



High Touch High Tech®

Science Experiences That Come To You

Vision and Perception Games

Supplies:

- Print out of Muller-Lyer Illusion handout
- Print out of Vision Perception handout
- Color print out of Afterimage handout
- Color print out of Movement Illusion handout

Instructions:

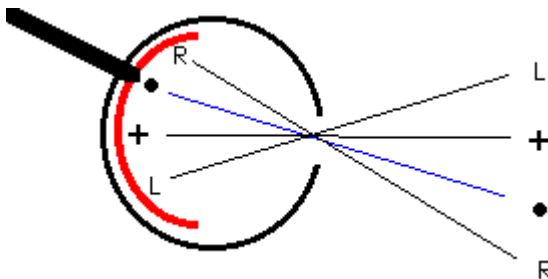
Follow the instructions provided on each handout. You will see some optical illusions! This means that the brain and eyes can be fooled! Try them out!

The Science Behind It:

What are our 5 senses? Taste, Touch, Sound, Smell and Sight!

What is the most important part of our sense of sight? Our eyes! Although the eyes are small spheres inside our head, they are incredible. Before we know how the eyes really work, we assume that the eyes are just small portals or openings to the brain. But, in fact, the brain controls what we actually see! Our sight is actually "made up" by the brain.

Take a look at the special features eyeball anatomy in the diagram below. The front of the eye acts like a camera lens. This lens directs light rays from each point in space around you. It then creates an image of the world on the back of the eyeball. This image falls on a sheet of photoreceptors (red in the diagram) and specialized brain cells (neurons), which are excited by light.



The sense of sight is very complicated. The eyes and brain work together so that we can see the world around us!



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Real World Relevance:

Do you wear glasses? Do you know other people that wear glasses or contacts?

There are different types of eye conditions that many of us have. As a result, we use glasses and contacts to help correct our vision. Here are a few of the more common conditions.

Myopia or Nearsightedness

A condition where a person's uncorrected vision is only clear up close. Instead of the light focusing on the retina, it focuses in front of the retina. A myopic person can read a magazine, however their distance vision is blurry and requires glasses or contact lenses to make it clear.

Hyperopia or Farsightedness

Hyperopia, commonly referred to as farsightedness, is when a person sees better in the distance than up close. Light entering the eye focuses behind the retina placing a blurry image on the retina. For a hyperopic person to see clearly at any distance a muscle, inside the eye called the ciliary body, must focus an intra-ocular lens. As we get older it becomes more difficult for the eye to accomplish this auto focusing. Because of the eye's ability to focus, farsighted people often don't need glasses until their 30s or 40s.

Uncorrected farsightedness, however, may cause a person to experience eyestrain or an eye turn (strabismus), depending on the degree of farsightedness and the patient's age. The younger we are the easier it is for the eye to compensate for farsightedness. Uncorrected farsightedness can lead to amblyopia. Farsightedness and presbyopia are often confused.

Astigmatism

Many people feel astigmatism is a bad, progressive disease. Actually astigmatism is caused when light focuses in two points in the back of the eye because it is not in the shape of a sphere. An eye with astigmatism has often been described to be in the shape of an egg or football, to some degree that is true, though an astigmatic eye is not exaggerated to that degree. Most people have some astigmatism. Visually, a person with uncorrected astigmatism will often see a faint shadow on letters or objects.

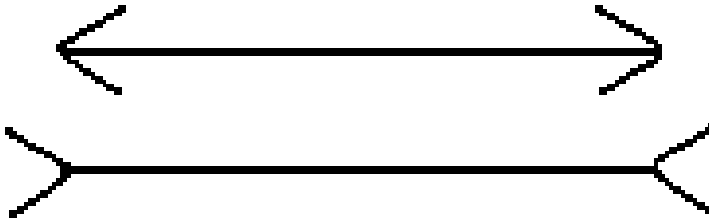


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Muller-Lyer Illusion

When asked to judge the lengths of the two lines, which are equal, viewers will typically claim that the line with outward pointing arrows is longer. When viewers are asked to place a mark on the figure at the mid-point, they invariably place it more towards the "tail" end. One possible explanation is that the line with arrows pointing outwards may simply appear longer because the arrows themselves extend past the line.



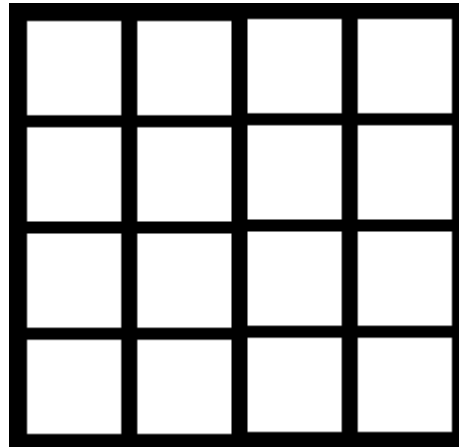
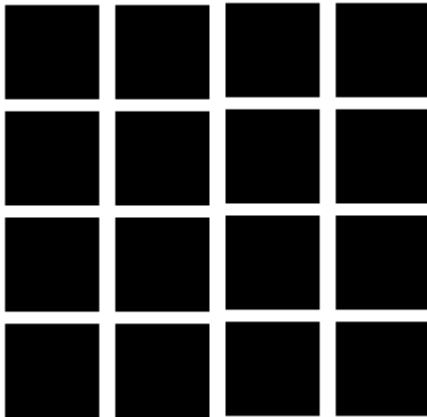


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Vision Perception

Stare at the middle of the picture with black squares 15-30 seconds. Are those really dots that appear at the corners of the squares? What happens if you focus on a dot? Now look at the middle of the picture with the white squares. Do you see dots again? What color are they?



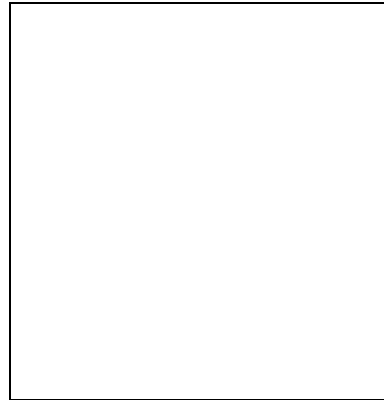
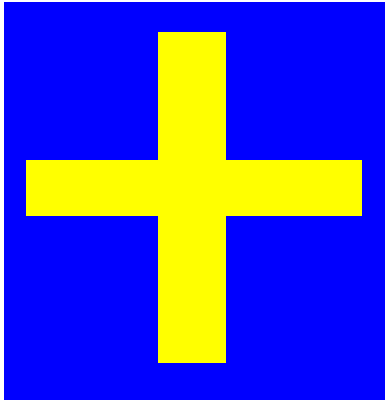


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Afterimage

Stare at the yellow "+" in the middle of figure for 15-30 seconds. Then move your gaze off to the white square on the right. Did the colors really reverse themselves? This is an example of an "afterimage".



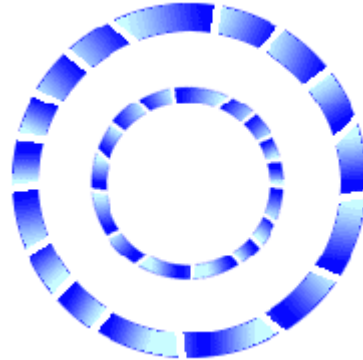


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Movement Illusion

These two dimensional objects produce the illusion of movement. Look at the center of these images to see the circles of images rotate.



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