TEACHERS ACTIVITIES

Theme:

Seeing is not always believing, especially when you're looking at an optical illusion.

Topics For Discussion:

Before viewing the program, show a few optical illusions to the class. The book, *Opt: An Illusionary Tale*, has several simple ones that involve only drawings or utilize simple materials. Discuss with students how the optical illusions played tricks on their eyes.

Invite students to relate experiences in which they thought they saw something, but it was actually something else.

Discuss optical illusions that are deliberately created and the people who create them (e.g., magicians, movie makers, etc.).

Introduce the concept of "special effects." Ask students for examples of special effects they have seen (e.g., talking animals, people who can fly, morphing, etc.). How do they know these are special effects? Some students may have seen television programs on how special effects are created and can share what they learned.

Curriculum Extension Activities:

Obtain some microscopes to give students an opportunity to examine some common objects "up close." Another possibility is to arrange a field trip to a nearby high school and partner the younger children with the older science students who can show the children how to use the microscope and talk with them about what they see when they look at slides.

Have students do or make some of the optical illusions that the young people in the program do.

Give students a sheet of paper to which a border has been added. Have them color the border as a window frame. (As an alternative, a construction paper frame may be glued around the edges.) Have students draw and color a scene that they can see through their "window." Enlist the aid of the art teacher in teaching students about pictures with a foreground and background and the use of perspective. When their pictures are completed, they might add construction paper lattice pieces to their window so that it appears to be divided into panes. Display all the windows on a bulletin board. Discuss how the illusion of distance was shown in the pictures.

Locate some books of magic tricks. Make available some simple props and allow students to try some of the tricks. They may even wish to invent some of their own magic tricks. Discuss the concept of creating illusions through their tricks. After they have "perfected" their tricks, have a magic show and invite parents or other classes. Have students make posters advertising their show and write a printed program to give to audience members when they enter the room.

Have students experiment with drawing a face that also looks like a face when it is turned upside down. Talk about the placement of features on the face so that the illusion "works." (For example, eyes looking down in a face will be looking up when the face is turned around, and a beard on the face will be hair on the top of the head that is turned upside down.)

Discuss animal camouflage and why it is important. Have students locate pictures of animals who use camouflage and live in different habitats, such as the ocean, desert, forest, polar regions, rain forest, etc.

Have the students make "inkblot" pictures with paint. To do this, they will need these directions: fold a sheet of paper in half lengthwise, open it to lie flat, drop some paint on one-half of the paper (they might also put a few drops along the fold), fold the paper again and run their hand along the fold and over the paper, open the paper and let the paint dry. Display the pictures and invite students to study them, thinking about what they see. Later, discuss their different ideas for the pictures.

Children are fascinated by finding "hidden pictures." Have them create some of their own. Show some examples before they begin (children's magazines often contain hidden picture pages). Discuss how pictures of objects are disguised in the scenes. Display the students' pictures so that others can try to find the hidden objects.

SUPPLEMENTARY BOOKLIST:

TOPSY-TURVIES: PICTURES TO STRETCH THE IMAGINATION
by Mitsumasa Anno (Weatherhill)

UPSIDE-DOWNERS: MORE PICTURES TO STRETCH THE IMAGINATION
by Mitsumasa Anno (Walker)

AMAZING MAGIC TRICKS
by Dave Brown & Paul Reeve (DK)

THE TURN ABOUT, THINK ABOUT, LOOK ABOUT BOOK
by Beau Gardner (Lothrop, Lee & Shepard)

DINNER AT MAGRITTE'S
by Michael Garland (Dutton)

THE TREK
by Ann Jonas (Greenwillow)

REFLECTIONS
by Ann Jonas (Greenwillow)

MY FIRST MAGIC BOOK
by Lawrence Leyton (DK)

THE SQUIGGLE
by Carole Lexa Schaefer, illus. by Pierr Morgan (Crown)

THE OPTICAL ILLUSION BOOK
by Seymour Simon (Morrow)

STOP AND LOOK! ILLUSIONS
by Robyn Supraner, illus. by Renzo Barto (Troll Associates)

THE MYSTERIES OF HARRIS BURDICK
by Chris Van Allsburg (Houghton Mifflin)

