

## Light Refraction and Focused Vision in the Eye

(0:00 - 2:56)

Welcome to another spotlight video where we walk you through a spotlight figure from your textbook. This video walks you through the refractive problem spotlight found in chapter 9. After watching this video you should be able to describe how the eye focusses an image in normal vision and why some people are nearsighted or farsighted. Have you ever wondered how glasses correct vision or what is a cataract? When light passes from the air into your eyes the light is refracted or bent.

This bending begins at the cornea and continues through the rest of the eye because these structures are denser than air. In a normal eye looking at distant images the ciliary muscle is relaxed, the lens is flat, and the light from that object is bent to focus a clear image on the retina surface. Another name for normal vision is emetropia.

But not everybody has normal vision. People with nearsightedness or myopia can see nearby objects clearly but distant objects are blurry. The nearsighted eye is too long and shaped a bit like a football so when viewing distant objects light is bent but focusses too soon at a point in front of the retina.

When the light reaches the retina it is out of focus so the image is blurry. Nearsightedness is corrected with a diverging lens that refracts the light to focus it correctly on the retina. People with farsightedness or hyperopia can see distant objects clearly but have difficulty seeing things nearby.

Hyperopia results from an eye that is too shallow. Light focusses on a point behind the eye so again the light striking the retina is not focused and the image is blurry. A converging lens can correct for farsightedness.

It's very common that as people age and the lens loses elasticity near objects become blurry. This form of hyperopia called presbyopia is why many adults require reading glasses. In summary in normal vision refracted light properly focusses on the retina.

In nearsightedness the image focusses in front of the retina and is corrected with a diverging lens while in farsightedness the light focusses behind the retina and is corrected with converging lens. And as many people age and their lens becomes less elastic presbyopia can develop requiring the use of reading glasses. So what? Why is it important to understand how the eye focusses an image on the retina? Well this is important to understanding more complex eye conditions such as a cataract, a loss of lens transparency resulting from ageing called senile cataracts, excessive sun exposure or even drug interactions.

A cataract interferes with vision by reducing the amount of light reaching the retina. Vision declines despite functioning photoreceptors. Treatment for a severe cataract includes lens

replacement with an artificial substitute.