My Sight: Guidebook

Edith Ethridge

In keeping with our philosophy to provide access to information for people who are blind or visually impaired, the American Printing House for the Blind provides accessible versions of this book in large print and digital download.

My Sight:

Catalog Number 1-84000-00

The content of this guidebook follows the APA Style guidelines that were current at the time it was written, including the guidelines for bias-free language for disability and gender.

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Foreword:

Edith Ethridge, the author of this guidebook, is a retired Certified Low Vision Therapist (CLVT) from the Kentucky School for the Blind. The activities in this guide were developed during her working career and she has shared her endless knowledge with the field on this timeless project.

I had the privilege of knowing Edith Ethridge while attending the Kentucky School for the Blind as a student and personally participating in her vision program, which includes lessons from this guidebook. Ethridge made the content interesting, hands-on, and fun to learn. For me, going to her class was my favorite part of the day. Learning about the eye was fascinating, and I was able to explain my eye condition and my needs so much better. I was thrilled to work on this project and bring my wonderful teacher's instruction to life with the eye diagrams, eye puzzle pieces, tactile labeling worksheets, and other product manipulatives included within.

This guide is full of interactive lessons that are easy to follow and use with any student to get them involved with learning the parts of the eye, how the eye works, their own eye condition, and how to portray their own needs in the classroom based on how they see.

The guidebook is broken into three sections: Section I: Basic Concepts for Understanding the Eye; Section II: The Path of Light Through the Eye; and Section III: Self-Advocacy About My Eye Condition. As a low vision specialist, she taught the concepts of understanding students' eye conditions and how they could tell others about it—not only the facts but also what it means to them, how they visually see the world around them, and how to advocate for their needs.

The Glossary of Eye Terminology and Eye Conditions Guide, found at the end of this guidebook, is where readers can look up definitions and dive deeper into understanding visual systems. Students can create their own visual abilities statement using this as well.

The eye puzzle pieces have high-contrast color and texture to identify each part, and they are numbered in print and braille. The pieces fit together into the corresponding numbered tray like a puzzle. There are two puzzle sets to choose from for instruction. One set includes a PVC high-contrast color eye puzzle that can be used on a table or desk. The other puzzle set is an acrylic eye puzzle that can be used on the LED Mini-Lite Box (sold separately). You can build the eye model using the translucent colored and textured acrylic eye puzzle pieces on the lightbox by matching the numbered print and braille pieces in the tray. Each puzzle comes with a texture key to help students identify the parts of the eye and build the puzzle by matching the numbers, size, shape, color, and texture of the puzzle pieces with the key. The My Sight eye puzzle for the Light Box (1-84001-00) can be purchased separately on the My Sight product page at aph.org.

The eye diagrams are high-contrast, black-and-white raised line tactile graphics that highlight each specific part of the eye that will be discussed in more detail in the guidebook for each lesson. There are activities that involve identifying parts of the eye on the diagrams tactually, or visually by coloring different parts of the eye and adding tactile markers to show understanding. The diagrams can be purchased as a replacement part on the APH website. The eye diagram and key can be downloaded from the Tactile Graphic Image Library (TGIL) for further instruction and is available as a free download in the Manuals section on the My Sight

product page on the APH website as an embossable file.

The tactile labeling worksheets show three models of the eye: outside view, inside view, and cross-section view. Use print and braille labels to label each part of the eye to show understanding.

The following additional items can be found on the product page at aph.org:

- Guidebook downloadable PDF
- A downloadable reference sheet listing materials not included in the kit that are needed to complete lessons.
- My Sight eye puzzle for the Light Box (1-84001-00)
- My Sight (Spanish kit) (1-84000-SP)
- Replaceable eye diagram sheets, set of 11 (61-840-014)
- Print and braille vocabulary word labels for labeling worksheets. (61-840-005)
- My Sight white PVC eye puzzle with tray and texture key, (61-840-000)

Ethridge dedicated her time and expertise toward the development of this product, as along with other project contributors who have worked tirelessly over the years to make this curriculum, models of the eye, and tactile graphics available to use with students grades K–12 on their journey to becoming self-advocates for their visual needs—skills that will help them become successful, employable, and respected members of society.

— Justine S. Taylor, APH Product Manager

Table of Contents:

My Sight:

Students vary in their understanding of eye conditions and prognoses. Some may have a good understanding of their personal condition while others need direct instruction to understand their eye condition fully and how it affects their lives. My Sight provides a framework with which to begin a discussion about the eye, the visual system, and the breakdowns in the system that lead to a visual impairment. Participants in this program will develop the communication skills necessary to raise awareness about their visual impairment and build the confidence to communicate their visual needs to instructors, peers, family, medical professionals, and the general public.

This process and the materials are intended to be used by teachers of the visually impaired (TVIs), certified vision rehabilitation therapists (CVRTs), low vision specialists, counselors, and professionals who have been trained to work with individuals who are blind or visually impaired. Throughout this guide, such professionals are referred to as "instructors." The individual and group activities are designed for students of various ages and abilities, including sighted, low vision, and blind populations.

Throughout this process, the student of this curriculum will work toward a number of specific goals and be able to:

- Develop an understanding of the eye and the path of light from a source through the eye using models, diagrams, and activities.
- Identify and label each part of the human eye and explain the path of light through the eye to the retina.

- Explore breakdowns within the visual system and the resulting effect on vision and visual performance.
- Identify names and characteristics of specific eye conditions relative to individual needs.
- Develop self-advocacy strategies and techniques for use in daily environments and situations.
- Create a visual abilities statement related to the eyes and vision loss.
- Explore and analyze specific types of vision loss and the use of devices, adaptive techniques, and assistive technology that may be effective.
- Refine communication techniques with parents, peers, instructors, and medical professionals related to visual abilities and vision loss.
- Generate, collect, and organize relevant information for the transition into education and employment.

Section I: Basic Concepts for Understanding the Eye is best suited for younger students who only need a brief overview of the eye. The vocabulary, concepts, and activities are simple and require less time to complete. Students develop a basic understanding of the visual system using models, diagrams, and activities.

Section II: The Path of Light Through the Eye is written for older students or those who need a more detailed explanation of the eye to better understand their eye condition. Within this section, students develop an understanding of the visual system and the path of light from a source through the eye to the retina using models, diagrams, and activities.

Section III: Self-Advocacy About My Eye Condition helps the student learn self-advocacy skills and communication skills to apply in daily situations. The student will learn the name of their eye condition, how to spell the condition, how to gather medical information, and how to discuss the causes of vision loss. The student learns to communicate needs through a visual abilities statement to present to parents, peers, instructors, and medical professionals related to visual abilities and vision loss.

Information and materials provide a framework for instruction and discussion about the parts of the eye. Facilitators have the option to teach just one or two relevant parts of the eye or a complete program on the visual system and the breakdowns within the system that may result in vision loss.

This kit includes a set of tactile graphics, eye model pieces, a white-and-clear tray to place eye model pieces that can either be used to build the eye like a puzzle in the white tray or using the clear tray on the light box, and labeling worksheets to evaluate the student's understanding of each part of the eye. The materials are designed to simplify and clarify functions within the visual system. Materials are visually uncluttered with good contrast. A texture key is provided for the tactile models representing each part of the eye with high-contrast color and texture. There are vocabulary labeling worksheets (called Outside View, Inside View, and Cross-Section View) that can be used to label each part of the eye. Print and braille labels are included. The eye model parts correspond to print and tactile diagrams to facilitate transition from model to diagram. The cross-sectional model and corresponding diagrams may be used in isolation or together.

These materials provide basic tools for discussion and instruction of the human eye and vision loss. The design and materials representing the visual system are not intended to be to scale or scientifically exact. Enhancements allow tactual and visual representation of parts of the eye within the system to illustrate their location within a cross-sectional view and the relationship of the parts to one another.

Vision may fluctuate, and vision loss may be the result of one or more eye conditions within the visual system. There may be a primary cause or reason for vision loss along with a secondary cause or multiple conditions to discuss and learn more about through discovering the anatomy and physiology of the eye. The diagrams and models of the visual system provide basic concepts and tactile representations of the human eye to expand knowledge and understanding of vision loss.

The visual system is affected by eye structure; the health of cells, nerves, and tissues; eye movement; and the ability of the parts of the eye working together to focus and transmit signals, images, or codes of light.

The following is a listing of the tactile graphic diagrams and eye model puzzle pieces for a quick reference.

Tactile Diagrams:

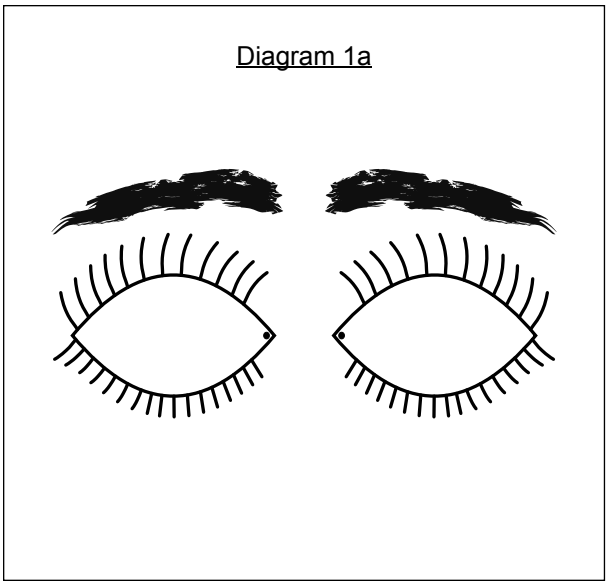


Diagram 1a
Eyebrows, eyelashes

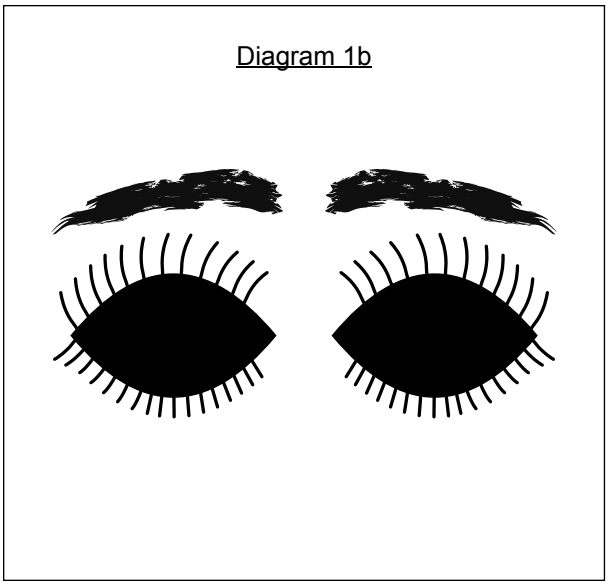


Diagram 1b
Eye area cutout

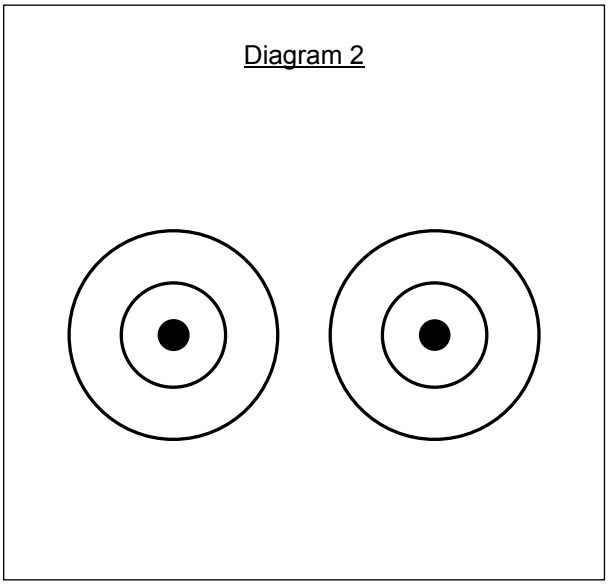


Diagram 2
Eyeball, iris, pupil

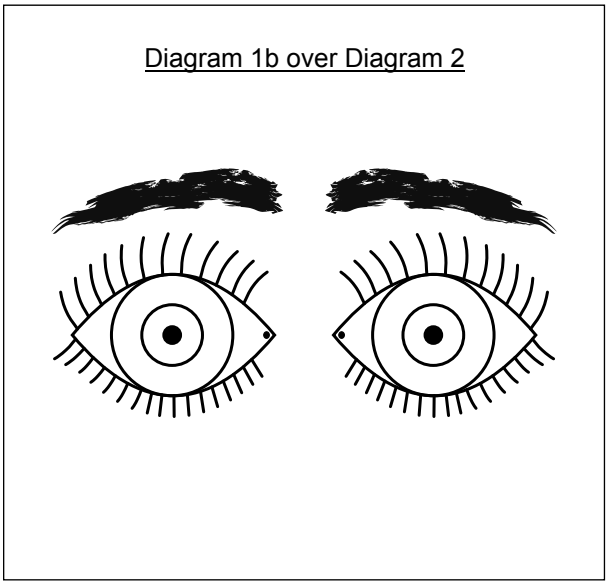


Diagram 1b over Diagram 2
Eyeballs with protecting features of the face

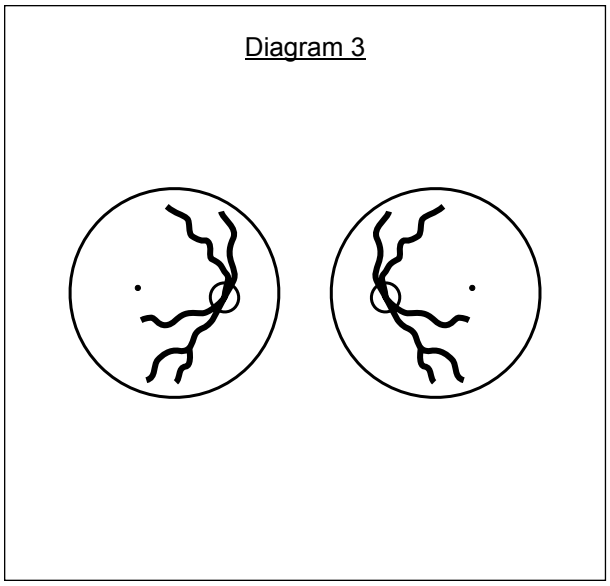


Diagram 3
Interior retina, blood supply, optic disc, macula, fovea

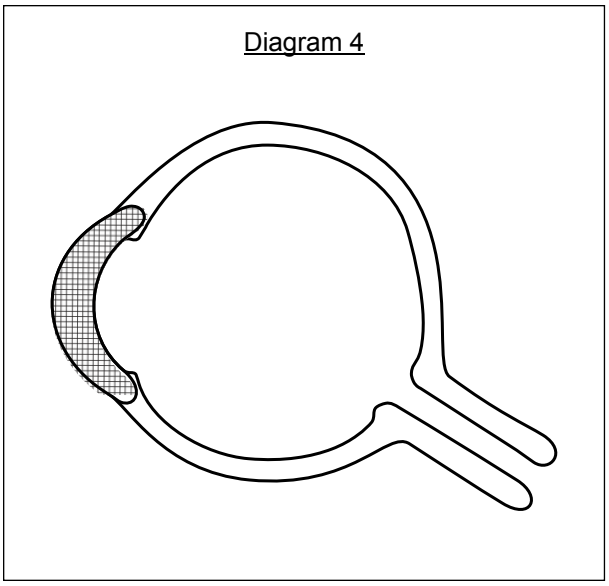


Diagram 4
Cornea (highlighted), sclera, optic nerve sheath

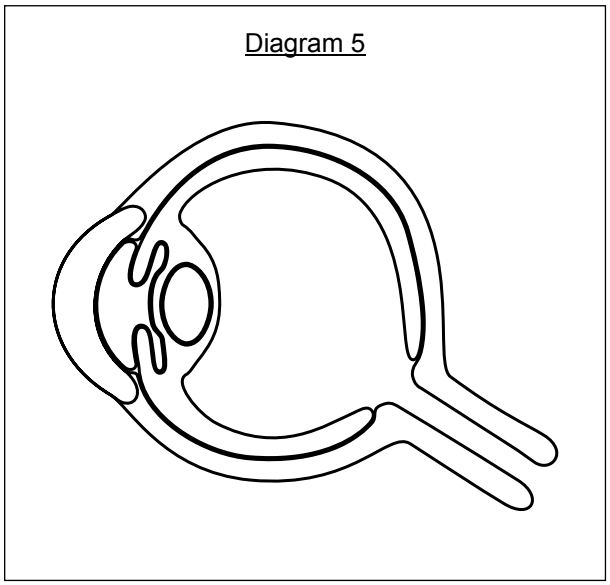


Diagram 5
Choroid, iris, pupil, uveal tract, lens; no highlights

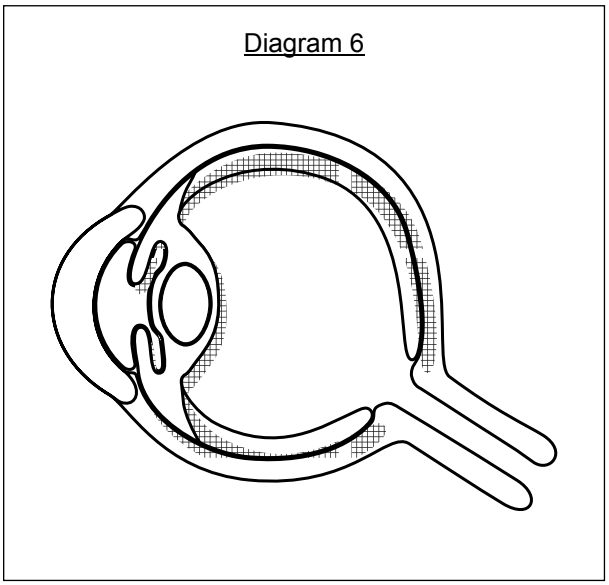


Diagram 6
Choroid (highlighted)

Diagram 7

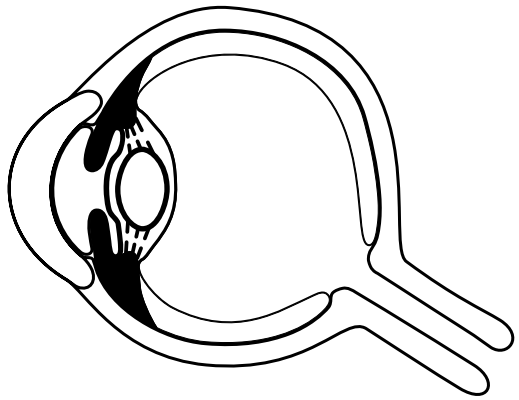


Diagram 7
Iris, lens, uveal tract, ciliary body, ciliary muscles, zonule fibers

Diagram 8

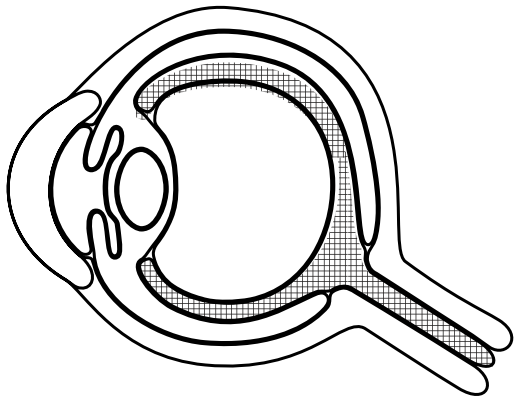


Diagram 8
Retina and optic nerve (highlighted)

Diagram 9

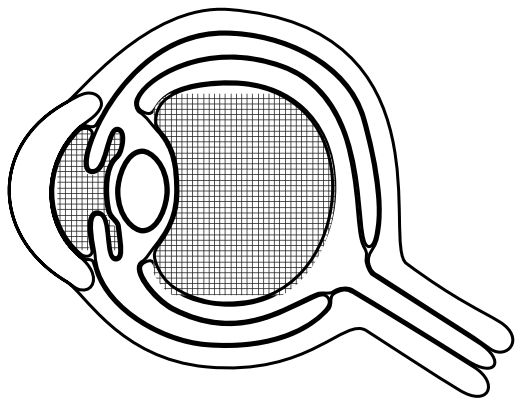


Diagram 9
Aqueous humor within the anterior chamber; vitreous humor within the posterior chamber (highlighted)

Diagram 10

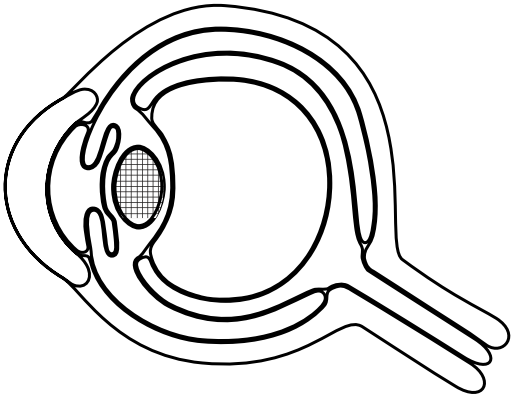


Diagram 10
Lens (highlighted), choroid, retina

Diagram 11

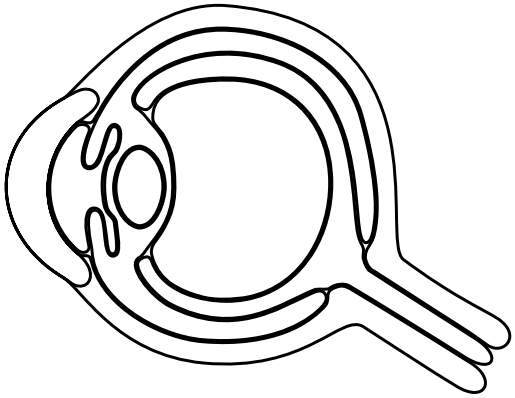
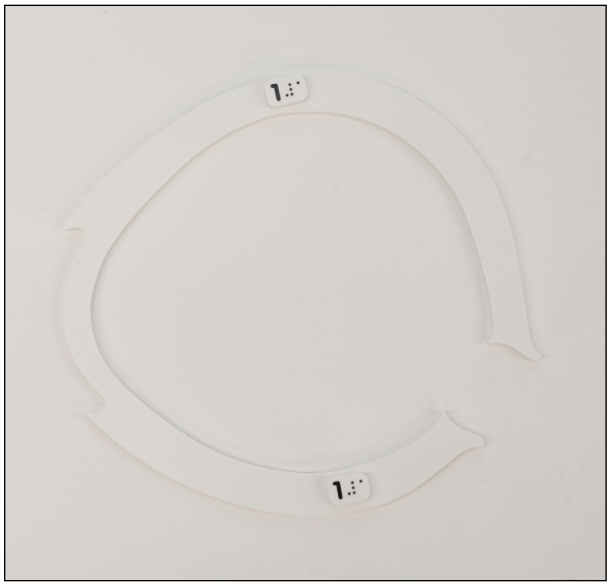


