# 6th Grade Science 9/11/18

Essential Question: What are optical illusions?

CW: Reading 1.1 Look at this

HW: Syllabus due Friday

# Agenda

1. Finish Activity 1.1

2. Reading 1.1 Look at this

3. Activity 1.2 DQB

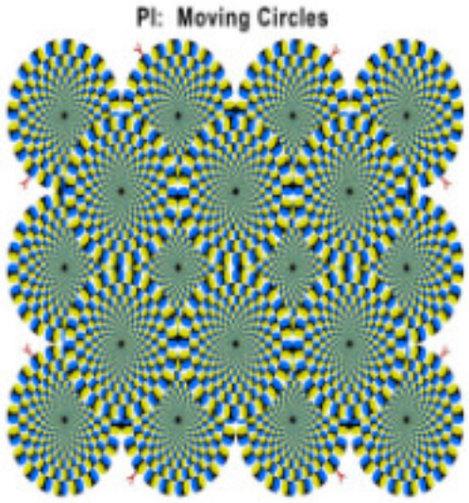
# Academic Language

- Be listening for/use these words:
- Phenomenon
- Optical
- Illusion

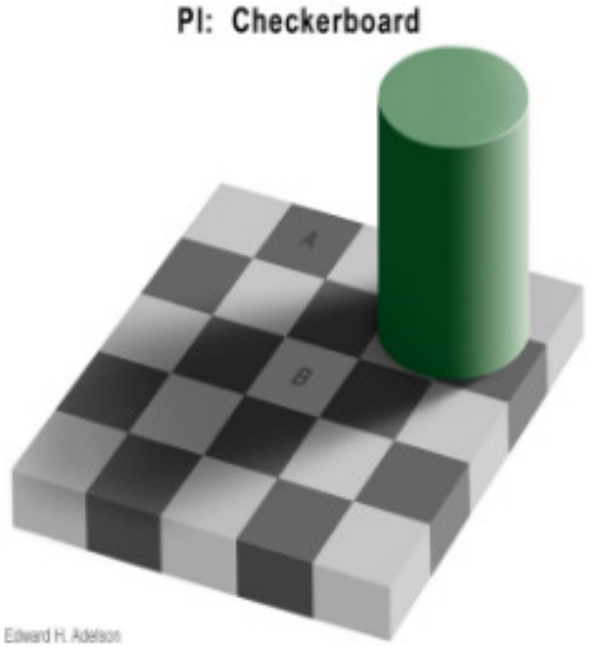
# Questions pg. 1-2

## Answers Questions 1-3

PI: Moving Circles



PI: Checkerboard




Edward H. Adelson

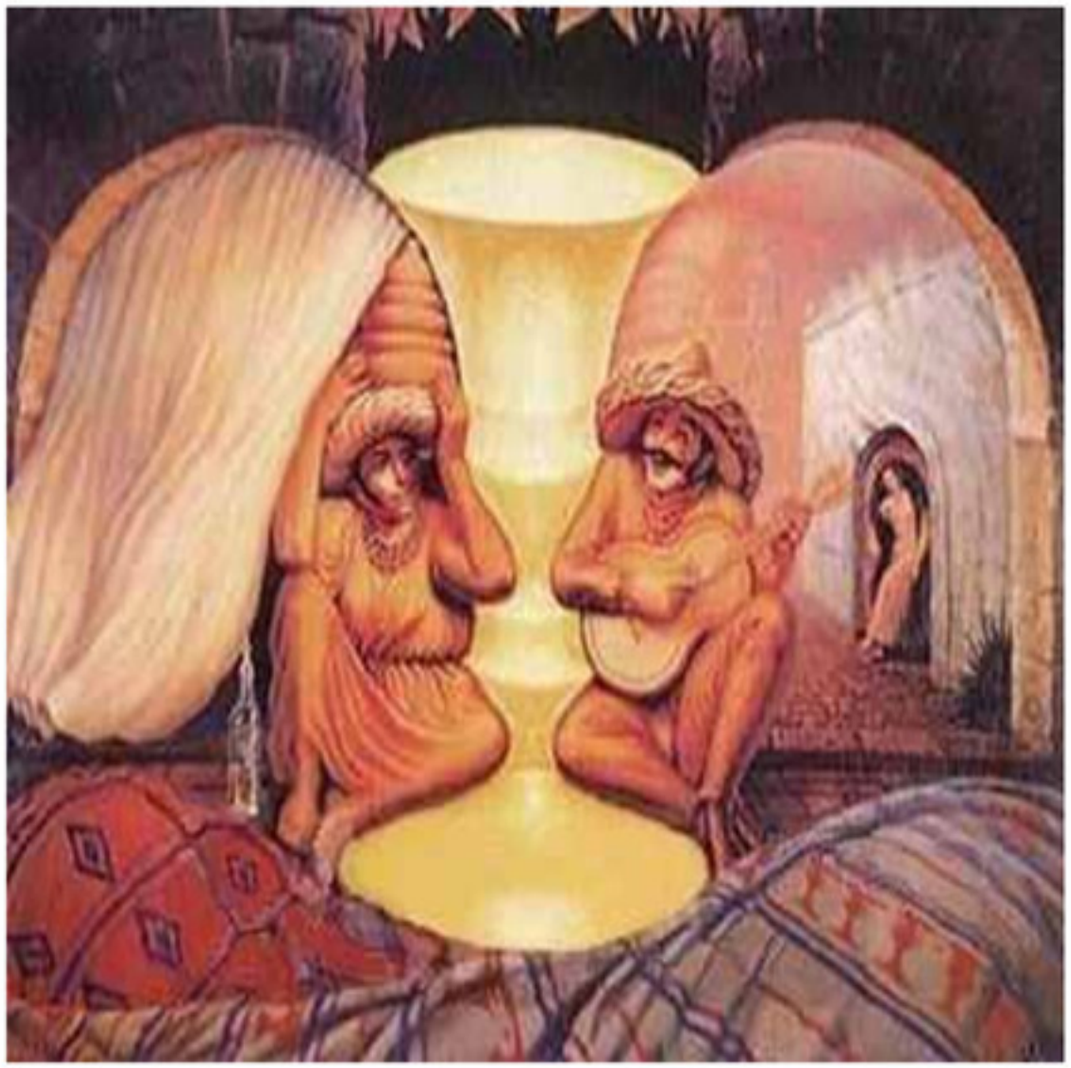
**Making Sense**

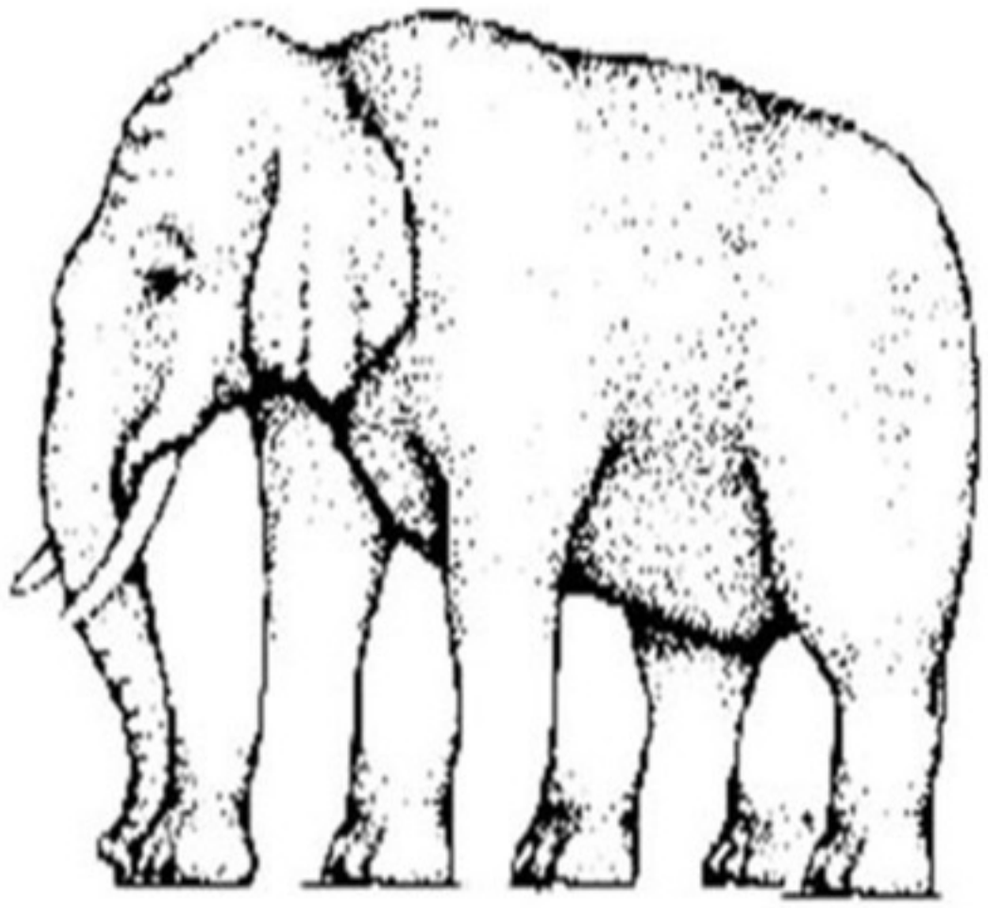
1. What did you notice about the circles in the first image?

