



Errors of refraction

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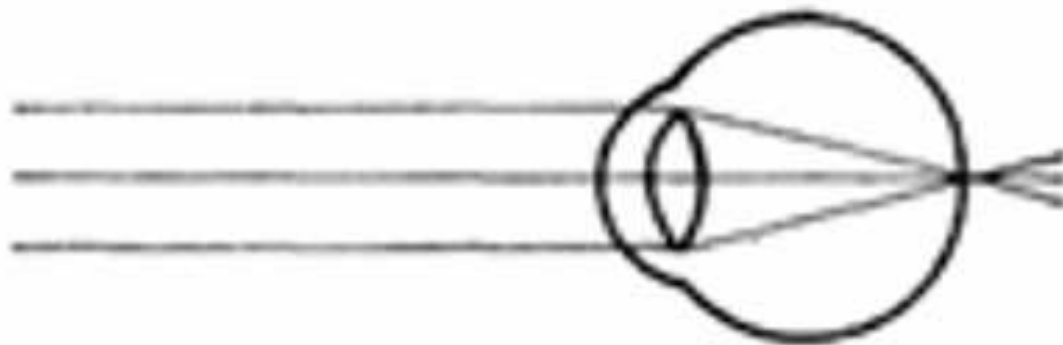
Main points

- Emmetropia
- Myopia
- Hypermetropia
- Astigmatism
- Presbyopia
- Amblyopia



Emmetropia

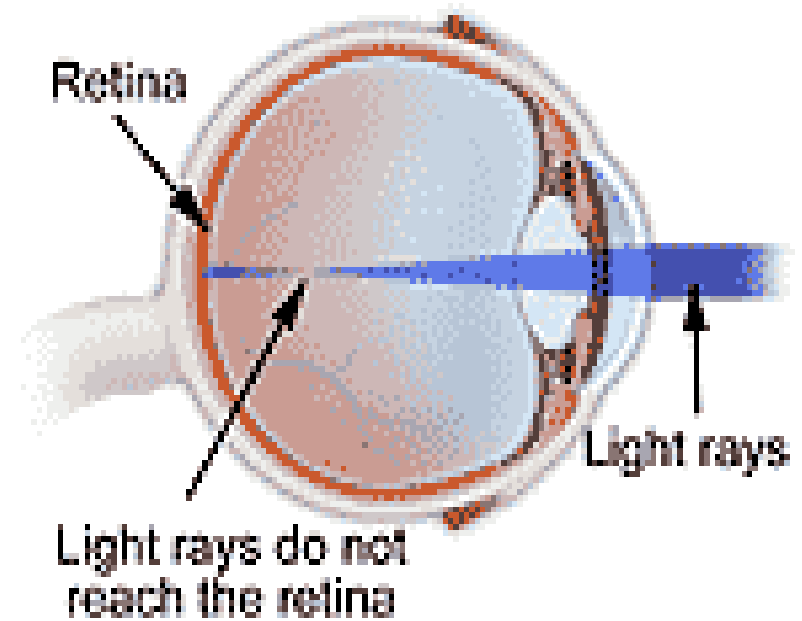
- Normal eye
- No refractive error
- The cornea and lens serve to focus light onto the light-sensitive retina



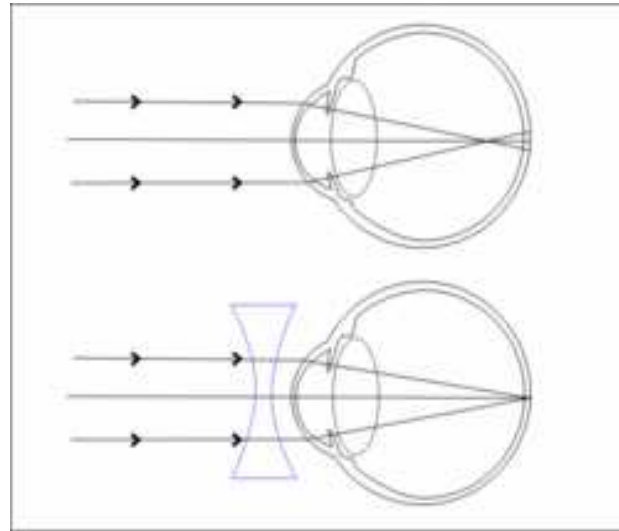


Myopia

- **Nearsightedness**
- Eye is too long or the cornea is too steep
- Images fall in front of the retina, causing distant objects to appear blurry



Correction of myopia



- concave (divergent) lens: lenses have negative dioptric value which compensates for the excessive positive diopters of the myopic eye