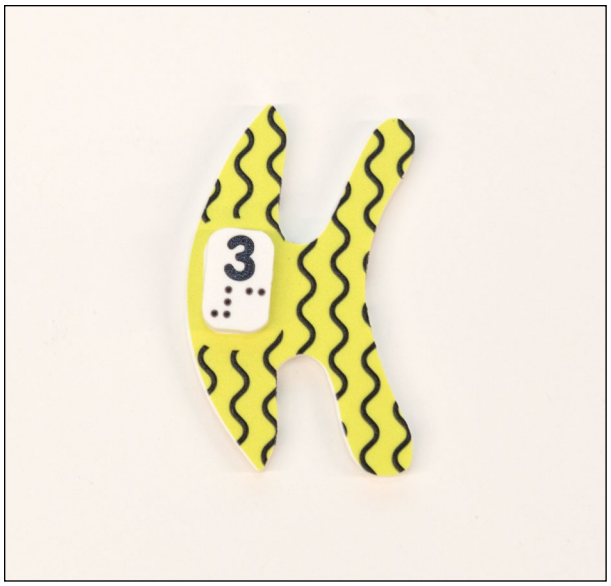
Diagram 11
No highlights, puzzle pieces fit in diagram

My Sight Eye Puzzle Pieces:

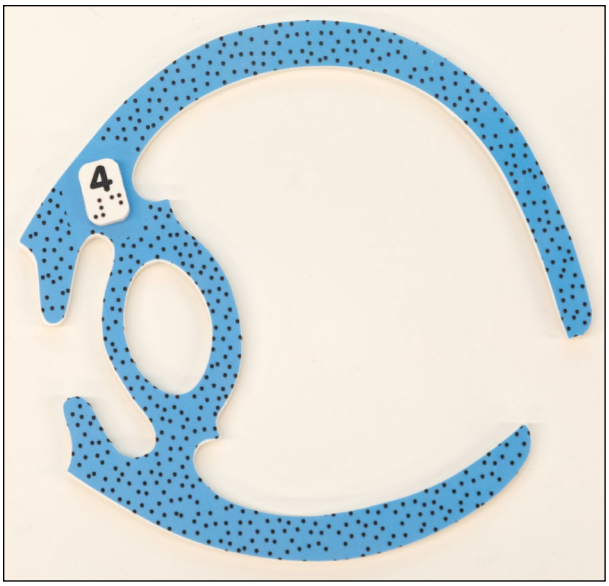


Puzzle Piece 1
Sclera

Puzzle Piece 2
Cornea

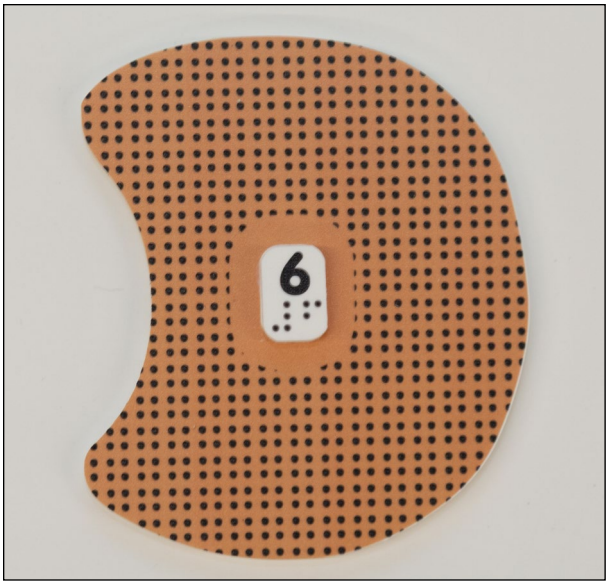


Puzzle Piece 3
Aqueous humor

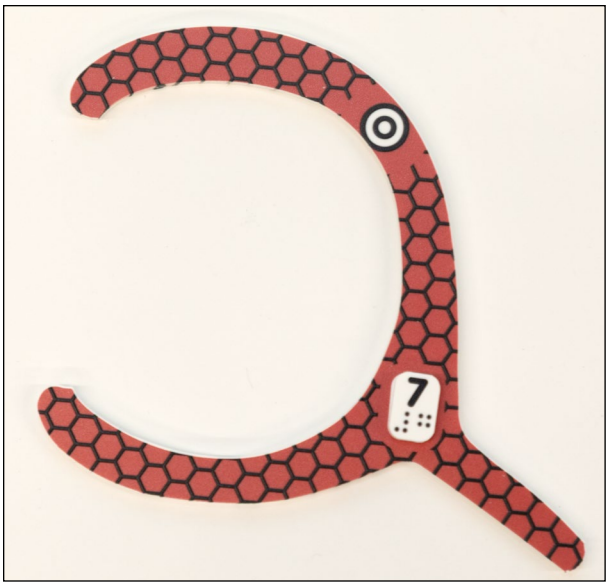


Puzzle Piece 4
Choroid

Puzzle Piece 5
Lens

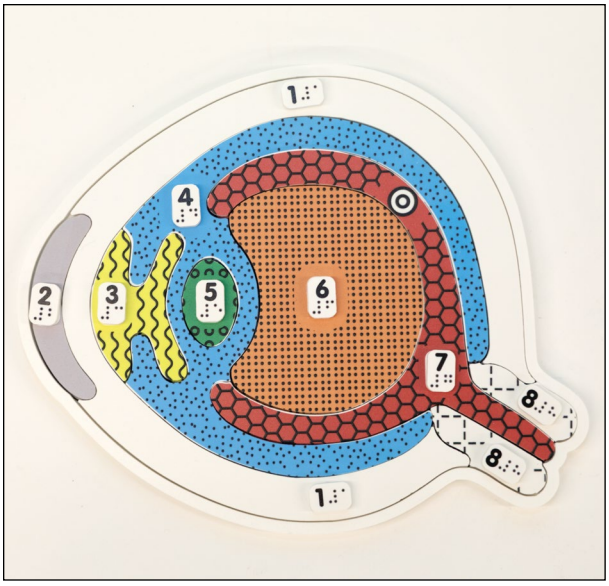


Puzzle Piece 6
Vitreous humor



Puzzle Piece 7
Retina and optic nerve

Puzzle Piece 8
Optic nerve sheath



Completed Eye Puzzle
Puzzle Pieces 1, 2, 3, 4, 5,
6, 7, and 8

Texture Key

Section I: Basic Concepts for Understanding the Eye

A. The Body's Protection for the Eye

Activities and discussions may direct the student to touch parts of the face with their fingertips, never the eyeball itself.

Prior to this activity, instructors are encouraged to promote proper hygiene instruction for handwashing, face washing, coughing and/or sneezing into the elbow, and use of hand sanitizer.

Students must wash or sanitize their hands before exploring their own faces to identify the ways the body protects the eye.

Activity A1, Section I

Students tactually and/or visually observe and explore their own faces by locating eyebrows, eyelids, eyelashes, and orbital bones, and then discuss other protections for the eye.

Vocabulary:

- eyebrows
- eyelids
- conjunctiva
- eyelashes
- tears

- tear duct
- eyeball
- eye socket
- orbital bones
- facial bones

Materials:

- Diagram 1a
- mirror or electronic magnification as appropriate
- use of self-view mode with a video magnifier (optional)
- tactile labeling worksheet of the eye demonstrating protective features of the eye

Guided Discussion

Prior to the activity, have the student wash their hands or use hand sanitizer as they will be touching their face. Instruct the student to close their eyes and gently touch and identify their eyebrows, eyelids, and eyelashes.

If appropriate, have the student use a mirror to evaluate their eyes or use a video magnifier with self-view to zoom in and magnify the student's eyes.

The student explores and identifies their orbital bones, which surround the eyeball and form the outside of the eye socket, and then explores the facial bones.

Discuss the ways in which these parts of the face help protect the eyeball.

- The hairs of the eyebrows help to direct water falling on the top of the head away from the eyes. Eyebrow movement may deter gnats or small bugs from the eyes.
- Orbital bones help protect the eyeball from blows to the head and face.
- The facial bones are the 14 bones that make up the skeleton of the face. They protect the sense organs of smell, sight, and taste.
- Eyelids protect the eye from dust and small particles blowing into the eye. As the eyelids open and close, they help keep the eye moist.
- Eyelashes help to protect the eye from small insects or particles that might blow toward the eye.
- The eye socket is the actual space surrounded by the orbital bones where the eyeball is located. The eyeball rests within the eye socket.

Discuss with the student other ways in which the body helps to protect the eye.

- The conjunctiva is a clear, thin tissue or membrane found on the inside of the upper and lower eyelids and across the front of the eyeball. It is thinner than a piece of plastic wrap. This very thin membrane helps protect the eyeball and keeps it moist. Avoid touching the conjunctiva. If the conjunctiva, in one or both eyes, becomes infected or irritated, the condition is called conjunctivitis. If untreated, the infection may cause reduced vision.
- Tears and fluids help lubricate and cleanse the conjunctiva, which is the thin membrane that covers the front of the eye.

- Tear ducts are small passages through which the tears and moisture flow.

Ask the student to identify items that people wear or use to protect the eyes. Glasses, sunglasses, safety glasses, filter lenses, eye patches, sports goggles, and hats provide extra protection for the eyes. Discuss job-related eyewear protection.

Evaluate Understanding

Ask the student to identify one way that the body protects the eye.

Ask the student what color their eyes are.

Can the student use a mirror or a video magnifier and point to their eyes and protective parts, explaining each?

Can the student tactually identify the location of the eyebrows, eyelids, eyelashes, and orbital bones on their own face?

Can the student identify one item that they might use to protect their eyes?

Have the student explore the eye model's outside view of the eye to identify and label each part.

Activity A2, Section I

The student evaluates Diagrams 1a and/or 1b, representing eyebrows and eyelashes, to relate to their own face.

The center of the eye area in Diagram 1a is cut out to allow the student to hold the diagram up to their face, as though using a mask. The cutout diagram will be referred to as Diagram 1b.

Materials:

Diagram 1a

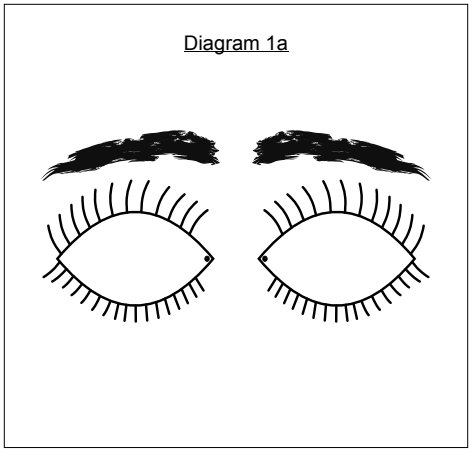
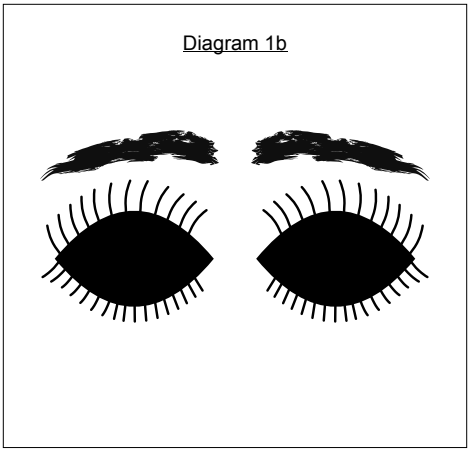


Diagram 1b



- Diagram 1a; Eyebrows, eyelashes
- Diagram 1b; Eye area cutout

Guided Discussion

Using Diagram 1a or 1b of the eyebrow and eyelashes, instruct the student to relate this drawing to their own eyes as they locate and describe similarities and differences between their face and the diagram.

Remind the student to avoid putting their fingers in their eye or on the surface of the eyeball, as this may lead to irritation and/or infection.

Note the small dot that represents the tear duct where fluids drain from the surface of the eye. This area is often referred to as the corner of the eye and is nearest the nose.

Evaluate Understanding

Using Diagram 1a or 1b, the student tactually and verbally identifies the representation of the eyebrows, eyelashes, and tear ducts.

Activity A3, Section I

The student uses their hands and a plastic eyeball to simulate the positional relationship of the eyeball, eye socket, and orbital bones.

Vocabulary:

- eyeball

Materials:

- plastic eyeball or table tennis ball
- a coat of clear glue or nontoxic nail polish over the cornea of the plastic eyeball to give an identifying texture to the front of the eyeball
- black marker to draw the pupil
- colored markers to color the iris

Guided Discussion

Use the materials to adapt a table tennis ball into an eyeball for the following activities. The model eyeball is the globe-shaped portion of the eye and is about the size and shape of a table tennis ball. The eye

socket is the actual space surrounded by the orbital bones where the eyeball is located. The eyeball rests within the eye socket.

Working with the student, place a plastic eyeball or table tennis ball in the fist in such a way that the front of the eye and the iris are visible through the circle made by the forefinger and thumb. Use the other hand to explore how the bones and skin form protection for the eyeball. Orbital bones help protect the eyeball from blows to the head and face.

The inside of the fist represents the eye socket. The eye socket forms a cupped area where the eyeball is protected by orbital bones in the face.

Photo: An adapted table tennis ball, pupil and iris facing up and resting in a fist, demonstrating eye socket and facial bones.

Evaluate Understanding

The student demonstrates and discusses the positional relationship of the eyeball, eye socket, and orbital bones.

The student explains how the eye socket and orbital bones provide protection for the eye.

B. The Size and Shape of the Eyeball

Activity B1, Section I

The student estimates the size and shape of the human eye.

Materials:

- Plastic eyeball or table tennis ball
- Several familiar round objects of various sizes to compare size

Photo: An adapted table tennis ball the size and shape of an eyeball, alongside a tennis ball.

Guided Discussion

Using objects familiar to the student, discuss the size and shape of the human eyeball.

The student selects or indicates items that they think may be the size and shape of the eyeball.

Ask the student to use their hands to estimate the size and shape of the eyeball.

Discuss with the student the following statements about the eyeball.

- The eyeball is similar in shape to a ball (sphere).
- The eyeball may be about the size of a table tennis ball, jawbreaker candy, a round sucker on a stick, or a small bouncy ball.

The student compares a plastic eyeball or table tennis ball with other round shapes that are larger or smaller, such as a grape, an orange, a tennis ball, and so forth.

Discuss other familiar round objects that are not available to touch or hold.

The instructor should observe and evaluate understanding for each student, as visual and tactual experiences vary.

Evaluate Understanding

Using a variety of student familiar objects, the student compares the object in size and shape to that of the human eye.

Activity B2, Section I

The student will form a model approximately the size and shape of the human eye.

Materials:

- white modeling clay
- plastic eye or table tennis ball

Guided Discussion

Using white modeling clay and a plastic eyeball or table tennis ball for comparison, instruct the student to form a ball the approximate size and shape of an eye. Allow the student to pinch off a piece of clay to form into a ball the size that they estimate to be of the eyeball. Then, ask the student to compare their work to the other round objects and the plastic eye or table tennis ball used earlier.

Direct the student to self-evaluate their work by asking, "Is the eyeball you formed larger, smaller, or about the same size? If not the same size, what would you do to make it the same size? Is the eyeball you formed similar in shape to the table tennis ball? If it is not the same shape, what could you do to make it the same shape?"

Discuss with the student the importance of the shape of the eyeball. If the eyeball is too short from front to back, then the condition is called hyperopia or farsightedness. Distance vision is clear, and near vision is blurry. This

may result in eye fatigue, eyestrain, and difficulty reading. Prescription glasses can usually help.

If the eyeball is too long from front to back, then the condition is called myopia or nearsightedness. Near vision may be clear, but distance vision is blurry. This may result in eye fatigue, eyestrain, and difficulty identifying objects and people at a distance. This can usually be corrected with glasses.

Evaluate Understanding

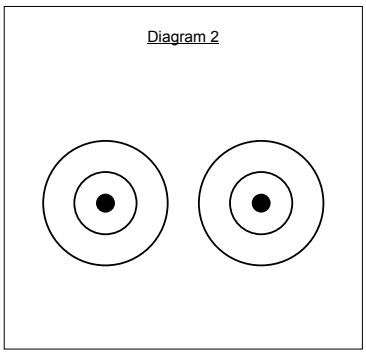
The student describes and demonstrates the approximate size and shape of the human eye. Evaluate and clarify answers. This activity may be challenging, but it is valuable to students without functional vision.

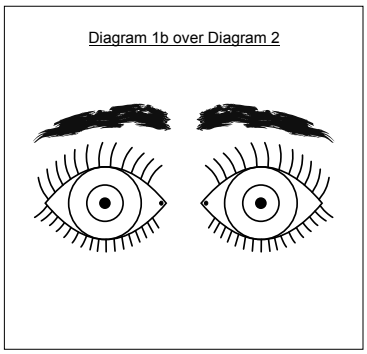
C. The Outside, Inside, Front, and Back of the Eye

Activity C1, Section I

Use Diagrams 2 and 1b to identify the parts of the eyeball that are visually observed by others.

Materials:





- Diagram 2; Eyeball, iris, pupil
- Diagram 1b over Diagram 2; Eyeballs with protecting features of the face

Guided Discussion

Present Diagram 2 to the student. The student will tactually and/or visually explore the representation of the sclera, iris, and pupil. This is a diagram of the front of two eyeballs. The outside circle band represents the sclera, the tough white covering of the eyeball.

The next circle band inside of the sclera represents the iris. The iris is a beautifully colored system of tissue and muscles. The color of the iris determines the color of the eyes. If the iris appears blue, you have blue eyes. If the iris appears brown, you have brown eyes. Some eyes appear dark green. The iris helps control the amount of light that enters the eye and helps to focus it on the retina. The iris contracts to increase the size of the pupil and expands to cover more of the space leaving a smaller pupil.

The center spot represents the open space in the middle of the iris called the pupil. Light can pass through the pupil to the back of the eye. The pupil appears bigger or smaller as the iris changes the size of the opening. The pupil looks like a dark hole or dark spot. Light is directed through the iris and then the pupil to focus on the retina.

Evaluate Understanding

The student identifies the area representing the sclera, iris, and pupil on Diagram 2.

Provide each student with the appropriate material to highlight the area of the iris.

- The student may color in the area or use colored tactual glue.
- The student may form colored modeling clay into the shape and size of the iris and make a hole for the pupil and place it over Diagram 2.
- The student may place precut iris forms on Diagram 2.

Activity C2, Section I

The student constructs simple individual models that are similar in size to the human eye.

Photo: A sock model.

Vocabulary:

- cornea
- iris
- pupil

- lens
- sclera
- optic nerve
- optic nerve sheath

Materials:

- plastic eyeball or adapted table tennis ball
- infant sock (snip a small 1/8”-hole in the toe of the sock.)
- clear nontoxic nail polish or clear drying glue for tactual cornea
- clear tape
- yarn for the optic nerve

Guided Discussion

Illustrate and discuss the following concepts with students.

The eye has an outside and an inside. The student paints the front of the “eyeball” with nontoxic nail polish or clear drying glue to provide a tactual cornea. Then, the student places the eyeball inside the sock; help align the cornea to the opening in the sock.

The eye has a front and a back. The student aligns the eye with the iris and pupil to show through the hole in the sock. Place the piece of yarn that represents the optic nerve in the sock. Then, help the student gather and tape the sock in the back making sure that the “optic nerve” extends out of the sock.

Guided Instruction Using the Vocabulary Terms

Use the sock model, Diagram 4, and Puzzle Pieces to illustrate and discuss the following parts of the eye.

Sock Model

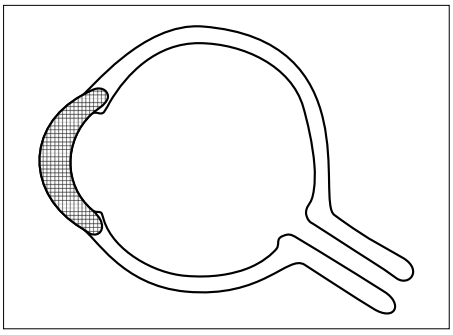
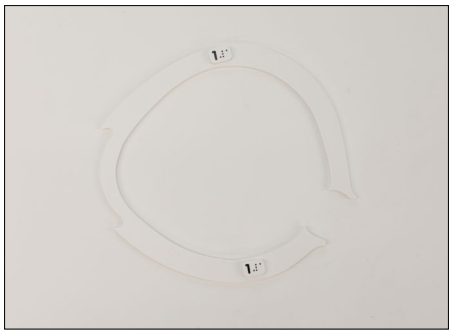


Diagram 4



Puzzle Piece 1
Sclera

Puzzle Piece 2
Cornea

- The front of the eye is clear. Light can shine through it. It is called the cornea.
    - o If the cornea is scarred as a result of injury or disease, then the light entering the eye will be scattered and not focused clearly.
    - o If the shape or thickness of the cornea changes, then the im ages may not be focused clearly.
- A tough white covering protects the remaining part of the eyeball. This is the sclera.

