

Think and Discuss

Think about the play. Finish the time line on page 15. Fill in what Hunder does. Then answer the questions.

1. Use your time line. At the beginning of the play, who in town knows all the facts about Hunder's demands?
2. How do the people first react to the demands? What do they do next? Why do you think they react that way?
3. What job does Quillow take? Why do the people believe that the job fits Quillow?
4. How do the people treat Quillow before the night's work? How do they treat him after the work is done?
5. How does Quillow fool the giant?
6. Whom does Quillow need to make his plan work? Why does he need them?
7. Would Hunder agree that this play belongs in a unit about playing tricks? Explain why or why not.
8. How might Quillow's story apply to a situation in your own school?



WORK IN A GROUP

Discuss the who, what, when, and where of Quillow's plan for getting rid of Hunder. Discuss why these facts were so important to the plan. Ask your classmates to explain what they say. Talk about their answers.

Focusing on "Can You Believe Your Eyes?"

Think and Read

- ▶ Talk about a time you thought you saw something but it turned out to be something else. Ask your classmates about times when their senses were tricked.
- ▶ Look at the title on page 34. Think about things that trick the senses. Then answer the questions that appear under the drawings.
 - What does the title suggest to you? How does it make you feel about your answers?
 - What information will you get from this article?
- ▶ Get ready to read an information article about optical illusions. Copy the chart. As you read, take notes on details that explain how optical illusions work.

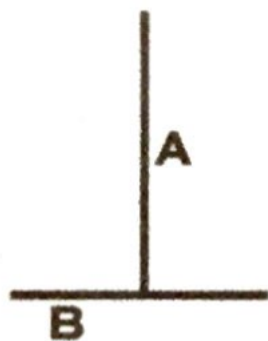
Optical Illusions	
Artificial	Natural

Now turn the page and read "Can You Believe Your Eyes?" Then you will talk about tricking the senses.

Connections

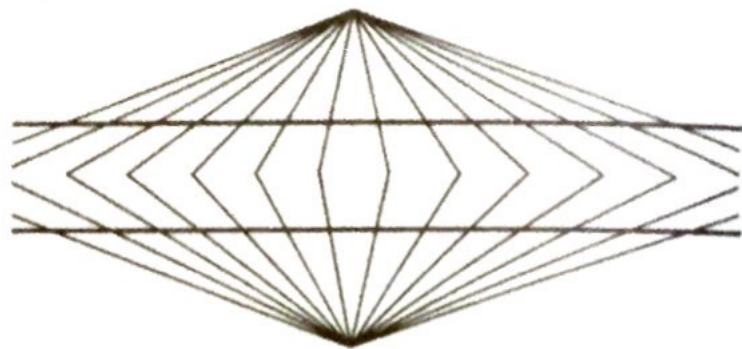
Can You Believe Your Eyes?

a.



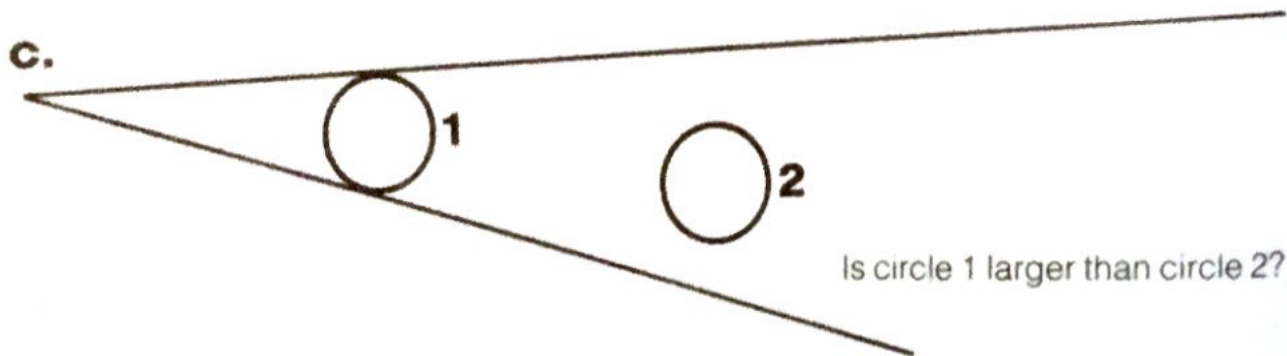
Is line A longer than line B?

b.



Are the two horizontal lines straight or curved?

c.