PICTURE PUZZLER
by Kathleen Westray (Ticknor & Fields)

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GPN
P.O. Box 80669
Lincoln, NE 68501-0669
Phone: 800-228-4630
Fax: 800-306-2330
Email: gpn@unl.edu
Web site: gpn.unl.edu

Putting The Hole Thing Together

Key Words: image, three-dimensional

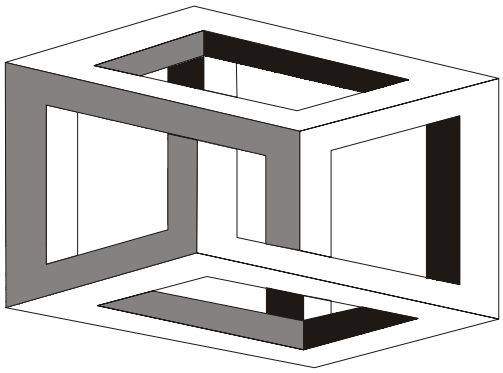
Concept: Objects look three-dimensional due to the combination of the images from our two eyes.

An image that we see is actually two images put together. Each eye sees a slightly different view and the brain puts them together. It is this combined image that makes things look three-dimensional rather than flat.

Materials: Pencils, paper.

1. To demonstrate that each eye sees a different view, ask each student to hold a pencil out at arm's length. Have them look at the pencil point with one eye (close the other eye) and then with the other. They will see that the pencil seems to move when they switch eyes. This is because each eye is seeing the pencil at a slightly different angle and the change they see is a shift in the background. This difference is even more obvious if they try the same activity with the pencil closer to the nose.

2. To explore how two images combine to create one view, have each student use a paper several inches long to shape a one-inch diameter tube. Have them hold out their right hand with their fingers pointing up and the palm away. Next have them place the middle of the tube between the thumb and first finger of that hand, gently pressing the thumb against the tube to hold it in place. Now move the tube (and hand) up to the left eye. Keeping both eyes open, look through the tube with the left eye while looking at the back of the hand with the right eye. The image of the hole in the tube will combine with the image of the hand to give the appearance that there is a hole in the hand.



Hurray for the Green, Black, and Orange

Key Words: afterimage, illusion, complementary color

Concept: Staring at colors then looking at something white causes an after image in the complementary colors of the image.

Using the afterimage effect introduced in the feature book (changing the balloon from red to green), you can create your own illusions.

Materials: Paper, opaque paints or magic markers, pencils.

1. To begin the process of creating an after-image illusion, ask each student to think of something that is known by its shape and color arrangement (e.g., stop signs, school crossing signs, traffic signals, fruits, flags, etc.). Have them choose one and make a pencil drawing of it.

2. Using a color wheel as a guide, have students color the picture using complementary colors in exchange for the typical colors (i.e., switch red with green, yellow with violet, blue with orange, and white with black).

3. Place a black dot near the center of the picture. Then to test the creations, have students stare at the dot in the center of their picture for one minute, then look at a blank piece of white paper. The afterimage will be the image of the object in its typical colors. Students can trade drawings and observe other afterimages.

Watch the Birdie, Catch the Birdie

Key Words: persistence of vision

Concept: Persistence of vision causes quickly-changing images to overlap.

The phenomenon of persistence-of-vision is similar to afterimage because it is a result of a mesh of individual visual images that are held briefly in our brain. Persistence-of-vision allows the images to be put together in a steady flow. This phenomenon makes it possible for us to see a movie as continuous movement when it is actually a series of single still images moving quickly in front of our eyes.

Materials: 3 x 5 cards, black felt tip pens (narrow tip), tape, unsharpened pencils.

1. To mark the center of a 3 x 5 card, fold it in half so it is divided into two 3 x 2.5 inch sections. Unfold the card, place an unsharpened pencil on the fold so the eraser is at the top and tape the pencil to the card.

2. In the center of the right side of the card, draw a small bird with a black felt tip pen.

3. Turn the card over so the pencil (with eraser at the top) is underneath the card. In the center of the side that is now on the right, use a felt tip to draw an empty bird cage large enough to hold the bird drawn in the previous step.

