White light is a mixture of many wavelengths (colors) and retinal cells react differently to different wavelengths.

How the human eye sees color
Light is part of a range of waves called the -
________________________ __________________. Color is how we perceive the________________ of light. All of the colors of visible light have________________ energies. __________ light has the lowest energy and __________ light has the highest energy. As you move through the spectrum of visible light from red to violet, the energy of the light ________________.

Photoreceptors
Our eyes have two types of photoreceptors: ___________ cells and ___________ cells. Cone cells respond to _______________ and there are three types. One type responds best to ________ light. Another type responds best to ______________ light and the last type responds best to ________ light. We see a wide range of colors depending on how each kind of ____________ cell is stimulated. For example, we see __________ light when all three types of cones (red, green, blue) are equally stimulated.

Rod Cells
Rod cells respond only to differences in light ________________, and not to color. Rod cells detect ____________, ____________, and shades of ____________. However, rod cells are more sensitive than cone cells especially at low light levels. At ________________, colors seem washed out because there is not enough light for cone cells to work. When the light level is very dim, you see “black and white” images transmitted from your ____________ cells. An average human eye contains about ________ million rod cells and ________ million cone cells. Each one contributes a “dot” to the total image assembled by your ____________. The brain evaluates all 137 million “dots” about 15 times each second.

Cone Cells
The cone cells are concentrated near the ________________ of the retina, making color vision best at the center of the eye’s field of view. Each cone cell “colors” the signals from the surrounding rod cells. Our eyes work according to an ________________ color process. Three photoreceptors (red, green, and blue) in the eye operate ________________ so that we see millions of different colors. The color you “see” depends on how much ________________ is received by each of the three different types of cone cells. The brain thinks “green” when there is a strong signal from the ________________ cone cells but no signal from the ________________ or ________________ cone cells.
Perception of Color

We perceive different colors as a combination of ______________ of the three additive primary colors: red, green, and blue. For example, we see yellow when the brain gets an equally strong ______________ from both the red and the green cone cells at the same time. Whether the light is actually yellow, or a combination of red and green, the cones respond the same way and we perceive ______________. If the red signal is stronger than the green signal we see orange. If all three cones send an equal signal to the brain, we interpret the light we see as ______________. The human eye can see any color by adding different percentages of the three ______________ primary colors. Mixing red and green light is one way the eye sees the ______________ yellow or orange, for example. Keep in mind that you perceive these colors even though the light itself is still red and green.

You can also see pure yellow light or orange light that is not a mixture of red and green. For example, ______________ street lights produce pure yellow light, not a mixture of yellow and green.

Not everyone sees color the same way.

A condition called ______________ blindness affects about _______ percent of males and 0.4 percent of females. This means that about one out of every _______ men has color blindness and about one out of every 250 women has color blindness. Although color blindness can be caused by ______________ disease, it is most often an ______________ condition. More males than females have color blindness because of how the genes that determine our sex are inherited. Males have a X and a Y chromosome; females have two X chromosomes. The color blindness alleles are on the X chromosome which males receive only from their _______________; they receive the Y chromosome from their _________________. Because females receive two X chromosomes, they have two chances to inherit the alleles for ______________ color vision. People who are color blind have trouble seeing certain colors. The most common condition is ______________ color blindness. People with this type of color blindness have trouble seeing reds and greens. Less common is blue-green color blindness. ______________ color blindness means that the person can only see shades of gray. Fortunately, this condition is rare. It is easy to lead a normal life with color blindness. Having color blindness just means that an individual must look for ways to ______________ to situations where color is involved. For example, color is extremely important when driving because traffic lights and street signs are color-coded. Fortunately, in most states, the traffic lights are vertical and the colors are in the same ______________—red on top, yellow in the center, and green on the bottom.