

Science of the Eye: *Bringing vision into the classroom*

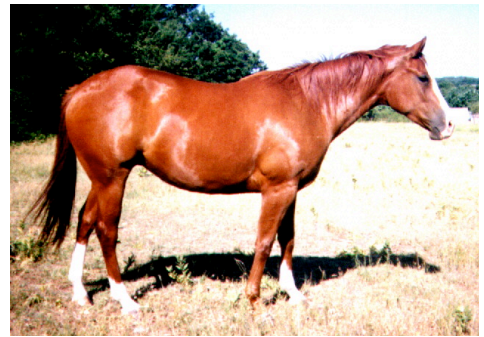
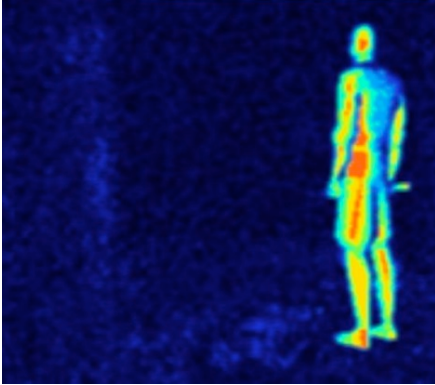
Classroom Worksheet:

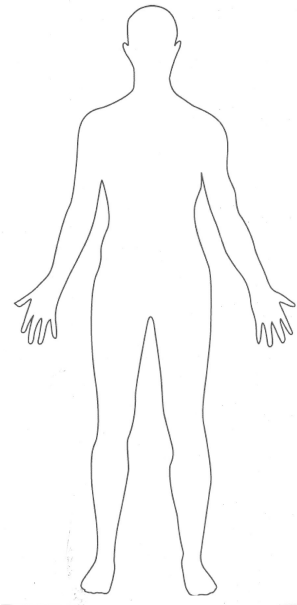
Do you know what animals can see?

Do they see the same things as we do?

Why do you think it is important to have eyes at all?

CHALLENGE QUESTION: MATCH THE ANIMALS TO WHAT YOU THINK THEY CAN SEE





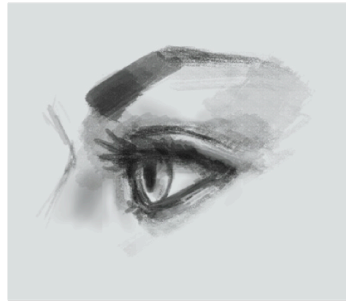
CHALLENGE QUESTION - Mirror, Mirror, on the Wall: If a mirror is mounted flat against the wall, how long does it have to be in order for you to see your entire body? Does distance play a role?



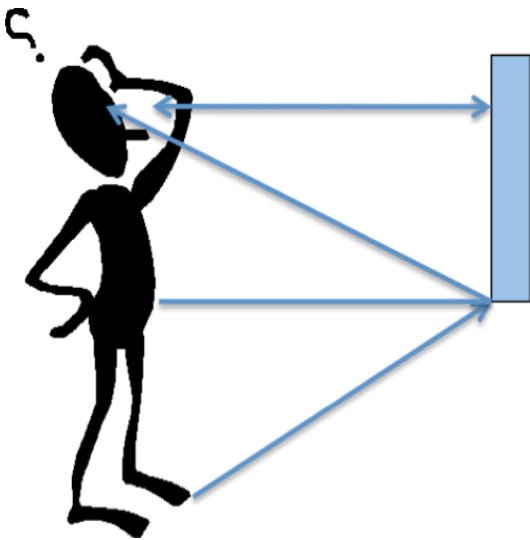
What is your prediction? (Sketch your description)

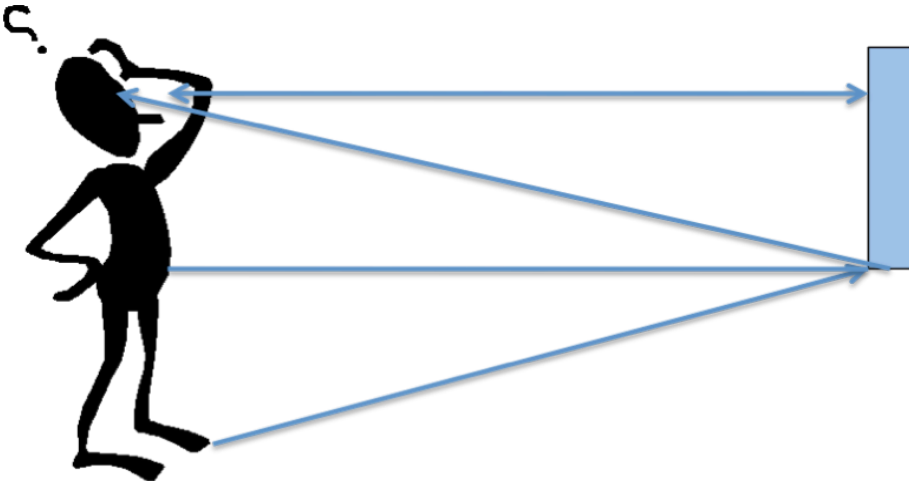


Let's think about how we see objects. Using the images below, show how you think we see the apple.



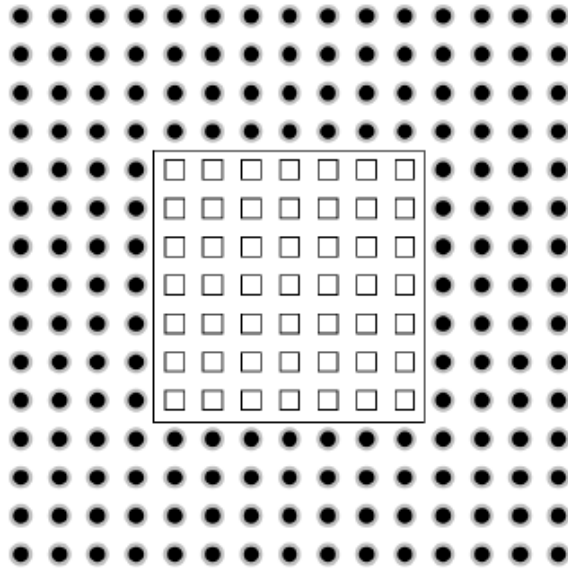
How long does the mirror have to be?





