

I “Light” What I See

Grade Level: Third

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Length of Unit: 14 Lessons, 2 Weeks

I. ABSTRACT

The content of the unit will consist of learning the parts of the eye and construction of an eye model. Students will also discover how the amount of light affects what we see. Each student will also classify information with the eye and light. The different teaching strategies are whole class, small group, hands-on discovery, the Scientific Method, construction, and vocabulary.

II. OVERVIEW

A. Concept Objectives

1. The students will gain an increased understanding of the eye and the functions of the different eye parts.
2. The student will learn how the eye works like a camera.
3. The students will experience the basic physical phenomena of light.

B. Content from the *Core Knowledge Sequence*

1. Parts of the eye: cornea, iris and pupil, lens, retina
2. Optic nerve
3. The speed of light
4. Light travels in straight lines
5. Transparent and opaque objects
6. The spectrum

C. Skill Objectives

1. The student will use the Scientific Method.
2. The student will experiment and observe changes.
3. The student will classify information.
4. The student will read for detail.
5. The student will identify cause and effect.
6. The student will follow written and oral directions.
7. The student will listen for details.
8. The student will construct a model of the eye.

III. BACKGROUND KNOWLEDGE

A. For Teachers

1. Core Knowledge Foundation. *Core Knowledge Sequence*. Charlottesville, VA: Core Knowledge Foundation, 1998, ISBN 1-890517-7.
2. Siepak, K. *Light and Color*. Greensboro, NC: Carson Dellosa Publishing Co., Inc., 1994, ISBN 0-44222-11567-8.
3. Hirsch Jr., E.D. *What Your Third Grader Needs To Know: Fundamentals of a Good Third Grade Education*. New York: Dell Publishing, 1994, ISBN 0-385-31257-1.

B. For Students

1. The students will have a basic knowledge of the five senses from prior Core Knowledge lessons in Kindergarten.

IV. RESOURCES

- A. Cohen, L. *Heat, Light and Sound.*
- B. Cole, J. *The Magic School Bus Explores the Senses.*
- C. Hirsch, Jr. E.D. *What Your Third Grader Needs to Know: Fundamentals of a Good Third-Grade Education.*
- D. Porter-Thaxton, K. *Hands On Science.*

V. LESSONS

Lesson One: Eye Basics

- A. *Daily Objectives*
 - 1. Concept Objectives
 - a. The students will gain an increased understanding of the eye and the functions of the different eye parts.
 - b. The student will learn how the eye works like a camera.
 - 2. Lesson Content
 - a. How the eye works.
 - 3. Skill Objectives
 - a. The student will activate prior knowledge.
 - b. The student will classify information.
 - c. The student will experiment and observe changes.
 - d. The student will use the Scientific Method.
 - e. The student will follow oral directions.
- B. *Materials*
 - 1. Butcher or chart paper
 - 2. Flip chart markers
 - 3. Scientific Method Chart Poster
 - 4. Scientific Method Chart (1 for each student)
 - 5. Mirrors (1 for each pair)
 - 6. Flashlights (1 for each pair)
 - 7. Dark room
 - 8. White paper 8 ½ x 11 (13 for each student)
 - 9. Construction paper 8 ½ x 11 (1 for each student)
 - 10. *Hands on Science* by Porter-Thaxton page 225
- C. *Key Vocabulary*
 - 1. Eye – The sense organ that we use to see.
 - 2. Pupil – The black hole in the middle of the eye.
 - 3. Iris – The colored part of the eye.
- D. *Procedures/Activities*
 - 1. Activate prior knowledge of the eye by using the butcher or chart paper to make a K–W–L chart with the whole class. Hang this in the hallway!
 - 2. Introduce vocabulary words: eye, pupil, and iris.
 - 3. Make the I “Light” What I See Dictionary. Use the white paper and construction paper to make a booklet. Fold the white paper in half and cut on fold. Use the construction paper as a cover. Staple. Put a letter of the alphabet at the top of each page. This will be used in most lessons to add the new vocabulary words.
 - 4. Using the Scientific Method Poster, make a prediction of what effect light has on your eyes.
 - 5. Hand out the mirrors, flashlights, and Scientific Method charts.

6. Have the room at normal light. Each student will need to watch their partner's eyes.
 7. Turn the lights off and have them record what happened to the eye.
 8. After your eyes are comfortable, have partner indirectly shine the flashlights into their eyes. Record what happened.
 9. Repeat as many times as needed.
 10. On Scientific Method chart and paper, conclude what happened to the eye when the amount of light changes.
- E. *Assessment/Evaluation*
1. Using the questions on page 225 from *Hands on Science* by Porter-Thaxton, orally monitor for understanding.

