For Educators

Teacher's Guide

MINNESOTA OPTOMETRIC ASSOCIATION

"Good Sight Goes Far" is a learning kit developed by the Minnesota Optometric Association (MOA) to help ensure that students in grades K-12 throughout Minnesota can see to learn.

Classroom activities to promote learning about vision and how the eyes work can be added to your current curriculum. They have been grouped by grade levels K-2 (Level 1), 3-5 (Level 2) and 6 and up (Level 3). Classroom activities include those led by teachers, such as an optical illusion sheet as well as exercises that each student completes on his/her own. Answers are on the Answer Key.

You can also use this guide to help detect students' eye and vision problems, provide insight for parents, and treat basic first-aid situations.

We invite you to take advantage of two other MOA resources:

- The MOA video lending library. Our web site *(www.MNEyeDocs.org)* includes a list of classroom videos that are available on loan. You can order by phone, mail or at the web site.

- Visit the MOA web site, *www.MNEyeDocs.org* and its new Teachers Resource Link. Here you can download the "Good Sight Goes Far" kit or components, and find out about further resources.

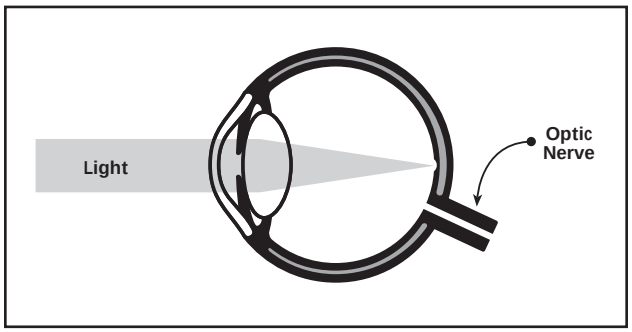
We hope you will find the "Good Sight Goes Far" kit a valuable addition to your classroom. Please give us your comments and suggestions by logging on to *www.MNEyeDocs.org.*

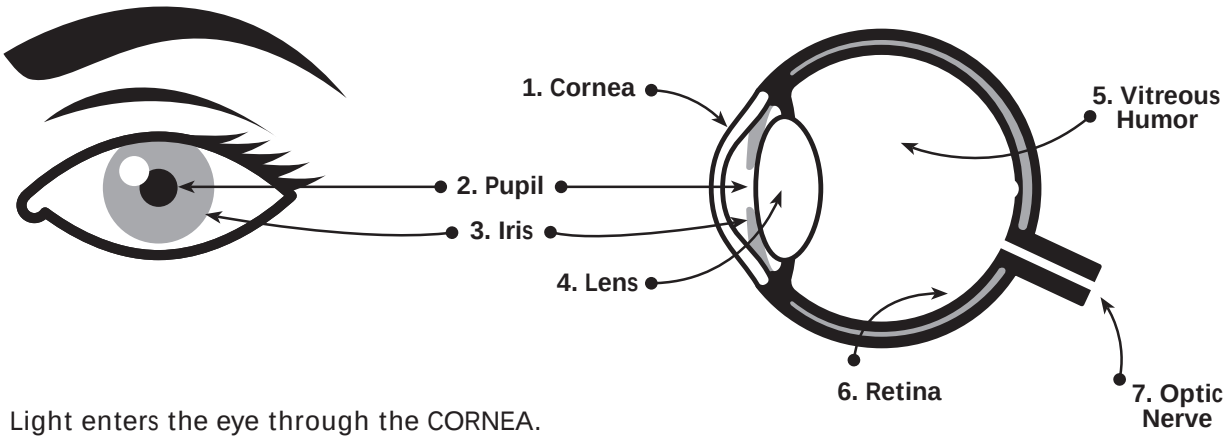
For Educators
and Level 3

How The Eye Works

MINNESOTA OPTOMETRIC ASSOCIATION

- Vision begins when light rays are reflected off an object and enter the eyes through the cornea, the transparent outer covering of the eye.
- The cornea bends or refracts the rays which pass through a round hole called the pupil.
- The iris, or colored portion of the eye that surrounds the pupil, opens and closes (making the pupil bigger or smaller) to regulate the amount of light passing through.
- The light rays then pass through the lens, which actually changes shape so it can further bend the rays and focus them on the retina at the back of the eye.
- The retina is a thin layer of tissue at the back of the eye that contains millions of tiny light-sensing nerve cells called rods and cones, which are named for their distinct shapes.
- Cones are concentrated in the center of the retina, in an area called the macula. In bright light conditions, cones provide clear, sharp central vision and detect colors and fine details.
- Rods are located outside the macula and extend all the way to the outer edge of the retina. They provide peripheral or side vision. Rods also allow the eyes to detect motion and help us see in dim light and at night.
- The rods and cones in the retina convert the light into electrical impulses. The optic nerve sends these impulses to the brain where an image is produced.





1. Light enters the eye through the CORNEA.
2. From the CORNEA it passes through the PUPIL.
3. The amount of light passing through is regulated by the IRIS, the colored part of your eye.
4. And, it hits the clear LENS.
5. Next, it passes through a jelly-like fluid. This fluid is what keeps the eye round. It is called the VITREOUS HUMOR.
6. Finally, it reaches the RETINA where it appears like an inverted picture.
7. The OPTIC NERVE now sends the picture to the brain and you see what you are looking at.

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

For Educators

The Teacher's Guide to Eye Problems

MINNESOTA OPTOMETRIC ASSOCIATION

There are a surprising number of vision skills that come into play when kids participate in either recreational or educational school activities. If these skills are not functioning properly, the child may struggle with learning or play, and may experience headaches, fatigue and other eyestrain problems.