- If the sclera becomes irritated and inflamed, then it may result in a condition called scleritis that may lead to vision loss.
- If the sclera is punctured from an injury, then the parts of the visual system affected may lead to vision loss.

- The sclera continues to the back of the eye and becomes the covering for the optic nerve that continues to the brain. This is the optic nerve covering, sometimes called the optic nerve sheath. The optic nerve sheath is the outside protective cover of the optic nerve as it connects the eyeball to the brain.

    - If there is damage to the optic nerve sheath, then the impulses of vision from the retina to the brain may be interrupted. Tumors or thickening on or within the sheath may cause degrees of vision loss.

- The optic nerve is the nerve that extends from the back of the eye to the brain. The optic nerve is composed of a bundle of retinal fibers that transmit the information of vision from the back of the eye to the brain.

    - If the optic nerve is underdeveloped from birth or deteriorates from disease, tumors, or trauma, then loss of visual acuity and loss of the visual field may occur.

- The colored part of the eye just behind the cornea is the iris. The iris helps control the amount of light that enters the eye and helps it to focus.

- If the iris is underdeveloped from birth, then the muscles will not open and close adequately to control the light entering the lens. This results in sensitivity to light.
- If the iris tissue does not have a sufficient amount of pigment (melanin), then the light entering the eye may be diffused through the iris tissue as well as the pupil. The light will not be properly directed through the lens, which results in reduced clarity.

- There is an opening in the middle of the iris. It looks like a dark spot and is called the pupil. Light is directed through the iris and then the pupil.

  - If the size of the pupils does not appear normal or equal this is referred to as, Anisocoria.
  - It can be normal in some people (physiological anisocoria), but it may also result from medical issues such as nerve damage, eye trauma, medication effects, or neurological conditions.

- The lens is located behind the iris. The lens is a part of the visual system that focuses a clear image onto the retina.

  - If the natural lens does not develop, then vision is distorted.
  - If the lens becomes cloudy, then less light enters the eye and vision is blurred.
  - If a cataract or thickening develops in the lens, then the lens may have to be removed. Doctors may insert a new lens into the eye.

- If there is trauma to the eye and the lens is dislocated and the path of light is distorted, then the light may not focus properly on the retina.

Evaluate Understanding

- Using the sock model, the diagram, or the puzzle pieces, ask the student to indicate and/or describe the front and back of the eye.
- The student identifies or names an outside covering of the eye.
- The student identifies or names the colored part of the eye behind the cornea.
- Light enters the eye through an opening in the iris. Ask the student to name or identify this part of the eye.
- The student identifies and describes parts of the eye discussed in this activity using the appropriate vocabulary terms.

Activity C3, Section I

The student simulates the movement of the eyeball within the eye socket.

Vocabulary:

- eye muscles

Materials:

- plastic eyeball or adapted table tennis ball
- large ball (basketball or soccer ball)

Guided Discussion

Demonstrate and ask student to demonstrate eye movement.

While holding the plastic eye loosely in one hand, ask the student to use the fingers of the other hand to hold and rotate the eyeball in the socket from the back of the eyeball.

Discuss that sets of eye muscles are attached to the eyeball and move the eye in different directions. The eye can move within the eye socket.

Using the large ball, instruct the student to hold the ball with both hands on opposite sides of the ball at arm's length. The student can rotate the ball to the left and right by extending and retracting one arm and then the other.

The arms simulate one pair of muscles turning the eyeball. Similarly, ask the student to hold the ball on the top and the bottom to rotate the front of the ball up and down.

Discuss with the student that a system of eye muscles controls the movement of the eyeballs. The brain controls the muscles. If the brain and the eye muscles are not working together, then vision in one eye may be reduced and binocular vision affected.

Eye-muscle imbalances cause eye conditions such as nystagmus, strabismus, and amblyopia. Refer to Eye Conditions Guide and Glossary of Eye Terminology in the back of this guidebook to look up definitions, eye conditions, and parts of the eye such as cornea and Pupil.

Evaluate Understanding

The student describes and/or demonstrates eye movement using the model. The student moves their eyes up, down, left, and right. Discuss how an eye doctor may instruct patients to move their eyes during an eye exam.

Review:

The student can use the diagrams to identify the protective parts of the eye and can explain the inside mechanisms and how they work in the visual system.

The student can build and name the parts of the eye from Section I using the high-contrast color and textured puzzle pieces or the acrylic puzzle pieces to build the eye on the light box.

The student can state the name of their eye condition and the definition.

The student can label each part of the eye on the worksheets with 90% accuracy.

At the end of Section I: Basic Concepts for Understanding the Eye, use the labeling worksheets to check for understanding and evaluation. Instruct the student to label each part of the eye using the print and braille labels on the Outside View tactile graphic with the vocabulary worksheet for Section I on Page 149.

Section II: The Path of Light Through the Eye

Following the instruction of Section I, the student should have a concept of the shape and size of the eyeball and the parts of the face that protect the eye. In Section II, the student explores parts of the eye to reveal how the visual system works. The student will continue to investigate the specific breakdowns within the visual system and the resulting effect on visual abilities and vision loss.

The diagrams and cross-sectional models in Section II provide a teaching tool about the path of light through the eye to the brain. Activities to foster understanding are within each section. Individual concepts, tactual interpretation skills, and previous experience with cross-sectional models vary. Select activities appropriate for the success of each participant.

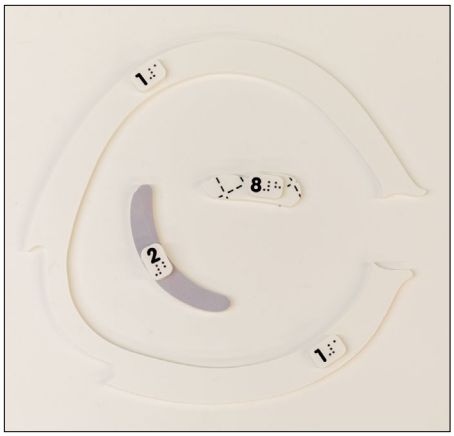
A. Outside Coverings of the Eye

Use the My Sight Eye Puzzle, tactile diagrams, and labeling worksheets to explore the outside and inside surfaces of the eye.

Vocabulary:

- cornea
- sclera
- optic nerve sheath

Ensure that the student knows the following terms: cornea, sclera, and optic nerve sheath. Use these terms in relation to the cross-sectional model and diagrams.



Puzzle Pieces 1, 2, & 8
Cornea, sclera, optic nerve sheath

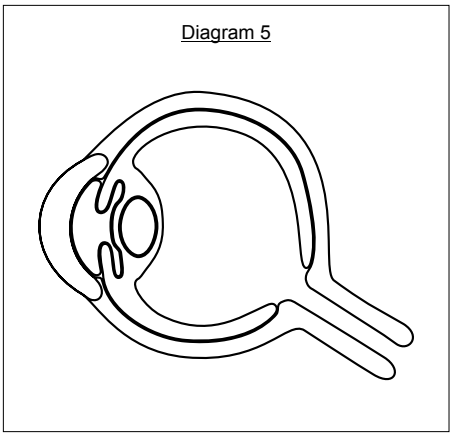


Diagram 5
Choroid, iris, pupil, uveal tract, lens; no highlights

Facilitate the tactile, visual, and oral review of Puzzle Pieces 1, 2, and 8 highlighting the following content.

- Vision begins with a light source. Light is reflected off objects in the environment. This light or reflection enters the eye. As the light enters the eye, the parts of the eye and the functions of each part create the visual system. Signals from the visual system are transmitted to the brain where they are received and interpreted.
- Light passes through the clear cornea.
- The sclera is the tough white outer covering of the eye, or white of the eye.
- Light cannot pass through the sclera.
- The sclera covering extends to the outside of the back of the eye to protect the optic nerve. This covering is called the optic sheath.

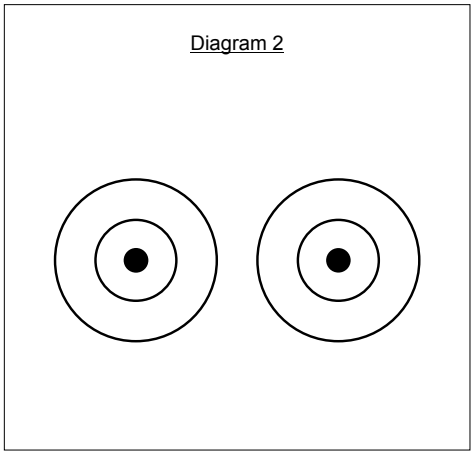
B. Outside View of the Eye

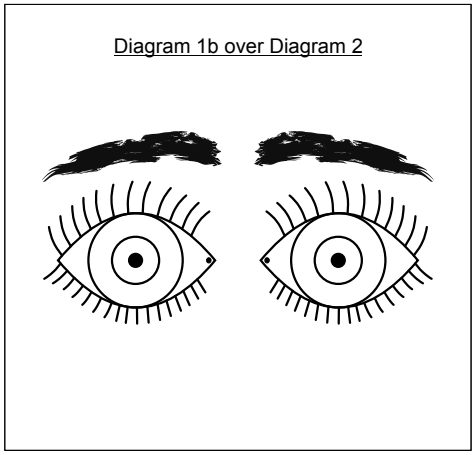
Vocabulary:

- iris
- pupil

Using diagrams of the front of the eye, the student identifies the iris and pupil.

Materials:





- Diagram 2; Eyeball, iris, pupil
- Diagram 1b over Diagram 2; Eyeballs with protecting features of the face

This combination may be used to illustrate what part of the eyeball is visually observed by others.

Guided Discussion

Present Diagram 2 to the student. Ask the student to explore tactually and/or visually the representation of the sclera, iris, and pupil.

Orient the student to Diagram 2. It is a diagram of the front of two eyeballs. The outside circle band represents the sclera, the white surface of the eyeball. The interior circle band represents the iris. The center spot represents the space in the middle of the iris called the pupil.

In Section II A and B, refer to Section I, Activities C1 through C3 as a review for additional understanding.

C. Systems Within the Eye

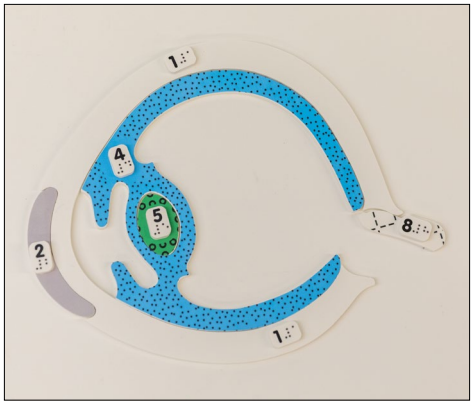
Vocabulary:

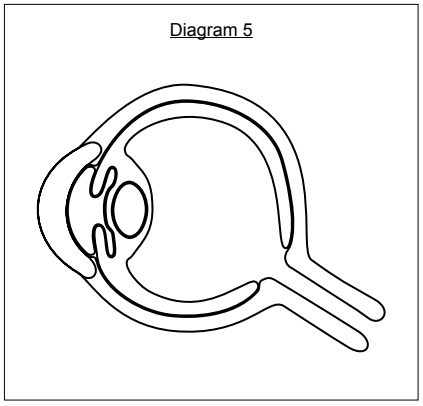
- iris
- pupil
- lens
- choroid
- ciliary body

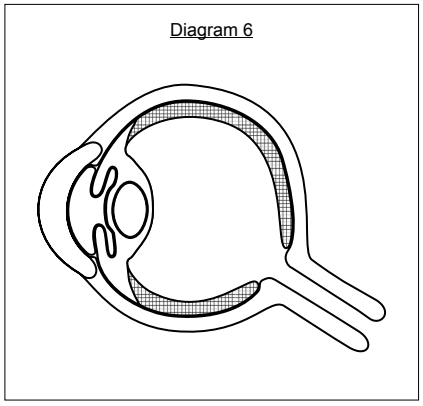
Activity C1, Section II

Using cross-sectional tactile labeling worksheets, diagrams of the middle layer of the eye, and eye puzzle pieces, the student identifies the iris, pupil, lens, and choroid.

Materials:







- Puzzle Pieces 1, 2, 4, 5 and 8; Choroid, iris, pupil, lens
- Diagram 5; Choroid, iris, pupil, uveal tract, lens; no highlights
- Diagram 6; Choroid (highlighted)

Guided Discussion

Discuss the following sequence of events with the student.

- A light source shines through the clear cornea,
- through the opening in the iris called the pupil,
- through the clear lens, and
- through the inside of the eye nourished by the choroid to the back of the eye where the optic nerve sends message of light to the brain.

Introduce the choroid layer using Puzzle Piece 4; place it on the puzzle board inside the sclera.

Discuss the following content as the student explores Puzzle Pieces 1, 2, 4, 5, and 8.

- The sclera is the tough white outside covering of the eyeball. Locate the cornea and optic nerve covering.
- The choroid is a layer of the eye that is attached to the inside of the sclera. It provides nourishment and oxygen to other parts of the eye.
- The ciliary body produces fluid that nourishes the front part of the eye. It comprises a system of very small fibers that control the shape of the lens and size of the pupil.
- The lens and the ciliary muscles help to focus light onto the back of the eye.

Diagram 6 highlights the choroid layer that provides nourishment to other layers of the eye.

Evaluate Understanding

Use Diagram 6 to evaluate understanding for each student. Instruct the student to locate the choroid layer on the diagram and discuss how this part interacts with the visual system.

Have the student use Diagram 5 with no highlights and color the choroid layer. Place the puzzle piece on the diagram for additional understanding.

Activity C2, Section II

Using familiar objects, the student identifies representations of the sclera and choroid layers.

Materials:

- small bowl, preferably white and opaque to represent the sclera
- plastic wrap to represent the choroid layer

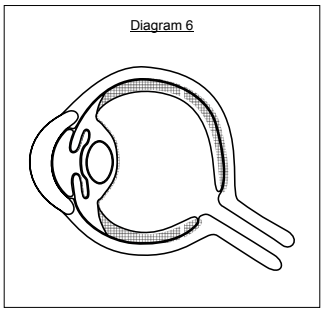
Guided Discussion

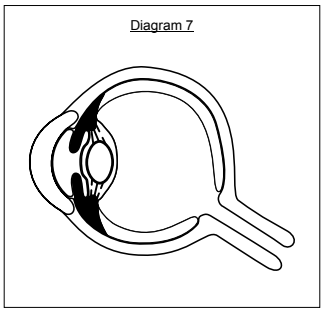
The student lines the small bowl with plastic wrap and notices how the wrap presses up against the inside of the bowl. Use a sprinkle of water to adhere the wrap if needed.

Evaluate Understanding

Note the thinness of the plastic wrap. The student tactually explores how the choroid presses against the sclera. The choroid is rich with blood vessels and gives nourishment and oxygen to the inside lining of the eye.

If the choroid becomes inflamed or infected, then the blood supply to the retina is affected in that area resulting in vision loss. Use the model as needed to discuss specific eye conditions that involve the uveal tract, ciliary tissue, ciliary body, and zonules. Refer to the Eye Conditions Guide to determine which eye conditions are affected by these systems.





See Diagrams 6 and 7: choroid, iris, lens, uveal tract, ciliary body, ciliary muscles, zonule fibers.

The ciliary body produces fluid for the front part of the eye. It comprises a system of very small muscles that control the shape of the lens and size of the pupil. Refer to the Glossary of Eye Terminology to identify and discuss the terms: uveal tract, ciliary body, and zonules.

D. Fluids and Gels Inside the Eye

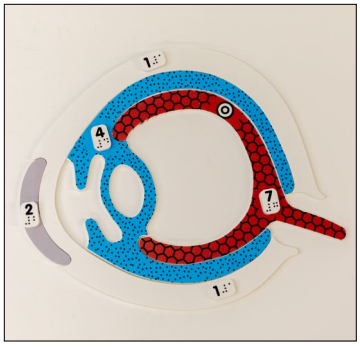
Vocabulary:

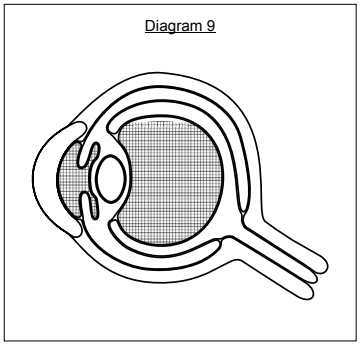
- aqueous humor
- vitreous humor

Activity D1, Section II

The student identifies the space for fluids and gels inside the eye using Diagram 9 and Puzzle Pieces 3 and 6.

Materials:





- Puzzle Pieces 1, 2, 4, and 7
- Diagram 9; Aqueous humor within the anterior chamber; vitreous humor within the posterior chamber (highlighted)

- small bag of water sealed (aqueous)
- small bag of clear gelatin sealed (vitreous)

Guided Discussion

Watery fluids nourish parts of the eye. The fluids must be clear for the light to pass through and reach the retina in the back of the eye.

Check to ensure the lens piece is in place and ask the student to locate the remaining spaces within the model. The aqueous humor is the watery fluid located in the enclosed space in front of the iris and behind it. It nourishes the lens and is produced by the ciliary body.

Evaluate Understanding

The student observes the small bag of water. Does it appear to contain a liquid or a solid? Is it clear? Can light shine through it? The student can feel the bag of liquid to get a sense of the consistency of the aqueous humor within the eyeball.

A larger area for fluids is in the middle of the eye and is called the vitreous humor. It is a thick fluid much like soft clear gelatin. The vitreous humor is so thick that it presses against the retina, which presses against the choroid that presses against the sclera and gives the eye shape. It is almost like filling a balloon with water and observing how the water helps make the shape of the balloon.

Activity D2, Section II

The student explores the positional relationship of the sclera, choroid, retina, and vitreous humor.

Materials:

- cereal bowl (glass or heavy plastic)
- plastic wrap
- clear gelatin in a clear plastic bag
- sprinkle of water, moist paper towel (optional)

Guided Discussion

The student moistens the inside of the cereal bowl with water. This outer covering, the bowl, represents the sclera.

Line the bowl with a piece of plastic wrap and notice how it presses up against and attaches to the bowl to represent the choroid.

Sprinkle with water and add another layer of plastic wrap on top of the first to represent the retina. Place a bag filled with the clear gelatin representing the vitreous humor, inside the bowl on top of the layers of plastic wrap. Instruct the student to observe and describe how the vitreous humor fills the space in the middle and spreads out against the layers of the retina, choroid, and sclera.

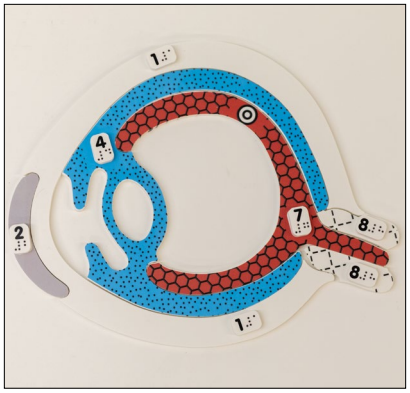
Evaluate Understanding

Evaluate the student's understanding and note their observations and responses.

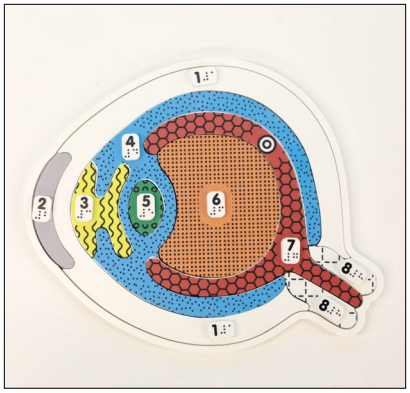
Activity D3, Section II

Use puzzle pieces and diagrams to identify the location of the aqueous humor and vitreous humor.

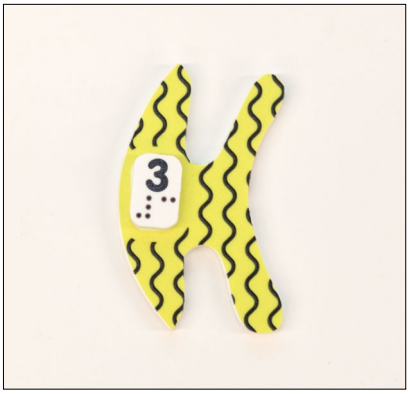
Materials:



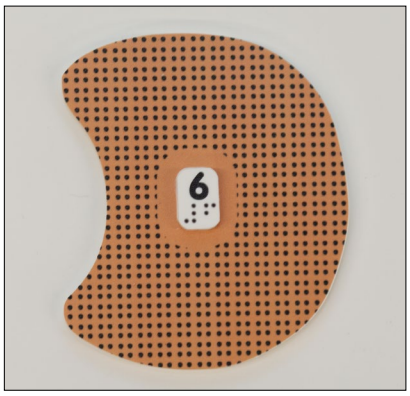
Puzzle Pieces
1, 2, 4, 7, and 8



Puzzle Pieces
1, 2, 3, 4, 5, 6, 7, and 8



Puzzle Piece 3
Aqueous humor



Puzzle Piece 6
Vitreous humor

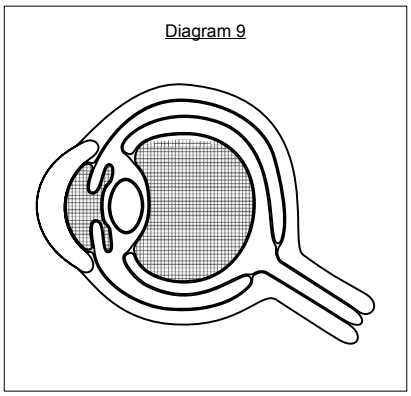


Diagram 9
Aqueous humor within the anterior chamber; vitreous humor within the posterior chamber (highlighted)

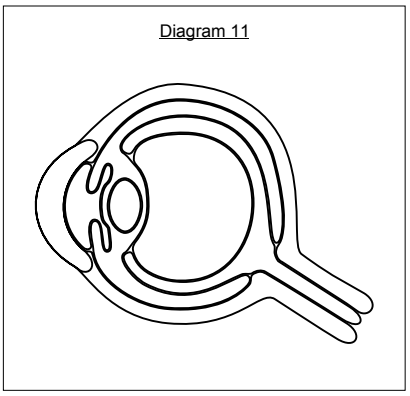


Diagram 11
No highlights, puzzle pieces fit in diagram

Guided Discussion

Use the puzzle pieces and emphasize that they represent the location of the fluid and gel in a crosssectional view. Place all puzzle pieces on the puzzle tray minus Puzzle Pieces 3 and 6. The student explores the open spaces where these would be. Compare and contrast with student.