4. Pick the card/pencil up and hold the pencil between the palms of both hands. Roll the pencil back and forth while watching the right side of the card. Because the image of both the bird and the cage persist momentarily, they seem to overlap and the bird appears to be in the cage

Mirror

Key Words: lines of symmetry, reflection

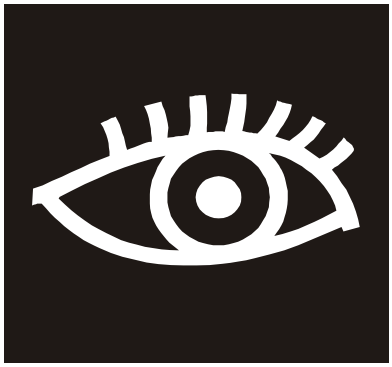
Concept: Mirrors create a line of symmetry between the real image and reflected image.

We depend on information from our eyes to guide our movements. As we've witnessed in the previous activities, sometimes our eyes can play tricks on us. Other times our eyes don't have to play tricks to make simple things tricky. For example, writing our name, even with closed eyes, is usually easy. But try to do it by looking in a mirror. Our eyes see a clear reflection, and our hand knows what to do, but they don't seem to work very well together.

Materials: Small rectangular or square-shaped mirrors, paper, pencils.

- Working together in teams of three, have students take turns writing their names while looking in a mirror. One of the group members can hold a piece of paper or lightweight cardboard under the writer's chin so the writer can only rely on the image in the mirror as a guide. The third group member can hold the mirror in place for the writer. Have group members trade positions.

- Have students use a mirror to find lines of symmetry for each letter of the alphabet. (A line of symmetry is any line that cuts a letter or picture, so that the reflection looks like the missing part.) Students can begin their survey by placing the mirror at a right angle to each letter so it is cut in half. Which letters have vertical lines of symmetry? Which have horizontal lines? Which have several lines of symmetry? Is there a difference between printed and written letters?



Cross Multipl-eyed

To focus on any object our eyes must be pointed directly at it. Because our eyes are set apart, they angle toward each other as we focus on an object. The degree of this angle changes as the object moves closer or farther away.

Materials: White paper, 3 x 5 cards, pencils.

1. In pairs, partners can take a turn watching the eyes of others as they focus on their fingertip and move their hand up to and away from their nose. As the finger gets closer, the eyes will point toward the bridge of the nose.

2. At arm's length, hold out hands so the index fingers are pointing towards each other — tip to tip but not quite touching. Focus on a spot on a wall that is several feet away. Next move fingers to about 12 inches from the eyes (this will block the view of the spot). A little sausage-shaped object floating between the fingers will appear. Actually, the object is an illusion created by the overlapping images of the finger tips that each eye sees.

3. Overlapping images can lead to some other interesting effects. On the right side of a 3 x 5 card, draw a 1/2-inch dark silhouette of an airplane as it would look from above. At no more than an inch to the left of the plane draw a 2-inch square landscape (including such things as a river, a bridge, a road, a pond, trees, a house, etc.) as it would appear from above. When it's complete, focus on something that is several feet away and without changing this focus, move the card so that it is about 6 inches in front of your eyes. It will appear as though the airplane is flying over the landscape. Pivot the card so the right side moves up and down and the plane looks like it is really flying.

Is It Hot or Not

Key Words: senses, touch, temperature

Concept: Our sense of touch, like the sense of sight, can be misled in some ways.

Our eyes aren't the only way we can experience sensory illusions. Each of our senses can be misled if the conditions are right. For instance, our sense of touch can be misled in judging temperature. Our perception of a hot day will vary depending on whether we step outside from an air-conditioned building or a warm building.

Materials: Three basins, cold water, room temperature water.

1. Fill three basins with water — two with room temperature water and the third with cold water.

2. Have several students place one hand in the basin of cold water for two or three minutes. Then have them put one hand in each of the two basins of room temperature water. Ask them to describe the temperature of the water in each basin. *(They will indicate that one basin is warmer than the other. The hand that was in the cold water will perceive the room temperature water as warmer.)*

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P.O. Box 80669
Lincoln, NE 68501-0669
Phone: 800-228-4630
Fax: 800-306-2330
Email: gpn@unl.edu
Web site: gpn.unl.edu