Eyesight is just one component of vision. Eyesight is simply the ability to see objects clearly. Other aspects of vision are:

- Eye health.
- Eye teaming, which is the ability of the eyes to work together.
- Eye focusing, the ability of the eyes to focus and shift focus on near and distance points.
- Eye motility, when eyes can move together to read, to directly view an object or move to one viewing area to another.
- Near vision, the ability to see clearly and comfortably at 10-13 inches.
- Distance vision, the ability to see clearly and comfortably beyond arm's reach.
- Comprehension of what the eye sees.

Vision is a "guiding mechanism" in daily performance as well as in overall growth and development, including the role of eye-hand coordination.

While these vision skills themselves are basic, some symptoms of vision problems and eye functioning can be similar to symptoms of other problems. Here are some signs of vision and eye problems to watch for. The child tends to:

- Lose place while reading.
- Places head close to the book or desk when reading or writing.
- Has trouble finishing written assignments.
- Has difficulty remembering, identifying and reproducing basic shapes.
- Has difficulty with sequential concepts.
- Has poor hand-eye coordination.
- Displays evidence of developmental immaturity.
- Has headaches, nausea and dizziness.
- Has burning and itching eyes.
- Experiences blurring of vision at any distance.
- Has double vision.
- Uses finger to maintain place while reading.
- Omits, repeats and miscalls small words or confuses similar words.
- Excessively blinks or rubs eyes.
- Has difficulty remembering what was read.
- Turns or tilts head to use one eye only or closes or covers one eye.
- Has eyes that are crossed, turned in or out, or move independently of each other.
- Has reddened, watering eyes, encrusted eyelids, frequent styes.
- Dislikes or avoids close work.
- Makes frequent reversals when reading or writing.
- Consistently performs below potential.

When any of these symptoms are identified, parents should be notified with the recommendation for a thorough eye examination by the family primary eye care doctor.

Vision changes can occur without children, teachers or parents noticing them. The Minnesota Optometric Association (MOA) recommends that children visit the optometrist for a thorough eye exam at age 3, and every two years, more often if specific problems or risk factors exist.

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

For Educators

Quick Facts for Good Vision

MINNESOTA OPTOMETRIC ASSOCIATION

- One in four children experience vision problems. Children may not realize what excellent sight is like or that their vision is gradually changing.
- An eye doctor should always treat conjunctivitis, a common contagious infection.
- Chronic headaches and behavior problems can mean a child is having difficulty seeing.
- Strabismus, a visual defect sometimes referred to as "crossed eyes," does not self-correct over time. This affects about 4% of children in the U.S.
- Amblyopia, or "lazy eye," affects 2-3 out of every 100 people. While its effects are preventable, it is the leading cause of sight loss of all people between the ages of 20 and 70.
- Children accomplish 80% of all learning through sight up through age 12.
- The first eye exam by a primary eye doctor should be performed at ages three, five and then every two years unless more frequently indicated. School screening may detect first signs of eye or vision problems but is not a substitute for a comprehensive eye exam.
- "20-20 eyesight" refers to the ability to see letters that are 3/8 inch in size clearly from a distance of 20 feet.

The basic vision skills needed for school use are:

- Near vision. The ability to see clearly and comfortably at 10-13 inches.
- Distance vision. The ability to see clearly and comfortably beyond arm's reach.
- Binocular coordination. The ability to use both eyes together.
- Eye movement skills. The ability to aim the eyes accurately, move them smoothly across a page and shift them quickly and accurately from one object to another.
- Focusing skills. The ability to keep both eyes accurately focused at the proper distance to see clearly and to change focus quickly.
- Peripheral awareness. The ability to be aware of things located to the side while looking straight ahead.
- Hand/eye coordination. The ability to use the eyes and hands together.

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

For Parents

Vision and Pre-Schoolers

MINNESOTA OPTOMETRIC ASSOCIATION

Children grow and change rapidly, so how they see has a tremendous impact on their learning and development. During preschool years, children develop visually-guided eye-hand-body coordination, fine motor skills and the visual motor skills necessary to learn to read. As a parent, you can help with this process by initiating skill exercises, by watching for signs that indicate an eye or vision problem and by ensuring that children receive a comprehensive eye exam prior to entering kindergarten.

Helping a preschooler develop vision skills begins with simply reading to the child while allowing him/her to see the book and pictures. Other fun activities include imaginative play, using colored shapes, a chalkboard or finger paints. Using playground equipment like a jungle gym and balance beam in a safe, supervised environment, learning to ride a bike and playing ball games are all helpful to eye-hand-body coordination.

Parents should watch for any signs that could indicate a vision development problem. These include:

- A short attention span for the child's age
- Difficulty with eye-hand-body coordination in ball play and bike riding
- Avoidance of puzzles, coloring ad other detailed activities
- "Tired" or rubbing at eyes while or after reading or using eyes

Only a comprehensive eye exam can detect such vision problems as amblyopia, or lazy eye, which is the loss or lack of development of vision in an eye so the brain "learns" to see with the good eye only. The Minnesota Optometric Association (MOA) suggests that children have a complete eye exam as early as six months old, again at age three and then before starting kindergarten, and two years thereafter unless risk factors indicate more frequent visits. According to the United States Center for Health Statistics, only 14 percent of American children under the age of five have received a comprehensive eye exam.

To help make the eye examination a positive experience:

1. Allow one hour. It may be helpful to schedule the exam in the morning.
2. Talk about the examination in advance and encourage your child's questions.
3. Explain the examination in your child's terms, comparing the E chart to a puzzle and the instruments to tiny flashlights and a kaleidoscope.