Lesson Two: Eyeball Sense

A. *Daily Objectives*

1. Concept Objective
 - a. The students will gain an increased understanding of the eye and the functions of the different eye parts.
2. Lesson Content
 - a. Parts of the eye: cornea, iris, and pupil, lens, retina.
 - b. Optic nerve.
3. Skill Objectives
 - a. The student will follow written and oral directions.
 - b. The student will read for detail.
 - c. The student will write a short journal on sight.

B. *Materials*

1. Appendix A
2. *Hands on Science* by Porter-Thaxton page 204 (Also have a transparency)
3. Scissors
4. Construction paper 8 ½ x 11 (1 per student)
5. Overhead projector

C. *Key Vocabulary*

1. Retina – The back part of the eye that has an upside-down picture of what you are looking at on it.
2. Lens – Focuses picture to the retina so you can see near and far.
3. Optic Nerve – A bundle of small nerves that carries the picture to your brain.

D. *Procedures/Activities*

1. Discuss lesson one experiment from the day before.
2. Introduce new vocabulary: retina, lens, and optic nerve.
3. Add the new words to their "I Light What I See" Dictionary.
4. Hand out page 204 from *Hands on Science* and go over instructions with the class.
5. When they are finished they should color the parts of the eye that they labeled.
6. As they finish the assignment, give them Sight – Appendix A.
7. When everyone is finished with page 204, go over the parts that they labeled. Use an overhead for visual learners.
8. Cut off the paragraph and have them mount the eye with labels on to construction paper. Use for a bulletin board with the K-W-L chart if you choose.

- E. *Assessment/Evaluation*
1. Use Appendix A as a way of checking for understanding sight. Have them share with the whole class if they would like to do so.

Lesson Three: The In & Out of the Eye

- A. *Daily Objectives*
1. Concept Objective
 - a. The students will gain an increased understanding of the eye and the functions of the different eye parts.
 2. Lesson Content
 - a. Parts of the eye: cornea, iris and pupil, lens, retina.
 - b. Optic nerve.
 3. Skill Objectives
 - a. The student will activate prior knowledge from lessons 1 & 2.
 - b. The student will follow written directions.
 - c. The student will read for detail.
- B. *Materials*
1. Crayons or colored pencils
 2. Appendix B – The In & Out of the Eye!
- C. *Key Vocabulary*
1. Vitreous body – White jelly-like substance in your eye.
 2. Muscles – Help move the eye.
 3. Tear gland – Helps keep your eyes clean, shiny, and wet.
 4. Blood vessels – Helps keep your eyes healthy.
 5. Sclera – The white part that shapes and helps protect your eye.
- D. *Procedures/Activities*
1. Introduce new vocabulary words: vitreous body, muscles, tear gland, blood vessels, and sclera.
 2. Enter new vocabulary words into their dictionaries.
 3. Hand out a copy of Appendix B – The In and Out of the Eye! Go over instructions with them as a whole class. This is used as an assessment to check for understanding of new and review vocabulary terms.
 4. Check over the assignment looking for correct usage of vocabulary and coloring the correct parts (following directions).
- E. *Assessment/Evaluation*
1. This lesson is an assessment to check and monitor for understanding thus far.

Lesson Four: How's (of) the Eye!

- A. *Daily Objectives*
1. Concept Objectives
 - a. The students will gain an increased understanding of the eye and the functions of the different eye parts.
 - b. The student will learn how the eye works like a camera.
 2. Lesson Content
 - a. How the eye works.
 3. Skill Objectives
 - a. The student will listen for details.
 - b. The student will identify cause and effect.

- B. *Materials*
1. Crayons or colored pencils
 2. Appendix C – How Seeing Works Like a Camera
 3. *Hands on Science* by Porter-Thaxton page 226
 4. 3 x 5 cards (1 per student)
 5. Any book with optical illusions or magic eye pictures
- C. *Key Vocabulary*
1. Camera – A device used for taking still pictures. It works like the eye.
 2. Cause – This is why something happens or what made it happen.
 3. Effect – The result or outcome of the cause.
- D. *Procedures/Activities*
1. Introduce new vocabulary word: camera.
 2. Add to their dictionary.
 3. Students need crayons or colored pencils and Appendix C.
 4. Read “How Seeing Works Like a Camera” (Appendix C) to students while they color the pictures.
 5. Hand out page 226 from *Hands on Science* by Porter-Thaxton. Read through instructions together. Go over examples of cause and effect situations. This is a good activity to do in pairs.
- E. *Assessment/Evaluation*
1. Have each pair of students write down an example of a cause and effect situation on a 3 x 5 card identifying the cause and the effect. These could be with sight or any other sense or sense organ!
 2. Check over their work. Use 3 x 5 cards for bulletin board if you choose.