- Which one is larger or covers more space?
- Which area is closer to the front of the eye?
- What is the texture of each puzzle piece?
- What does the texture represent? Have the student feel the texture key and puzzle pieces. The wavy lines for the aqueous humor represent the liquid in this chamber, and the circles or dots for the vitreous humor represent a gel.

The student adds Puzzle Piece 3, representing the aqueous humor or the fluid behind the cornea and iris in the front of the eye. Notice how the puzzle piece narrows at the point of the pupil, the opening of the iris.

Place Puzzle Piece 6 in the tray. This piece represents the location of the vitreous humor.

The aqueous humor is a watery fluid that is located in an enclosed space in front of the iris and behind it. The aqueous nourishes the lens and is produced by the ciliary process. The vitreous humor is a thick gel. Larger than the aqueous, the vitreous is located in the middle of the eyeball. It presses up against the retina and helps sustain the shape of the eye. These areas are sometimes referred to as the aqueous chamber and the vitreous chamber.

Fluids in the eye are produced and drained through intricate systems within the eye that maintain a balance of pressure. If the fluids within the eye build up too much pressure, then the high pressure may push against and damage the optic nerve head or optic disc and cause vision loss.

Evaluate Understanding

The student locates the aqueous humor and vitreous humor represented on the diagram and puzzle, and then labels the tactile worksheet to identify these parts. Which eye condition is the result of the buildup of fluid in the eye that increases eye pressure? Refer to the Eye Conditions Guide to look up the definition of glaucoma.

The student can complete the My Sight Eye Puzzle to identify and explain each part using the texture key.

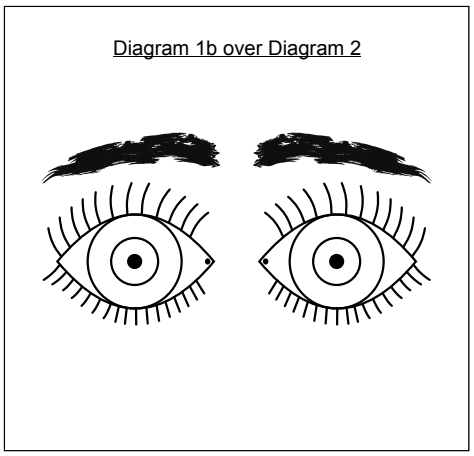
Have the student use Diagram 11 with no highlights to identify the aqueous and vitreous humors. Have the student color to identify the aqueous and vitreous humors. Place the puzzle pieces in the diagram to show understanding. Have the student color wavy lines representing the watery aqueous humor and color circles to represent the vitreous humor gel. You can use foam stickers, glue, bump dots, or other textures to make a tactile representation.

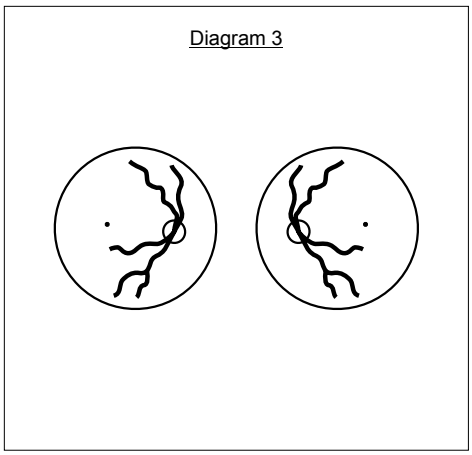
E. Two Views of the Eye

Vocabulary:

- retina
- macula
- fovea
- optic disc
- retinal blood supply
- optic nerve

Materials:





- Diagram 1b over Diagram 2; Eyeballs with protecting features of the face
- Diagram 3; Interior retina, blood supply, optic disc, macula, fovea

Activity E1, Section II

Align Diagram 1b on top of Diagram 2 and present it to the student.

Guided Discussion

Present Diagram 3 to the student. This diagram illustrates the view of the eyes as seen by the eye doctor who looks through the opening of the iris, through the pupil into the back of the eye.

An ophthalmologist or optometrist may perform this exam. During visual exams, the eyes are usually dilated. A drop of medication goes into the eyes. The iris contracts, allowing the pupil to increase in size. This gives the doctor a better view of the inside of the eye. The doctor looks through the open eye, through the clear cornea, through the clear aqueous, the pupil, the lens, the vitreous to the inside lining of the eye, to the retina. Eye care professionals determine the health of the eye and examine the retina for signs of eye disease. (See Section III for detailed description of eye care professionals.)

Explore and discuss the view of Diagram 3. The squiggly lines represent some of the circulating blood supply to the retina. These are branches of the central retinal artery.

There is a circle on the lines that represent the optic disc. The optic disc is a very small area on the back of the eye where the bundled nerve fibers leave the retinal tissue and form the optic nerve. The optic disc does not contain cells that respond to the light entering the eye. Light reflected from an object enters the eye and is focused on a very small area of the retina known as the macula.

A very small dot on the diagram indicates the location of the macula. The macula is located in the central portion of the retina. Light is directed onto the macula for the most precise detailed vision.

The fovea is an even smaller concentration of cells in the center of the macula. The fovea is so small that it is not indicated on the drawing. It contains a high concentration of cells known as cones. The cones are specialized cells that are responsible for color and detail vision.

The retina is the inside lining of the eye. Just as the choroid layer presses against the sclera, the retinal layer presses against and is connected to the choroid.

The retina is the light-sensitive membrane in the back of the eye that receives the impulse of images and transmits the image to the brain through the optic nerve.

If the retinal tissue becomes detached from the supporting tissue, then vision loss may occur in that spot. If the retinal tissue is completely detached, then the cells cannot react to light entering the eye and send messages to the brain.

If the retina layers are abnormal at birth or compromised by trauma or disease, then a person's visual abilities may be reduced in a variety of ways, one being detached retina or retinal detachment.

The macula is located in the central portion of the back of the retina. It provides the clearest and most distinct detail vision.

If the cells within the macula and fovea are not healthy, then central detail vision and color distinction are affected. Refer to the Eye Conditions Guide to determine the eye conditions causing color blindness and diminished detail vision.

The retinal blood supply is blood that circulates through the retinal and choroid layers to supply nourishment to the tissues.

The optic disc is a very small area in the back of the eye where the bundled retinal fibers leave the retinal tissue and form the optic nerve. This spot may be referred to as the optic nerve head. If a doctor observes abnormal changes in the optic disc, this may indicate changes in vision and lead to vision loss.

The optic nerve is composed of a bundle of retinal fibers that transmit the visual information from the back of the eye to the brain. If the optic nerve is underdeveloped from birth or deteriorates from disease, tumors, or trauma, then loss of visual acuity and loss of the visual field may occur.

The optic nerve sheath is the outside protective cover of the optic nerve as it connects the eyeball to the brain. If there is damage to the optic nerve sheath, then the impulses of vision from the retina to the brain may be interrupted. Tumors or thickening on or within the sheath may cause degrees of vision loss.

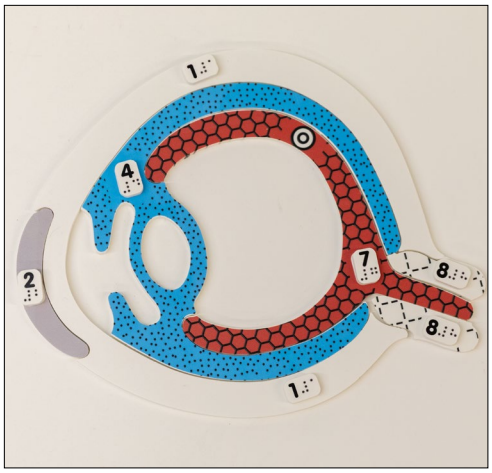
Evaluate Understanding

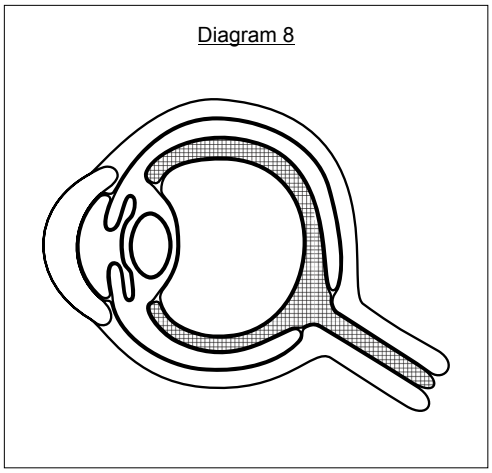
The student identifies the location of the optic nerve disc, retinal blood supply, macula, and the fovea within the center of the macula. (Note: The fovea is too small to represent). Using the cross-sectional view, ask the student to explore the positional relationships of the terms. Use the texture key with the labeling tactile worksheets to identify and label the inside and cross-section eye parts.

Activity E2, Section II

The student explores the representations of the interior section of the eye.

Materials:





- Puzzle Pieces 1, 2, 4, 7, and 8
- Diagram 8; Retina and optic nerve (highlighted)

Guided Discussion

Instruct the student to examine Diagram 8 highlighting the retina and optic nerve. Review terms representing Puzzle Pieces 1, 2, and 4 and compare them to the diagram in a cross-sectional view. Continue discussion exploring the retina. Have the student label the tactile labeling worksheet, cross-sectional view.

Central and Peripheral Vision:

Central vision describes a person's field of vision when looking straight

ahead. It is the ability of the eye to perceive in the direct line of vision on the spot of the retina that contains the highest concentration of cells for seeing color and detailed information.

The cones are specialized light-sensitive cells that are responsible for color discrimination and visual acuity. A high concentration of cones is located within the macula and fovea.

The rest of the retina contains more cells that help determine shadows and movement. This area is responsible for visual abilities in reduced light.

Peripheral vision or side vision occurs through cells on the retina other than those in the macula and fovea. These cells are known as rods. They are not sensitive to color but do detect movement along with shades of light and dark. They are helpful to vision in low-light situations such as in a dark hallway, in the very early morning, or at dusk.

- Instruct the student to look through paper towel rolls to illustrate central vision.
- Ask the student to cover one eye. Make a fist with the other hand and hold it 3–6 inches (7.62–15.24 cm) in front of the uncovered eye. While focusing directly on the fist, this illustrates peripheral vision. The student may experience the loss of central vision, and the ability to see movement, color, and detail will be less distinguishable.

Refer to the Eye Conditions Guide to determine which visual impairments occur from the deterioration of the macula.

If the rods are absent or degenerating, then the ability to distinguish visual detail in low-light situations is affected.

Refer to the Eye Conditions Guide to determine which visual impairments affect eyesight at night or in low-light conditions.

Evaluate Understanding

Use simulators, see See Like Me: Low Vision Simulators from aph.org, or instruct the student to look through paper towel rolls. Cupped hands may also simulate loss of peripheral vision. Placing a fist between both eyes and looking straight ahead can simulate central vision loss.

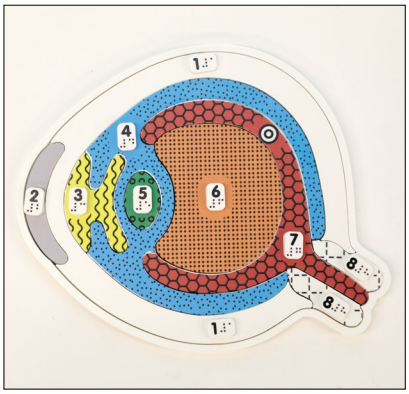
F. Focusing Systems of the Eye

Activity F1, Section II

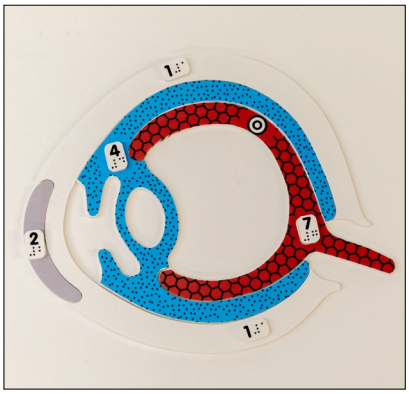
Use the puzzle and diagrams to explore the path of light and identify parts of the visual system that contribute to the focusing of light onto the macula.

Vocabulary:

- cornea
- iris
- lens
- aqueous
- vitreous
- uveal tract



Puzzle Pieces
1, 2, 3, 4, 5, 6, 7, and 8



Puzzle Pieces
1, 2, 4, and 7

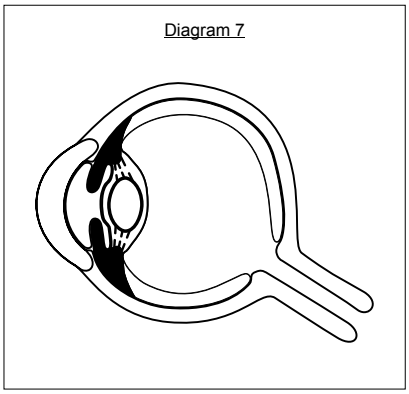


Diagram 7
Iris, lens, uveal tract, ciliary body, ciliary muscles, zonule fibers

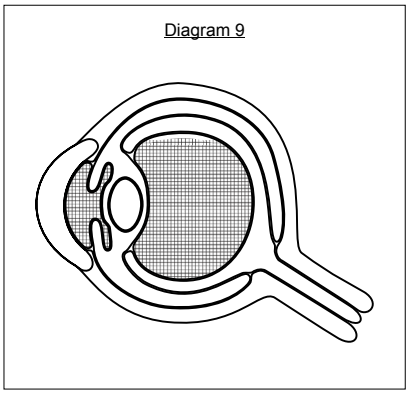


Diagram 9
Aqueous humor within the anterior chamber; vitreous humor within the posterior chamber (highlighted)

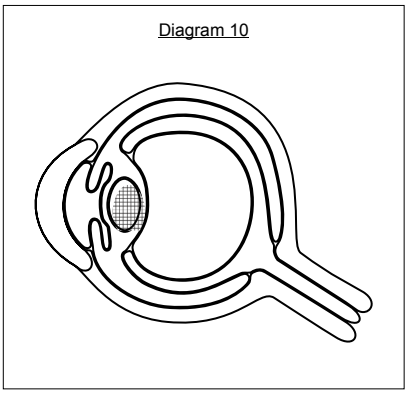


Diagram 10
Lens (highlighted), choroid, retina

Materials:

- Wikki Stix or bendable wax strips: Use to illustrate the path of light directly through the front of the cornea to the back of the retina.
- Diagrams to show visual axis: Use as a guide to identify parts of the visual system, following the path of light into the eye.

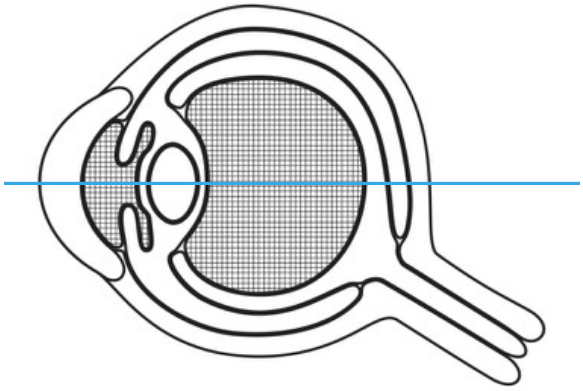


Photo: Diagram 9, with a visual axis line following the path of light into the eye from the front of the cornea to the back of the retina.

Guided Discussion

Beginning with the clear curved cornea, ask the student to describe an aspect of the parts of the eye that contribute to the successful passage of light onto the retina.

- The cornea must be clear for light to pass through.
- The aqueous provides nourishment and moisture.
- The iris contracts and expands to control the amount of light needed.
- The lens is in place to help focus light on the retina.
- Small muscles around the lens control its shape.
- The uveal tract contains the ciliary body, the iris, and the choroid.
- The ciliary body changes the size of the pupil, the iris, and the shape of the lens.
- Light passes through the clear vitreous to focus on the macula.

- Receptors in the retina react to the light and send impulses or signals through the optic nerve to the brain.
- Structures of the eye guide the light to focus on the retina.
- The lens is held in place by tissues and tiny muscles.
- The main outside covering is the sclera. The curved front is the cornea.
- Puzzle Piece 4 or middle layer illustrates the iris, pupil, and choroid.

The choroid, ciliary body, and the iris are connected and work as a system called the uvea or uveal tract. If the uvea or uveal tract becomes inflamed due to infection or disease, then tissue may scar and vision loss may occur.

Explore how light passes through the parts of the eye. Light rays enter the eye first through the clear curved cornea, which is at the front of the eye and protects the eye from particles and debris. Another part of the eyeball, which protects the eye, is white in color and is called the sclera. Light cannot pass through the sclera because it is a thick, opaque membrane. Light moves then through the pupil, the black circle in the middle of the eye. The pupil helps light travel through the lens. As light rays move through the pupil, the iris helps the pupil to change shape, depending on the amount of light entering the opening of the eye. The iris has two sets of muscles; a bright light makes the muscle contract, and the pupil becomes smaller, which lets in less light; the other muscle helps the pupil get bigger. When a dim light shines through the eye, the pupil expands, letting more light in to pass through the lens. The lens focuses light rays on the back of the eyeball called the retina. The photoreceptors of the retina react to the light and relay the message of light to the optic nerve that then sends the

message to the brain, where an image is interpreted. When light passes through the lens, the image falls on the retina and appears upside down. The brain interprets the image and turns it right side up to identify what you see.

Evaluate Understanding

Using the puzzle, tactile labeling worksheets, and/or diagrams, explain each vocabulary word. Ask the student to supply the vocabulary words verbally and use the print and braille labels to identify each term to fill in the blank. Provide the following vocabulary words from the word bank on one side of the felt board. Have the student follow along tactually on the tactile worksheets as they explain each term. Have the student select the correct word and place it on the other side of the board to fill in the blanks.

Demonstrate the path of light through the eye by filling in the blank with each vocabulary word.

Aqueous Humor	Macula	Pupil
Vitreous Humor	Cornea	Lens
Optic Nerve	Retina	Iris

Light source shines through the clear curved _____
Through the clear fluid called the _____
Through the colored, ring-shaped _____ behind the cornea
Through the adjustable circular opening called the _____
Through the clear _____ that focuses light rays on the back of the eye through the clear gel called the _____
Through the inside of the eye to the light-sensitive membrane in the back

of the eye called the _____ , where light is focused on the central spot called the _____, responsible for detail vision, where cells react and send a message through the _____ to the brain.

Answer Key:

Light source shines through the clear curved (cornea)
Through the clear fluid called the (aqueous humor)
Through the colored, ring-shaped (iris) behind the cornea
Through the adjustable circular opening called the (pupil)
Through the clear (lens) that focuses light rays on the back of the eye through the clear gel called the (vitreous humor)
Through the inside of the eye to the light-sensitive membrane in the back of the eye called the (retina), where light is focused on the central spot called the (macula), responsible for detail vision, where cells react and send a message through the (optic nerve) to the brain.

What path does light take as it travels through the eye? Provide the student with the following vocabulary words. Mix them up out of order. Ask the student to arrange these different structures in the correct order and discuss how light passes through the eye to evaluate understanding of the path of light from the cornea to the retina:

- cornea
- aqueous humor
- iris
- lens
- vitreous humor
- retina

At the end of Section II: The Path of Light Through the Eye, use the vocabulary worksheets to evaluate understanding. Instruct the student to label each part of the eye using the print and braille labels on the tactile labeling worksheets with the vocabulary words for Section II on Page 150.

Evaluation:

Other examples:

- Use diagrams and Wikki Stix to trace the path of light from the front of the eye to the optic nerve.
- The student describes the path of light as it passes through the parts of the eye.
- The student describes the significance and function of each part as light passes through the eye.
- The student is able to instruct others independently on the basic parts of the eye and the visual system.
- Puzzle pieces removed from the tray will fit on top of Diagram 11. Use these pieces to highlight a section for illustration and discussion.
- The student labels tactile worksheets with the correct vocabulary terms with 90% accuracy.

- The student colors raised-line diagrams with tactual paint or glue for emphasis.

- The student can build the eye puzzle, name each part, and understand how light travels through the eye to the retina.

- The student can identify the breakdowns in the visual system that cause their eye condition.

- The student can spell their eye condition and write a paragraph explaining their visual impairment.