The Minnesota Optometric Association has over 500 member doctors of optometry around the state. The MOA is committed to furthering awareness of optometrists as primary eye care or family eye doctors and to bringing about change that positively impacts the MOA member doctors and their patients. For more information on the MOA, visit *www.MNEyeDocs.org.*

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

For Educators and
School Nurses

First Aid for Eyes

MINNESOTA OPTOMETRIC ASSOCIATION

This is an immediate first-aid guide to prevent eye injuries from becoming more serious.
Be sure to see the eye doctor as soon as possible after an eye injury.

FOREIGN OBJECTS:

- Don't rub.
- Lift upper eyelid outward and gently pulling down over the lower lashes. Tears will flow, often washing the object out. If the object does not wash out, contact a doctor of optometry. Do not try to remove the embedded material. Remove any contact lenses and completely clean them.

CHEMICALS IN EYES:

- Immediately flush eyes with cool water for at least 15 minutes. Hold head under slowly running faucet, or pour water slowly from a glass.
- Seek professional attention immediately! Remove any contact lenses immediately and flush eyes.

A BLOW TO THE FACE RESULTING IN A BLACK EYE:

- Treat with cold compresses for about 15 minutes every hour.
- Have the eye checked by the eye doctor for any internal damage.
- If the blow breaks contact lenses, try to remove pieces of the lenses immediately. Rinse, then call your doctor of optometry.

CUT, LACERATION OR PENETRATING EYE INJURY:

- Do not try to treat.
- Do not flush with water or apply any medicine.
- Do not try to remove a contact lens.
- Gently cover eye with bandage or gauze pad and go directly to the eye doctor or nearby hospital.

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

For Parents

An Eye Care and Vision Guide

MINNESOTA OPTOMETRIC ASSOCIATION

Good vision is a prerequisite for learning in school-aged children, so detecting any eye or sight problems early is important in schoolwork and play.

The components of vision:

- Eyesight is just one component of vision. It is the ability to see objects clearly.

Other aspects of vision are:

- Eye health
- Eye teaming, which is the ability of the eyes to work together
- Eye focusing, the ability of the eyes to focus and shift focus on near and distance points
- Eye motility, when eyes can move together to read, to directly view an object or move to one viewing area to another
- Near vision, the ability to see clearly and comfortably at 10-13 inches
- Distance vision, the ability to see clearly and comfortably beyond arm's reach
- Comprehension of what the eye sees

Vision is a "guiding mechanism" in daily performance as well as in overall growth and development, including the role of eye-hand coordination.

Here are possible symptoms of eye and vision problems:

- Loses place while reading
- Places head close to the book or desk when reading or writing
- Has trouble finishing written assignments
- Has difficulty remembering, identifying and reproducing basic shapes
- Has difficulty with sequential concepts
- Has poor hand-eye coordination
- Displays evidence of developmental immaturity
- Has headaches, nausea and dizziness
- Has burning and itching eyes
- Experiences blurring of vision at any distance
- Has double vision
- Uses finger to maintain place while reading
- Omits, repeats and miscalls small words or confuses similar words
- Excessively blinks or rubs eyes
- Has difficulty remembering what was read
- Turns or tilts head to use one eye only or closes or covers one eye
- Has eyes that are crossed, turned in or out, or move independently of each other
- Has reddened, watering eyes, encrusted eyelids, frequent styes
- Dislikes or avoids close work
- Makes frequent reversals when reading or writing
- Consistently performs below potential

What to do if any of these exist:
Sometimes symptoms such as not handing in written assignments may mean the child is not sleeping well or there is another problem unrelated to vision. But if this behavior correlates with any other symptoms, or any single vision-related symptom exits, make an appointment with your family eye doctor.

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

For Parents

The Family Eye Doctor

MINNESOTA OPTOMETRIC ASSOCIATION

What is optometry?

- Doctors of optometry are independent primary care health providers who examine, diagnose, treat and manage diseases and disorders of the visual system, the eye and associated structures as well as diagnose related systemic conditions.
- As the primary eye care or family eye doctor, the optometrist is an integral part of the health care team. The management of eye care health is the focus of the family eye doctor's practice.

Specifically, doctors of optometry do the following:

- Examine the internal and external structures of the eyes to diagnose eye diseases like glaucoma, cataracts and retinal disorders; system diseases such as hypertension and diabetes; and vision conditions like nearsightedness, farsightedness, astigmatism and presbyopia.
- Test to determine the patient's ability to focus and coordinate the eyes, and to judge depth and see colors accurately.
- Prescribe medications to treat eye diseases, prescribe eyeglasses and contact lenses as well as low vision aids and vision therapy.
- Refer and work with MDs when surgery or advanced care is necessary.

The family eye doctor is accessible.

- There are over 500 doctors of optometry practicing in Minnesota.
- Optometrists are the most accessible eye care providers in the nation, with optometric services available in more than 6,900 municipalities. In more than 4,000 of these communities, optometrists are the only local primary eye care providers.

An optometrist's education:

- Following a four-year college education, optometric students receive a professional education during a four-year doctoral program. The degree of doctor of optometry (O.D.) is conferred upon graduation.
- Classroom and clinical training includes human anatomy, pharmacology, sensory and perceptual psychology, biochemistry and epidemiology as well as all aspects of vision care, optics and eye health.
- These are the unique aspects of an optometrist's education:
  - Focused education over four years on ocular and related systemic pathology.
  - The advanced study of optics.
  - The science of light and vision.
  - Lens design, construction, application and fitting.

The MOA is committed to furthering awareness of optometrists as primary eye care or family eye doctors and to bringing about change that positively impacts the MOA member doctors and their patients. For more information on the MOA, visit *www.MNEyeDocs.org.*

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For Parents

Back-In-School Eye Test

MINNESOTA OPTOMETRIC ASSOCIATION

Take this simple yes or no test for your child. If you answer "yes" to more than one question, or you have not seen your optometrist in over a year, it's probably time to schedule an appointment.