Lesson Five: Construction Day

- A. *Daily Objectives*
1. Concept Objective
 - a. The students will gain an increased understanding of the eye and the functions of the different eye parts.
 2. Lesson Content
 - a. Parts of the eye: cornea, iris and pupil, lens, retina.
 - b. Optic Nerve
 3. Skill Objectives
 - a. The student will follow oral directions.
 - b. The student will listen for detail.
 - c. The student will construct a model of the eye.
- B. *Materials*
1. *Hands on Science* by Porter-Thaxton page 203
 2. Two paper bowls per student (Chinet works best)
 3. Yarn cut in to 6 inch pieces
 4. Plastic wrap
 5. Cotton balls (1 per student)
 6. Construction paper cut into 4 x 4 squares (blue, green, and brown)
 7. Tape
 8. Stapler
 9. Glue
 10. Another adult to help if possible

- C. *Key Vocabulary*
1. There are no new vocabulary terms for this lesson.
- D. *Procedures/Activities*
1. Have materials ready for them. Cut a hole in the bottom of one of the bowls leaving about $\frac{1}{2}$ - $\frac{3}{4}$ inch rim. Cut the yarn in to 6-inch pieces, one for each student.
 2. Review vocabulary terms from dictionaries.
 3. Review manners for following project directions.
 4. Show them all the materials and ask the students to predict what we are going to do with all these different materials today. Probe them to make a model of an eye.
 5. Show them the materials again and ask them how they think we are going to make the model with these materials.
 6. Hand out materials.
 7. Make sure that they are ready to listen and work quietly! Make a model along with them.
 8. On the inside of the bowl with the hole, cover it with plastic wrap and tape down securely. This is the cornea.
 9. Next have each student cut a doughnut out of the construction paper about the same size as his or her plastic wrap. Have them use the same color as their eyes. The hole is the pupil and the colored paper is the iris.
 10. Tape the colored doughnut hole on top of the plastic wrap.
 11. Place tape across the bowl with the sticky side facing the hole. Stick the cotton ball on the tape so that it is in the middle. (It may need a dab of glue too.) The cotton ball is the lens.
 12. Color the inside of the other bowl completely black. This represents the retina. With a pen or pencil, punch a small hole in the middle of the bowl. Thread the yarn through the hole leaving about 5 inches dangling out the back. Tie a knot on the inside of the bowl. The yarn is the optic nerve.
 13. Last, tape, glue, or staple the two bowls together! You have an eye!
- E. *Assessment/Evaluation*
1. Ask students which parts of the eye the materials represent. For instance; The lens is represented by _____? What does the yarn represent?
 2. There are also questions on the bottom of page 203 in *Hands on Science* by Porter-Thaxton.

Lesson Six: Tic-Tac Toe Eye

- A. *Daily Objectives*
1. Concept Objectives
 - a. The students will gain an increased understanding of the eye and the functions of the different eye parts.
 - b. The student will learn how the eye works like a camera.
 2. Lesson Content
 - a. Parts of the eye: cornea, iris and pupil, retina, lens.
 - b. Optic nerve
 3. Skill Objectives
 - a. The student will follow oral directions.
 - b. The student will listen for details.
 - c. The student will identify cause and effect.

- d. The student will classify information.
- B. *Materials*
 - 1. 10 string necklaces with a paper clip attached
 - 2. Set of X and O's - Appendix D
 - 3. Questions from all assignments in this unit or teacher generated
 - 4. Chairs at front of the room in a 3 x 3 grid or a tic-tac toe board taped out on floor.
 - 5. 3 x 5 cards (1 per student)
 - 6. Markers – skinny
 - 7. K-W-L chart from beginning of unit.
- C. *Key Vocabulary*
 - 1. No new vocabulary.
- D. *Procedures/Activities*
 - 1. Tell the students that Today is a review day to help study for the test! We will play Tic-Tac Toe...um...I mean Tic-Tac Eye!
 - 2. Divide the class into two teams. The X's and the O's! Each team will receive the respective letters and 5 string necklaces.
 - 3. Taking turns with each team, ask them a question from the unit thus far. If they are correct, take a necklace and attach the X or O and pick a chair.
 - 4. They may not move after they sit!
 - 5. Go back and forth until one team wins!
 - 6. Repeat at least enough for everyone to get a chance!
- E. *Assessment/Evaluation*
 - 1. Give each student a 3 x 5 card.
 - 2. Every student will brainstorm something that they have learned in this unit. Once they have their idea, have them share it with you. If acceptable, have them write it neatly on the card in marker. Try to have each student come up with a different fact. The 3 x 5 cards become the L of the K-W-L chart.
 - 3. Use the K-W-L chart and 3 x 5 cards for a bulletin board in the hallway. It is nice for them to have ownership in the chart with their very own fact card! The rest of the school gets to see what you are doing as well!

Lesson Seven: Eye Test! Agh!

