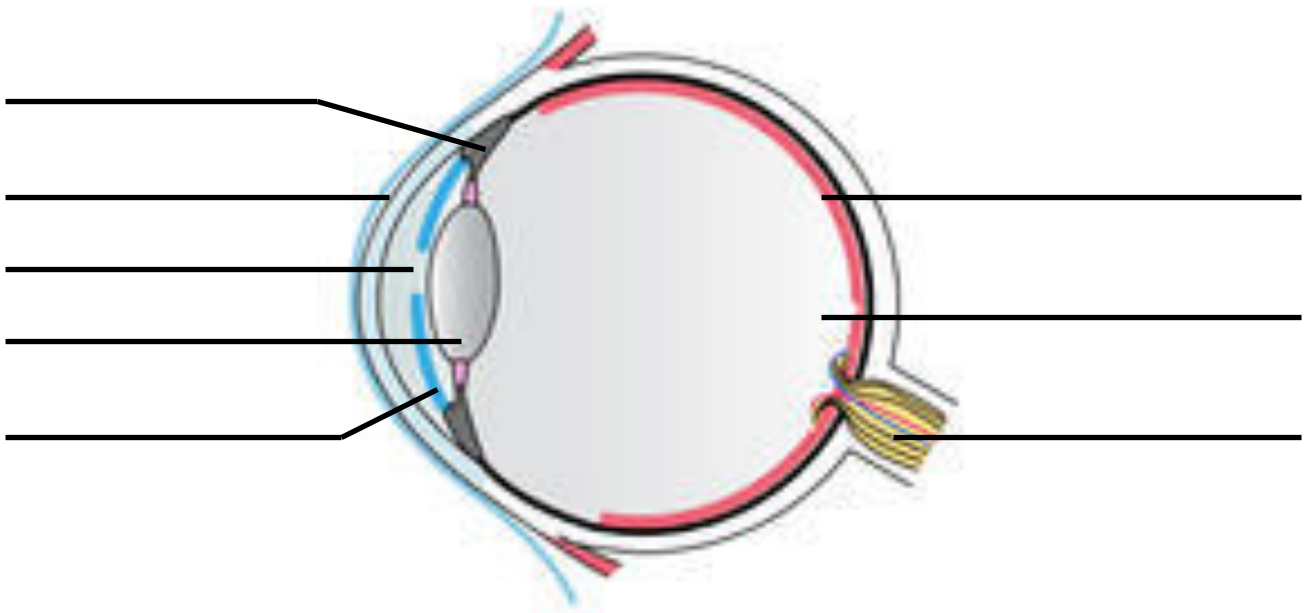


Eyes and cameras capture images using the properties of light. If you want to produce realistic images, the devices that can use the same optical principles that your eyes use to capture images.

4.1 Image Formation in Eyes and Cameras

The eye is a _____ technology that uses a _____ to form images.
Label the diagram of the eye, using page 231 of your text:



Light either travels from a source to your eyes, or reflects off an object to your eyes. Light travels into the eye through an opening called the _____. The pupil is a hole created by a circular band of _____ called the _____. The iris _____ the size of the pupil depending on how much light is in the surrounding environment:

Fill in the table describing what happens to each part of the eye depending on the amount of light in the classroom:

	Iris	Pupil	Picture
Dim Light			
Bright Light			

Image Formation in the Eye

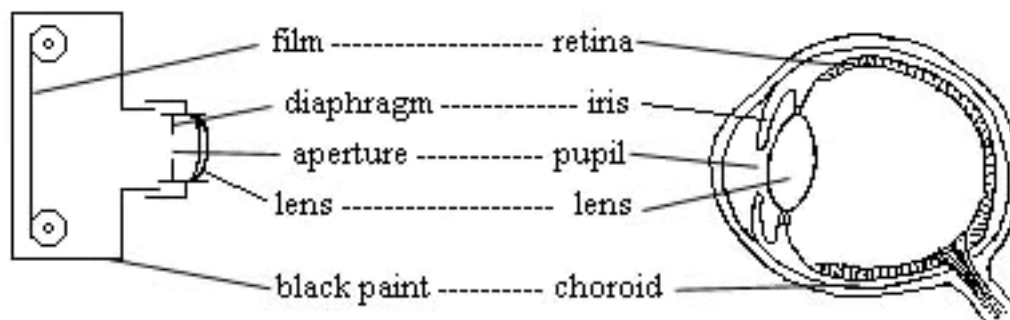
Images are formed when light focuses on the back of the eye, allowing your brain to form an image. The following steps are what is required to see.