Does your infant or pre-schooler:	Yes	No
Have an eye turning inward, outward, upward, or downward frequently	☐	☐
Tend to bump into objects	☐	☐
Have red eyes or lids	☐	☐
Rub eyes frequently	☐	☐
Have excessive tearing	☐	☐
Turn or tilt head to use one eye only	☐	☐
Have encrusted eyelids	☐	☐
Have frequent styes	☐	☐
Avoid coloring, puzzles, or detailed activities	☐	☐
Experience difficulty with eye-hand-body coordination	☐	☐

Does your school-age child:	Yes	No
Lose place while reading	☐	☐
Avoid close work	☐	☐
Hold reading material closer than normal	☐	☐
Tend to rub eyes	☐	☐
Have headaches	☐	☐
Turn or tilt head to use one eye only	☐	☐
Make frequent reversals when reading or writing	☐	☐
Use finger to maintain place when reading	☐	☐
Omit or confuse small words when reading	☐	☐
Consistently perform below potential	☐	☐

Regular eye exams, starting at six months, by a doctor of optometry can help you be certain that your child's vision is developing normally. Since vision changes can occur without you or your child noticing them, your child should visit the optometrist at least every two years, or more frequently, if specific problems or risk factors exist. If needed, the doctor can prescribe treatment including eyeglasses, contact lenses or vision therapy. Keep in mind that a school vision screening, while helpful, is not a substitute for a thorough eye examination. Schedule your child's back-to-school eye examination with your optometrist to make the most of a good education.

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

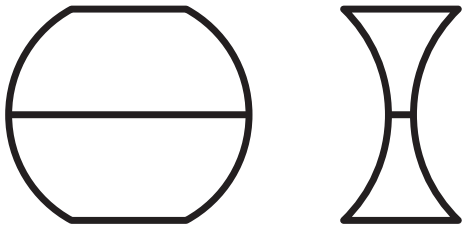
Activity Sheet
All Levels

Optical Illusions

MINNESOTA OPTOMETRIC ASSOCIATION

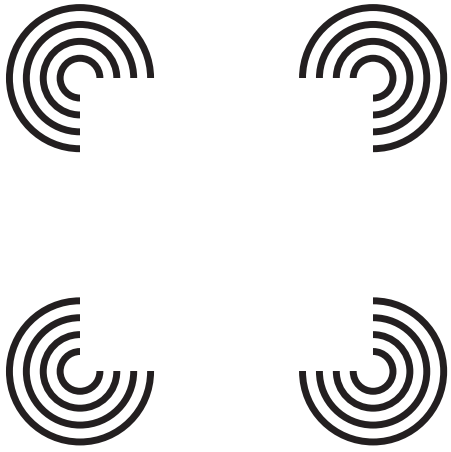
1. Which line is longer?

2. Which of the bottom lines of each object is longer?



3. What do you see?

4. What shape do you see inside the four partial circles?



For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

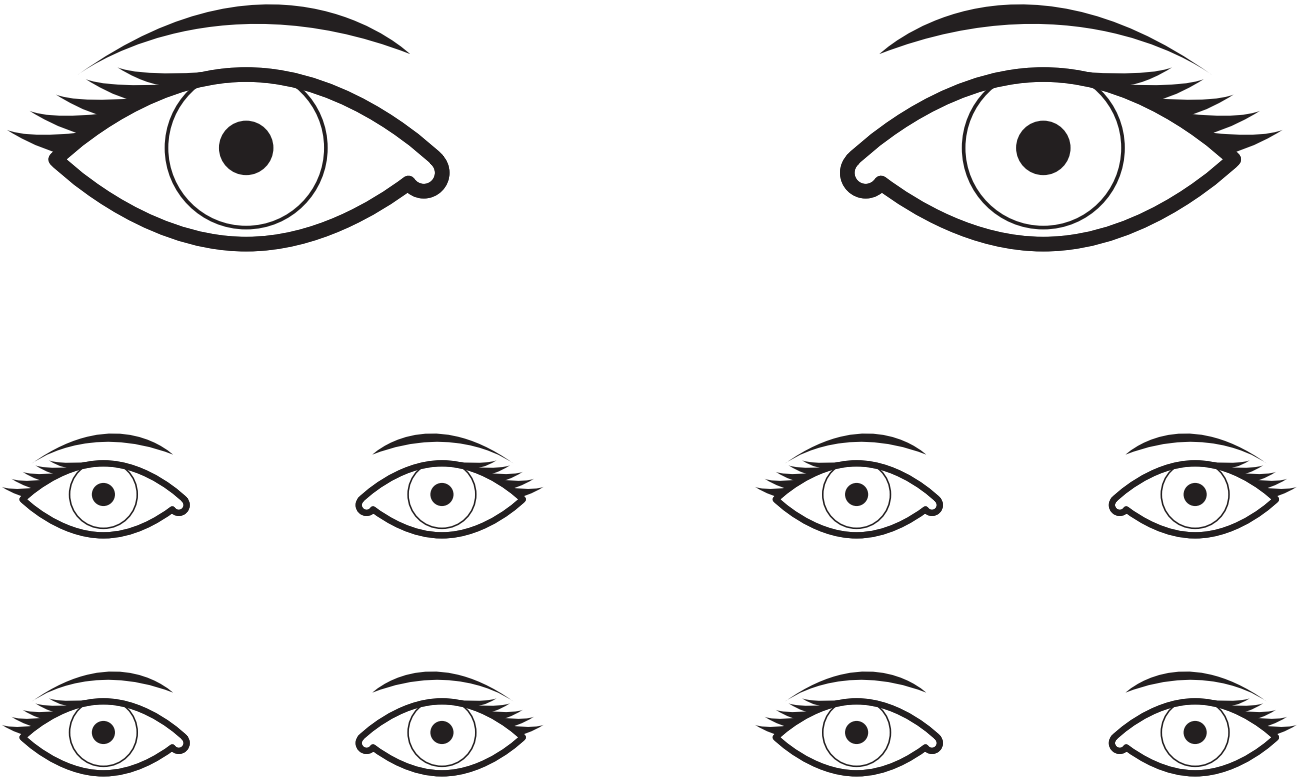
Activity Sheet
Level 1

Our Eyes Are All Different

MINNESOTA OPTOMETRIC ASSOCIATION

The part of the eye that is colored is called the iris. Everyone in the world has a different color iris! What color is your iris? That's one of many things that make you special.