Is circle 1 larger than circle 2?

People say, "Seeing is believing," but this saying is not always true. Your eyes and your brain can be fooled.

The drawings on this page can fool your eyes and your brain. Did they fool you? The lines in *a* are the same length. The long lines in *b* are straight. The circles in *c* are the same size.

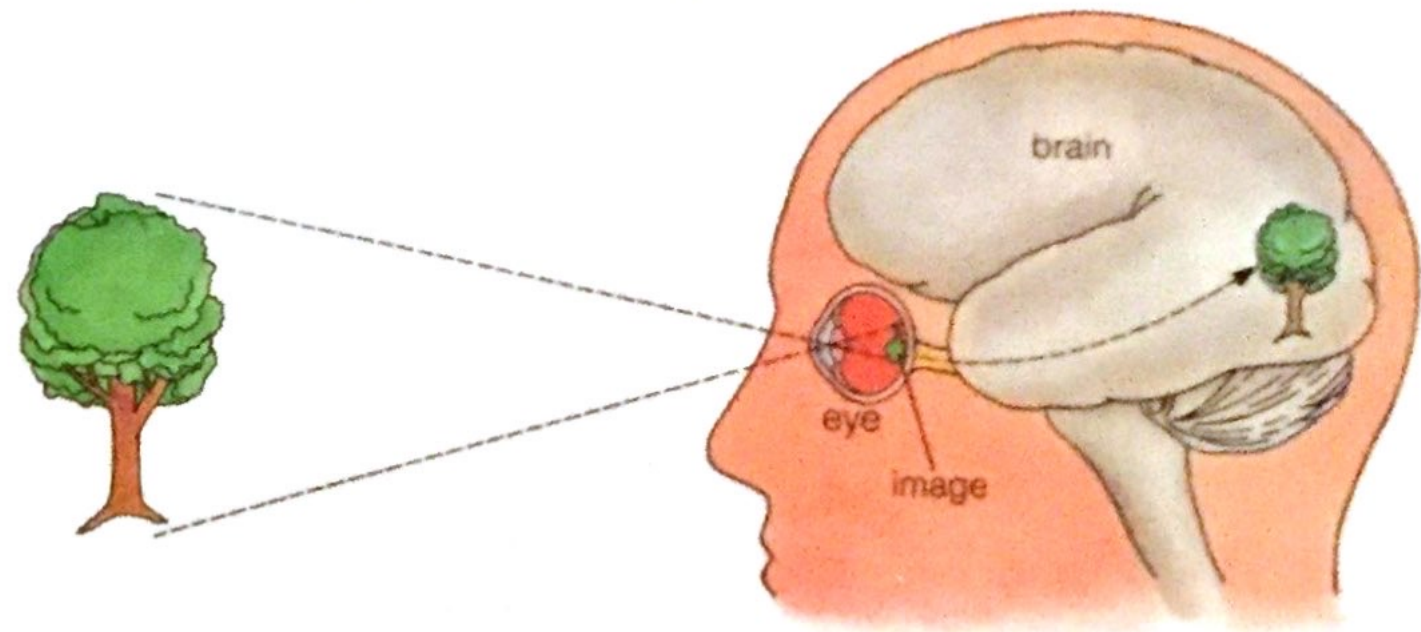
Each of these drawings is an *optical illusion*. An *optical illusion* happens when your eyes and your brain see something that is not really what it appears to be.

How Optical Illusions Happen

Your eyes and your brain work together to help you see. Light carries a picture, or *image*, of an object into each of your eyes. As light enters your eyes, the image of the object is turned upside-down. You receive two upside-down images of the object—one in each eye.

Messages about these upside-down images travel along your *optic nerves* to your brain. Sight centers in your brain turn the images right side up. The centers also combine the two images into one. Your brain then figures out what you are looking at and you "see" the object.

Then your brain must make sense of what you see. To do this, your brain compares what you are seeing to what you have seen in the past. Sometimes your brain does not do a very good job. It puts in curves that are not really there. It makes objects seem smaller or bigger than they really are. Your brain fools you and an optical illusion happens.



Sometimes an optical illusion picture makes your brain see the picture in two different ways. When you look at the picture, you see one thing. When you look again, you see something else.

Look at the drawing in *a*. As you look at it, the picture will seem to change. Sometimes you will see a vase. Sometimes you will see two faces. Your brain sees the picture in two different ways.