Section III: Self-Advocacy About My Eye Condition

After completing Section I and Section II, the student has a basic understanding of the eye and its parts, how light travels through the eye, and common eye conditions that result from breakdowns in the visual system. In Section III, the student will learn to apply this knowledge to situations in the daily environment.

The student will learn how to collect medical information, communicate needs, and implement supplemental aids and devices to assist in successful outcomes. They will gain the tools necessary to discuss their eye condition with parents, family members, medical professionals, instructors, and peers. The student will become an efficient communicator of their visual abilities and needs for adaptations.

Specific goals of Section III are as follows:

- Collect, organize, and use information related to visual conditions, visual functioning, and visual efficiency.
- Create a visual abilities statement.
- Participate in activities that build communication skills and self-confidence and self-determination related to vision needs.

The instructional activities are designed to build confidence and independence in performing life skills pertinent to individuals with vision loss.

Continue to complete activities in this section to help the student develop the skills needed to become a self-advocate of their eye condition and express their needs to others in an appropriate manner.

A. Understanding Your Eye Condition Begins at the Doctor's Office

Activities and discussions in this section may require personal medical information from the student.

Prior to this activity, instructors are to obtain appropriate permission and maintain privacy and respect. Use your professional judgment to decide whether any of the following activities are to be presented and discussed individually or in a small group.

- Ask the student what the medical professionals have said about their vision. How much information does the student know about their eye condition? Ask the parent/guardian or family members about their understanding of the student's vision. If there are any misunderstandings, list questions for the healthcare professional and obtain clarification.
- Be aware of any special precautions or signs of emergency for each student.
- Using information from the medical history, identify the parts of the eye affected, the type of system that is interrupted, and the effect on visual functioning.
- Carefully review functional vision assessments or any other assessments that may support or conflict with medical

information or a student's understanding. Remember that vision loss may be the result of more than one breakdown within the system.

Make note of any positive or negative perspective related to the following:

- functional vision
- eye movement
- visual field
- eye structure
- pupil response
- light sensitivity
- color vision
- night vision
- health of eyes

Activity A1, Section III

Using the models and diagrams familiar to the student, identify areas for discussion.

- Review the path of light through the eye.
- Discuss any interruptions of vision caused by the functions of the parts, the systems, the interpretation of messages, or specific ways in which these breakdowns or differences may alter what is seen and interpreted.
- Discuss environmental issues that affect visual functioning (e.g., lighting, seating, positioning, reading, writing, seeing the computer screen, cooking, cleaning, grooming, playing, socializing, going up or down stairs, crossing streets, etc.).

Guided Discussion

Discuss the following healthcare professionals with the student.

Ophthalmologist:

An ophthalmologist is a medical or osteopathic physician (Doctor of Medicine, MD, or Doctor of Osteopathy, DO) who specializes in the medical and surgical care of the eyes and visual system and in the prevention of eye disease and injury. An ophthalmologist is qualified by lengthy medical education, training, and experience to diagnose, treat, and manage all eye functions and is licensed by a state regulatory board to practice medicine and surgery. An ophthalmologist is a medically trained specialist who can deliver total eye care (vision services, prescribing glasses or contact lenses, eye examinations, medical eye care, and surgical eye care). Ophthalmologists also prescribe medications as needed and are often involved in the scientific research into the causes of, and cures for, eye diseases and vision problems.

Optometrist:

An optometrist (Doctor of Optometry, OD) is a health service provider who specializes primarily in function and disorders of the eye. Optometrists are trained to examine the eyes for visual defects, diagnose problems or impairments, prescribe corrective lenses, and provide certain types of treatment. Optometrists are educated and trained by an accredited optometry college in a 4-year course but do not attend medical school. They are state licensed to examine the eyes and to determine the

presence of vision problems. Optometrists determine visual acuity and prescribe glasses, contact lenses, and eye exercises. Some optometrists also complete 1- to 2-year residencies with training in a specific subspecialty area such as pediatric or geriatric eye care, specialty contact lens, ocular disease, low vision, or neuro-optometry.

Optician:

An optician is a technician who makes, verifies, and delivers lenses, frames, and/or contact lenses upon prescription to the patient. The optician's functions include prescription analysis and interpretation; determination of the lens and frame design best suited to the wearer's needs; the preparation and delivery of work orders for the grinding of lenses and the verification of the finished ophthalmic products; and the adjustment, replacement, repair, and reproduction of previously prepared ophthalmic lenses, frames, and other specially fabricated ocular devices.

Low Vision Specialist:

Many optometrists and some ophthalmologists have additional credentials or specialization in low vision testing, diagnosis, and treatment. They are trained to conduct low vision examinations and prescribe special low vision optical devices. It is important to have a comprehensive low vision eye exam performed by an optometrist or ophthalmologist who specializes in low vision. The low vision exam helps to determine what low vision optical devices, lighting options, large print reading materials, and/or other vision services and assistive technologies are needed to assist the student in the classroom, workplace, home, and daily living environments.

Evaluate Understanding

Ask the student to explain the differences between an ophthalmologist and optometrist. Discuss the student's experience with these professionals and ask whether the student has seen a doctor about their eye condition. Discuss in what circumstances the student may need to see any of the professionals listed.

Activity A2, Section III

The student will feel more prepared for medical appointments after reviewing this section. Discuss the importance of being a self-advocate during doctor's appointments. The student will learn how to gather and collect important information from the doctor's visit. They will learn what to expect, questions to ask, the process for selecting glasses and frames, and how to implement the use of low vision devices into daily situations.

Medical information is private, personal information. Maintain privacy in discussions and obtain personal or parental permission as required. Genetic information may best be referred to medical specialists.

Guided Discussion

Discuss the following topics for the student to consider before a medical appointment, during the office visit, and after the medical appointment.

<u>Before a Medical Appointment:</u>

- The instructor should be notified when an appointment with an ophthalmologist or optometrist is made. Update educational forms as needed.
- The instructor or service provider may want to accompany the student to the appointment to share functional vision information or note new visual tasks that the student is required to do in the educational setting or work environment.
- If the instructor is unable to attend a vision exam with the student, help the student collect a list of questions to take with them to go over with the parent/guardian and eye doctor at the visit and discuss the next time you meet with them.
- Talk about signing in at the office, health insurance cards, social skills, and appropriate behavior when interacting with the receptionist at the doctor's office. For low vision students, have the parent/guardian take a favorite game or activity that illustrates near visual abilities for the doctor or technicians to observe.

During the Office Visit:

- Include the student in discussions during the eye exam.
- Encourage doctors to address the student for information. This may require a little extra time, but remember the goal is independence.
- Note the information to which the student is unable to respond.
- Go prepared with a few specific questions. Take handwriting or work samples if this will help illustrate near vision abilities or concerns. Ask the examining doctor for a measure of near visual acuity to share with teachers. This information may be one component in the selection of print size and the potential for low vision devices.

- Ask for copies of the office report for the student, parent/guardian, instructor, school, and other service provider's records. Check to see whether yearly forms have been completed and sent to the correct address.
- When reading the report, use a yellow highlighter to mark words or symbols you cannot interpret and ask for clarification from the doctor, medical staff, or technician.
- If vision devices or glasses are prescribed, ask the doctor to indicate the appropriate usage (for near and/or distant vision, full-time use, or protection only). Keep a copy of the prescription to add to the student's records. Is there a need for a backup pair of glasses? What is the replacement plan if the devices are lost or broken?

After the Medical Appointment:

- The student or parent/guardian should contact the instructor after appointments and share accomplishments and areas to address with the student through discussion or role-play activities.
- Any change in visual performance is critical information for decisions that will be made at educational meetings, during transition planning, or for the work environment.
- Maintain a record of doctors seen, surgeries, and medications. Discuss the importance of recordkeeping systems and appropriate information to share.
- The student is learning strategies of organization and self-advocacy as the instructor and parent/guardian model this behavior to build a life skill and promote valuable independence for the student.

- The student should take home a business card with the doctor's name, office information, and the next appointment date to share with the instructor or other service providers.
- Ask the student to summarize the visit to the doctor to an interested family member or friend stating the office location, reason for visit, sequence of events within the office, discussions with the doctor, change in medication or prescription, and plan for next appointment.
- Mark a calendar with the next appointment time and special instructions.

Selecting Eyeglass Frames:

There are several things to consider when selecting frames.

- The size and weight of the prescribed lenses may affect the size and material of the frames.
- Facial features may affect fit. A very low bridge of the nose and problems with ear formation may require additional expertise.
- Transition lenses for photophobic students may require a letter from the doctor stating that the lenses are a medical necessity and essential to control glare in the educational setting or work environment.
- Discuss glasses for full-time protection or specific activities with the doctor.
- Consider the size and weight of the glasses if the individual wears hearing aids.

Caring for Vision Devices:

- Ask the student to communicate a plan for lost or broken glasses with the instructor and parent/guardian. Does the student have a backup pair of glasses at home or at school?
- Develop a plan that allows the student to assume increased re sponsibility for assistive technology and vision devices at home, school, and work as well as social and recreational activities.

Does the student know there is a sign-in sheet at the doctor's office and specific forms to fill out as a new patient? Discuss the appropriate way to ask the receptionist for assistance when signing in and filling out forms. Suggest that the student take a signature guide or printed sticker labels of their name to put on the sign-in sheet. The student should know their personal contact information, phone number, e-mail, home address, and medications. As needed, create a card with the student's information ahead of time to take to the appointment. If appropriate, fill out patient forms with the student before the appointment to speed up the process.

If the form cannot be completed legibly, accurately, and within an appropriate time, create an electronic copy that may be completed before the appointment and given to the receptionist, nurse practitioner, or doctor. Forms may vary to some degree between practices, but most offices are willing to fax, e-mail, or mail copies for completion before an appointment. Further, most medical practices have online portals where the patient can complete and submit forms.

When filling out forms, consider the following:

- What devices or adaptations are needed to access information?
- Does the student need to request magnification or text-to-speech technology?
- Discuss appropriate requests or use of devices, take note of reading ability, content understanding, or ability of handwriting when filling out forms.
- Identify and highlight items the student cannot answer inde pendently because of print size or knowledge of the material.
- Alter the form using large print, braille, or an electronic format.
- Determine what the student can complete independently.
- Read and/or scribe for the student only if needed.
- Can the student answer basic questions for information such as name, address, age, and contact and emergency numbers?

Evaluate Understanding

What specific things would a patient want to ask a vision professional about visual functioning? Consider the following topics:

- visual acuity
- eye fatigue
- night vision
- color vision
- medications
- intraocular pressure
- artificial tears
- infections
- care of prosthesis

- care of glasses
- care of contacts
- care of vision devices
- use of drops or ointments
- appropriate hygiene to promote overall eye health
- stability of vision versus progressive eye condition

B. Identify Your Eye Condition and Appropriately Communicate Your Visual Functioning

The doctor has probably given a name to the student's eye condition. The words may be difficult to understand, as are many medical terms. The student can always ask what a word or phrase means. Often there are several breakdowns in the visual system, which may involve many parts of the eye. The primary condition may result in a secondary one.

Activity B1, Section III

Formulate an appropriate definition or medical description of the diagnosis in clear and understandable terms.

Guided Discussion

Use the labeling worksheets, puzzle, and/or diagrams to locate visual areas.

Review the path of light through the eye.

Note the possible breakdowns in the visual system on the model.

Discuss the impact on visual functioning.

Clarify misunderstandings or misinterpretations.
Confirm plan for training in the use and care of prescribed vision devices.

Evaluate Understanding

Ask the student the following questions.

- What did the doctor say to you about your eyes?
- What does that mean to you?
- Can you explain it?
- Were any devices prescribed?

Activity B2, Section III

The student learns the name of their eye condition and knows how to spell the condition. These are the first steps to communicate to others that the student's vision is different and they may need assistance.

Guided Discussion

Work with the student to develop a concrete understanding about their eye condition. Ask the following questions.

- What is the name of your eye condition? Are there any other related issues such as nystagmus or photophobia?
- How do you spell your eye condition?

Use voice assistant technology to help the student define and spell their eye condition. For example, speak the following to the voice assistance technology: "Define 'photophobia'" and "Spell 'photophobia.'"

Plug in any eye term or eye condition to help the student learn about the condition.

Evaluate Understanding

The student should make note of their eye condition in their personal records electronically, written, or using a recording device. Make sure the student spells the term correctly and records the definition provided by the voice assistant. The student can also begin to research their eye condition. Be sure the student knows how to identify and spell the eye condition correctly. Ask the student to type the eye condition into an online search engine to continue learning facts about the eye and specific eye condition.

Activity B3, Section III

There may be a variety of terms used to identify levels of vision. Work with the student to find the preferred or most appropriate terms for describing their eye condition.

Individuals may select terms that describe visual abilities rather than

disabilities. Some students prefer to state that they have a visual impairment, and others prefer to use the term low vision. Discuss the terms legally blind and blind and how the public may perceive the terms.

Guided Discussion

Discuss the following terms with the student.

Visual acuity determines visual functioning or the ability to see letters, numbers, or objects measured by a standard distance, usually at 20 feet (6.10 m) or 16 inches (40.64 cm).

Visual field is the area that can be seen when looking straight ahead, measured in degrees from the
fixation point; also called field of vision.

Visual clutter refers to a combination of images and background that provides distracting details for some individuals who are unable to select a single object from its background.

20/20 vision is a term used to express normal visual acuity (the clarity or sharpness of vision) measured at 20 feet (6.10 m). If you have 20/100 vision, it means that you must be as close as 20 feet (6.10 m) to see what a person with unimpaired vision can see at 100 feet (30.48 m). Normal 20/20 vision only indicates the sharpness or clarity of vision at a distance. Other important vision skills, including peripheral awareness or side vision, eye coordination; depth perception, focusing ability, and color vision contribute to the overall visual ability. (AFB, 2019).

Visual impairment is any degree of vision loss that affects an individual's ability to perform the tasks of daily life caused by a visual system that is not working properly or not formed correctly. Blindness is the inability to see or the absence or severe reduction of vision. Most individuals with blindness have some variation of light perception or ability to see outlines and shapes of objects and who use senses other than vision for learning.

Legal blindness is a visual impairment in which distance visual acuity is 20/200 or less in the better eye after best correction with conventional lenses or if visual field restriction is 20 degrees or less. Low vision refers to a visual impairment even with correction; however, the potential for vision use in daily routines exists with optical or nonoptical devices, environmental adaptations, and compensatory strategies.

Accommodations are made to the learning or work environment for the individual with a visual impairment to meet the same expectations as classmates or coworkers and to be successful in completing a task that may need to be done in a different way. These accommodations might be a change of seating, listening to auditory recordings of text, enlargement of reading materials, increased clarity and contrast, increased illumination, decreased glare, and decreased visual clutter. A testing accommodation could consist of extended time or allowing the student to complete test items in a different format. A workplace accommodation might consist of an adapted work schedule to account for public transportation.

An adaptation is the modification of instructional materials or a work environment to assist the needs of individuals who are visually impaired, including magnification, auditory, tactile, and visual adaptations.

Modifications are differences or changes in a curriculum to cover less material or material that is less complex. A testing modification can consist of fewer questions, assessment content at a different grade level, or an alternative assessment. A workplace modification can consist of a job coach or assistant to help accomplish work-related tasks.

Evaluate Understanding

The instructor discusses the following with the student.

- Which visual term do you identify with based on your visual functioning or visual acuity?
- How does the public perceive these terms?
- Are there specific problems related to different environments? (Address lighting, seating, technology, and adaptations.)
- What are the differences between accommodations and modifications?
- Do you know what accommodations and modifications you need to be successful?

C. Devices and Techniques

This section provides a brief overview of devices used to assist the individual with vision loss. Consider an assistive technology assessment for a more comprehensive list of technology and uses.

Activity C1, Section III

Open a student-centered conversation about visual abilities and visual challenges. Take notes for the student as appropriate.

Asking a student, "Do you see . . . ?" is not as informative as, "Describe the details of what you see at night."

Begin with near vision subjects such as facial expressions, a handheld object, items on a computer screen, and particular objects in the room.

Guided Discussion

Discuss near and distant visual tasks. What does the student struggle to see during daily tasks?

Identify Visual Abilities:

- Light perception, shadows, shapes, faces, letters, and so forth.
- Near, intermediate, and distant abilities.
- Discuss what helps functional vision, what does not, and why.
- Explore the prescribed vision devices.
- Ask the student to demonstrate the appropriate use of devices for a variety of tasks.

Ask the student to consider what they have learned about the path of light through the eye, the visual system, and their eye condition as explained by the doctor and the functional vision assessment.

Identify Needs:

"My eyes get tired when the lights are bright. I usually wear my sunglasses in classes with bright lights. Regular print is hard for me to read for more than a few minutes. I can use a 4x magnifier and read a longer time."

"I can see details when things are close to me."

"I can read the math problems on the board when I use my monocular."
Develop a Plan to Request What Is Needed

"I will need to move within 3 feet (0.91 m) of a demonstration to see the detail in what is going on."

"I like to have a human guide on field trips."

Evaluate Understanding

What adaptations, devices, and/or assistance are most helpful?

What is the student doing that works?

Activity C2, Section III

This activity begins the discussion of vision devices that can be used to complete daily tasks. In what ways would the following devices aid in the student's access to information?

- glasses
- visors

- hats
- sunshields
- filters
- magnifiers
- monocular
- task lighting
- bold-line paper
- felt-tip markers
- electronic magnification (handheld video magnifier or desktop magnifier)
- tablet magnification
- screen enlargement software
- enhanced contrast

Nonvisual aids:

- audio
- electronic format
- screen reader software
- voice assistant technology
- text-to-speech
- tactile literacy
- braille
- braille display
- tactile graphics
- a combination of multimedia platforms.

Make a list of environmental factors that help or hinder what the student sees best. Consider the following:

- lighting
- magnification
- position
- distance
- print size
- contrast
- glare

Guided Discussion

Discuss the following terms with the student.

Low vision device is a type of optical or nonoptical device used to enhance the visual capability of persons with visual impairments. Low vision devices range from bold-line paper to felt-tip markers to magnifiers and monocular telescopes. (Koenig & Holbrook, 2000).

Assistive technology is the equipment used to help individuals compensate for the loss of vision or a visual impairment such as speech, braille, and large print devices that enable a person who is visually impaired to use a personal computer and software programs. (Koenig & Holbrook, 2000).

The assistive technology assessment is a method to determine the most appropriate technological tools for current and future education or employment tasks. (Koenig & Holbrook, 2000).

Evaluate Understanding

Ask the student to describe their visual functioning in daily environments. Develop a list of optical and nonoptical devices and a plan to implement them into the school or workday.

Determine with the student whether an assistive technology assessment is needed. Will it help in selecting the appropriate device(s) for the student at school, work, home, and in the daily living environments?

The student should demonstrate to teachers, parent/guardian, family members, and peers the use of assistive technology devices and how the devices assist them for specific tasks.

D. Concentrate on the Positive Aspects of Visual Abilities and Problem-Solving Techniques Consider what is planned for the near future.

Activity D1, Section III

What might be the next challenge in accessing materials or adapting to a new environment or location?

- Create a plan to help problem-solve or anticipate future needs.
- Discuss individuals that may be helpful to best execute a plan.

Guided Discussion

Assist students to communicate the following information.

Your Vision:

- your eye condition
- your visual functioning (visual acuity)
- your use of adaptations, devices, and technology

Encourage the student to role-play a variety of situations in which it is appropriate or inappropriate to share personal information about visual functioning.

Your Story:

Refine communication strategies for use with family, peers, instructors, medical staff, and employers.

Identify and problem-solve common situations related to your vision.

Create a visual abilities statement.

Communicate visual functioning information.

Identify future needs and goals.

Evaluate Understanding

The student gathers information about their eye condition and what they have learned. Begin to develop a visual abilities statement.

Activity D2, Section III

Elevator Speech:

Within the business world, an "elevator speech" is often crafted to refine a message or idea so succinctly that it can be delivered within the 60 seconds it takes to travel from the first-floor lobby to the executive offices above. The message may be tailored to a particular person or group to capture attention and present ideas that may get you through the door to success.

A statement about visual abilities and the specific adaptations that lead to success can be prepared and delivered in much the same way. Knowing what and how much to say to whom is a skill that can be developed, refined, and practiced.

Guided Discussion

It is important to give enough information to be helpful but refrain from offering information that is too personal or inappropriate.

As students approach employment age, research the Americans with Disabilities Act (ADA) and the 2008 ADA Amendments. Discuss how this act might affect the student's particular circumstances.

Revise and condense the statement into a clear concise statement of abilities and needs.

Discuss when it is appropriate to identify visual condition and prepare a short concise response.

Evaluate Understanding

Role-play or practice with supportive conversations and situations in which information exchange is appropriate or inappropriate on the telephone, in person, on the computer, or within social networking sites.

E. Visual Abilities Statements for Students

Activity E1, Section III

Pre-writing discussion: This activity illustrates the adaptations and techniques that provide for sensory proficiency in a variety of settings.

Use information from the Functional Vision Evaluation. It may be important to make note of where the student's best visual abilities occur. Example: "I can read 2-inch (5.08 cm) handwriting on the board from 5 feet (1.52 m) but not at 7 feet (2.13 m)."

Guided Discussion

Use some of the following questions and triggers to initiate the conversation and begin framing appropriate statements. These discussions will help the student to start thinking about writing their vision statement, their audience, and what to include.

- Tell me about your eye condition. What parts of the eye are affected that caused the condition? What is the name? How do you spell it? Explain the definition.