CHALLENGE QUESTION: Look at the optical illusion below.

Describe what you see.



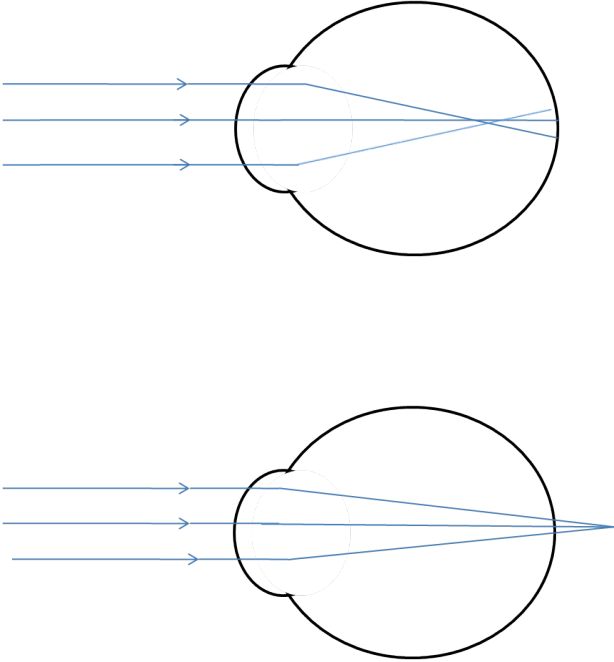
http://www.michaelbach.de/ot/mot_eyejitter/index.html from Pinna B & Spillmann L (2002) A new illusion of floating motion in depth. Perception 31:1501-1502.

EXPLANATION: This optical illusion helps to show how our eye makes slight involuntary movements. We have to make small eye movements to prevent the cells from our retina from desensitizing the signal that they receive.

Additional Questions: Why do you think eye movements are important?

Name one activity that would be difficult if you could not move your eyes.

CHALLENGE QUESTION: In the picture below, which person is near-sighted and which person is far-sighted?



Convex lenses are thicker in the middle than the edges. Concave lenses are thicker at the edges than in the middle. Which type of lens would you use to correct for the refractive errors above? Draw how this will change the pattern of the light rays in the eye.

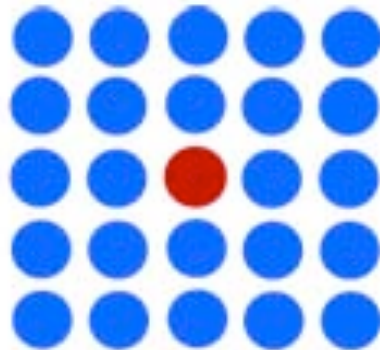


CHALLENGE QUESTION: How to find the blind spot?

To draw the blind spot tester on a piece of paper, make a small dot on the left side separated by about 6-8 inches from a small + on the right side. Close your right eye and hold the image (or place your head from the computer monitor) about 20 inches away. With your left eye, look at the + and slowly bring the image (or move your head) closer while looking at the +. At a certain distance, the dot will disappear from sight. This is when the dot falls on the blind spot of your retina. Now, reverse this process by closing your left eye and looking at the dot with your right eye. Move the image slowly closer to you and the + should disappear.



How the brain fills in the blind spot?



GLOSSARY

Aqueous humor - clear fluid filling the area between the lens and the cornea, composed mostly of water and helps the cornea keep its rounded shape.

Blind spot - The area where the optic nerve leaves the retina. Each eye has a blind spot where there are no photoreceptor cells.

Blood vessels - Tiny arteries and veins that carry blood to the retina.

Choroid - thin, dark sheet of tissue between the retina and the sclera.

Cones - One type of photoreceptor cells in the retina. They are responsible for daylight and color vision.

Cornea - A transparent covering over the iris and the pupil that helps protect the eye and begins focusing the light. In the preserved specimen, the cornea is cloudy.

Hyaloid fossa - indentation in the center of the vitreous body that supports the lens

Fovea - A region of the retina where cones are highly concentrated and vision acuity is the highest.

Iris - A muscle that controls the amount of light that enters the eye. It is suspended between the cornea and the lens.

Lens - A biconvex transparent flexible structure that focuses the light coming into the cornea and pupil, adjusts the eye's focus, allowing us to see objects both near and far. It is responsible for about 20 percent of our focusing.

Optic nerve - The bundle of nerve fibers that sends information from the retina to the brain.

Retina - light-sensitive portion of the eye composed of receptor cells called rods and cones. It detects images focused on the back of the eye by the lens and the cornea. The retina is connected to the brain by the optic nerve.

Rods - One type of photoreceptor cells in the retina. They respond to dim light.

Sclera - The thick, tough, white outer covering of the eyeball. It is an opaque sheet of connective tissue that protects inner structures of the eyeball and helps maintain rigidity.

Tapetum - The iridescent portion of the choroid tissue that is located behind the retina. Found in animals that have good night vision, it reflects light back through the retina.

Vitreous body - the cavity between the retina and the back of the lens.

Vitreous humor - viscous fluid that fills the vitreous body and helps give the eyeball its shape.

Zonula ciliaris - ligaments that suspend the lens and stretch it to focus for near and far vision

Eye Dissection