2. Do you think what happened was real? How do you know?

3. Why do you think that square A and square B looked different the first time you looked at them than they did the second time you looked at them?

# So, can we believe our eyes?





#4: Record questions you have about the images, light and how you see

Good readers will think about texts in very specific ways as they read. "Writing in the Margins," then, identifies and defines six common ways highly proficient readers think about the texts they read. We know that comprehension of a text improves when readers:

- visualize ideas
- summarize ideas
- clarify information
- make connections
- respond to ideas
- ask questions

# Critical Reading Strategy

Visualize what the author is saying and draw an illustration in the margin. Visualizing what authors say will help you clarify complex concepts and ideas.

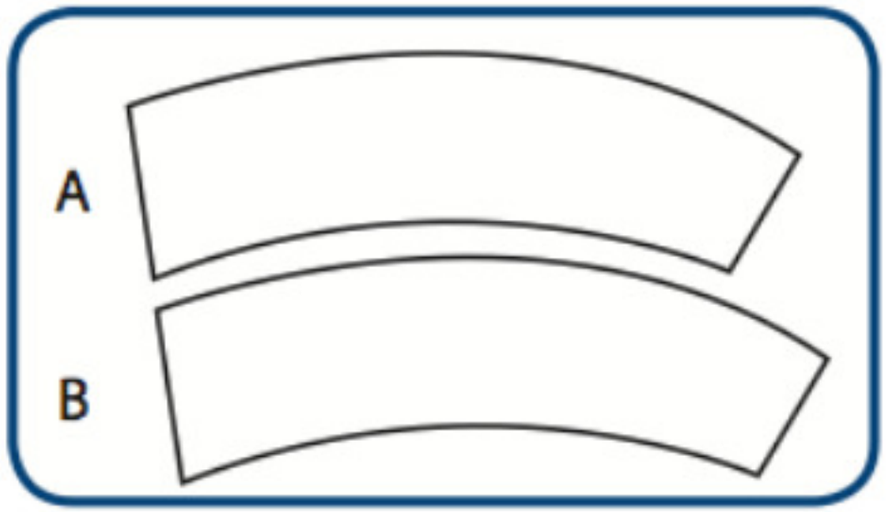
When visualizing, ask:

- What does this look like?
- How can I draw this concept/idea?
- What visual and/or symbol best represents this idea?

# Reading 1.1 Look at this

*Getting Ready*

The picture shows two bent rectangles. Which bent rectangle is longer?




Now use a ruler to measure the size of the two bent rectangles. Were you correct? To most people, B looks longer than A. When you measured, you might have learned that your guess was wrong. In this reading, you will learn how your brain can get confused by what your eyes see. You will be able to compare the figures in this reading to what you saw in class.