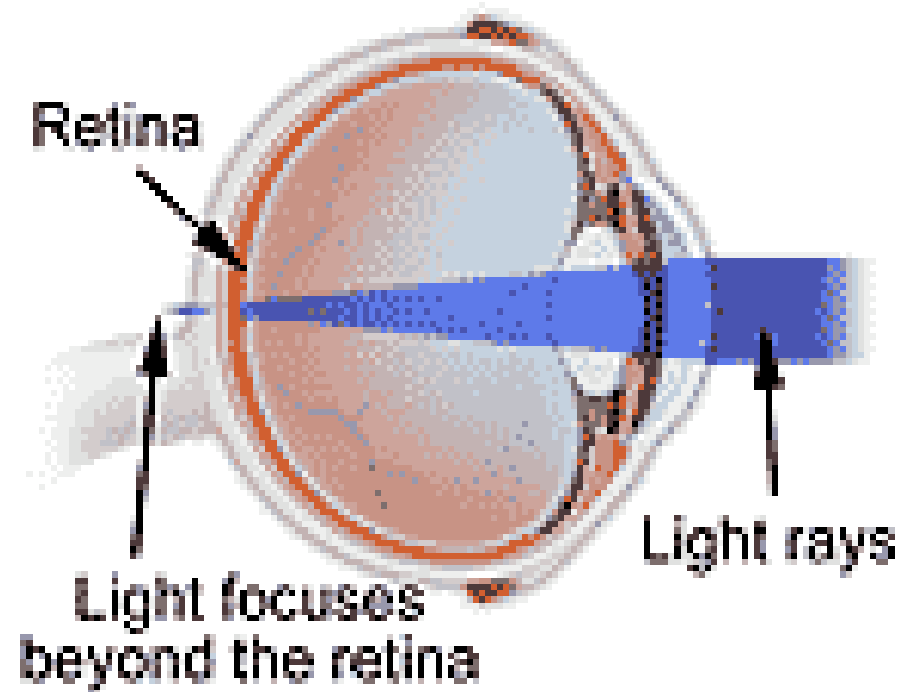
Correction of myopia



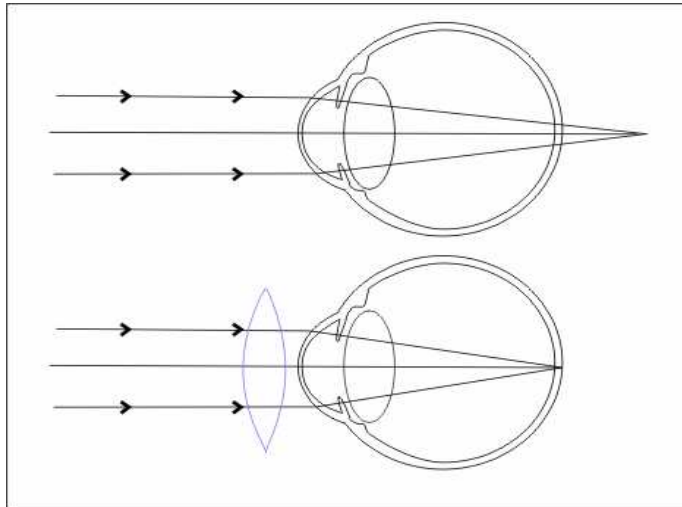
- Myopia also may be corrected by refractive surgery, such as LASIK

Hypermetropia

- **Farsightedness**
- A hyperopic eye is shorter than usual or the cornea is too flat
- Images are not in focus when they reach the retina, causing close objects to appear blurry



