squeezebox
- Ice cubes
- Drinking glasses
- Hot water

Advanced Planning/Preparation Time: 20 minutes

1. Gather materials
2. Review the discussion material and experiment set-up

*Source: Eyes on the Sky, Feet on the Ground,
Harvard-Smithsonian Center for Astrophysics*

Rings and Things

The most beautiful aspect of the outer planets is their rings. Each of the gas giants, Jupiter, Saturn, Uranus, and Neptune, all have rings of some kind. Although these rings are made from the tiniest chunks of dust and ice, they still appear very bright to the cameras. How could such tiny particles so far away in space be so visible?

Materials: Flashlight, baby powder in a plastic squeezebox, ice cubes, drinking glasses, hot water

1. In a dark room, place a flashlight on the edge of a desk or table.
2. Hold the squeezebox below the beam of light and then quickly squeeze the box to let a fast shot of powder come up through the beam. Observe.
3. Fill a glass with hot water and leave another empty.
4. Drop an ice cube into the empty glass and observe its color: How clear is it? Bright? White?
5. Drop an ice cube into the hot water. It cracks. Observe the color: how clear is it? Bright? White?

Discussion

Before the powder is released, the beam of light is hard to see, like the rays of sunlight through empty space in the Solar System. Since the human eye can only see light if it bounces off of something and into the eye, the beam is hard to see until the powder particles are tossed into it. The particles fly around and bounce the light to the eye. The particles, although tiny, are mirrors for the eye to see reflected light from the Sun and are therefore quite bright.

The particles of the rings are small pieces of ice and dust, but what if they were larger pieces? Would they be as bright? The second part of the activity shows that a large solid ice cube is very clear, that is, lots of light is traveling through it and not getting stuck inside. The broken ice cube looks very white and bright. This is because where there once was a solid cube there are now jagged fractures for light to bounce off of. The rings of planets are made of broken pieces of ice and dust which have lots of jagged surfaces, making them all the more brilliantly bright.