Your Eyes

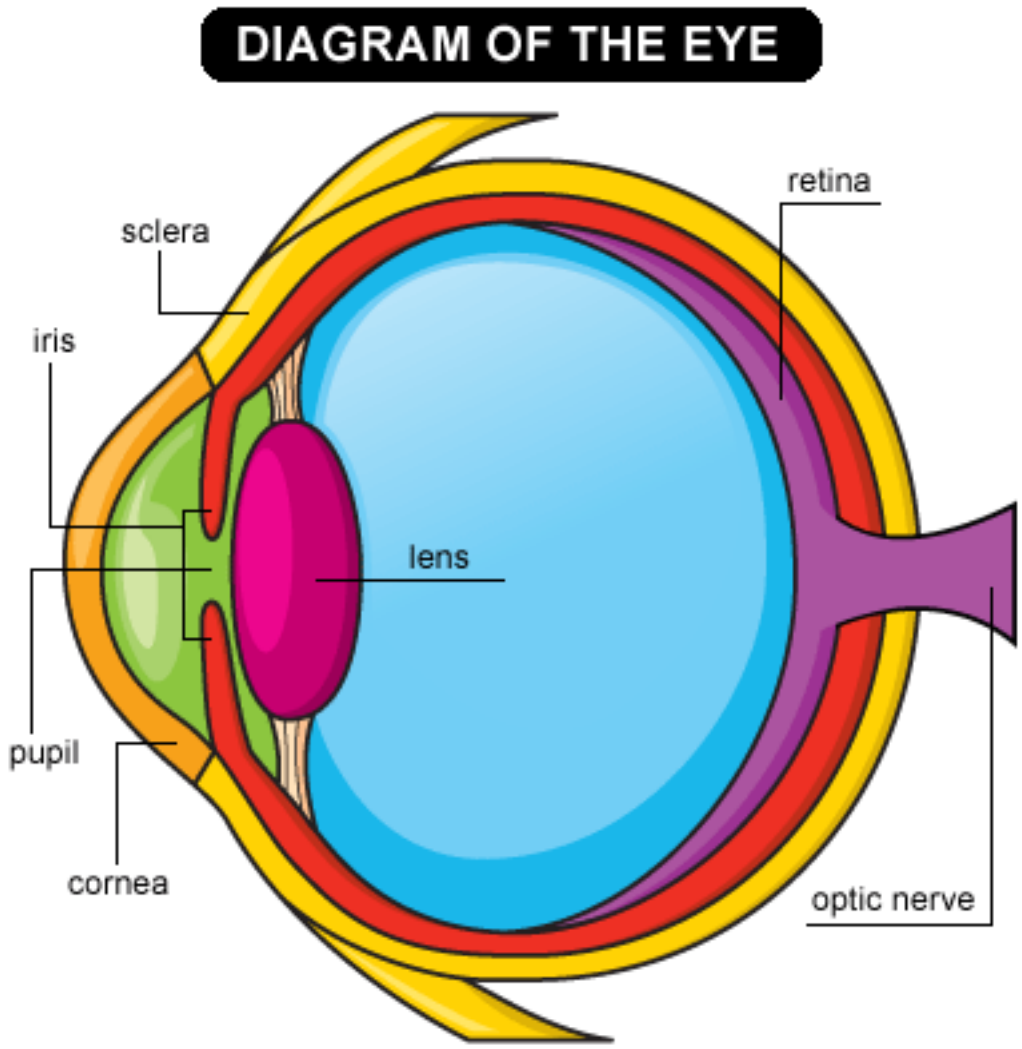
Which part of your body lets you read the back of a cereal box, check out a rainbow, and see a softball heading your way? Which part lets you cry when you're sad and makes tears to protect itself? Which part has muscles that adjust to let you focus on things that are close up or far away? If you guessed the eye, you're right!

Your eyes are at work from the moment you wake up to the moment you close them to go to sleep. They take in tons of information about the world around you — shapes, colors, movements, and more. Then they send the information to your brain for processing so the brain knows what's going on outside of your body.

You can see that the eye's pretty amazing. So, come on — let's take a tour of its many parts.