- 1) Light passes through the _____ entering the eye through the _____.
- 2) The _____ muscles contract and relax to change the shape of the _____. This allows the light to focus properly.
- 3) Light focuses on the _____, stimulating the _____ located there.
 - a. Cones - _____
 - b. Rods - _____
- 4) Photoreceptors send a message to the _____, which passes the message to the brain.

Fun Fact: Since light passes through a lens, the image formed on the retina is upside down. Our brain allows us to see the image the right way.

The optic nerve creates a blind spot in the human eye, as there are no photoreceptors. Try to find your blind spot on page 233 (*Give it a Try*)

Images are formed in cameras in a very similar way. This is why human and other mammalian eyes are classified as _____ eyes.

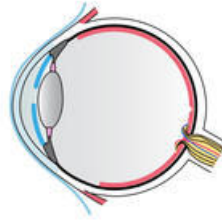


Compare cameras and eyes on the worksheet and submit for grading.

To better understand the human eye, we will complete a dissection of a cow's eye. If you do not think you can handle the dissection, let Miss. C know in advance to set up an alternative task.

Correcting Vision Problems

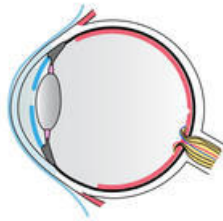
Normal Vision:



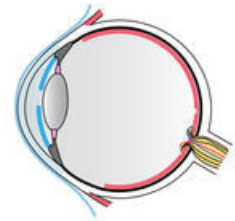
Many people have difficulty seeing because they are unable to effectively _____ light on the retina. The _____ are not able to effectively reshape the lens.

Farsightedness (hyperopia)

People who are farsighted cannot see _____ objects clearly. The eye cannot make the lens _____ enough to focus light and the image falls behind the retina.



Far-sightedness

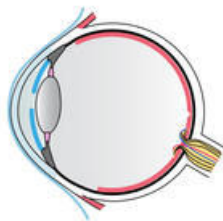


Corrected by a convex lens

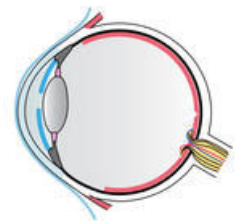
The _____ lens helps to narrow the light so that it focuses on the retina.

Nearsightedness (Myopia)

People who are nearsighted cannot see _____ objects clearly. The eye cannot make the lens _____ enough to focus light and the image falls in front of the retina.



Near-sightedness



Corrected by a concave lens

The _____ lens helps spread light out so the image extends to the retina.

Laser Eye Surgery

Surgeons can use lasers to reshape the _____. As you recall from the dissection lab, the cornea is the thick outer layer that protects the eye. By reshaping it, the cornea acts like a _____.