Look at the drawing in *b*. As you look at it, you may see a young woman at one time and an old woman at another. Your brain changes what it sees each time.



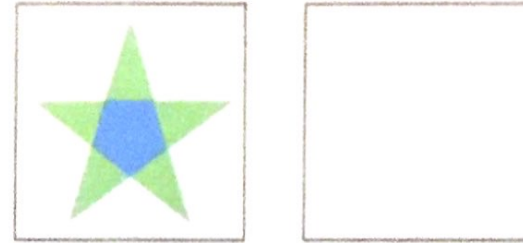
Do you see a vase or two faces?



Do you see a young woman or an old woman?

In pictures *a* and *b*, there really are two different images. Your brain can see and understand both of them. So your brain flips back and forth between the two.

Sometimes your brain sees colors that are not there. Look at the picture of the blue-green star for a minute. Then look at the white space next to it.



The red star you see on the white paper is an optical illusion called an *afterimage*. An afterimage repeats the same image that your brain saw, but changes its colors.

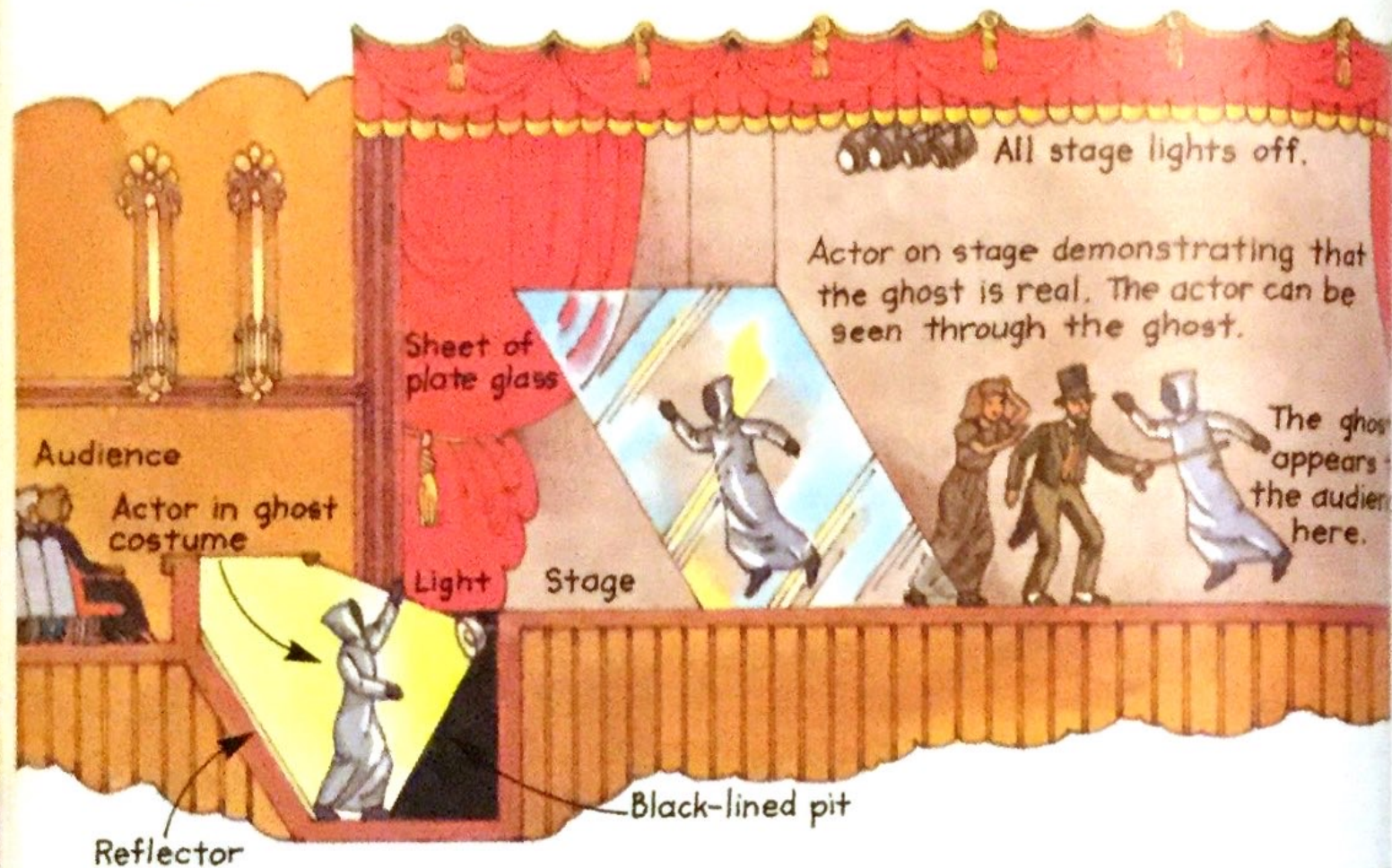
Afterimages happen because of the way the back wall, or *retina*, of your eye works. The retina has a group of cells that pick up colors from the light and images that come through your eyes. Some of these cells pick up blue. Some cells pick up green. Some cells pick up red. Cells work together to pick up other colors like yellow and purple.