- Tell me about your vision devices. Has anyone ever asked you why you use the devices? What did you say?
- Describe your experiences in gym class. Do you have any different ways you need to be able to catch a ball, visually following an instructor, or seeing friends from a distance?
- Do you go through the cafeteria line independently? How do you make selections? Do you have difficulty finding a seat with your friends?
- When your class goes on a field trip, can you travel independently, or do you have a human guide?
- Do you use a cane? Can you travel independently? What orientation and mobility skills do you use to get around safely?
- Do people ever offer you help when you don't really need it? Tell me about that. How do you communicate this to people around you?
- Has there ever been a time that you needed assistance and didn't get it?
- What accommodations would help you?
- Are there ever times when you feel people don't really understand what you see? Tell me about that. What would you like to explain to them?

Evaluate Understanding

Review responses and alter or expand activity as needed. Do a thought cloud, topic web, or other exercise to gather the information the student wants to include in their statement.

Activity E2, Section III

Create the vision ability statement:

Identify the audience and discuss what information might be appropriate to share with instructors, employers, peers, educational team, family members, or medical professionals.

Ask the student to organize their thoughts and write or record a visual abilities statement that communicates to others what and how they see. Have the student present their vision statement to their peers, teachers, or family members. They could present talking points, a PowerPoint presentation, or a Word document; communicate verbally monologue style; audio record; and/or provide a video, blog, or other multimedia presentation. Presenting a vision statement for a public speaking class is also a great way to practice these skills.

Determine the best format and who they will share their vision statement with. Practice presenting the information about their eye condition, as well as what tools, devices, and accommodations they need to be successful in different environments. Keep the file saved where the student can access it to use as they progress from home to school and to work and can revise if any changes occur.

Guided Discussion

Read through the following examples of vision statements that were designed for use in a variety of settings. Use these to get the student started and to think about their own vision statement. The following vision statements are real world examples collected from students and added to this guide to provide meaningful examples for other students to work from and expand their own learning and knowledge.

For School Settings:

I am visually impaired. These are some of the things I need to do my best work:

- I use a large print copy of any work or assignment on the board, smartboard, or classroom monitor.
- I need to sit within a few feet of the TV, demonstration, project, or activity to see detail.
- When we attend a program in the auditorium, I may need to move to the front row or use my monocular.
- In case of a fire drill or another emergency, I would like the assistance of a human guide.
- I use screen enlargement magnification on the computer, reading glasses, felt-tipped pens, and monocular.
- I use a cane to help me travel independently in unfamiliar environments.
- I like to keep my cane folded up in my backpack most of the time and use it when it is dark outside or in low lighting situations.
- Eighteen-point font is the size print I can read without a magnifier.

I see out of my right eye. I have trouble seeing things close and far away. I can use large print or magnifiers to read smaller print. I can use a monocular to see things across the room and on the TV. Please give me an electronic copy of what is on the board or smartboard. I see better on some days than others. The pressure in my eyes or the medicine I take may affect my vision. Thank you for helping me to do my best work.

Hi! My name is Anna.

I can see some light with my right eye. I use the BIGmack on my wheelchair tray to ask for help. I will need to get my medicine before lunch every day. It is a treat for me to be the line leader.

I am Julie. I have albinism. I have trouble seeing things up close and on the board. I use my glasses, magnifier, and monocular to help me to see things best. I store my vision devices in my backpack. Bright lights really bother me. My hat helps protect my eyes and my skin. Most of the time, I remember to put on extra sunscreen when we go outside, even if it is not summer. I have nystagmus. That means my eyes move back and forth really fast. Have any questions? Just ask me.

For the Doctor

I'm Julie, and I am 15. The last time you said that my vision was 20/200. I have some questions for you.Will I be able to drive? Are there any devices or glasses that will help me? Will my children have albinism? Do you think my vision will get any worse?

For the Annual Review Meeting

I am Julie. Thank you for coming to my meeting. I have albinism. I brought some simulators that might give you an idea of how I see. I use a magnifier and a monocular. I use a handheld video magnifier and laptop computer.

I am just learning how to copy from the board using the monocular. You might want to look through the monocular and try to copy something. It is not as easy as you think. I need a lot of practice, additional time, and electronic copies of assignments, and a notetaker can help me. Most of my teachers let me sit where I need to in class. I may not be able to get my driver's license, and I really want to learn bus travel.

If you have any questions about my vision, just ask me.

I have an eye condition called Stargardt disease, which also includes macular degeneration. It's a condition in which I have no central vision, just peripheral vision. I experience eye fatigue quickly because I strain my eyes constantly to look around the spot where there is no vision, which is about the size of a fist. My vision is 20/200, which is legally blind. This means I have to get within 20 feet (6.10 m) of something to see it, whereas someone without a visual impairment can see it 20 feet away. I was born with this condition and it may get worse as I get older. Not having central vision makes it difficult to read and see detail. I like to use 26-point font.

I use a lot of technology in my classes, including screen enlargement and screen reader programs on my laptop. I use a desktop video magnifier and a 5x handheld optical magnifier for spot reading. I need notes and assignments e-mailed electronically and I sometimes get notes from a student in class as a backup as well. I use Bookshare and BARD to get audiobooks. My goal is to become paperless and use mainly technology that eliminates the difficulty I have receiving printed materials large enough for me to see.

For the Parent or Guardian

Thank you for taking me to the eye doctor all the time. I think I am old enough now to see how I can do it on my own. Next time, I would like to sign in, give them the insurance card, and pay the copay myself. I would appreciate it if you went into the exam room with me, but I would like to answer the questions myself. I hope you will take some notes for me and write down anything I didn't know on my own. We can make the return appointment together, and I will make a note of the date and time in my own calendar too.

Thank you for all of the years you have done this for me. Now, I am ready to do it on my own.

Applying for a Job

Review and discuss the Americans With Disabilities Act and the 2008 Amendments. Use sample job applications to complete electronically. Plan and organize thoughts in preparation for a personal interview without sharing a written script. Emphasize what the interviewer can and cannot ask. Consider a variety of questions that may be asked. Discuss issues related to public misconceptions about blindness and visual impairment.

Evaluate Understanding

Encourage ownership of the information. Instruct and discuss issues related to sharing confidential information in a variety of circumstances.

Statements should be reviewed and revised as circumstances change.

Assist the student in composing a visual abilities statement to address near, intermediate (computer), and distant vision. Be specific about current school or work environments and concerns.

F. Practice and Role-Play

This section provides question and answer scenarios for the students to discuss the self-advocacy skills they have learned. The binder includes the Role-Playing Cards in print and braille. The facilitator can add cards for a variety of situations the student may encounter or use the supplied cards. Send the scenario cards to students electronically as an assignment or distribute to teams for practice before participation. An accessible PDF format is available for download on the My Sight product page at aph.org.

Recording responses allows students to review and evaluate answers and help determine the length of responses. The participants can record using a phone, notetaker, or other audio recorder device.
Monitor the recordings and delete when finished as this may contain personal information.

Practice the plan and role-play for a variety of situations and settings. It may be helpful to video or audio record the exercise to review for the student to critique.

Activity F1, Section III

Think Fast: Role-Play Activity

The instructor may ask students these questions individually or distribute the questions on the provided Role-Playing Cards to small groups of students as a teamwork exercise.

Guided Discussion

The student should be able to collect their thoughts and answer in a normal conversational pace and tone with head up facing the person who asked the question. Eye contact is maintained if possible. The student should have access to devices and in appropriate format as needed for reading.

A stopwatch or timer is optional but adds a bit of fun and anticipation. It also gives students a chance to experience what it takes to talk for 1 minute or the selected time. Students set timers on their watch, phone, computer, or note taker to expand the activity.

Answers will vary depending on student age, ability, and visual condition.

Role-Playing Cards:

Your math teacher is absent. A substitute teacher sees on a note that you have a visual impairment and asks what your accommodations or needs are for math class.

What do you answer?

You walk into the ophthalmologist's office. What are some of the first things that you do? Describe three.

The receptionist in the doctor's office asks you to fill out a medical history form. It is in regular print on a clipboard.

What is your plan for doing this?

The medical technician or doctor's assistant asks you about your vision. What information can you give about medications, the name of your eye condition, changes in your vision, date of last appointment, name of the doctor you saw on your last visit, and the condition of your glasses, contacts, or sunshields?

The doctor asks you to look up, down, to the left, and to the right. Can you demonstrate this?

What could you tell a friend about eye safety? Can you name three ideas?

Your scout troop is going on an overnight camping trip. What are some of the things you need to consider taking with you related to your vision needs?

Identify your eye condition and how it affects your vision, but alter the

explanation for two of the following individuals: an ophthalmologist, your teacher, a friend in your class, a parent, a family member, or an employer.

You are asked to make a 2-minute presentation about the eye in science class. Organize your thoughts and then describe the path of light through the eye. You may use a diagram or model.

Your science teacher just challenged you to identify one breakdown in the visual system and a resulting vision condition. Can you do this in 1 minute?

While on a field trip, your friend asks you why you use a monocular and asks how it works. Take 1 minute to describe why and how you use it.

Your parent reminds you that you are going to see the optician. Why would you be going to this person and what do you expect from the visit?

You are about to cross the street while using your cane. Someone approaches you, yells, "Wait, I will help you!" and grabs your arm. What do you do?

You are at a job interview, and you have your handheld video magnifier and cane with you. The interviewer asks you about these devices and why they are important. How do you respond?

The school year is just beginning, and you have received your class schedule. What is your plan to explain your eye condition to your teachers, and how will you ask for accommodations in advance for each class?

A friend in class asks you what device you are using and why.

How do you respond?

Evaluate Understanding

Review responses. Alter or expand the activity as needed.

Eye Conditions Guide

A B C D E F G H K L M
N O P R S T U

Definitions and descriptions within the text and glossary have been adapted from this guide to provide consistency for learning. The definitions are broad in order for the learner to further research common eye conditions in more detail to expand knowledge in the cause, symptoms, risk factors, diagnosis, and management.

Achromatopsia

Achromatopsia is a hereditary condition that results in color blindness and often causes difficulty in seeing detail. It affects the cones, which are specialized cells in the retina that are responsible for color and detail vision in illuminated conditions. The retina is the light-sensitive membrane that receives images and transmits them to the brain. Persons with achromatopsia may also experience photophobia (extreme sensitivity to light), reduced visual acuity (difficulty seeing detail), and nystagmus (involuntary, rhythmic movements of one or both eyes).

Albinism

Albinism is a hereditary condition involving a total or partial lack of melanin, which gives color to the eyes, skin, and hair. Vision problems vary depending on which eye structures are affected and how much melanin these structures have. The iris is the colored part of the eye that expands or

contracts to control the amount of light that enters the eye. When the iris has little or no color, light can enter the eye through the entire iris, not just through the opening in it, resulting in visual distortion. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Without enough melanin, the part of the retina responsible for clear central vision may not develop properly; this results in loss of central vision. Without sufficient melanin, the nerve pathways between the eye and the brain may be altered, leading to additional impact on vision. Depending on these factors, albinism can result in central vision loss, photophobia (extreme sensitivity to light), nystagmus (rhythmic repetitive movements of the eyes), and strabismus (abnormal alignment of one or both eyes).

Altitudinal Hemianopia

Altitudinal hemianopia refers to the inability to see in the top or bottom half of the visual field and is usually caused by lesions on the optic nerve. The optic nerve sends visual information to the brain, and damage to the nerve can prevent parts of the visual field from being processed and seen.

Altitudinal Hemianopsia

See Altitudinal Hemianopia.

Amblyopia

Amblyopia, also known as lazy eye, refers to reduced visual functioning in one eye, uncorrectable with prescription lenses, with no organic eye

disease, and usually resulting from untreated strabismus. Strabismus, sometimes called crossed eyes, is an abnormal alignment of the eyes. If one eye is turned inward or outward, each eye sees an image from different angles or perspectives and the brain cannot combine the pictures into a coherent whole. To resolve this dilemma, the brain suppresses information from one eye and creates a monocular image based on information from the other eye. Without appropriate treatment, the brain can lose the ability to process information from the affected eye. Loss of functional vision in the affected eye, double vision, and lack of depth perception will result.

Aniridia

Aniridia is a condition, present at birth, in which the iris of the eye does not develop fully. Usually, both eyes are affected. The iris is the colored part of the eye that expands or contracts to control the amount of light that enters the eye. Aniridia results in reduced vision. It is often accompanied by problems with other eye structures that affect vision. Persons with aniridia experience reduced visual functioning, photophobia (extreme sensitivity to light), and nystagmus (involuntary, rhythmic movements of one or both eyes).

Anophthalmia

Anophthalmia is the absence of one or both eyeballs and is present from birth.

Aphakia

Aphakia is the absence of the natural lens of the eye that is located behind the iris and provides the focusing power of the eye. The lens focuses an image on the retina in the back of the eye. The retina is the light-sensitive membrane that receives images and transmits them to the brain. Aphakia can be present from birth or may result from cataract removal, perforation, injuries, or other damage to the lens. The condition can lead to problems with depth perception or distortions in vision.

Astigmatism

Astigmatism refers to the inability of the eye to focus sharply at any distance. Astigmatism usually results from a cornea that is not completely spherical in shape and therefore cannot focus an image accurately onto the retina of the eye. The cornea, in the front of the eye, must be shaped like a dome or half of a baseball to allow pictures to enter the eye and focus correctly on the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. If the cornea is oval rather than spherical (e.g., looks like half of a football), it cannot take in clear pictures to be sent on to the brain. Astigmatism results in blurred vision and eyestrain.

Axenfeld-Rieger Syndrome

Axenfeld-Rieger syndrome is a group of conditions that occur together and can be inherited. These conditions can include glaucoma, a flattened appearance of the face and nose, and fewer teeth than usual. Glaucoma involves optic nerve damage usually resulting from increases in internal fluid pressure of the eye. The optic nerve sends information from the eye to

the brain. Persons with glaucoma may experience loss of side vision, reduced central vision, photophobia (extreme sensitivity to light), and difficulty with night vision.

Best Disease

Best disease is an inherited form of progressive macular dystrophy. The macula is the central portion of the retina responsible for seeing detail and color. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Damage to the macula results in blurred central vision, blind spots, or total central vision loss. Good side vision is usually retained. Photophobia, or extreme sensitivity to light, may accompany this condition.

Best Vitelliform Dystrophy

See Best Disease.

Binasal Hemianopia

Binasal hemianopia refers to the inability to see in the inside (toward the nose) halves of the visual fields in both eyes. It is usually caused by optic nerve damage. The optic nerve sends visual information to the brain, and damage to the nerve can prevent parts of the visual field from being processed and seen.

Binasal Hemianopsia

See Binasal Hemianopia.

Bitemporal Hemianopia

Bitemporal hemianopia refers to the inability to see in the outside (toward the temple) halves of the visual fields in both eyes. It is usually caused by optic nerve damage. The optic nerve sends visual information to the brain, and damage to the nerve can prevent parts of the visual field from being processed and seen.

Bitemporal Hemianopsia

See Bitemporal Hemianopia.

Blepharitis

Blepharitis refers to inflammation of the eyelids. Eyelids may be red, swollen, itchy, or display flaky or scaly patches of skin. Blepharitis is usually caused by infection or allergy and may run a long course if untreated. Treatment involves daily application of medications prescribed by eye doctors and good hygiene.

Buphthalmos

Buphthalmos refers to glaucoma that is present in infants because of a hereditary eye structure defect. Glaucoma involves high fluid pressure inside the eye. This pressure damages the optic nerve, which brings visual information from the eye to the brain. Usually, the eye structure problem is correctable with early surgery, and glaucoma can be reversed before vision is seriously affected. Without treatment, vision loss will occur and

may involve narrowing of the field of vision and reduced central vision.

Cataract

Cataract refers to a clouding or opacification of the lens. The lens, located behind the iris, is a part of the eye that directs light onto the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. When the lens remains clear, a sharp image is focused on the retina. With cataract(s), less light passes through the lens, causing vision to become blurry. Reduced visual acuity (inability to see detail) or blurred vision, and photophobia (extreme sensitivity to light) can accompany cataracts.

Cerebral Palsy

Cerebral palsy (CP) is a term used to describe a group of chronic conditions affecting body movement and muscle coordination. It is caused by damage to one or more specific areas of the brain, usually occurring during fetal development or infancy. The brain injury that caused cerebral palsy can also cause problems with vision including strabismus (abnormal alignment of the eyes), loss of depth perception, and loss of visual acuity (ability to see detail).

CHARGE Syndrome

CHARGE syndrome refers to most or all of the following conditions that occur together: coloboma (a gap in one or more structures of the eye leading to vision loss), heart defects (ranging from mild to severe), atresia

of the choanae (narrowed or blocked passages between the nose and throat that enable breathing through the nose), stunted growth and development, genital or urinary abnormalities, ear abnormalities, and hearing loss. The degree and type of vision and hearing losses vary.

Chorioretinitis

Chorioretinitis refers to inflammation of the retina (the structure in the back of the eye that prepares visual information to be sent on to the brain) and choroid (blood vessels that nourish the retina). This condition can be acquired before birth or later in life. Vision loss may be minimal to severe, depending on the location of scars resulting from infection. If the center of the retina (responsible for clear central vision) is scarred, central vision will be lost.

Coloboma

Coloboma refers to a missing portion, absence of, or incorrect development of one or more of the following eye structures: eyelid, iris, lens, retina, choroid, or optic disc. The iris is the colored part of the eye that controls how much light enters the eye. The lens focuses the image onto the retina in the back of the eye. The choroid refers to a layer of blood vessels that nourish the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. The optic disc is the location where nerve cells leave the retina to take information to the brain. The impact of coloboma on vision depends on which eye structures are affected and on the amount of damage to these structures. Persons may experience decreased visual acuity (difficulty seeing detail),

nystagmus (involuntary, rhythmic movements of one or both eyes), strabismus (abnormal alignment of the eyes), photophobia (extreme sensitivity to light), loss of side vision, or cataracts (clouding of the lens in the eye).

Cone Dystrophy

Cone dystrophy refers to the degeneration of cone cells, which are responsible for both color perception and detail vision. Most cone cells are located in the center of the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Cone dystrophy results in a progressive loss of central vision and loss of color discrimination. Persons with cone dystrophy may also experience photophobia (extreme sensitivity to light) and nystagmus (involuntary, rhythmic movements of one or both eyes).

Congenital Stationary Night Blindness

Congenital stationary night blindness is a hereditary disorder that affects the rod photoreceptors of the retina and impairs night vision. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Persons with this condition may also experience moderate to high myopia (nearsightedness).

Computer Vision Syndrome

Computer vision syndrome, also referred to as digital eye strain, describes a group of eye- and vision-related problems that result from prolonged computer, tablet, e-reader and cell phone use.

Corneal Dystrophy

Corneal dystrophy refers to a number of eye conditions in which cloudy material builds up on various parts of the cornea, causing the cornea to become opaque. The cornea is the clear, spherical structure in the front of the eye that allows the visual image to enter the eye. As the cornea becomes cloudy, the images it receives become less clear. Corneal dystrophies occur in both eyes, are usually inherited, and are often progressive. Vision problems and symptoms may include astigmatism (inability to focus sharply at any distance); nystagmus (involuntary, rhythmic movements of one or both eyes); strabismus (abnormal alignment of the eyes); photophobia (extreme sensitivity to light); perception of faint, extra images; and pain.

Corneal Scarring

Corneal scarring is caused by disease or injury to the cornea. The cornea is the clear, spherical structure in the front of the eye that allows the visual image to enter the eye. Scar tissue blocks the passage of light into the otherwise clear cornea. The larger and more centrally located the scarring, the more vision will be lost.

Cerebral/Cortical Visual Impairment

Cerebral/cortical visual impairment (CVI), also known as neurological visual impairment (NVI), is a condition in which eyes and optic nerves appear healthy, yet vision is impaired. CVI/NVI is caused by damage to the brain that affects most of the specialized visual brain centers. CVI/NVI

may result from stroke, trauma to the head, intracranial bleeding, prenatal problems, or other factors. Children with CVI/NVI may show reduced visual fields, variable vision, selective attention, and a preference for certain colors. Appropriate CVI/NVI early intervention can be highly effective in helping children develop a more efficient visual processing system.

Degenerative Myopia

Degenerative myopia (also called progressive myopic degeneration) is a hereditary condition in which a child becomes increasingly myopic or nearsighted. Over time, distant objects become increasingly blurred and difficult to see while near objects remain relatively clear. This condition results from an increasing elongation of the eye because of degenerative changes in any of several eye structures. Prescription lenses may need to be changed frequently as the condition progresses.

Detached Retina

Detached retina is the complete or partial separation of the retina from the choroid. This occurs when the retina is pulled away from the back of the eye. When completely detached, the retina loses its blood supply and cannot function. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. When the retina is completely detached, the brain receives no information from the eye and blindness results. Retinal detachments can be caused by trauma to the eye or head and by many other eye conditions. See also Retinal Detachment.

Diabetic Retinopathy

Diabetic retinopathy refers to the condition in which the blood vessels of the retina are damaged by diabetes. Fluid or blood may seep into the retina, causing it to become wet and swollen. If new blood vessels develop in inappropriate places, bleeding in the eye, retinal scar tissue, and retinal detachments can occur. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. When the retina is damaged by diabetic retinopathy, persons can experience blurred vision, blind spots in their visual fields, and difficulty seeing detail.

Dislocated Lens

Dislocated lens occurs when trauma to the eye or inherited conditions move the lens of the eye out of its normal position. The lens is a structure that focuses an image onto the retina where it is changed into a form that can be processed by the brain. If the lens dislocation is slight, it usually causes no problems. If the lens is extremely dislocated, vision may be very blurred. Treatments may include prescription lenses or surgery.

Enucleation

Enucleation is the surgical removal of an eyeball. An eye may be enucleated for many reasons such as malignancy or extreme pain in an eye that is blind. An artificial eye, also called a prosthesis, is worn after surgery. Artificial eyes are made of plastic and are created to look like the original eyes.