The Parts of the Eye

You can check out different parts of the eye by looking at your own eye in the mirror or by looking at (but not touching) a friend's eye. Some of the eye's parts are easy to see, so most friends will say OK. Most friends won't say OK if you ask to see their liver!



Big as a Ping Pong Ball

The eye is about as big as a ping-pong ball and sits in a little hollow area (the eye socket) in the skull. The eyelid protects the front part of the eye. The lid helps keep the eye clean and moist by opening and shutting several times a minute. This is called **blinking**, and it's both a voluntary and involuntary action, meaning you can blink whenever you want to, but it also happens without you even thinking about it.

The eyelid also has great reflexes, which are automatic body responses, that protect the eye. When you step into bright light, for example, the eyelids squeeze together tightly to protect your eyes until they can adjust to the light. And if you flutter your fingers close (but not too close!) to your friend's eyes, you'll be sure to see your friend's eyes blink. Your friend's eyelids shut automatically to protect the eye from possible danger. And speaking of fluttering, don't forget eyelashes. They work with the eyelids to keep dirt and other unwanted stuff out of your eyes.

The white part of the eyeball is called the **sclera** (say: SKLAIR-uh). The sclera is made of a tough material and has the important job of covering most of the eyeball. Think of the sclera as your eyeball's outer coat. Look very closely at the white of the eye, and you'll see lines that look like tiny pink threads. These are blood vessels, the tiny tubes that deliver blood, to the sclera.

The **cornea** (say: KOR-nee-uh), a transparent dome, sits in front of the colored part of the eye. The cornea helps the eye focus as light makes its way through. It is a very important part of the eye, but you can hardly see it because it's made of clear tissue. Like clear glass, the cornea gives your eye a clear window to view the world through.

Iris Is The Colorful Part

Behind the cornea are the iris, the pupil, and the anterior chamber. The **iris** (say: EYE-riss) is the colorful part of the eye. When we say a person has blue eyes, we really mean the person has blue irises! The iris has muscles attached to it that change its shape. This allows the iris to control how much light goes through the **pupil** (say: PYOO-pul).

The pupil is the black circle in the center of the iris, which is really an opening in the iris, and it lets light enter the eye. To see how this works, use a small flashlight to see how your eyes or a friend's eyes respond to changes in brightness. The pupils will get smaller when the light shines near them and they'll open wider when the light is gone.

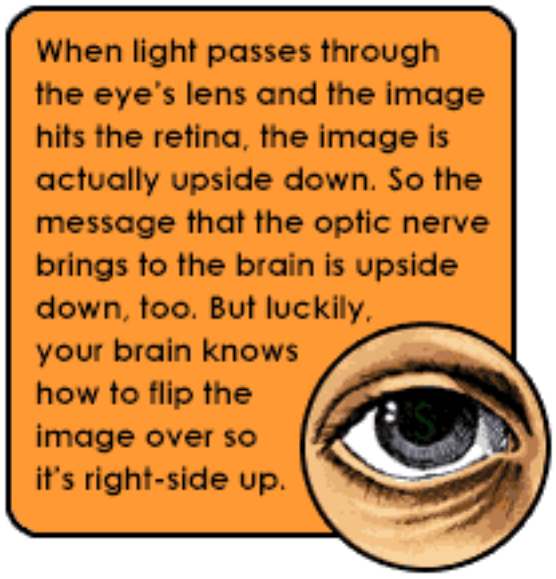
The **anterior** (say: AN-teer-ee-ur) **chamber** is the space between the cornea and the iris. This space is filled with a special transparent fluid that nourishes the eye and keeps it healthy.

Light, Lens, Action

These next parts are really cool, but you can't see them with just your own eyes! Doctors use special microscopes to look at these inner parts of the eye, such as the lens. After light enters the pupil, it hits the lens. The lens sits behind the iris and is clear and colorless. The lens' job is to focus light rays on the back of the eyeball — a part called the **retina** (say: RET-i-nuh).

The lens works much like the lens of a movie projector at the movies. Next time you sit in the dark theater, look behind you at the stream of light coming from the projection booth. This light goes through a powerful lens, which is focusing the images onto the screen, so you can see the movie clearly. In the eye's case, however, the film screen is your retina.

Your retina is in the very back of the eye. It holds millions of cells that are sensitive to light. The retina takes the light the eye receives and changes it into nerve signals so the brain can understand what the eye is seeing.