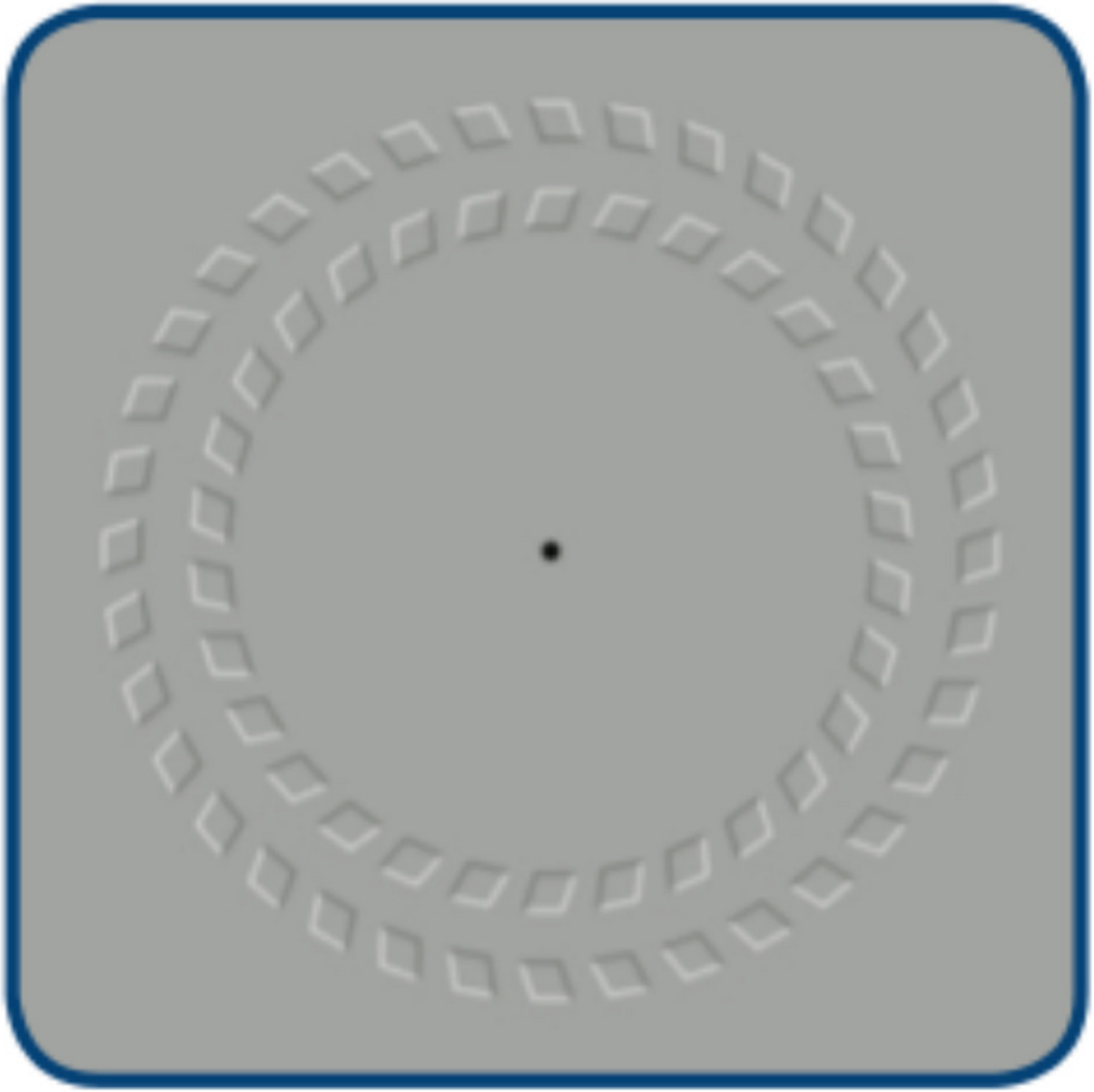
To compare means to think about what is alike and what is different. As you read, think about what is similar and different about the light box and the pictures in this reading.