When you looked at the blue-green star, the cells that pick up blue and green got tired and stopped working. Only the cells that pick up red kept working. So when you looked at the white paper, your eyes saw a red star.

Optical Illusions on Stage

Some optical illusions are caused by things that happen *outside* the eye. The brain is working fine and so is the retina. The light coming to the eye brings an image of something that is not really there.

Pepper's Ghost



A hundred years ago, a magician named John Pepper made audiences see something that was not there—a “ghost.” Here is how he did it.

The stage was nearly dark when the ghost appeared. A big, slanted sheet of plate glass was propped between the audience and the stage. But the audience could not see it. An actor dressed as a ghost was hidden in a black-lined pit in front of and below the stage. When a light was shined on the actor, his likeness, or *reflection*, appeared on the glass. The reflection seemed to be a “ghost” on the stage. The ghost could “walk” through a chair. Other actors could put their hands through him. When the stage lights went on, Pepper’s “ghost” would vanish.

Nature's Optical Illusions

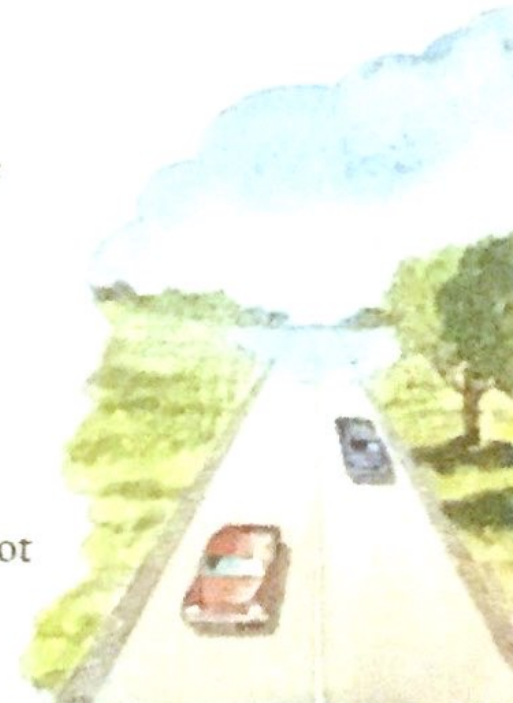
Optical illusions happen in nature, too. Nature bends light rays and makes you see things that are not there. One of nature's most familiar optical illusions is a trick of light called the *mirage* (mih-RAHZH). A mirage happens when an object that is far away appears to be quite close. A mirage can make you think a pool of water is on the road ahead. A mirage can change the shape of an object and make it look like something entirely different from what the object really is.

A mirage is caused by the bending of light through layers of air of different temperatures. A road's hot surface heats the air just above it. The hot air layer acts like a mirror. Light from the sky is reflected back toward someone coming down the road. What looks like a puddle of water across the road is really an image of the sky.

In the Arctic, there is another kind of mirage. This mirage forms when cold ground or water makes the air nearby colder than the air above. When the light bends, images are seen out of place. Faraway objects may seem closer and higher than they really are. It is even possible to see an image of a distant city or boat that is far from actual view!

Arctic mirages may have changed the course of history. A thousand years ago people called the Vikings sailed the North Atlantic. The Vikings lived in Europe but found their way to Iceland and Greenland. They also reached Canada.