A Muscle Makes It Work

The lens is suspended in the eye by a bunch of fibers. These fibers are attached to a muscle called the **ciliary** (say: SIL-ee-air-ee) **muscle**. The ciliary muscle has the amazing job of changing the shape of the lens. That's right — the lens actually changes shape right inside your eye! Try looking away from your computer and focusing on something way across the room. Even though you didn't feel a thing, the shape of your lenses changed. When you look at things up close, the lens becomes thicker to focus the correct image onto the retina. When you look at things far away, the lens becomes thinner.

The biggest part of the eye sits behind the lens and is called the **vitreous** (say: VIH-tree-us) **body**. The vitreous body forms two thirds of the eye's volume and gives the eye its shape. It's filled with a clear, jelly-like material called the vitreous humor. Ever touch toy eyeballs in a store? Sometimes they're kind of squishy — that's because they're made to feel like they're filled with vitreous humor. In a real eye, after light passes through the lens, it shines straight through the vitreous humor to the back of the eye.

Rods and Cones Process Light

The retina uses special cells called **rods** and **cones** to process light. Just how many rods and cones does your retina

have? How about 120 million rods and 7 million cones — in each eye!

Rods see in black, white, and shades of gray and tell us the form or shape that something has. Rods can't tell the difference between colors, but they are super-sensitive, allowing us to see when it's very dark.

Cones sense color and they need more light than rods to work well. Cones are most helpful in normal or bright light. The retina has three types of cones. Each cone type is sensitive to one of three different colors — red, green, or blue — to help you see different ranges of color. Together, these cones can sense combinations of light waves that enable our eyes to see millions of colors.

Helping You See It All

Rods and cones process the light to give you the total picture. You're able to see that your friend has brown skin and is wearing a blue hat while he tosses an orange basketball.

Sometimes someone's eyeball shape makes it difficult for the cornea, lens, and retina to work perfectly as a team. When this happens, some of what the person sees will be out of focus.

To correct this fuzzy vision, many people, including many kids, wear glasses. Glasses help the eyes focus images correctly on the retina and allow someone to see clearly. As adults get older, their eyes lose the ability to focus well and they often need glasses to see things up close or far away. Most older people you know — like your grandparents — probably wear glasses.

To the Brain!

Think of the optic nerve as the great messenger in the back of your eye. The rods and cones of the retina change the colors and shapes you see into millions of nerve messages. Then, the optic nerve carries those messages from the eye to the brain!

The optic nerve serves as a high-speed telephone line connecting the eye to the brain. When you see an image, your eye "telephones" your brain with a report on what you are seeing so the brain can translate that report into "cat," "apple," or "bicycle," or whatever the case may be.

Have No Fear, You Have Tears

For crying out loud, the eye has its own special bathing system — tears! Above the outer corner of each eye are the **lacrimal** (say: LAK-ruh-mul) **glands**, which make tears. Every time you blink your eye, a tiny bit of tear fluid comes out of your upper eyelid. It helps wash away germs, dust, or other particles that don't belong in your eye.

Tears also keep your eye from drying out. Then the fluid drains out of your eye by going into the lacrimal duct (this is also called the tear duct). You can see the opening of your tear duct if you very gently pull down the inside corner of your eye. When you see a tiny little hole, you've found the tear duct.

Your eyes sometimes make more tear fluid than normal to protect themselves. This may have happened to you if you've been poked in the eye, if you've been in a dusty or smoking area, or if you've been near someone who's cutting onions.

And how about the last time you felt sad, scared, or upset? Your eyes got a message from your brain to make you cry, and the lacrimal glands made many, many tears.

Your eyes do some great things for you, so take these steps to protect them:

- Wear protective goggles in classes where debris or chemicals could go flying, such as wood shop, metal shop, science lab, or art.
- Wear eye protection when playing racquetball, hockey, skiing, or other sports that could injure your eyes.
- Wear sunglasses. Too much light can damage your eyes and cause vision problems later in life. For instance, a lens could get cloudy, causing a cataract. A cataract prevents light from reaching the retina and makes it difficult to see.

The eyes you have will be yours forever — treat them right and they'll never be out of sight!

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