Esotropia

Esotropia is a misalignment of the eye in which one or both eyes looks inward, toward the nose. Esotropia is one type of strabismus.

Exotropia

Exotropia is a misalignment of the eye in which one or both eyes look outward, away from the nose. Exotropia is one type of strabismus.

Farsightedness

See Hyperopia.

Glaucoma

Glaucoma refers to optic nerve damage usually resulting from increases in the internal fluid pressure of the eye (intraocular pressure). Fluid is constantly being made and drained out of the eye. When there is an imbalance between the production and drainage of this fluid, the pressure inside the eye may increase to levels that damage the optic nerve. The optic nerve is a bundle of delicate nerve fibers that sends visual messages from the eye to the brain. Over time, high pressure inside the eye can cause the optic nerve to deteriorate; this results in the narrowing of the field of view and possibly blindness. Persons with glaucoma can also experience poor night vision, photophobia (extreme sensitivity to light), and fluctuations in vision.

Hemianopia

Hemianopia refers to the inability to see in one half of the visual field in each eye, usually due to stroke, trauma, optic nerve damage, or brain tumor. The optic nerve sends visual information to the brain, and damage to the nerve can prevent parts of the visual field from being processed and seen.

Hemianopsia

See Hemianopia.

Histoplasmosis

See Ocular Histoplasmosis Syndrome.

Homonymous Hemianopia

Homonymous hemianopia refers to the inability to see in the same half of the visual field in each eye, usually resulting from a brain tumor or brain lesion.

Homonymous Hemianopsia

See Homonymous Hemianopia.

Hyperopia

Hyperopia, sometimes called farsightedness, is a condition in which near vision is blurred; but the persons can clearly see distant objects. In hyperopia, the eyeball is too short and images are focused behind the retina instead of onto the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Eye fatigue, eyestrain, squinting, and difficulty reading are frequently experienced.

Keratitis

Keratitis refers to various types of infections and inflammations of the cornea. Usually very painful, these conditions need immediate diagnosis and treatment so that the cornea is not damaged. The cornea is a clear, spherical-shaped structure in the front of the eye that allows light to enter into the eye. When damaged, the cornea is no longer clear and blurred images can result.

Keratoconus

Keratoconus refers to a progressive, frequently hereditary, condition in which the shape of the cornea gradually changes from a sphere to a pointed cone. The cornea is a clear, spherical-shaped structure in the front of the eye that allows light to enter into the eye. As the cornea's shape changes, images cannot be focused clearly onto the retina of the eye and visual acuity, the ability to see detail, decreases.

Leber Congenital Amaurosis

Leber congenital amaurosis (LCA) is a hereditary condition involving very low retinal function as measured by an electroretinogram. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Many persons with this condition only have form or light perception. Accompanying conditions may include keratoconus (a cone-shaped cornea resulting in difficulty seeing detail), cataracts (clouding of the clear lens that results in blurry vision), and developmental delays.

Left Homonymous Hemianopia

Left homonymous hemianopia refers to the inability to see in the left half of the visual field in each eye, usually resulting from a brain tumor or brain lesion.

Macular Degeneration

Macular degeneration, also known as age-related macular degeneration (AMD), refers to a group of eye conditions that result in the deterioration of the macula. The macula is the central portion of the retina, providing the clearest, most distinct vision. When one looks directly at something, the light from that object forms an image on the macula. The macular area is also the main portion of the retina used for color discrimination. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. As the macula deteriorates, central vision is lost. Peripheral or side vision is usually retained. Although AMD doesn't typically cause complete blindness, it can significantly impair everyday activities like reading, driving, and recognizing faces.

Types of Macular Degeneration:

Dry AMD (Non-Exudative):

- the most common type
- characterized by the gradual thinning of the macula and the accumulation of tiny protein and lipid deposits called drusen beneath the retina
- progression is slow and may not cause noticeable vision changes in the early stages

Wet AMD (Exudative):

- less common but more severe
- caused by abnormal blood vessels growing under the retina, which can leak fluid or blood, leading to rapid vision loss
- often develops as an advanced stage of Dry AMD

Macular Hole

Macular hole refers to a round, red lesion in the fovea or the center of the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. The fovea processes the clearest and sharpest central vision. A macular hole, if untreated, results in the loss of this clear central vision and may lead to retinal detachment and further vision loss. Macular holes may be caused by trauma, inflammation, and other eye conditions.

Microphthalmia

Microphthalmia, sometimes called microphthalmos, refers to the underdevelopment of one or both eyes, resulting in a smaller than usual appearance. This condition is usually hereditary and present at birth. It is often accompanied by cataracts (a clouding of the lens of the eye that causes blurred vision), aniridia (the incomplete development of the iris or colored part of the eye), glaucoma (damage to the optic nerve that brings information from the eye to the brain), and coloboma (a condition resulting in incomplete development of parts of the eye). Microphthalmos may also be associated with other disabilities.

Microphthalmos

See Microphthalmia.

Multiple Sclerosis

Multiple sclerosis (MS) is a disease involving the loss of myelin, a substance that helps nerve cells transmit information to and from the brain. The optic nerve transmits information from the eye to the brain. If the optic nerve is affected, vision loss can occur. Vision loss caused by MS can be temporary or permanent. The degree and type of vision loss varies according to specific effects on the optic nerve.

Myopia

Myopia, sometimes called nearsightedness, is a condition in which distance

vision is blurred; but the person can clearly see close objects. In myopia, the eyeball is too long and images are focused in front of the retina instead of onto the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Distant objects are blurry, and eye fatigue and squinting are frequently experienced.

Nearsightedness

See Myopia.

Night Blindness

Night blindness refers to poor visual acuity (inability to see detail) at night or in low-light conditions.

Nystagmus

Nystagmus refers to involuntary rhythmic eye movements, resulting in decreased visual acuity (reduced detail vision). Nystagmus is generally associated with an underdevelopment of a part of the eye and usually accompanies congenital eye conditions.

Ocular Histoplasmosis Syndrome

Ocular histoplasmosis syndrome refers to a fungal infection that can result in retinal scarring or bleeding. The fungus Histoplasma capsulatum is found in soil containing dried bird or bat droppings. When it becomes

airborne and is inhaled, the fungus usually produces a mild infection in the lungs with symptoms similar to the common cold. Years after recovery from this fungal infection, a small percentage of persons develop abnormal blood vessel growth behind the retina. This growth results in scarring near the center of the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Retinal damage from histoplasmosis can result in partial or total loss of clear central vision.

Optic Atrophy

Optic atrophy, also called optic nerve atrophy, refers to a dysfunction of the optic nerve, which carries information from the eye to the brain. The degree of vision loss depends on the type and amount of nerve damage. A number of conditions including problems in fetal development, inherited conditions, and diseases that damage the optic nerve such as multiple sclerosis, meningitis, and hydrocephalus can cause optic atrophy.

Optic Nerve Atrophy

See Optic Atrophy.

Optic Nerve Glioma

Optic nerve glioma is a slow-growing, nonmalignant tumor of the optic nerve or optic chiasm. The optic nerve sends information from the eye to the brain; the optic chiasm is an important crossing point in the optic nerve pathway. Persons with optic nerve glioma may experience vision loss

including reduced visual acuity (difficulty with detail vision) and decreased visual field (reduced side vision).

Optic Nerve Hypoplasia

Optic nerve hypoplasia (ONH) congenital abnormality refers to the underdevelopment of the optic disc. The optic disc is a bundle of delicate fibers that send visual information from the eye to the optic nerve. Vision problems are present at birth and do not progress. Children with ONH may experience poor or no side vision and a reduction of detailed vision; vision problems vary according to the degree and type of damage involved with the incomplete coloboma of the optic disc.

Optic Neuritis

Optic neuritis, also called optic papillitis, is a condition involving optic nerve damage from inflammation, degeneration, or loss of myelin, a substance that helps nerve cells transmit information to and from the brain. Damage to the optic nerve may result from a variety of causes including meningitis, diabetes, multiple sclerosis, and trauma. The optic nerve sends visual information from the eye to the brain. The type of vision loss varies according to the type and degree of damage to the optic nerve. Treating the underlying causative condition may restore optic nerve function and vision. When neuritis does not respond to treatment or when damage to the optic nerve cannot be reversed, permanent visual loss occurs. Symptoms include rapid vision loss in one or both eyes, pain, blurred vision, and “blind spots” or holes in the visual fields.

Papillitis

See Optic Neuritis.

Photophobia

Photophobia refers to extreme sensitivity to light. Some persons may experience discomfort and pain as well.

Presbyopia

Presbyopia (refractive error) refers to the loss of elasticity of the lens and/or the loss of ciliary muscle function, as occurs with aging; this usually becomes significant after age 45. The eye gradually loses the ability to focus on near objects. Presbyopia may also be caused by diseases such as hypothyroidism or glaucoma. The condition is usually resolved by prescription lenses.

Progressive Myopic Degeneration

See Degenerative Myopia.

Ptosis

Ptosis is a drooping of the eyelid caused by paralysis or weak eyelid muscles. Ptosis requires surgical correction if it interferes with vision.

Refractive Errors

Refractive errors refer to the eye's inability to focus images on the retina in the back of the eye. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Near or distance vision may be blurry, and visual acuity may be reduced. Refractive errors can often be corrected with prescription lenses.

Retinal Detachment

Retinal detachment is a condition in which the retina separates from its correct position at the back of the eye. The retina is the light-sensitive membrane that receives images and transmits them to the brain. If a detachment is not repaired, permanent vision loss may occur. See Detached Retina.

Retinitis Pigmentosa

Retinitis pigmentosa (RP) refers to an inherited group of retinal diseases. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. RP is a slow, progressive deterioration of the retina and usually begins in the peripheral retinal area; this results in reduced peripheral (side) and night vision. RP can eventually lead to total blindness.

Retinoblastoma

Retinoblastoma is a malignant tumor that develops inside the eye and is usually seen in children. This condition may develop in one or both eyes. If untreated, the tumor will spread to the brain and cause death. Treatment

often involves removal of the affected eye. Depending on size and location of the tumor, radiation treatment, laser, cryotherapy, or chemotherapy may be used. Type and degree of vision loss depends on the type of treatment used.

Retinopathy of Prematurity

Retinopathy of prematurity (ROP) occurs in premature babies. This condition affects normal blood flow in the retina. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Grades I through IV ROP describe the degree of severity of visual impairment. In grades III and IV, abnormal blood vessels grow in the wrong places. When these blood vessels leak, they cause scarring. Scars may later shrink, pulling on the retina and sometimes causing retinal detachments. The amount of vision loss depends on the amount, extent, and form of visual damage. Visual acuity can range between 20/20 vision to no light perception at all. When vision exists, near vision is usually better than far vision, side vision may be reduced, and there may be blind spots or "holes" in the visual field.

Right Homonymous Hemianopia

Right homonymous hemianopia refers to the inability to see in the right half of the visual field in each eye, usually resulting from a brain tumor or brain lesion.

Rubella

Rubella, also called German measles, is a viral infection that usually causes fever, body rash, and general cold-like symptoms. If a woman develops rubella during the first 3 months of pregnancy, the baby may be born with any of a number of disabilities and physical problems. Cataracts, glaucoma, retinal damage, and incomplete eye structures often occur. The type and degree of vision loss depends on which of these conditions are present.

Scotoma

Scotoma refers to a blind spot in any part of the visual field. Conditions that affect the retina (membrane in the back of the eye that receives images and transmits them to the brain), optic nerve (bundle of nerves which send visual information to the brain), or brain can cause a scotoma.

Shaken Baby Syndrome

Shaken baby syndrome (SBS) refers to impairments and/or disabilities that result from child abuse in which a child is forcefully shaken. Disabilities can result from either direct traumatic injury or as a secondary complication of intraocular bleeding. Visual impairment may result from retinal detachment, optic atrophy, and/or damage to visual pathways in the brain.

Stargardt Disease

Stargardt disease, sometimes called juvenile macular degeneration, results in the deterioration of the macula. The macula is a small portion of the

retina responsible for detailed central vision. This condition is hereditary and progressive. People with Stargardt disease lose central vision. They also frequently experience difficulties with photophobia (extreme sensitivity to light) and adjusting to changes in lighting conditions. They usually retain peripheral or side vision.

Strabismus

Strabismus, sometimes called crossed eyes, refers to a condition where the eyes are not aligned in the same direction. Strabismus is often hereditary and frequently caused by an imbalance in the muscles that control eye position and movement. Strabismus may accompany other serious eye conditions. Early examination and treatment are essential. If untreated, strabismus can result in amblyopia and functional blindness in the turned eye. Amblyopia is a condition in which the brain receives a very different image from each eye, cannot make the two different perspectives into an integrated picture, and consequently suppresses information received from the turned eye.

Sympathetic Ophthalmia

Sympathetic ophthalmia refers to a condition in which inflammation develops in an uninjured eye following serious injury to the other eye. Inflammation usually develops soon after injury, though it can occur much later. If untreated, this condition can result in loss of sight in the uninjured eye.

Toxoplasmosis

Toxoplasmosis is an infection caused by the parasite Toxoplasma gondii. The infection may be contracted by eating infected, undercooked meat or handling soil or cat feces that contain the parasite. Toxoplasmosis can be congenital or acquired. If the eyes are affected, the retina becomes inflamed. Scarring occurs when inflammation heals. The retina is the light-sensitive membrane in the back of the eye that receives images and transmits them to the brain. Type and amount of vision loss depends on the location of retinal scars. If scarring occurs in the center of the retina where sharp, central vision is processed, then central vision loss occurs.

Trachoma

Trachoma is a type of infection affecting the conjunctiva, eyelids, and cornea. The conjunctiva is a thin membrane that covers the surface of the inner eyelid and part of the eyeball. Inflammation of the conjunctiva is called conjunctivitis, which makes the white of the eye appear red. If untreated, this infection causes eyelashes to turn inward and scar the cornea. The cornea is the clear, spherical structure in the front of the eye that sends images to the back of the eye for processing. When the cornea is scarred, images can no longer enter the eye. Trachoma is rare where hygiene is practiced, but it is a leading cause of blindness in developing countries. This condition is prevented by washing hands and the face in clean water and is successfully treated with antibiotics.

Trauma

Trauma refers to any injury near the head or eye that results in vision loss. Common causes of eye trauma include gunshot wounds, automobile

accidents, blows to the head or eyes, burns, and penetration by foreign bodies (e.g., flying debris). The degree and type of vision loss depends on the nature of the trauma and the parts of the eye affected.

Tumor

Tumor refers to an abnormal growth of tissue serving no physiological purpose. Tumors can be malignant or benign and can occur in most structures of the eye. If a tumor is life threatening, the affected eye will be removed. Otherwise, the degree and type of vision loss depends on the location, size, and type of tumor.

Usher Syndrome

Usher Syndrome is a rare genetic disorder that primarily affects hearing, vision, and sometimes balance. It is the most common condition that involves both hearing loss and an eye disorder known as retinitis pigmentosa (RP). RP causes progressive vision loss due to the degeneration of the retina, the light-sensitive tissue at the back of the eye.

Types of Usher Syndrome

There are three main types, distinguished by the severity and onset of symptoms:

Type 1:

- Hearing: Profound congenital deafness (present at birth).

- Vision: Early onset of RP, typically in childhood.
- Balance: Significant issues due to vestibular dysfunction, causing delays in motor milestones like walking.

Type 2:

- Hearing: Moderate to severe hearing loss from birth.
- Vision: RP develops later, often in adolescence or early adulthood.
- Balance: Normal.

Type 3:

- Hearing: Progressive hearing loss starting in childhood or adolescence.
- Vision: RP onset and progression vary but usually occur in adolescence or early adulthood.
- Balance: Variable, with some individuals experiencing difficulties.

Uveitis

Uveitis refers to inflammation inside the eye that can result in scarring and vision loss. Uveitis can be caused by injury to the eye, infection, inflammation, autoimmune diseases such as rheumatoid arthritis, or neurological conditions such as multiple sclerosis. It may affect eye structures including the iris, ciliary body, and choroid. The iris, the colored part of the eye, determines how much light enters the eye. The ciliary body

produces fluid that nourishes the front part of the eye. The choroid is the blood supply for the retina, which transforms visual information into a form that can be processed by the brain. The type and degree of vision loss depends on which eye structures are involved. Treatment of both underlying conditions and specific eye conditions is essential.

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Glossary of Eye Terminology

A C E F I L M O P R S T U V Z

Aqueous Humor

The aqueous humor is a transparent watery fluid that is located between the back surface of the cornea and the front surface of the vitreous humor. The aqueous humor nourishes the cornea, iris, and lens. It is produced by the ciliary body and maintains intraocular pressure.

Central Vision

Central vision describes an eye's best vision; used for reading and discriminating fine detail and colors. A person's field of vision when looking straight ahead. Results from the fovea and macular area.
See Visual Field.

Choroid

The choroid is the vascular layer of the eye located between the sclera and the retina. The choroid provides nourishment and oxygen to other parts of the eye.

Ciliary Body

The ciliary body is the structure that produces the aqueous humor. It is composed of a system of very small fibers that control the shape of the lens and size of the pupil.

Cones

The cones are specialized light-sensitive cells that are responsible for color discrimination and visual acuity. A high concentration of cones is located within the macula and fovea.

Conjunctiva

The conjunctiva is a clear tissue found on the inside of the upper and lower eyelids and across the front of the eyeball. This very thin tissue or membrane helps protect the eyeball and keeps it moist.

Cornea

The cornea is the transparent front part of the eye that covers the iris, pupil, and anterior chamber and provides most of an eye's optical power.

Eye Muscles

Six eye muscles attached to the eyeball control eye position and movement. An additional muscle controls eyelid elevation. (extraocular muscles)

Eye Socket

The eye socket is the actual space surrounded by the seven orbital bones where the eyeball is located. It is the boney cup that surrounds and protects the eyeball.

Eyeball

The eyeball is the globe-shaped part of the eye, within the eyelids and the eye socket. It is about the size and shape of a table tennis ball.

Eyebrows

Eyebrows are hairs that grow across the brow bone from above the bridge of the nose toward the outer edge of the eye. Their main function is to prevent sweat, water, and other debris from falling into the eye.

Eyelashes

Eyelashes are hairs that grow at the edge of the eyelid. They help to protect the eye from small debris or particles. They are sensitive to being touched and provide a warning that an object is near the eye.

Eyelids

Eyelids are thin folds of skin that cover and protect the eye from dust or small particles blowing into the eye. As the eyelids open and close, they help keep the eye moist.

Facial Bones

The facial bones consist of the 14 bones that make up the skeleton of the face. They protect the sense organs of smell, sight, and taste.

Fovea

The fovea is a very small indentation within the macula that produces sharp vision. It contains a high concentration of cells known as cones.

Iris

The iris is the pigmented tissue of the eye just behind the cornea. It gives color to the eye and helps control the amount of light that enters the eye. The iris contracts to increase the size of the pupil and expands to cover more of the space leaving a smaller pupil.

Lens

The lens is part of the visual system that focuses a sharp image onto the retina. Suspended by fine ligaments (Zonules) attached between ciliary processes. The lens is located behind the iris and comprises many layers.

Macula

The macula is a small spot located in the central portion of the retina. It focuses central vision, which is used for reading and discriminating fine detail and color.

Optic Disc

The optic disc is a very small area on the back of the eye where the bundled nerve fibers leave the retinal tissue and form the optic nerve. The optic disc

does not contain cells that respond to the light entering the eye.

Optic Nerve

The optic nerve extends from the back of the eye to the brain. Messages or impulses of light formed by the retina are transmitted to the brain where vision is interpreted.

Optic Nerve Covering or Optic Nerve Sheath

The optic nerve covering or optic nerve sheath is the tissue that covers and protects the optic nerve fibers from the back of the eyeball to the brain.

Orbital Bones

Orbital bones are the seven bones that make up the eye socket. They help protect the eyeball from blows to the head and face.

Peripheral Vision

Peripheral vision is the part of vision that occurs outside the very center of the gaze. It also referred to as side vision. Peripheral vision provides information about objects and movement outside of the direct line of vision. See Visual Field.

Pupil

The pupil is the black circular opening in the center of the iris that

regulates the amount of light that enters the eye. Light is directed through the pupil before reaching the lens to focus on the retina.

Retina

The retina is the light-sensitive nerve tissue in the back of the eye that receives images and transmits them along the optic nerve to the brain.

Retinal Blood Supply

Retinal blood supply is blood circulated through the retinal and choroid layers to supply nourishment to the tissues.

Rods

Rods are light-sensitive cells found on the retina. Rods are sensitive to low light levels (night vision) and send signals of shadows and movement to the brain.

Sclera

The sclera is the tough white protective outer layer of the eye.

Tear Ducts

Tear ducts are small drainage channels through which the tears flow.

Tears

Tears help to lubricate and cleanse the thin membrane that covers the front of the eye and keeps it clear of foreign particles.

Uveal Tract

The uveal tract or uvea is the pigmented vascular layers of the eye consisting of the choroid, ciliary body, and iris.

Visual Field

The visual field is the area of space that can be seen. It includes both central vision and peripheral vision. The visual field is measured in terms of degrees from the center of the eye. See also Central Vision, Peripheral Vision.

Vitreous Humor

The vitreous humor is a thick transparent gel that fills the rear two-thirds of the eyeball, between the lens and the retina. It presses up against the retina and provides nourishment to the cells. The thick vitreous helps sustain the shape of the eye.

Zonules

Zonules are a system of fibers that hold the lens in position and control the shape of the lens.

