

Vision

by Sophia

WHAT'S COVERED

In this lesson, you will learn about the eye—its structure and its function—and the processes that happen that allow us to be able to see. Specifically, this lesson will cover:

1. Outer Parts of the Eye

The **sclera** is the white of the eye and is made of dense, fibrous tissue that helps provide protection for the eye. The **cornea** is a clear extension of the sclera that covers the **iris** and helps to focus light by bending or refracting it.

The **lens** is the part of your eye that helps to focus incoming light. As light enters in through your eye, it actually enters through your **pupil**, which is right in front of the lens. The light will then hit the lens. Then, that light will be refracted (bent) towards the back of the eye.



The space between the lens and the cornea is filled with **aqueous humor**. Aqueous humor is a gel-like substance that helps maintain pressure and also helps to transmit light to the lens. The outermost layer of the eye is the conjunctiva; it consists of mucus and blood vessels that protect the outside of the eye.

The pupil is the opening in the iris (the colored part of the eye that makes us "blue-eyed", "green-eyed", "grayeyed", "hazel-eyed" or "brown-eyed"). The pupil can constrict or dilate to control the amount of light that enters the eye. If it's really bright outside and you're out, the pupil actually constricts to allow a less light in. Or if you're in a really dim room, your pupils will dilate to try and let more light in, so that you can see a little bit more clearly.

⑦ DID YOU KNOW

The iris is kind of like another set of fingerprints. The patterns, colors, and variation in a person's iris are unique to them. So it's a very individualistic part that can be used in some cases to identify a person.

TERMS TO KNOW

Sclera

The white of the eye that aids in protection.

Cornea

A layer that covers the iris and helps to focus light into the eye.

Iris

The colored portion of the eye.

Lens

A structure in the eye that focuses light to the retina.

Pupil

The black part of the eye through which light enters.

Aqueous Humor

Fluid within the eyeball that maintains pressure and transmits light.

2. Inner Parts of the Eye

Within the eye, you can find the **vitreous humor** that helps to maintain pressure, support the eye, and helps the eye maintain its shape. The vitreous humor is similar to the aqueous humor, but it's found behind the lens and there's much more of it.



The **retina** is within the back of the eye; the lens focuses incoming light so that it shines on the retina. The retina contains rods and cones, which are **photoreceptors** that help to process this incoming light and allow

you to see images and colors.

The **fovea** is an area in the retina where vision is the sharpest and is densely packed with all of these different types of photoreceptors. The **optic nerve** is the part of the eye that will then send information up to the brain for interpretation.

TERMS TO KNOW

Vitreous Humor

Fluid within the eyeball (between the lens and the retina) that supports the lens and the eyeball.

Retina

An area in the back of the eye that contains photoreceptors to absorb light.

Photoreceptor

A sensory receptor that detects visible light.

Fovea

An area of the retina where vision is the most acute.

Optic Nerve

A nerve that sends impulses to the visual cortex in the brain, where images are interpreted.

3. Rods and Cones

In the first step of **vision**, light enters as a wave through the pupil and the lens will focus it onto the retina. Then, rods and cones will convert the light signal into an electrical impulse conducted by the optical nerve to the brain.

Rods and **cones**, which are photoreceptors found within the retina, are connected to the neurons that send visual information to the **visual cortex**. The axons from neurons within the retina converge to form the optic nerves that carry visual information to the cortex to be processed within the brain.



Rods get their name because they have a rod shape to them. Rods are what allow us to see in dim light and

IN CONTEXT

If you're trying to make out an object in dim light, it may help to look at through your peripheral vision, rather than looking at it straight on. That's because most of your cone cells (which work better in bright light) are in the center of your retina, while most of your rod cells (which are better at detecting dim light) are near the edge of the retina.

Cones, on the other hand, contain a different visual pigment, and they allow for daytime vision and for you to be able to see in bright light. There are actually three different types of cones: red, green, and blue.

If you think back to our rods, the reason that we can't see colors in the dark is that we can only see coarse images in the dark in black and white. In a dark environment, there isn't enough light to activate cones so we have a more difficult time processing colors.

IN CONTEXT

If you were to walk into a dark room and hold up two different colors of shirts, you wouldn't be able to tell the actual color of either of them. In order to be able to interpret color, you need to be in the presence of bright light.

🔶 🛛 BIG IDEA

Rods and cones are the two different types of visual receptors that are found in your retina. They allow for dim light, coarse perception, daytime vision, and bright light, and the difference in their shape is how they get their name.

Rods and cones contain visual pigments, which change their shape when different wavelengths of light are absorbed. Each color of light relates to a different wavelength of light. The wavelengths of red, blue, green, purple, or yellow are all different from one another. These visual pigments change shape, depending on the type of wavelength that's absorbed. Visual pigments contain a version of the protein opsin, plus retinal, which is derived from vitamin A.

⑦ DID YOU KNOW

If you've ever heard someone tell you before that eating a diet high in carrots will help with your vision, there is actually some truth behind that. Carrots are high in vitamin A, and retinal is derived from vitamin A.

TERMS TO KNOW

Vision

The perception of light, images, and movement by the eye.

Rod Cell

A photoreceptor cell that detects dim light.

Cone Cell

A photoreceptor cell that detects bright light.

Visual Cortex

The part of the brain that receives nerve impulses from the optic nerve.

SUMMARY

This lesson has been an overview of vision. Specifically, you learned about the structure of the **inner and outer parts of the eye** and how vision works with **rods and cones**. Finally, you took an in-depth look at the rods and cones in your retina.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND

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TERMS TO KNOW

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Cone Cell

A photoreceptor cell that detects bright light and color.

Cornea

A layer that covers the iris and helps to focus light into the eye.

Fovea

An area of the retina where vision is the most acute.

Iris

The colored portion of the eye.

Lens

A structure in the eye that focuses light to the retina.

Optic Nerve

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