- A. *Daily Objectives*
 - 1. Concept Objectives
 - a. The students will gain an increased understanding of the eye and the functions of the different eye parts.
 - b. The student will learn how the eye works like a camera.
 - 2. Lesson Content
 - a. Parts of the eye: cornea, iris and pupil, lens, retina
 - b. Optic nerve
 - 3. Skill Objectives
 - a. The student will activate prior and new knowledge.
 - b. The student will follow written directions.
 - c. The student will classify information.
- B. *Materials*
 - 1. Appendix E – Eye Test
 - 2. Student's eye models

- C. *Key Vocabulary*
 - 1. No new vocabulary
- D. *Procedures/Activities*
 - 1. Clear everything off their desks except their model of the eye.
 - 2. Quick review.
 - 3. Hand out test and go over instructions.
 - 4. If it is possible, have the nurse come in and do eye examinations with them after the assessment. Or, call in an optometrist that would like to volunteer and do eye exams.
- E. *Assessment/Evaluation*
 - 1. This lesson is the assessment.
 - 2. Have the nurse or optometrist ask the student to tell them a fact about the eye.

Lesson Eight: Light Basics

- A. *Daily Objectives*
 - 1. Concept Objectives
 - a. The students will experience the basic physical phenomena of light.
 - 2. Lesson Content
 - a. Light travels in straight lines.
 - 3. Skill Objectives
 - a. The student will experiment and observe changes.
 - b. The student will classify information.
 - c. The student will read for detail.
- B. *Materials*
 - 1. Chart paper
 - 2. Markers
 - 3. Crayons
 - 4. *Heat, Light and Sound* by Cohen page 15
- C. *Key Vocabulary*
 - 1. Light- The form of energy that makes it possible for us to see.
 - 2. Discover – To find out something that people did not know about before.
- D. *Procedures/Activities*
 - 1. Introduce new vocabulary words: light and discover.
 - 2. Enter these words into dictionary.
 - 3. Brainstorm things we already know about light.
 - 4. Begin KWL chart and record responses.
 - 5. Read together and complete page 15 from *Heat, Light and Sound* by Cohen.
- E. *Assessment/Evaluation*
 - 1. Collect page 15 and evaluate learning.

Lesson Nine: Me and My Shadow

- A. *Daily Objectives*
 - 1. Concept Objectives
 - a. The students will experience the basic physical phenomena of light.
 - 2. Lesson Content
 - a. Light travels in straight lines.
 - 3. Skill Objectives
 - a. The student will experiment and observe changes.
 - b. The student will read for detail.

- c. The student will identify cause and effect.
- B. *Materials*
 - 1. *Heat, Light and Sound* by Cohen page 14
 - 2. Appendix F
 - 3. Appendix G
 - 4. Tape
 - 5. Crayons or markers
 - 6. Scissors
 - 7. Flashlight
- C. *Key Vocabulary*
 - 1. Shadow – A dark area caused by something (or someone?) blocking the light.
 - 2. Radiant Energy- A form of energy.
 - 3. Ray – A beam of light energy.
- D. *Procedures/Activities*
 - 1. Introduce new vocabulary words: shadow, radiant energy, and ray.
 - 2. Have students enter new words into dictionaries.
 - 3. On the overhead projector discuss possible outcomes of page 14.
 - 4. As a group, locate a sunny spot either outdoors or indoors to place page 14.
 - 5. Return to classroom and discuss radiant energy and light speed.
 - 6. Ask questions using Appendix F as a guide.
 - 7. Conduct experiment outlined on Appendix G.
 - 8. Fill out observation sheet from the bottom of Appendix G.
 - 9. Return to location where page 14 was placed.
 - 10. Discuss outcome.
- E. *Assessment/Evaluation*
 - 1. Collect observation sheet, Appendix G.

Lesson Ten: Transparent, Translucent and Opaque

- A. *Daily Objectives*
 - 1. Concept Objectives
 - a. The students will experience the basic physical phenomena of light.
 - 2. Lesson Content
 - a. Transparent and opaque objects.
 - 3. Skill Objectives
 - a. The student will use the Scientific Method.
 - b. The student will experiment and observe changes.
 - c. The student will follow written and oral directions.
 - d. The student will listen for details.
- B. *Materials*
 - 1. Three marbles
 - 2. Plastic wrap
 - 3. Aluminum foil
 - 4. Flashlight
 - 5. Three bowls
 - 6. Wax paper
 - 7. Rubber bands
 - 8. Appendix H
- C. *Key Vocabulary*
 - 1. Transparent – A material which allows light to pass through it.

2. Translucent – A material that blocks some light, while allowing some to pass through.
3. Opaque – A material that blocks light completely.

