The Bionic Bunny Show
(GPN #46)

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Program Description: In a visit to the taping of **Star Trek: The Next Generation,** LeVar shares a behind-the-scenes look at how another television show, where he is a character named Lt. Geordi LeForge, is made. Experts from the show explain how they create special effects and how the show is edited.

Seeing Is Believing

Key Words: vision, visual illusions, making observations

Concept: What we see can be explained.

We rely heavily on our sense of sight to receive information about the world around us. Movie magic like the models and computer-generated images shown on Star Trek: The Next Generation are examples of our tendency to believe what we see. Magicians use this tendency to their advantage when they show us things we know can't be real. Try creating a visual illusion.

Materials: Quarters, dimes.

1. Have a small group of students practice the following visual illusion:

- Place a dime on the inside of the fingers of your left hand. Cover the dime with a quarter. Then place a second dime on top of the quarter.
- Hold your left hand out flat to show the dime resting on the quarter. (Be sure the lower dime is completely covered by the quarter.) Then take the top dime off the quarter and place it in your pocket using your right hand.
- Close your left hand, folding your fingers over your palm to flip the quarter and lower dime over onto your palm. (The lower dime will now be on top of the quarter.)
- With your left hand still closed, tell those watching that you will make the dime reappear on top of the quarter. Wave your right hand and pretend to throw an invisible dime at your closed left hand.
- Open your left hand and show that the dime is resting on the quarter.

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2. After the students have practiced the above steps, have them perform the illusion in front of a small group of students who have not seen the illusion. Have the observing students ask the performer questions and/or work with coins until they discover how the illusion was created.

3. Ask the observing students what they thought when they first saw the illusion, why they didn't believe the illusion was real, and how they came up with an explanation for the illusion.

Science Note: Scientists use a similar process in their research. If scientists see something they don't understand, they begin looking for a scientific explanation based on principles of physics, biology, and/or other sciences. Some of the ways they do this is by talking to people about their questions, reading about the subject, and performing experiments related to the observation. Scientists have a basic assumption that events can be explained—that they are not "magic."

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Rolling Along

Key Words: scientific inquiry, observation, experimentation

Concept: Events can be explained.

A basic assumption of science is that events can be explained. Scientific inquiry is the process of using principles of science to explain how or why events happen. It includes the task of trying to separate fact from fiction, which can be difficult because, as was observed in the **Seeing Is Believing** activity, events are not always what they appear to be. Initial explanations sometimes turn out to be more fiction than fact, but through continued observations and experimentation the correct explanation can often be discovered.

Materials: Coffee can with a plastic lid, stiff cardboard, hammer, nail, small rubber band, large rubber band, paper clips, heavy metal washers, tape, wrapping paper.

1. Follow these steps to make a "rollback can" ahead of time, so students are not aware of how the can is made.

- Trace around a plastic coffee-can lid to make a circle the same size as the lid. Cut out the circle and tape it on the top of the lid to add rigidity. Using a nail, punch a hole through the center of the plastic lid and through the cardboard circle. Punch a similar hole in the bottom center of the coffee can.

- Thread several heavy washers onto a small rubber band, and then tie the rubber band in a knot around the washers. Tie this to the center of a large rubber band.

- Use the nail to push one end of the large rubber band through the hole in the bottom of the can from the inside. To secure the end, push a paper clip between the protruding end of the rubber band and the coffee can outside bottom. Tape the paper clip securely to the bottom of the can.

- Use the nail to push the opposite end of the large rubber band through the holes in the lid and cardboard from the inside. To secure this end, push a paper clip between the end of the rubber band and the cardboard, then tape the paper clip to the cardboard. Place the lid on the can. The large rubber band should now be suspended horizontally with the small rubber band near the center of the can hanging down vertically. The washers should not be touching the side of the can.

- Test the can by gently rolling it forward. The can should roll forward and stop, winding up the large rubber band as it goes. Then the can will roll back towards you as the rubber band unwinds. If the can does not roll back, you may need to add additional washers or try a rubber band that is tighter or looser.

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- Cover the can with wrapping paper keeping it as smooth as possible so that it will roll easily. Now your rollback can is complete.

2. Demonstrate the rollback can for the class. Without unwrapping it, ask them to develop an explanation of how the can works. Have them work in small groups to brainstorm explanations. If they have difficulty, you may wish to give them a list of the materials you used to make the rollback can.

3. Have each group of students present drawings of their ideas. Discuss which ideas the class feels would work and which would not and why. Ask students how they might revise their ideas after the class discussion. Ask them to see how many of their ideas are physical explanations rather than magical ones.

Extension: Assist students in collecting materials to build a model demonstrating their idea. After discussing a construction plan, have them build the model and test it, revising it as they work. They will undoubtedly want to unwrap the demonstration can, but encourage them to modify their models as they continue observing how the demonstration can works.

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