Some scientists think the Arctic mirage may have helped the Vikings reach new shores. These scientists

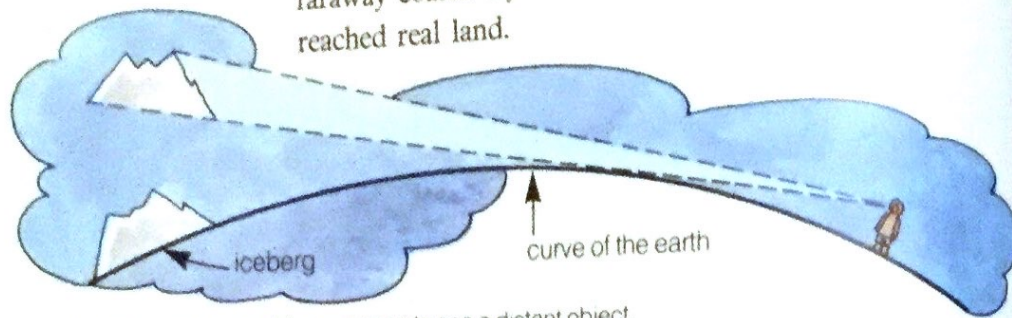


A road puddle mirage



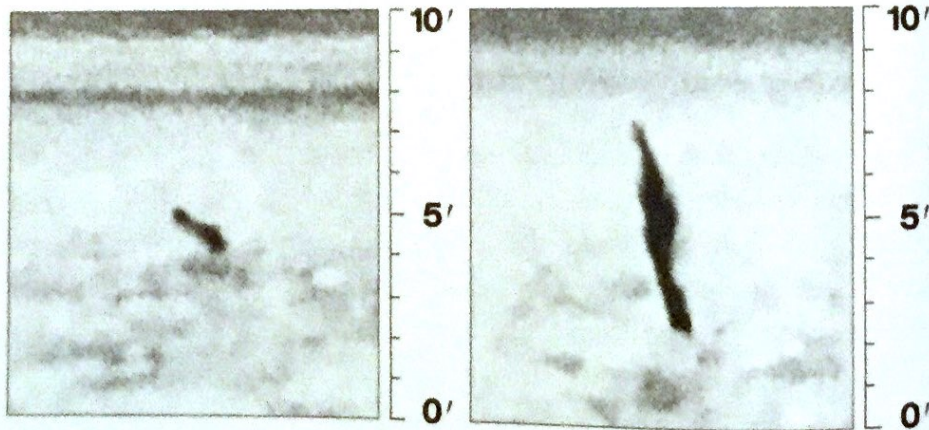
An Arctic mirage

believe that Viking sailors saw Arctic mirages of faraway coasts. By chasing the mirage, the Vikings reached real land.



An Arctic mirage enables a person to see a distant object, such as an iceberg, that is actually hidden beyond the curve of the earth.

The Arctic mirage may also explain stories of sea monsters. A mirage can change the shape of something in the water. A floating log can look long and thin. The log can also look short and thick. A mirage can change the shape of a whale so that sailors would not recognize it for what it was.



A mirage makes the stick in the water look shorter and wider

A mirage makes the stick look longer and thinner.

Like those long-ago sailors, you may not always see what you think you see. Optical illusions can fool you. Seeing is not always believing!

Think about the information article. Review your notes on man-made and natural optical illusions. Then answer the questions

1. During an optical illusion, what parts of the body can play tricks on the senses?
2. What would be the effect on optical illusions if the brain were to lose its memory? Why would this be so?
3. What can people do to be sure that they are not seeing an afterimage?
4. Use your chart. What do desert and Arctic mirages have in common?
5. Most people are amused to discover that they have been looking at a mirage. How could a mirage be a cruel experience for someone in the desert?
6. How might history be different if people had never been fooled by optical illusions?
7. How might your knowledge of optical illusions keep you from jumping to conclusions?

Think and Discuss



**WORK IN
A GROUP**

Talk about all of the ways that you depend upon your senses in a single day. Ask questions about what your classmates say. Talk about the answers.



Focusing on "The Tournament"

**Think
and
Read**

- ▶ Talk about events in the past that caused changes in the future. Ask your classmates about past events that gave shape to our present lives.
- ▶ Look at the title and the picture on pages 44-45. Think about how past events can cause changes in the present. Then read the introduction to the story.
 - What comes to mind when you look at the picture and read the title?
 - What seems out of place in the picture?
 - What might the selection be about? Why do you think so?
- ▶ Get ready to read a story about traveling into the past. Think about how time travelers might change history. Think about what you would add to this chart.

"The Tournament"	
Characters	Settings
_____	_____
_____	_____
_____	_____
_____	_____

Now turn the page and read "The Tournament." Then you will talk about causing changes in history.