D. Procedures/Activities

1. Introduce new vocabulary words: transparent, translucent, and opaque.
2. Have students enter new words into their dictionaries.
3. Build background knowledge by discussing clear, semi-clear, and un-clear objects.
4. Have students list items for each category.
5. Conduct experiment on Appendix H.
6. Have students reflect on results as a group.
7. If time permits, conduct extension activity on Appendix H.

Lesson Eleven: Light and Color

A. Daily Objectives

1. Concept Objectives
 - a. The students will experience the basic physical phenomena of light.
2. Lesson Content
 - a. The spectrum
3. Skill Objectives
 - a. The student will experiment and observe changes.
 - b. The student will identify cause and effect.

B. Materials

1. Appendix I
2. Prisms (1 per group of 3 or 4)
3. White and black construction paper

C. Key Vocabulary

1. Spectrum – The order of colors.
2. Prism- An angle of glass that separates the colors in light.
3. Reflect- A light surface will “bounce” light away.
4. Absorb – A dark surface will “soak up” light.

D. Procedures/Activities

1. Introduce new vocabulary words: spectrum, prism, reflect, absorb.
2. Have students enter words into their dictionaries.
3. Build background knowledge by questioning what makes something white.
4. Discuss how white light is made of many different colors (refer to Appendix I).
5. Introduce prism and demonstrate how to use it.
6. Allow student to use prisms and make discoveries.
7. Discuss what was discovered.
8. Explain that different colored items are actually reflecting that particular color.
9. Discuss how light and dark objects reflect or absorb light.

E. Assessment/Evaluation

1. Have students complete Appendix I and collect. Check for understanding.

Lesson Twelve: Roy G. Biv

A. Daily Objectives

1. Concept Objectives
 - a. The students will experience the basic physical phenomena of light.
2. Lesson Content
 - a. The spectrum
3. Skill Objectives

- a. The student will follow written and oral directions.
 - b. The student will listen for details.
- B. Materials**
- 1. Paper plates
 - 2. Straight pins
 - 3. Pencils
 - 4. Crayons
 - 5. Heat, Light and Sound by Cohen page 17
- C. Key Vocabulary**
- 1. Acronym – A word or phrase that is made up of the first letters of something.
- D. Procedures/Activities**
- 1. Review previous lesson on color.
 - 2. List colors from spectrum on chalkboard.
 - 3. Have students watch as you take the first letter of each color and spell Roy G. Biv.
 - 4. Discuss acronym and add to dictionary.
 - 5. Pass out paper plate and have student cut out inner circle of plate.
 - 6. Divide the circle into three sections.
 - 7. Color each section red, blue, yellow; respectively.
 - 8. Review that white light is made of all colors.
 - 9. Have students attach circle to pencil eraser using straight pins.
 - 10. When spun, the color should disappear and show only white.
 - 11. Pass out Appendix M for students to complete.
- E. Assessment/Evaluation**
- 1. Visual and through questioning.

Lesson Thirteen: Light Review

- A. Daily Objectives**
- 1. Concept Objectives
 - a. The students will experience the basic physical phenomena of light.
 - 2. Lesson Content
 - a. The speed of light
 - b. Light travels in straight lines.
 - c. Transparent, and opaque objects.
 - d. The spectrum.
 - 3. Skill Objectives
 - a. The student will follow written and oral directions.
 - b. The student will listen for details.
 - c. The student will classify information.
- B. Materials**
- 1. List of light vocabulary
 - 2. Review questions (teacher generated)
 - 3. Word jumble/word search (teacher generated)
- C. Key Vocabulary**
- No new vocabulary.
- D. Procedures**
- 1. Review with student the previous experiments and activities dealing with light.
 - 2. Play “Hangman” on chalkboard using vocabulary from lessons.
 - 3. With review questions or test questions divide class into groups to play Jeopardy, or another review game.

Lesson Fourteen: The Test

- A. *Daily Objectives*
 - 1. Concept Objectives
 - a. The students will experience the basic physical phenomena of light.
 - 2. Lesson Content
 - a. The speed of light
 - b. Light travels in straight lines.
 - c. Transparent and opaque objects.
 - d. The spectrum.
 - 3. Skill Objectives
 - a. The student will follow written and oral directions.
 - b. The student will classify information.
- B. *Materials*
 - 1. Test (Appendix J)
- C. *Key Vocabulary*
 - No new vocabulary.
- D. *Procedures/Activities*
 - 1. Conduct mini-review.
 - 2. Allow time for student questions
 - 3. Administer test.
- E. *Assessment/Evaluation*
 - 1. This lesson is the assessment.