Color your iris in the picture below. Color some of the other color eyes you see in your room.



For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

Activity Sheet
Level 1

Safe Eyes

MINNESOTA OPTOMETRIC ASSOCIATION

There are some things you can do to protect you and your friends' eyes.

1. Play with toys the way they were meant to be played.
2. Don't throw toys, dirt or rocks at others.
3. Don't run with sharp or pointy things in your hands.
4. If something gets stuck in your eyes, don't rub. Have an adult help you.
5. Wear safety glasses when helping an adult with sanding wood, sawing, blowing leaves or any other job that might get dust in your eyes.
6. Get plenty of sleep.
7. Make sure to have your eyes tested.

Pick one of the safety tips above and draw a picture in the space below to help teach other children.

Activity Sheet
Level 1

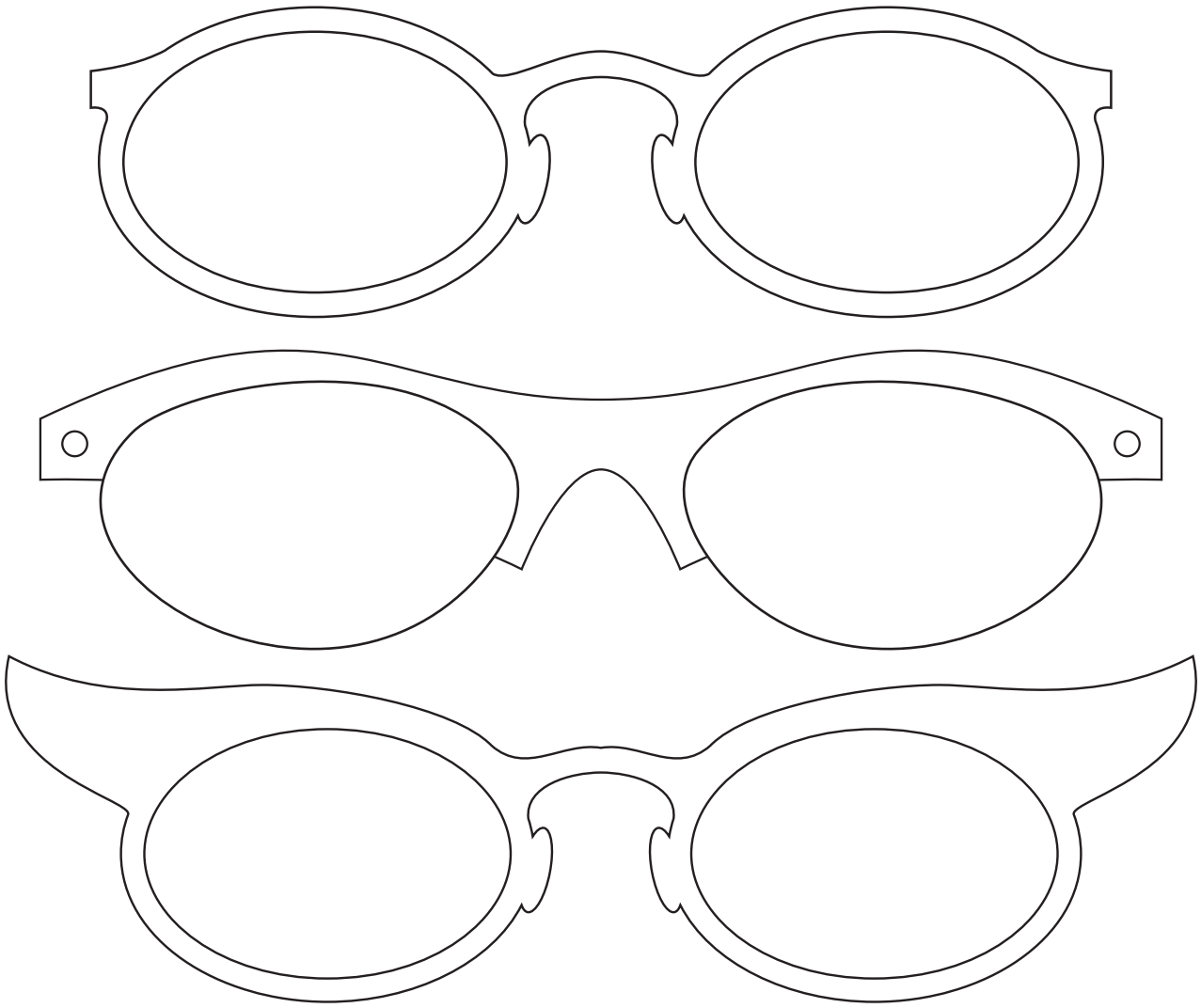
Why Do Some People Wear Glasses?

MINNESOTA OPTOMETRIC ASSOCIATION

People wear glasses or contacts so that they can see things clearly. When things are blurry, it's hard to see things like words on a black board or an exit sign if there is a fire. It's almost like glasses give that person a super-power to see things they couldn't see before.

How many people do you know that wear glasses or have contacts?

Color your own super-power glasses. What would they let you see?



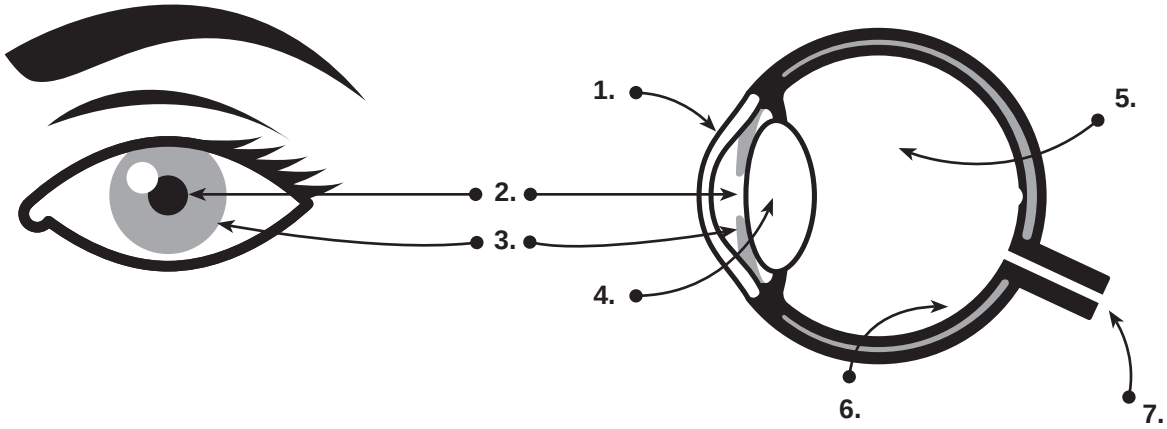
For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

Activity Sheet
Level 2 & 3

How The Eye Works

MINNESOTA OPTOMETRIC ASSOCIATION

Below is a drawing of the eye with some of the more important parts numbered. Write the names of the parts of the eye and their functions in the proper boxes. The clue list is there to help you.



	PART NAME	FUNCTION
1.		
2.		
3.		
4.		
5.		
6.		
7.		

PART NAMES
- Lens
- Retina
- Ciliary Muscle
- Optic Nerve
- Pupil
- Cornea
- Iris

FUNCTIONS
- Contains cells that detect light
- Opening to the inner eye
- Controls the size of the pupil
- Focuses image of object
- Controls shape of lens
- Transmits information to brain
- Outermost transparent layer of eye, begins focusing process

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

Activity Sheet
Level 2 & 3

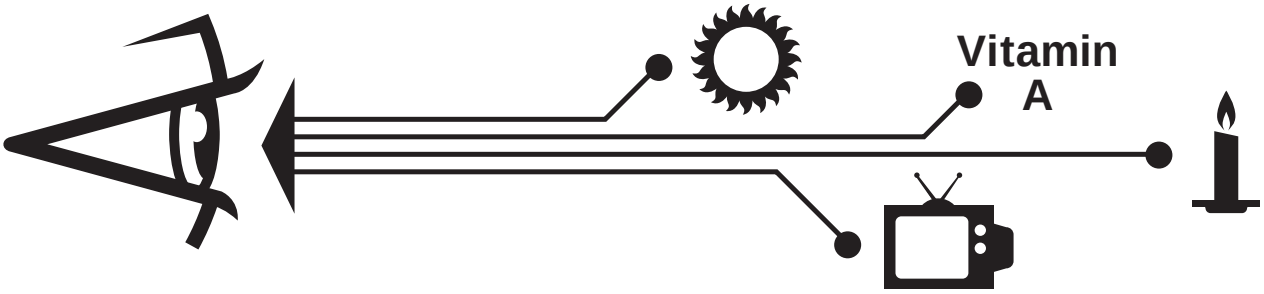
Your Eye-Q Test

MINNESOTA OPTOMETRIC ASSOCIATION

If your eyes are functioning well they will bring you clear images of the world around you. But to do so, they need your help and understanding. The statements below are designed to give you an idea of how well you understand you eyes. Check the True or False box next to each statement. The correct answers are available from your teacher.

Grade yourself as follows:

- 19-20, I understand my eyes very well
- 17-18, my view of my eyes is pretty clear
- 15-16, my concept of my eyes is a little fuzzy
- 13-14, the way I see my eyes could use a little correcting
- 12 or under, my eyes need much more understanding



	True	False	
1.	☐	☐	At a distance of ten inches, my eyes can detect an object as small as four thousandths of an inch in size.
2.	☐	☐	My eyes can distinguish only four colors.
3.	☐	☐	My eyes can see a candle 14 miles away.
4.	☐	☐	Ten percent of what I know comes through my eyes.
5.	☐	☐	Reading in dim light can put a strain on my eyes.
6.	☐	☐	When viewing the TV, I should sit a distance equal to twice the width of the screen.
7.	☐	☐	A lack of vitamin A in my diet can cause reduced night vision.
8.	☐	☐	Dilation of the pupils allows my doctor to see a better view of the inside of my eyes.
9.	☐	☐	The best color for sunglasses is blue.
10.	☐	☐	Tears contain substances that slow down bacterial growth.
11.	☐	☐	My eyelids work much like a car's windshield wipers.
12.	☐	☐	Sunglasses will allow me to look directly at the sun.
13.	☐	☐	Many prescriptions for eyeglasses are identical.
14.	☐	☐	Smoking can effect my vision.
15.	☐	☐	If I have 20/20 vision, I don't have any eye problems.
16.	☐	☐	Air pollution affects only my lungs and breathing.
17.	☐	☐	If I am nearsighted, I see near objects more clearly than distant ones.
18.	☐	☐	If I am farsighted, I see distant object more clearly than near ones.
19.	☐	☐	Glaucoma is a serious eye disease that can cause blindness.
20.	☐	☐	Regular eye examinations can help protect my eyes and general health.

