

EYES

FRAMEWORK

I. Scientific and Engineering Practices

II. Cross-Cutting Concepts

III. Physical Sciences

SKILLS/OBJECTIVES

- Understand the eye and how it works
- Compare human eye to other animals' eyes

MATERIALS

- Mirrors
- 5 pairs compound eye glasses
- 1 eye model
- 20 plastic cups
- 150 pennies
- Balls
- 30 paper with x's and dots
- 3 sheets of 5 colors each brightly colored paper

NOTES

N/A

BACKGROUND

- Ask kids what they know about eyes.
- Show the kids the eye model, points of emphasis:
- Muscles on top/bottom/sides: the eye uses muscles, just as the arms and legs do
- The retina (take the eyeball out for this) is the dark part in the back, this is where images actually hit
- Lens: like glasses, the lens focuses the image (can move a little forward or backwards)
- Demonstrate how the lens inverts images with the magnifying glass

Activity # 1	Comparing Animal Eyes
Materials	<ul style="list-style-type: none"> • Pictures of human, fly, and other animal eyes • Compound eye glasses • Mirrors
Worksheet	N

- Look at pictures of human eyes, fly eyes, and various other animals
- Note differences and similarities between the eyes
- Have the kids try out the compound eye glasses
- Questions to consider asking: why would different animals have different eyes? What is helpful about some of these eyes?
- Have the kids take a look at their own eyes with mirrors. What happens when they close their eyes for 10 seconds, and then open them? (pupil dilation) Have the students look at each other's eyes as well
- Point out that muscles control how our eyes function, much in the same way that we use muscles for all other things, like moving our arms (show on diagram)

Activity # 2	Depth Perception Test
Materials	<ul style="list-style-type: none"> • Pennies • Cups • Balls
Worksheet	N

- Have kids pair off
- Give each pair of kids 10 pennies and one cup
- Have one kid hold one penny, and slowly move their hand left to right over the cup, and have the other kid tell the one holding the penny to drop the penny when their hand is over the cup
- Once all of the pennies have been dropped, count how many actually got dropped in the cup
- Repeat the exercise, but this time have the kid watch with left eye closed
- Repeat with right eye closed
- Record and compare results between watching with only left eye open, only right eye open, and both eyes open
- Second test: have kids pair off, and give each pair a ball
- Have them try to catch the ball 10 times, then try with one eye closed, then the other and record results

- The kids should find that they performed better with both eyes than just one. This is because the brain uses information from both eyes to determine depth and how far away something is/exact location
- Other possible tests have kids try to touch fingers together when they have one eye closed

Activity # 3	Optical Illusions
Materials	<ul style="list-style-type: none"> • Worksheet with optical illusions
Worksheet	Y

- Give each kid a piece of paper with the various optical illusions
- After completing each illusion, have a brief discussion with the kids about what they saw, and why it could have happened
- For the one with the various balls, the reason that the golf ball is the 'closest' and the basketball/soccer ball appear 'farthest' is because of the relative size in real life of each
- The shapes are similar to the blind spot test; the brain fills in blank spots to fill in shapes

Activity # 4	Peripheral Vision Test
Materials	<ul style="list-style-type: none"> • Brightly colored cards
Worksheet	N

- Have one kid stand still, with a clear open space in front of them
- Have another kid have different brightly colored cards, and slowly walk in a semicircle around the first kid (have them take two large steps away from the first kid)
- Have the first kid say when they can first see the card, and also when they first can determine the color of the card. These could be different times, because the color sensing receptors (cones) of the eyes are more concentrated in the center, while the rods are more numerous in the periphery of our vision

Activity # 5	Blind Spot Test
Materials	<ul style="list-style-type: none"> • Paper with x's and dots
Worksheet	N

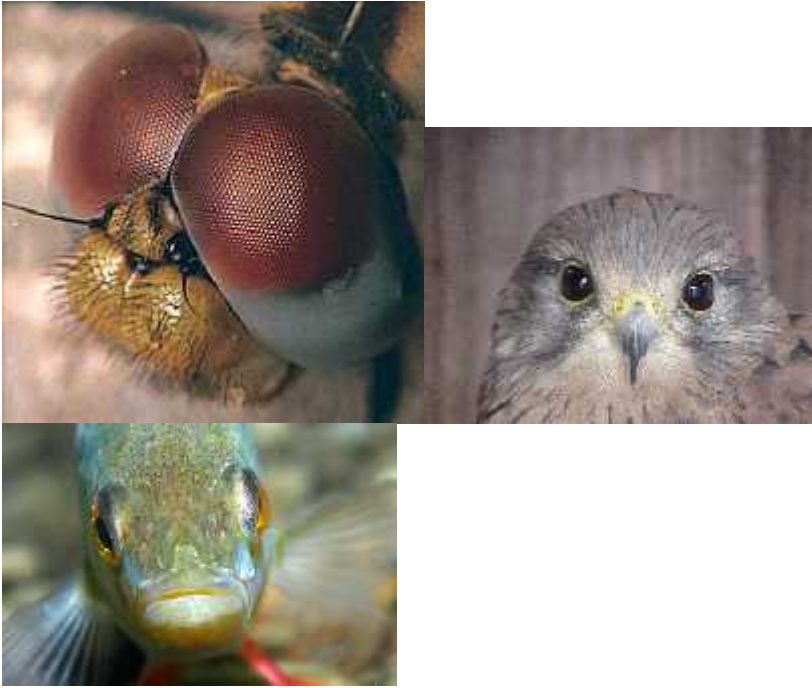
- Give each kid a piece of paper with an x on one end, and a dot on the other end.