Quick Reference: Tactile Diagrams and Eye Puzzle Pieces

Tactile Diagrams

Diagram 1a

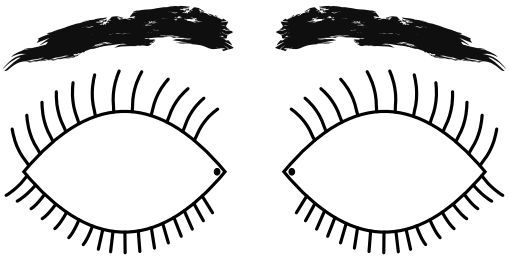


Diagram 1a
Eyebrows, eyelashes

Diagram 1b

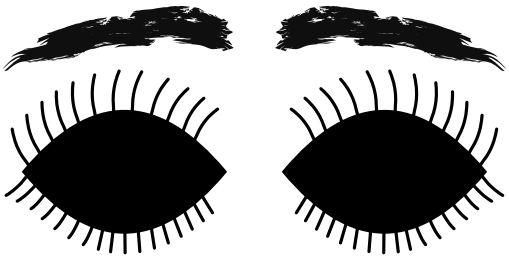


Diagram 1b
Eye area cutout

Diagram 2

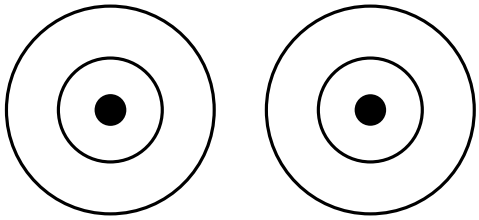


Diagram 2
Eyeball, iris, pupil

Diagram 1b over Diagram 2

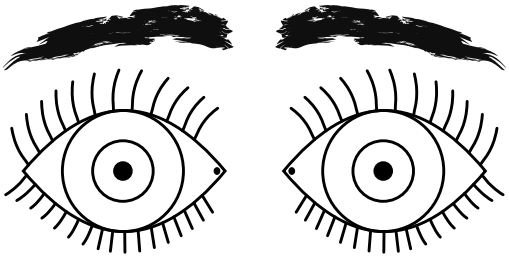


Diagram 1b over Diagram 2
Eyeballs with protecting features of the face

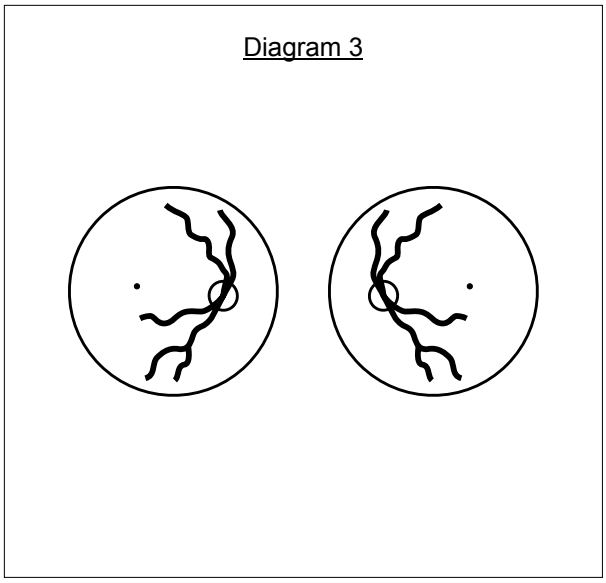


Diagram 3
Interior retina, blood supply, optic disc, macula, fovea

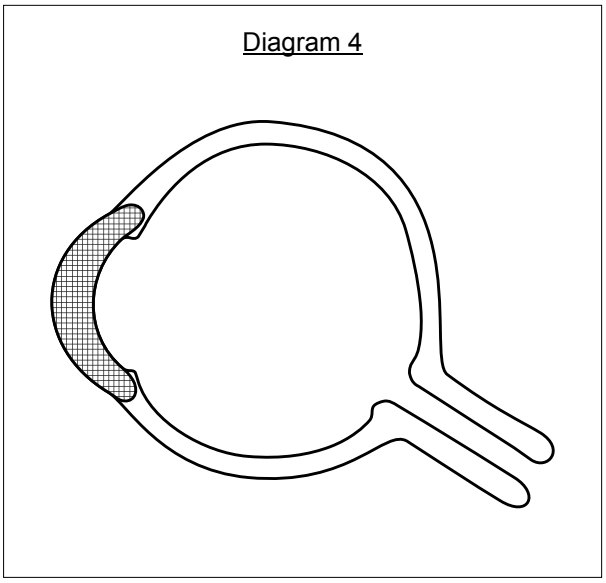


Diagram 4
Cornea (highlighted), sclera, optic nerve sheath

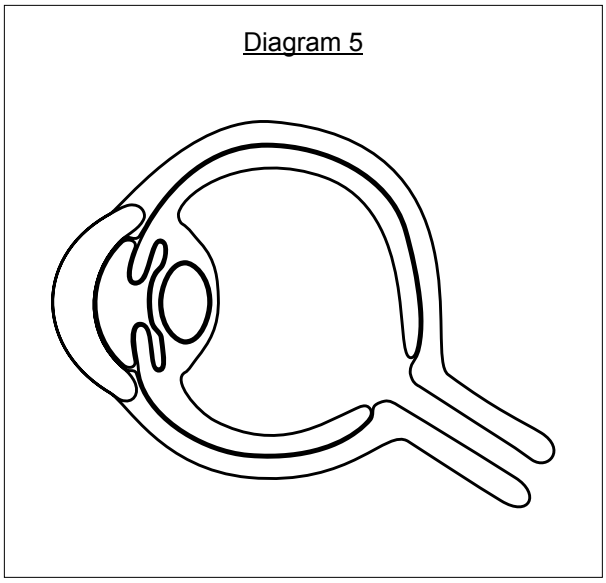


Diagram 5
Choroid, iris, pupil, uveal tract, lens; no highlights

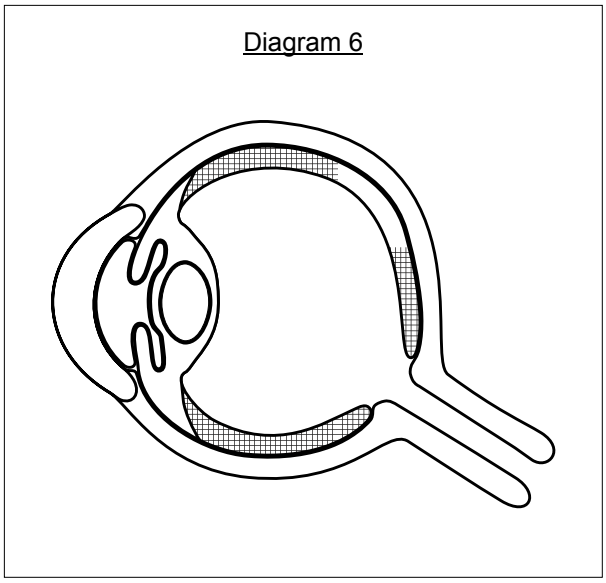


Diagram 6
Choroid (highlighted)

Diagram 7

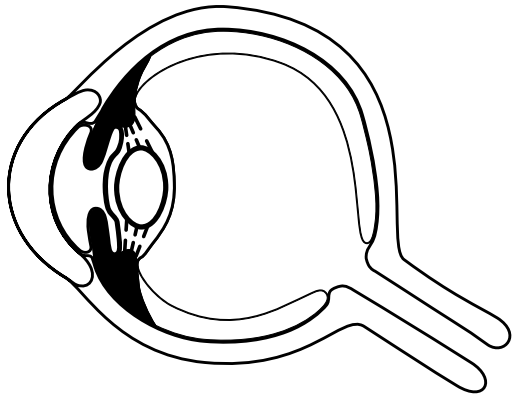


Diagram 7
Iris, lens, uveal tract, ciliary body, ciliary muscles, zonule fibers

Diagram 8

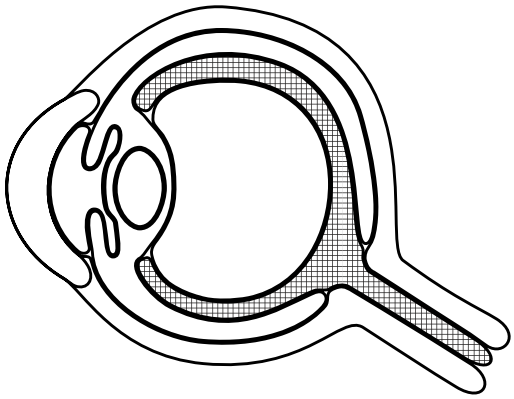


Diagram 8
Retina and optic nerve (highlighted)

Diagram 9

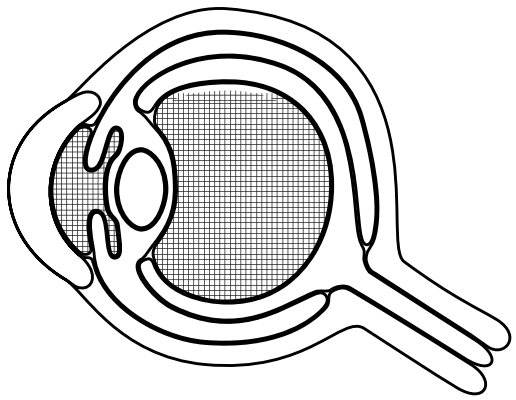


Diagram 9
Aqueous humor within the anterior chamber; vitreous humor within the posterior chamber (highlighted)

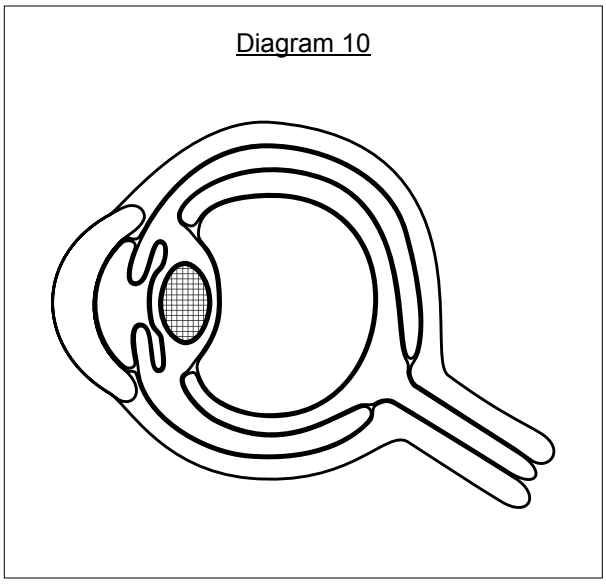


Diagram 10
Lens (highlighted), choroid, retina

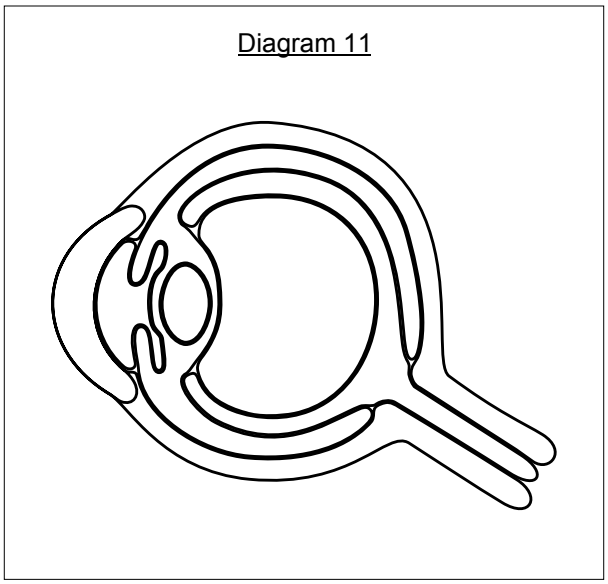
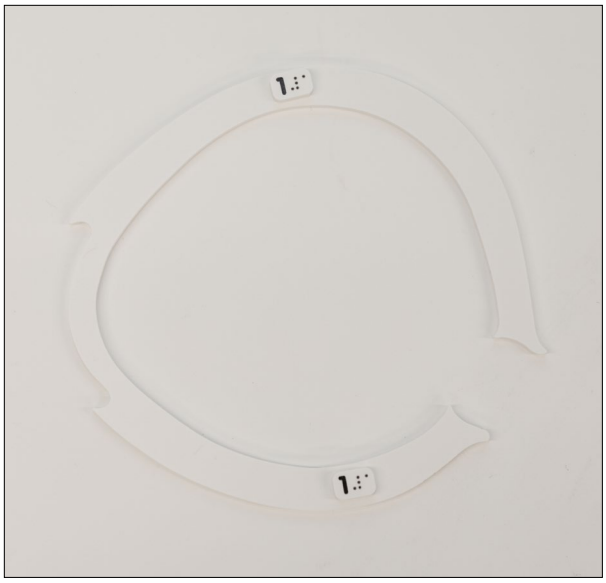


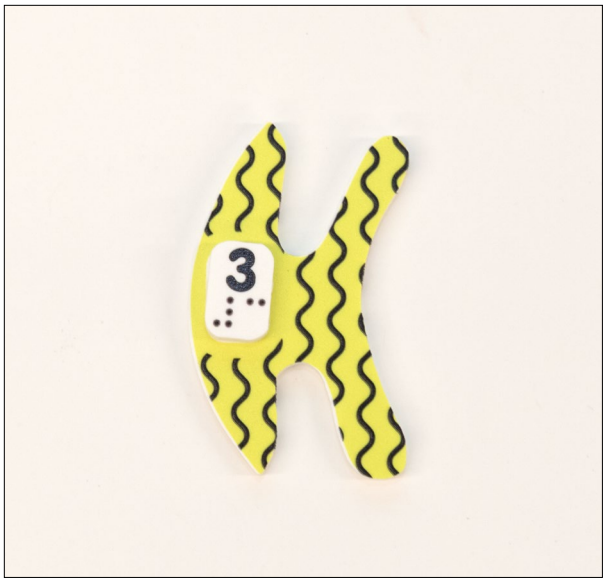
Diagram 11
No highlights, puzzle pieces fit in diagram

Puzzle Pieces

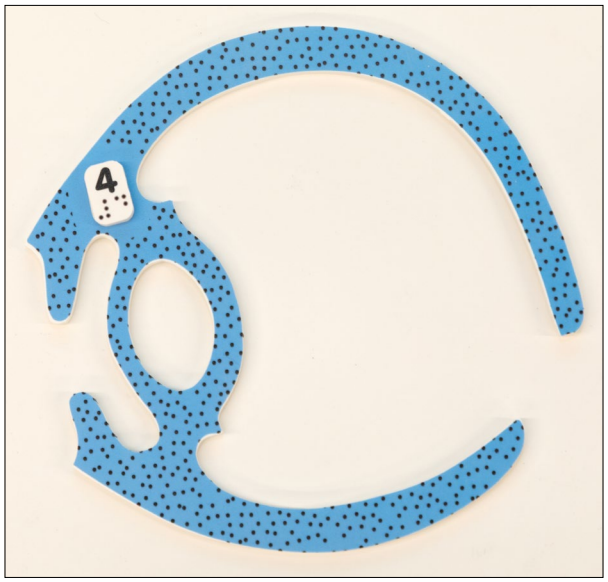


Puzzle Piece 1
Sclera

Puzzle Piece 2
Cornea

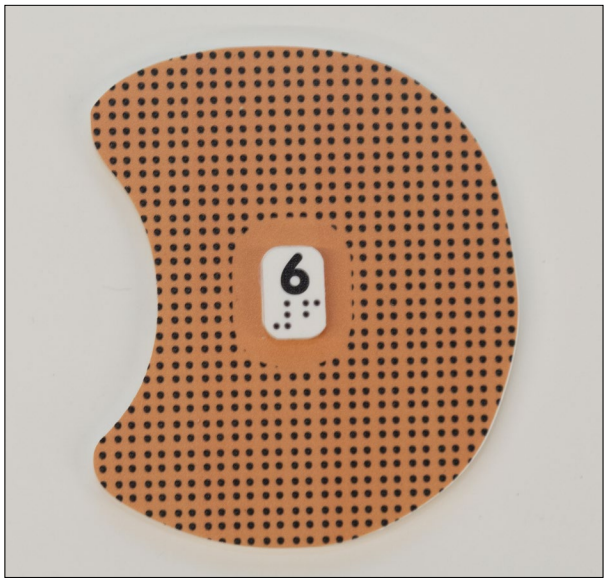


Puzzle Piece 3
Aqueous humor

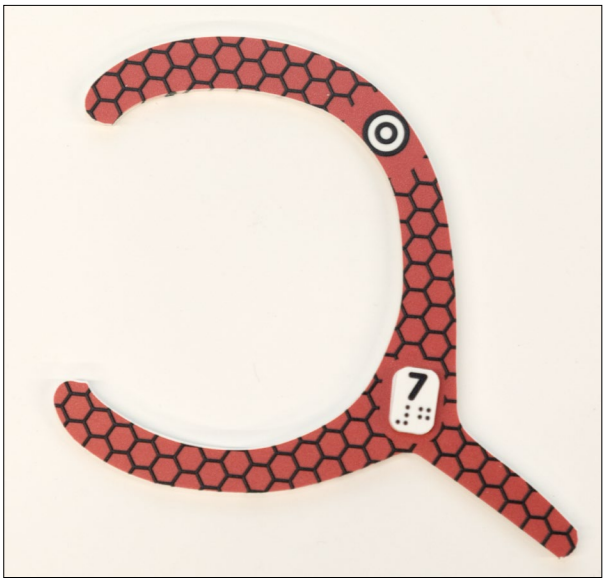


Puzzle Piece 4
Choroid

Puzzle Piece 5
Lens

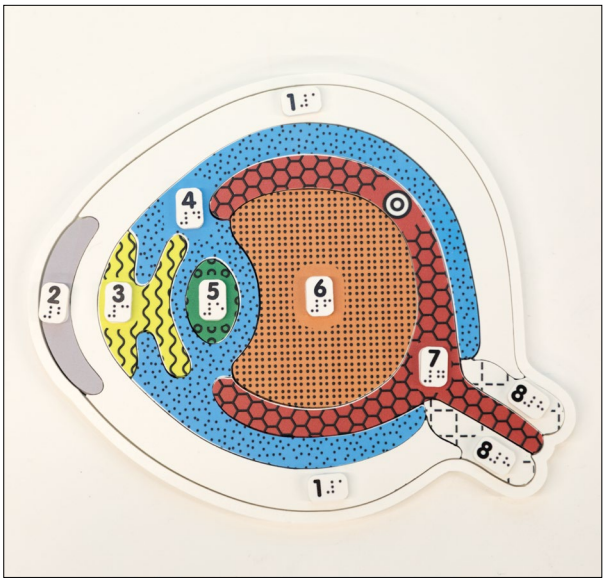


Puzzle Piece 6
Vitreous humor

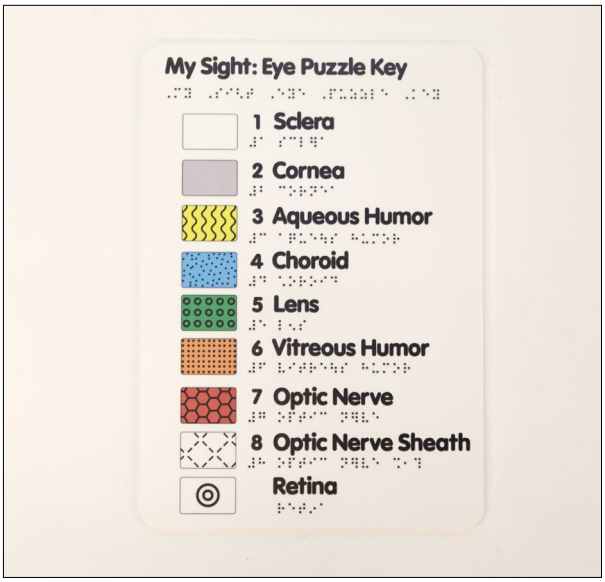


Puzzle Piece 7
Retina and optic nerve

Puzzle Piece 8
Optic nerve sheath



Completed Eye Puzzle
Puzzle Pieces 1, 2, 3, 4, 5, 6, 7, and 8



Texture Key

Vocabulary Worksheets:

Following instruction of Section I and Section II, evaluate the student's understanding of vocabulary terms by completing the labeling worksheets. The student will visually and tactually view the eye represented on each of the provided tactile graphics, named Outside, Inside, and Cross-Section View. Use the listed vocabulary words to label each part of the eye. Have the student visually or tactually locate the dotted line from each part of the eye, follow to the end of the line, and place the print and braille label to identify the correct name of each part. Use the texture key to identify the corresponding texture of each part for the inside view and cross-section view. Use the answer key to check the student's work.

Some parts are too small to represent. Use the texture key to identify and label the general position and tactile symbols of each part on the labeling worksheet to evaluate understanding of the parts in relationship to one another.

Section I

Vocabulary Worksheet: Basic Concepts for Understanding the Eye

Outside view of the eye

Vocabulary

1. eyebrow
2. eyelid

3. eyelashes
4. conjunctiva
5. iris
6. pupil
7. sclera
8. tear duct

Inside view of the eye

Vocabulary

1. pupil
2. cornea
3. upper eyelid
4. lower eyelid
5. lens
6. optic nerve
7. eye socket
8. orbital bones
9. optic nerve sheath
10. eye muscles

Section II

Vocabulary Worksheet: The Path of Light Through the Eye

Cross-sectional view of the eye

Vocabulary

1. orbital muscles
2. ciliary body
3. aqueous humor
4. cornea
5. zonules
6. lens
7. vitreous humor
8. optic disc
9. optic nerve sheath
10. retina
11. choroid
12. sclera
13. macula
14. fovea
15. optic nerve

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