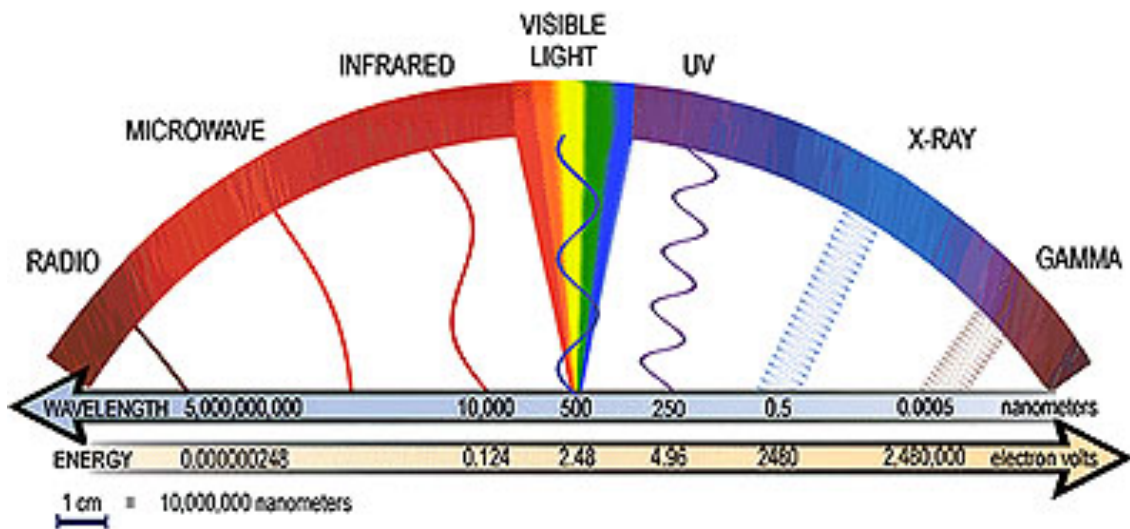
Vision Enhancing Technology

_____ are a useful piece of technology that aides our vision in low light. These goggles work in the following way:

- 1) Light is focused onto an image _____
- 2) Inside the intensifier, the light _____ releases a stream of particles.
- 3) The particles hit a phosphor-coated screen.
- 4) The _____ glow green when the particles strike them.
- 5) The person wearing the goggles sees a green glowing image.

Draw and label a diagram that shows how night vision goggles work (page 235):

3.1.2 The Wave Model of Light



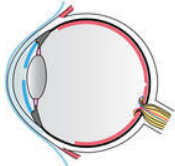
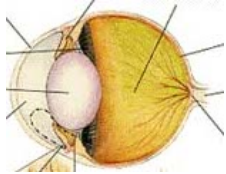
Each colour of light in the spectrum has a different wavelength (*see pg 215*). The human eye is able to view the wavelengths of light that fall in the visible light spectrum. There are some creatures in the animal kingdom that can see outside this spectrum.

4.2 Animal Eyes

Camera Eyes

Most _____ (animals with backbones) have camera eyes. The structure of the eye varies depending on how the animal uses it.

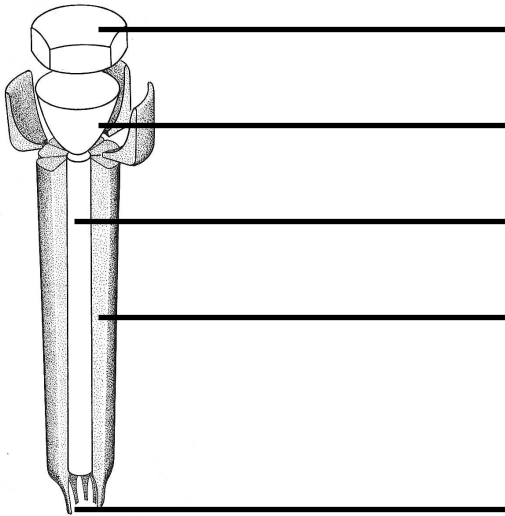
Read pg. 236-7 to describe differences between the following eyes camera eyes.

Human Eye	Fish Eye	Avian Eye	Cat Eye
			

Compound Eyes

Insects and crustaceans have compound eyes. If you look closely at these creatures, you will see that each eye is made up of _____ smaller units.

Each individual unit in a compound eye is called an _____.



Compound eyes are GREAT at spotting _____.

Despite this, having _____ lenses makes it difficult to form a single, coherent _____. The image formed is referred to as a "_____ " because it is made up of lots of small dots of light.

4.3 Image Storage and Transmission

The eye is very effective at forming images; however, unless one has an eidetic the ability to remember what we have seen is not. There are many ways in which we can store images:

Digital Images

Digital images use the same principle as _____. Stadium images are created when large groups of people hold a coloured card, depicting an image. Creating stadium pictures takes a lot of _____.

When a computer receives an image, it _____ the picture into small elements called _____ (short for pic_____ el_____). The pixels act like the individual colour cards of a stadium image. The computer is able to remember the placement of each piece in order to recreate the image.

While You Watch: Take notes on how pixels are coloured while watching the video found on the class website.

Images that have a _____ number of pixels will have a _____
_____ and be of better quality.

Images that have a _____ number of pixels will have a _____
_____ and be of poor quality.



If you are working with a large image on a computer, how can you improve the quality of it? _____

If you are working with a small image on a computer, what might happen if you try to enlarge it? _____

Use information from pages 231-234 (film camera) and page 243 (digital images) to compare the 2 technologies:

Film Camera	Digital Camera

Transmitting Digital Images

Digital information is very _____ in that you can _____ information much further and more easily than ever before (*REMEMBER, if you take a digital photo and send it to even one person, you have lost absolute control of that photo*).

Though you need to be careful with information being sent, digital transmission has many advantages. Read page 244 and list those advantages below:
