

Human Vision

Textbook pages 202–215

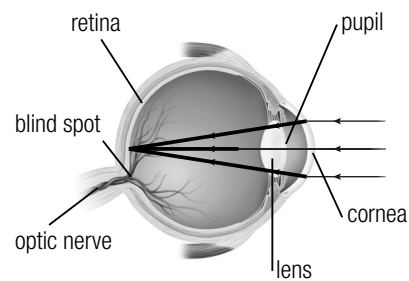
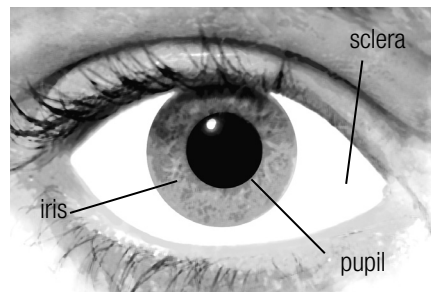
Before You Read

Some people can see things clearly from a great distance. Other people can see things clearly only when they are nearby. Why might this be? Write your thoughts below.

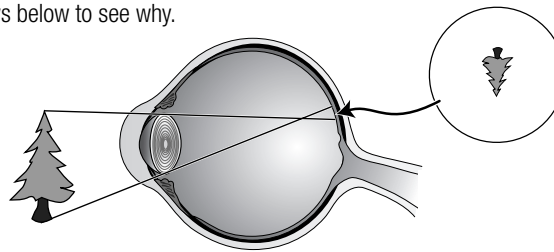
Mark the Text

Identify Details

As you read the section, use one colour to highlight the text or labels that describe the parts of the eye. Use another colour to highlight facts about light and human vision.



The image of an object that is formed on the retina is upside down. Follow the light rays below to see why.



What happens to light that enters the eye?

1. First, light rays are refracted by the cornea. The cornea does most of the focussing of the light rays.
2. Next, the refracted rays enter the eye through the pupil. The iris changes the size of the pupil. The pupil gets larger to let more light in if light levels are dim. The pupil gets smaller to let less light in if light levels are bright.
3. Then the light rays pass through the lens. They converge on the retina. The lens gets thicker to help focus light rays from objects that are closer to you. The lens gets thinner to help focus light rays from objects that are farther away.
4. The image formed on the retina is upside down. Cells in the retina change the image into electrical signals.
5. The electrical signals are sent to the brain along the optic nerve. As the brain interprets the signals, it changes the image so that it is upright. ✓

Reading Check

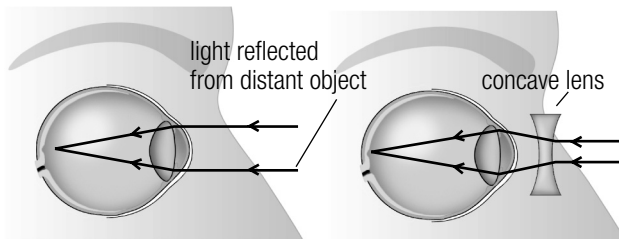
1. What is the path of light rays from outside the eye to the retina?

How can lenses help correct vision problems?

- ◆ **Near-sightedness:** A person who is near-sighted can see objects clearly when they are close to the eye. Distant objects look fuzzy. This condition happens if the light rays converge before they reach the retina. A concave lens can help diverge the light rays before they reach the cornea. Then, as the light rays pass into the eye, they will converge on the retina to form a clear image.
- ◆ **Far-sightedness:** A person who is far-sighted can see objects clearly when they are far from the eye. Nearby objects look fuzzy. This condition happens if the light rays do not converge by the time they reach the retina. A convex lens can help the light rays to start to converge before they reach the cornea. Then, as the light rays pass into the eye, they converge on the retina to form a clear image.
- ◆ **Astigmatism:** If the shape of the cornea is irregular, light rays can focus in more than one place on the retina, resulting in a condition called **astigmatism**. This problem can also be corrected using lenses. ✓

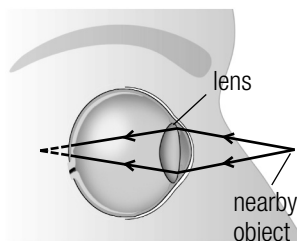
✓ Reading Check

2. What are three reasons why an image might look fuzzy?

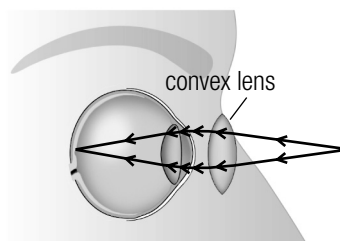


Near-sighted vision: image falls short of retina (eye has longer shape than normal eye)

Vision corrected with concave lens: lens allows image to fall on retina



Far-sighted vision: image falls behind retina (eye has shorter shape than normal eye)



Vision corrected with convex lens: lens allows image to fall on retina

Use with textbook pages 202–210.

Parts of the eye

Use the vocabulary words in the box below to label the parts of the eye. Place the correct letter on the line next to each part of the eye.

Vocabulary	
a. iris b. lens c. pupil d. sclera e. retina f. cornea g. optic nerve	

Use the same vocabulary words in the box above to fill in the blanks below. Each word can be used only once.

8. Light rays are first refracted by the _____.
9. Surrounding the cornea is an opaque white tissue called the _____.
10. Light enters the eye through an opening in the centre called the _____.
11. The _____ is the coloured circle of muscle surrounding the pupil. It controls the amount of light entering the eye.
12. Light then passes through the flexible, convex _____ which can change its shape.
13. Once light is refracted by the lens, it is focussed on the _____ at the back of the eye, where an image is formed.
14. Light-sensitive cells detect the image and an electric message is sent to the brain through the _____.

Use with textbook pages 202–210.

Inside the eye

Part of each statement below is false. Rewrite each statement to make it true.

1. The lens does most of the focussing of the light rays that pass through the eye.

2. The light rays that pass through the eye diverge.

3. In bright light, the iris makes the pupil larger to allow more light to enter.

4. The human eye has a concave lens.

5. The lens of the eye produces an upright image.

6. Light rays are sent to the brain through the optic nerve.

7. People who are near-sighted cannot bring nearby objects into focus.

8. Far-sightedness can be corrected by using a concave lens.

Name _____

Date _____

Use with textbook pages 208–209.

Vision problems

Complete the following table. One answer is provided for you.

Problem	Description	Where is image formed?	How is the problem corrected?
Near-sightedness	Nearby objects are clear, but distant objects are fuzzy.		
Far-sightedness			
Astigmatism			

Use with textbook pages 202–210.

Human vision

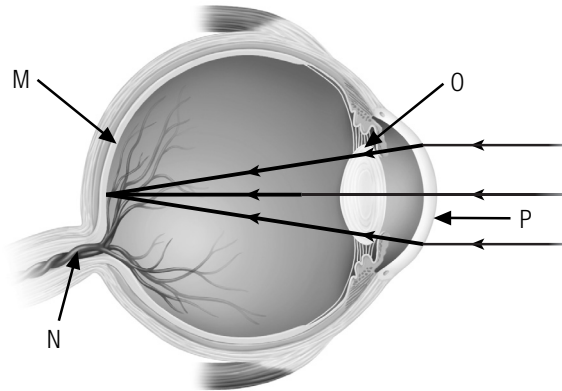
Match each Term on the left with the best Descriptor on the right. Each Descriptor may only be used once.

Term	Descriptor
1. _____ normal vision	A. image forms behind the retina
2. _____ astigmatism	B. image forms in front of the retina
3. _____ far-sightedness	C. no image is formed
4. _____ near-sightedness	D. image forms on more than one point on the retina
	E. image forms on the retina

Circle the letter of the best answer.

- Which of the following is referred to when we speak about the colour of someone's eyes?
 - iris
 - pupil
 - retina
 - sclera
- Which of the following is the white part of the eye?
 - iris
 - pupil
 - sclera
 - cornea
- Which of the following statements is **true**?
 - The pupil is larger in dim light.
 - The pupil never changes in size.
 - The pupil is smaller in dim light.
 - The pupil is larger in bright light.

Use the following diagram to answer questions 8 to 10.



- Which of the following structures represents the convex lens of the eye?
 - M
 - N
 - O
 - P
- What is the function of the structure labelled N in the diagram?
 - to focus the light
 - to send electrical signals to the brain
 - to provide nutrients and support for the cornea
 - to control the amount of light that enters the eye
- Which structure does most of the focussing?
 - M
 - N
 - O
 - P
- Which of the following describes how the image of an object appears on the retina?
 - it is reversed right to left
 - it is upright
 - it is upside down
 - it is a mirror image of the actual object