## *What Are Optical Illusions?*

Look at these pictures.

Stare at the small dot in the center of the circles. Now move the picture closer to you while you keep looking at the dot. What happens?

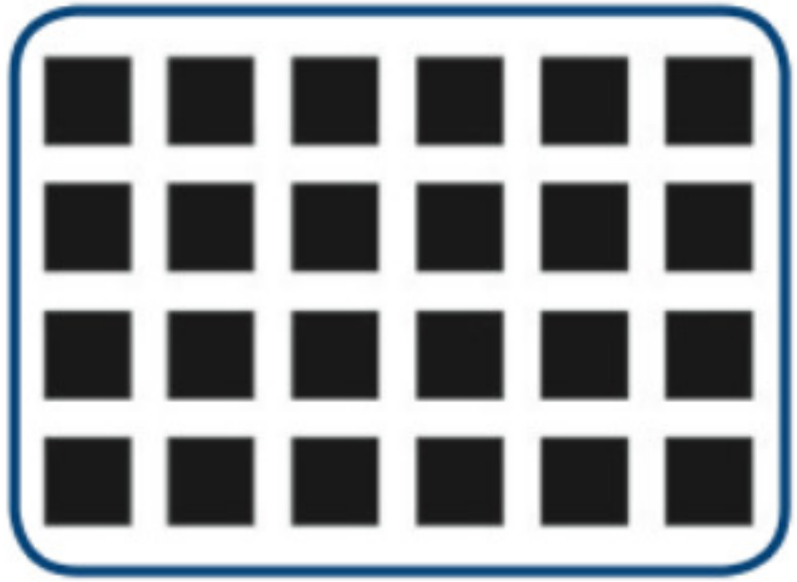
Tricks like these are called *optical illusions*. *Optical* is a word related to your sense of sight. Many other words start with the prefix *opt-*. An optometrist is an eye doctor. If you need glasses, an optician may have helped you choose your glasses.



You may have seen magicians who perform illusions. Magicians do not really make things disappear. But they do know how to fool your brain so you think things disappear. Optical illusions can be fun because they fool you. Optical illusions are a kind of trick. Your eyes play an important role in seeing. But your eyes and your brain work together. Your brain is the organ that makes sense of what you see. In the picture in the Getting Reading section, your eyes see two identical bent rectangles. Your eyes see the right thing, but your brain interprets it wrong. When your brain gets it wrong, this is called an illusion. Optical illusions and magician's tricks are not real. Your brain is just fooled.

*Another Optical Illusion*

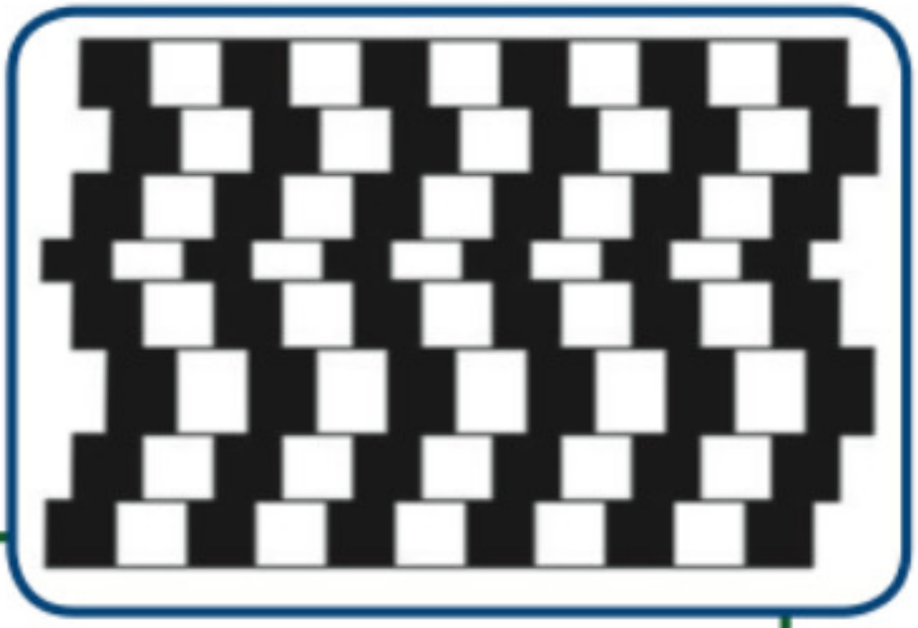
Look at these small dark squares. If you look closely for a few seconds, you will see light gray circles in between the squares. Are the gray circles really there, or do they just seem to be there?