VI. HANDOUTS/WORKSHEETS

Appendices A - J

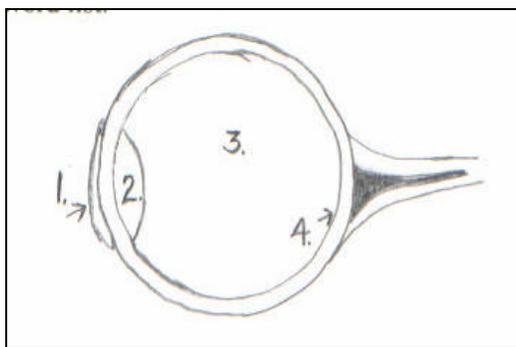
VII. BIBLIOGRAPHY

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- Siepak, K. *Light and Color*. Greensboro, NC: Carson Dellosa Publishing Co., Inc., 1994, ISBN 0-44222-11567-8.

Name _____

The In and Out of the Eye!!

Directions: Follow the directions and then fill in the blanks with the words from the word list.



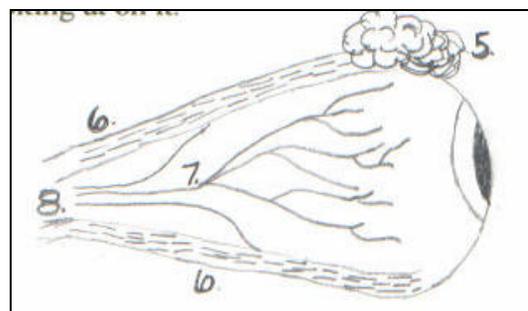
Word List

Cornea
Retina
Lens
Vitreous Body

1. Number 1 is the _____. It is sensitive and protects the eye. Color it yellow.
2. It focuses so you can see near and far. _____ is number 2. Color it orange.
3. The jelly-like substance is the _____. Color it silver. Number 3 is the _____.
4. Color number 4 blue. It is the _____. It has an upside-down picture of what you are looking at on it.

Word List

Muscles
Tear Gland
Optic Nerve
Blood Vessels

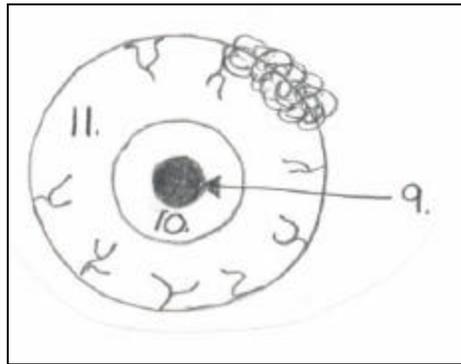


5. Color number 5 yellow. The _____ helps keep your eye shiny, wet, and clean.

Appendix B continued – I “Light” What I See

Name _____

6. Number 6 are the _____. These help move your eye. Color them red.
7. The _____ are number 7. They keep the eye healthy. Trace them with purple.
8. Color number 8 black. The _____ carries the picture to your brain.



Word List

Sclera
Iris
Pupil

9. The _____ is number 9. It gets bigger and smaller with the amount of light. Color it black.
10. Number 10 is the _____. It is different colors on different people. Color the _____ the same color as yours.
11. The white part that covers most of your eye is the _____. It shapes and protects your eye.

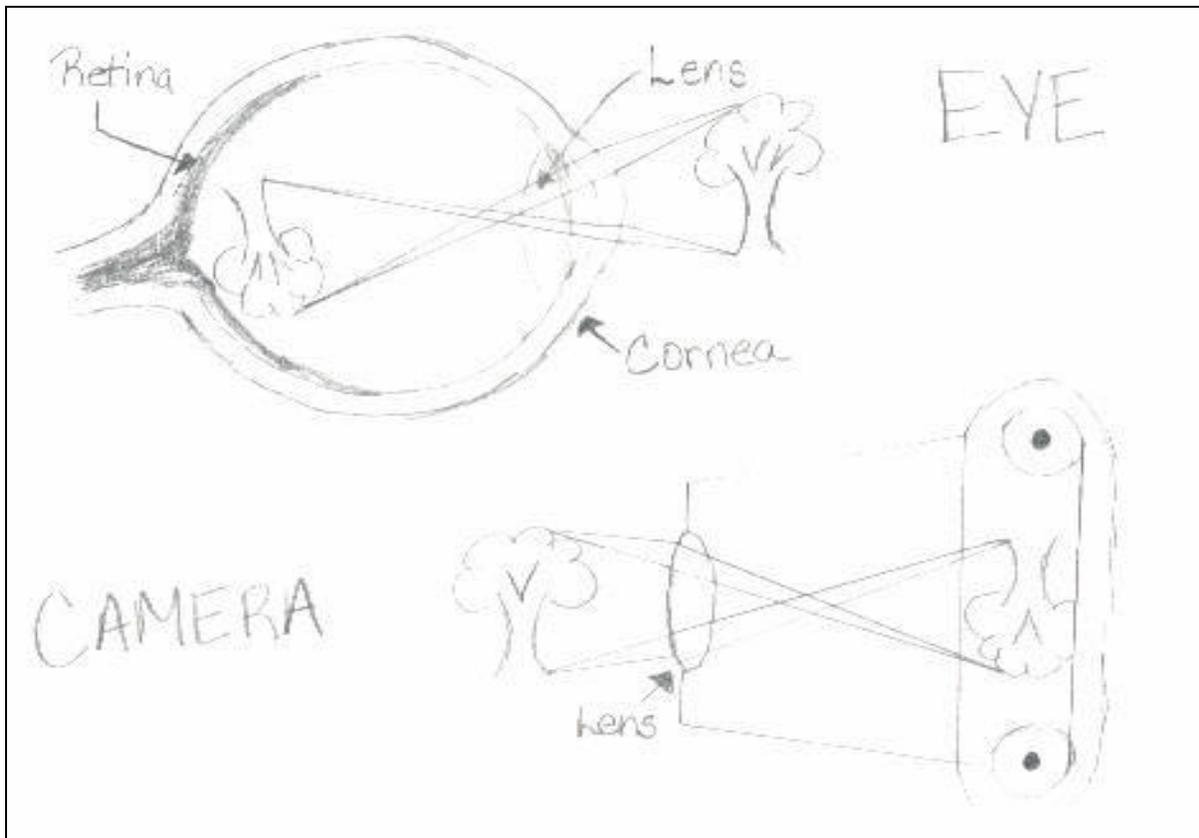
How Seeing Works Like A Camera

Have you ever used a camera? Did you know that you use something like a camera everyday? Your eyes work like a camera. The pupil lets light into your eye. The iris works like a shutter of a camera. The iris opens and closes to let in the right amount of light. When it is bright and sunny, your iris closes so your pupil gets smaller. That way less light is let in. Inside or in a dark room, the iris opens up to let the pupil get bigger and allow in more light.

A clear, curved lens is found behind the iris. The lens bends the light coming into your eye through the pupil. The lens focuses the light to the retina. The retina then acts like camera film. The picture is sent from the lens to the retina upside down! Amazing!

The upside down picture is then sent to the brain by way of the optic nerve. Your brain is so smart that it turns the picture right side up! Wow!

Color the camera and your eye below.

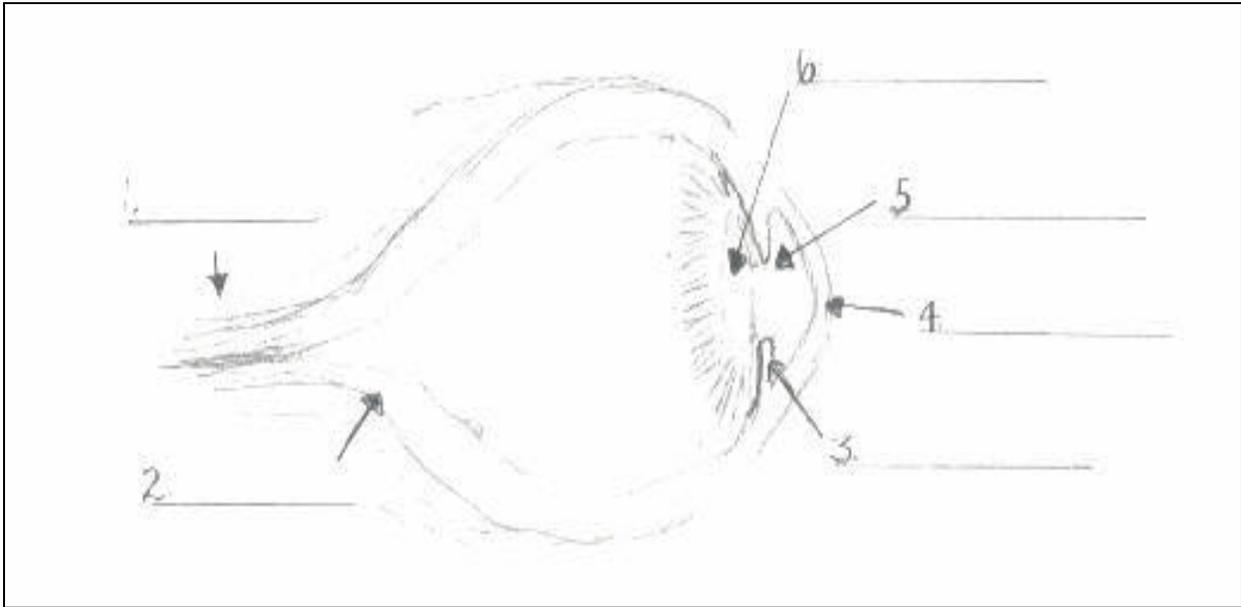


Tic Tac Toe Eye



EYE TEST

Label the parts of the eye. Use the words in the box below.