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Activity Sheet
Level 2

Eyes In Action

MINNESOTA OPTOMETRIC ASSOCIATION

We all use our eyes differently. The way we use them depends on our jobs, habits and leisure activities.

To get an idea of the many ways your eyes help you every day, fill in the blanks below.

1. Today I used my eyes at home to do the following:

2. Today I used my eyes during leisure time to do the following:

3. Today I used by eyes at play or school to do the following:

Look over the items you listed above. Now complete the following:

1. At home, I take care of my eyes by:

2. At school, I take care of my eyes by:

3. During play and sports activities, I take care of my eyes by:

Now examine what you have written about how you take care of your eyes, then complete the following:

1. I care most about my eyes at HOME, at SCHOOL, PLAYING SPORTS, HANGING OUT (circle one) because:

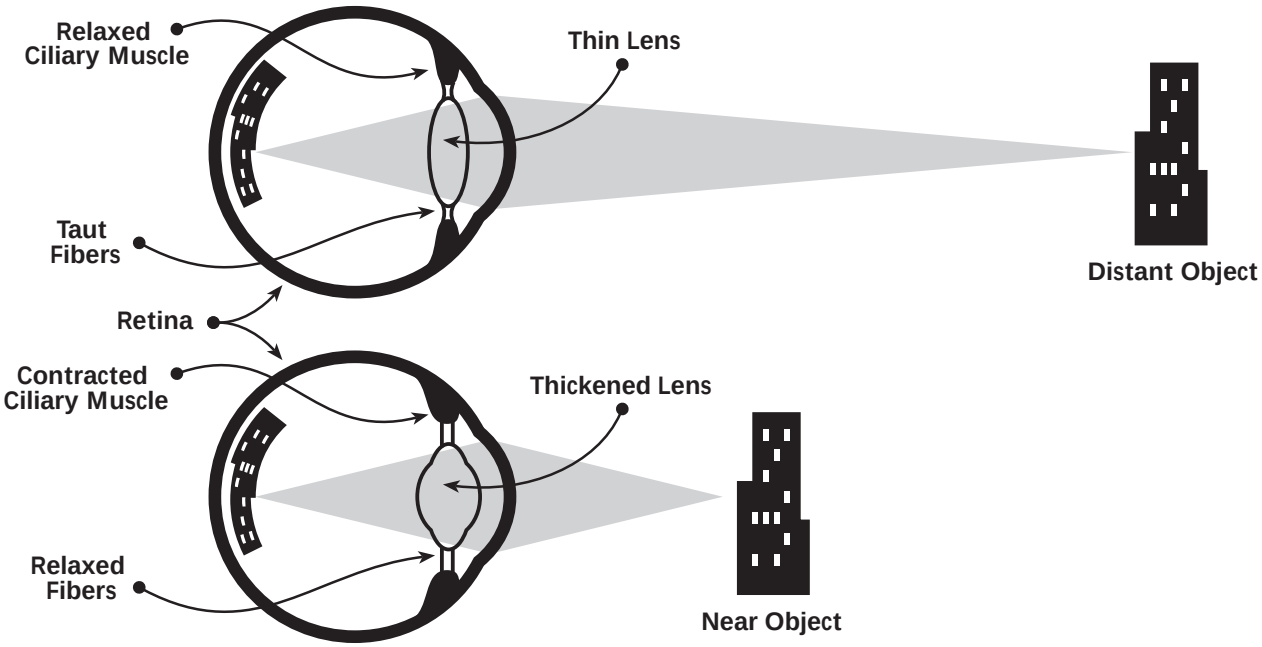
2. To take better care of my eyes, I am going to do the following:

Activity Sheet
Level 3

Focus On Seeing

MINNESOTA OPTOMETRIC ASSOCIATION

To see objects that are close up, the eye's lens must change shape according to the distance involved. The drawings show how lenses that are functioning correctly change shape to give a clear image. Look over the illustrations carefully and then fill in the statements to make them correct.



1. The shape of the lens is changed by _____.
2. For the image to be in focus, it must fall on the _____.
3. After passing through the lens, the position of the image is_____.
4. For nearsighted people, the eyeball may be too long and the image will fall in _____ of the _____.
5. For farsighted people, the eyeball may be too short and the image will fall in _____ of the _____.
6. You might be _____ if objects in the distance appear blurred.
7. Since focusing of an image in the eye is caused by the bending of light rays, your doctor of optometry can correct nearsightedness and farsightedness with glass or plastic _____.

For more information, visit the Minnesota Optometric Association web site at *www.MNEyeDocs.org.*

Activity Sheet
Level 3

Healthy Eyes Checklist

MINNESOTA OPTOMETRIC ASSOCIATION

There are many conditions that make one person's eyes function differently from another person's. Some of these conditions are associated with getting older. Others can occur at any time or may even be present from birth. Recognizing these conditions and knowing how they can be treated are important parts of your eye care program. Below are three random lists: EYE CONDITIONS, DEFINITIONS, and TREATMENTS. Indicate which EYE CONDITION goes with the DEFINITION and TREATMENT. (NOTE: Some conditions have the same treatment.)

EYE CONDITION	DEFINITION	TREATMENT
1. Nearsightedness (myopia)		
2. Farsightedness (hyperopia)		
3. Astigmatism		
4. Presbyopia		
5. Strabismus (crossed-eyes)		
6. Amblyopia (lazy eye)		
7. Glaucoma		
8. Cataracts		

DEFINITION

A. A gradual decline in focusing ability due to normal aging.

B. Near objects are seen more clearly than ones that are far away.

C. The two eyes are not aligned. They look in different directions at the same time.

D. Objects are seen more clearly when they are far away than at near distance.

E. An eye disease in which the fluid pressure in the eyeball is too high.

F. Cloudy spots or patches on the eye's normally clear lens.

G. A condition that causes a loss of sharp vision usually in one eye and usually in very young children.

H. A condition caused when the shape of the cornea is more oval than round.

TREATMENT

1. Detection before age three is vital. Treatment includes corrective lenses and vision therapy.
2. Vision therapy to develop coordination of eye muscles or, sometimes surgery on eye muscles.
3. Treatment includes corrective lenses and/or vision therapy.
4. Drugs or surgery.
5. Prescription eyeglasses and, in some cases, contact lenses.
6. Lenses during early stages, surgery later.

Classroom Exercise
All Levels

Day and Night

MINNESOTA OPTOMETRIC ASSOCIATION

Learning Objective:
To understand how the eyes react and adjust to light.

Materials:
A mirror and a flashlight

Procedure:
Set up a mirror in a darkened room. A student or several students should stand in front of a mirror for a few minutes. They should be able to notice that the pupils in their eyes have become larger. That is because, in the dim light, the muscles in the iris enlarge the pupil to let in more light. Now, give the flashlight to the student or students and instruct them to carefully shine it at their eyes while they continue to look into the mirror. Ask them what they see. They should see their pupils react by becoming smaller to let in less light.

Ask students to give examples from their everyday lives of the effects of light on their eyes. These might include:

- Entering a dark movie theater on a sunny day, and then leaving the theater to return to the bright sunlight.
- Being awakened by a bright light when you are sleeping.
- Being on an amusement park ride that suddenly goes into a tunnel.

Classroom Exercise
All Levels

Pinhole Focusing

MINNESOTA OPTOMETRIC ASSOCIATION

Learning Objective:
To show that light travels in a straight line and can be focused to form an image or picture.
To illustrate the effect a lens has in bending light rays.

Materials:
Poster board, sheet of waxed paper, scissors, push pin, darning needle, masking tape, a drop light or table lamp shielded to emit the most light in one direction.

Procedure:
Cut a piece of poster board about 12 inches square. Make a small, clean hole in the center of the poster board with a push pin. (Make sure the hole is very small and very sharp.) In a very dark room, ask one student to hold the poster board with the pinhole in line with, and between 5 to 10 feet away from, the drop light or lamp. Ask another student to hold the waxed paper about an arm's length away from the poster board. Explain that the waxed paper serves as a screen, and that an image focused by the pinhole will appear on that screen upside down.

Demonstrate this by asking a third student to hold an object, such as a scissors, between the light source and the poster board. Ask the student to move the waxed paper closer and farther away and ask students to tell you what they observe.

Conduct the same demonstration two or three more times, enlarging the hole gradually each time until it is the size of the circumference of a darning needle. The image should become brighter and more blurred due to overlapping light rays. If the hole gets too large, mask it with tape and start again.

Explain to the students that the cornea and lens of the eye bend the entering light rays and narrow them to focus on the retina. Note that at this point the picture is upside down, just as the students saw in the demonstration. The image is turned around in the brain and we "see" it right side up.

NOTE: Since you are performing this experiment in a dark room, remind students to be careful.

For Students

Safety Tips for Eyes

MINNESOTA OPTOMETRIC ASSOCIATION

Eyes are very precious. They allow you to read, to draw, to learn, to play, to see people, to watch television. In fact, nearly everything you do begins with what you see. *So, protect your eyes. Take care of your vision. Our world is full of wonderful things to see!*

There are five important eye safety tips to remember:

1. Be careful not to throw, point or run with sharp objects.
2. Stay away from BB guns, bows-and-arrows and sling shots that can shoot objects in your eyes.
3. Use proper lighting for reading, writing, using your computer or watching television.
4. If something gets in your eyes, wash them out with water right away.
5. Tell your parents or teacher if you have trouble seeing clearly. You may need to see your optometrist, a doctor who can help you see better.

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For Educators

Activity Sheets Answer Key

MINNESOTA OPTOMETRIC ASSOCIATION

How The Eye Works, Level 2 & 3

ANSWERS:

1. Cornea.
   Outermost transparent layer of eye.
   Begins focusing process.
2. Pupil.
   Opening to the inner eye.
3. Iris.
   Controls size of pupil.
4. Lens.
   Focuses image of object (on retina).
5. Vitreous Humor.
   A jelly-like fluid that keeps the eye round.
6. Retina.
   Contains cells that detect light.
7. Optic Nerve.
   Transmits information to the brain.

Your Eye-Q Test, Level 2 & 3

ANSWERS:

1. True	11. True
2. False	12. False
3. True	13. False
4. False	14. True
5. False	15. False
6. False	16. False
7. True	17. True
8. True	18. True
9. False	19. True
10. True	20. True

Focus On Seeing, Level 3

ANSWERS:

1. Ciliary Muscles
2. Retina
3. Inverted or upside down
4. Front, Retina
5. Back, Retina
6. Nearsighted or Myopic
7. Lenses

Healthy Eyes Checklist, Level 3

ANSWERS:

1. B-3	5. C-2
2. D-3	6. G-1
3. H-3	7. E-4
4. A-5	8. F-6

Optical Illusions, All Levels

ANSWERS:

1. They are the same lengths.
2. They are the same lengths.
3. You may see a vase or two faces looking at each other. You may see both, but not at the same time.
4. You should clearly see a square box, even though it is not drawn, just suggested by the partial circles.