This is another example of an illusion. Your brain is being fooled again.

*Can You Figure This Out?*

Here is one more interesting image. Look at the lines separating the rows of black and white squares.



Do you think what you are seeing is an illusion? Are the lines actually parallel and your brain is being fooled, or are the lines really at angles?

## *Were the Images in Class Optical Illusions?*

In class, you saw strange images. The first looked like a bunch of spinning circles. The second image looked like a checkerboard with a square marked A being clearly darker than another square marked B. Finally, your teacher added black rectangles to the second image and it became apparent that squares A and B had actually identical darkness. These images succeeded in fooling your brain. They were illusions. You observed a real phenomenon. What you saw depended on changes in the light. A phenomenon is an event that happens in the real world and that occurs over and over again.

Sometimes you can observe things that appear very strange but are actually real. For example, have you ever seen the moon disappear in the middle of the night even though it is above the horizon and there are no clouds in the sky? Hold the tips of your thumb and index finger next to each other so that they are just about touching. Hold them up so that they are next to your eye and look between them at a bright white background. You should just barely feel your thumb touching your finger. You should see one or more small black lines between your fingers. From where did these lines come? This is a real thing you are seeing, not an illusion. Your brain is not getting anything wrong. This goal in this unit is to figure out what happens to make people see things, whether they are real or illusions.

Investigating phenomena will help you learn how light affects what you see. In science class, you will observe different phenomena almost every day. By the end of the unit, you may be able to explain how you could see the two images from class.

### *Observing the Two Illusions in Class*

An important part of science is making observations. An observation is the act of paying careful attention to events that happen in the world. This is what you did in class. You paid close attention to what you could see when you looked at the two images. Making good observations, plus learning the science that goes with them, will help you to explain things that happen around you.

*What Questions Do You Have?*

List questions you have about light, seeing, or about the two images from class now that you have finished reading.

*Why Is Light Important?*

You already know that light helps you see. But did you know that if you understand the behavior of light, you can also understand how cell phones and microwave ovens work? The scientific ideas that explain the behavior of light also explain how computers, televisions, satellites, GPS, and many other systems work. In fact, many scientific discoveries from the last 100 years are based on the same principles that explain the behavior of light. You will not study all of these in class, but you will learn about many of them. You might also decide to investigate other uses of light on your own. You may be surprised to learn that light plays an important role in just about everything around you.

# Table talk

Were the checkerboard image and spinning circles image optical illusions?

# Whiteboard

How many light sources can you think of?

What affects vision and the way we see objects?

Answer on whiteboards with words or pictures

# Whiteboards

What happens when light hits different materials or objects?

# Whiteboards

What questions do you have about what happens when light hits different materials or objects?

# Collaborate

Within your groups create one question to share about what happens when light hits different materials or objects.

# Whiteboards

What questions do you have about eyes, vision, and how we see?

# Collaborate

Within your groups create one question to share about eyes, vision and how we see.

# Workbooks

Driving Question Notes
- Add a minimum of two questions to your notebooks

# Independently, brainstorm questions:

**How does light allow me to see?**

**What happens when light reaches an object?**

**How can light have different colors?**

**Is there light I cannot see?**

**Two Minutes: One question per post-it note**

# Share out

- Table group:
  - Each person shares their question.
  - Discuss similarities and differences.
    - *“My idea is like yours because…”*
    - *“ I thought about that in a different way…”*
    - *Decide on two questions to share – You can rewrite your questions.*