Cornea	Optic nerve	Pupil
Lens	Retina	Iris

Fill in the blank with the correct response.

8. Your eye works like a _____.
9. The pupil lets _____ into your eye.
10. The colored part of your eye is the _____.
11. _____ is the jelly-like substance in your eye.
12. The _____ sends an _____ - _____ picture to your brain.

Name: _____

Rays, Beams and Other Enlightening Things

Did you know that there are lots of different forms of energy? Radio waves, television signals, and x-rays are a few of the different kinds of energy that scientists call **radiant energy**. Light is also a form of radiant energy. Radiant energy moves away from the source in waves (hence the name radiant—it radiates!). Light waves are made up of many beams of light. A beam is actually a collection of many smaller pieces known as rays.

What source of light do you think radiates the most? You got it, the sun. Light rays travel through space very quickly. In space light travels 190 miles per second! That is like taking a trip around the world seven times in one second! Even moving at that speed, light still takes eight minutes to get from the sun to the earth.

ACTIVITY

Directions: After reading the information above, find the answers to the following questions.

1. It takes _____ for light to travel from the sun to the earth.
2. A beam of light is made up of many _____.
3. Light is a form of energy we call _____.
4. Light travels _____ through space.
5. How does radiant energy move? _____

Name: _____

(How do) You Light Up My Light

Let’s find out if light travels in a straight line. Here’s an activity that will help us find out!

Materials: five large index cards, crayons or markers, scissors, flashlight

Procedure:

1. Trace a circle (silver dollar size) on four of the index cards.
2. Select an artist to draw a light bulb on the fifth index card.
3. Cut out the circles on the four index cards.
4. Using tape, attach the card with the light bulb to a wall.
5. Choose four people to line up in front of the light bulb card.
6. Each person holds one of the four cards with a hole in it, trying to keep the cards lined up.
7. Select another person to shine the flashlight through the holes in the cards.
8. Work together to keep the “light bulb” lit.

Observations:

1. What happened when you tried to shine the flashlight through the holes?

2. How did you make the light bulb light up?

3. Why do you think this happened?

A Choice We Must Make

Is It Transparent, Translucent or Opaque?

Knowledge

Sometimes different objects react differently when light is shining on them. Some objects will let light shine through, while other objects will only let a little or no light through.

Why?

The purpose of this activity is to discover the differences between transparent, translucent and opaque materials.

The Stuff

Three (dark) marbles
Plastic wrap
Aluminum foil
Flashlight

Three bowls
Waxed paper
Rubber bands

Do It!

1. Place a marble inside an opaque bowl. Cover the bowl with plastic wrap. Ask students if they can still see the marble. They can because the plastic wrap is transparent; light passes through it and we can see what lies on the other side.
2. Put another marble inside another bowl. This time stretch waxed paper over the bowl (secure with a rubber band). Ask students if they can still see the marble. They should still be able to see the shape of the marble, but not clearly. The waxed paper is translucent; it allows some light to pass through, but it scatters some light, so we can't see it as well.
3. Set up a third bowl with a marble in the bottom. Cover the bowl with aluminum foil. Ask the students if they can still see the marble. The students will not be able to see the marble through the aluminum foil because the foil is opaque. Light does not pass through; we can't see what is on the other side.

Let's Do Some More!

Go on a scavenger hunt to find transparent, translucent and opaque objects. Instruct the students to classify their objects into three groups and then test their object with the flashlight to see if they classified correctly.

Name: _____

Taking Color Lightly

Did you know that sunlight is really made up of a band of different colors? The white light we see is really a mixture of many colors. You can see these colors with the help of a prism. A prism is a transparent piece of glass that usually has three sides. Hold up a prism in front of a window and let the sun shine through. Turn the prism so that the light appears on the wall. As the light passes through the glass, it is separated into red, orange, yellow, green, blue, indigo and violet. These are the same colors that appear in a rainbow!

1. How many colors make up sunlight? _____
2. What is a prism? _____
3. What happens to sunlight when it passes through a prism?

4. White light is really a mixture of what colors? _____

What gives objects their color? Objects can reflect only the light that strikes them. A red shirt reflects the part of light that we see as red. It absorbs the other colors!

1. What color is an object that does not reflect any light? _____
2. What colors are reflected by white paper? _____
3. Dark objects absorb _____ light than light-colored objects.

Name: _____

Light Test

1. What color does a red shirt reflect?
2. Name a source of radiant energy.
3. A "bundle" of light rays make up what?
4. What does a prism show us?
5. List all the colors of the rainbow in order.
6. What does a white object do when a light is shined on it?
7. What do we call a material that blocks light completely?
8. When blue and yellow are mixed, what color do we see?

True or False

9. Glass is translucent. True or False
10. Wax paper is translucent. True or False