- Have each kid stare at the x with one eye closed, while slowly moving the paper towards and away from their face, until the spot disappears. (If the dot is to the left of the x, close right eye, if dot is to the right of the x, close left eye.)
- It disappears because both of our eyes have a blind spot, but we don't notice it because the other eye can see in that blind spot. Also, if only one eye is open, the brain fills in the spot with what it assumes is there; that is why it seems like it's just paper when there is really a dot. The blind spot is where information leaves the eye on its way to the brain (probably too difficult to explain to the kids)
- Have the kids test out their other eye.

CONCLUSIONS

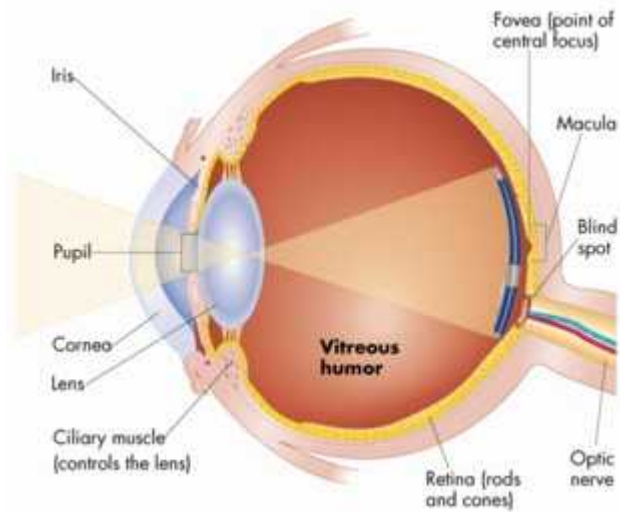
- Human eyes are very similar to other animal eyes, but there are also distinct differences between the various eyes.
- We have blind spots that don't allow us to see everything all at once – this is called our peripheral vision

Worksheet



How are these eyes the same? How are they different? What about compared to Human Eyes?

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Depth Perception Test Results:

How many pennies went in the cup when:

Both eyes were open ____

Only your left eye was open ____

Only your right eye was open ____

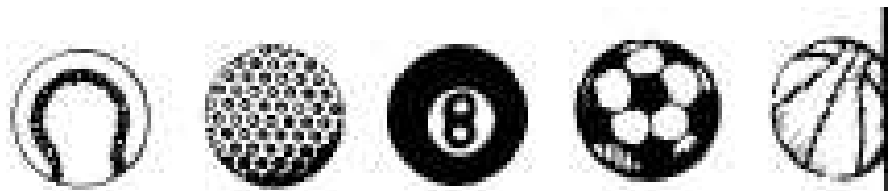
How many times did you catch the ball with:

Both eyes open ____

Only left eye open ____

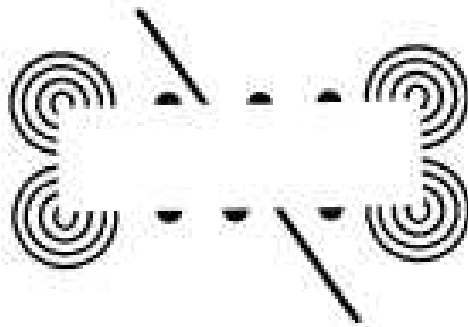
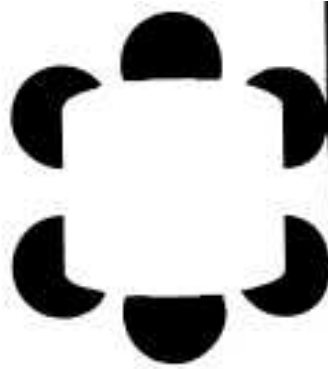
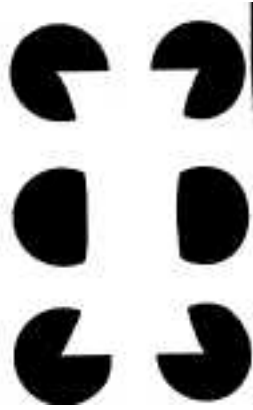
Only right eye open ____

Optical Illusions:



Which of these balls appears to be the closest? _____

Which is the farthest? _____



Can you see the shapes?

Blind Spot Test