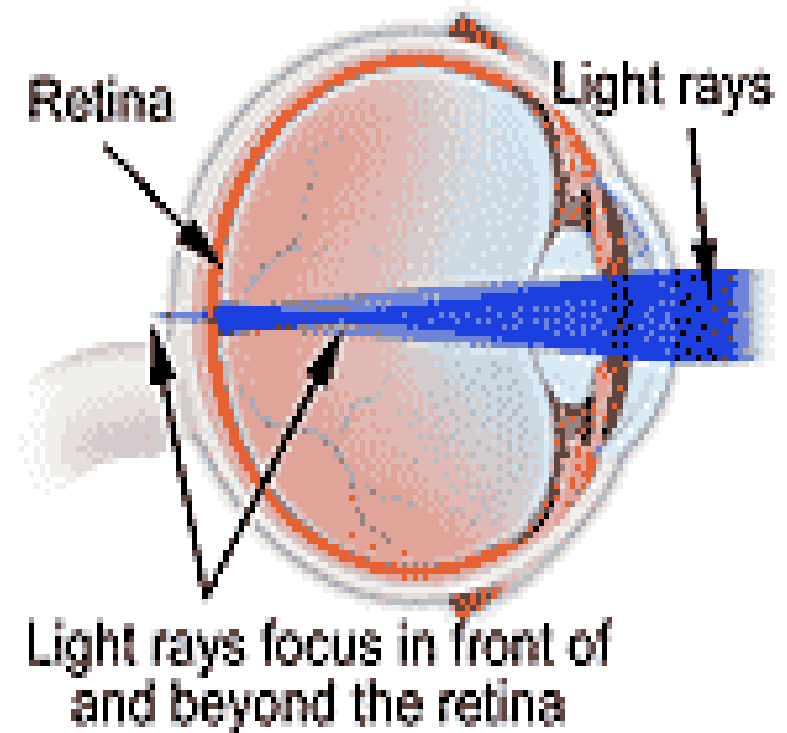
Correction of hypermetropia



- Convex (convergent) lens: lenses have positive dioptric value
- Refractive surgery may be able to correct some forms of hyperopia

Astigmatism

- An astigmatic eye has an uneven cornea
- Images fall in front of and beyond the retina, causing both close and distant objects to appear blurry





Symptoms of astigmatism

- Distortion or blurring of images at all distances
- Headache and fatigue
- Squinting and eye discomfort or irritation

Correction of astigmatism

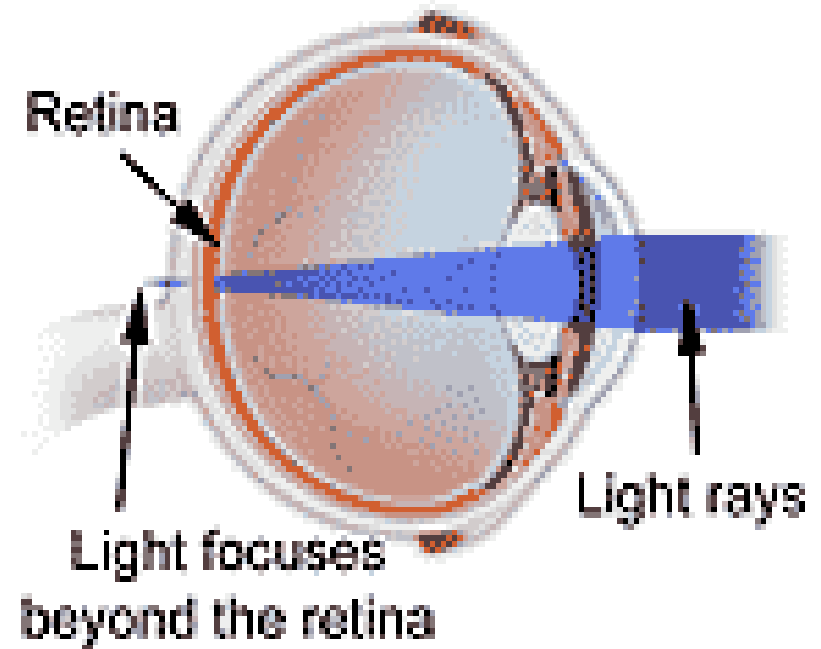
- Astigmatism can often be corrected by glasses with a cylindrical lens (i.e. a lens that has different radii of curvature in different planes)

Astigmatism

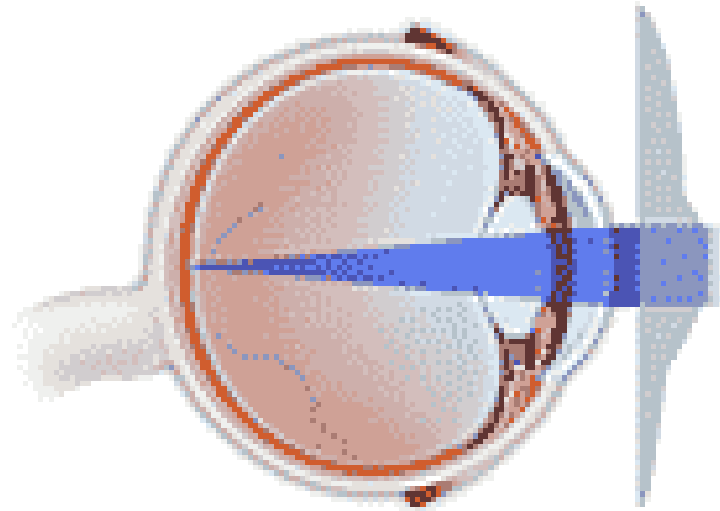


Presbyopia

- Is the eye's diminished ability to focus that occurs with ageing
- With presbyopia, the eye's lens can no longer change shape to focus on close objects
- Images are not in focus by the time they reach the retina



Correction of presbyopia



- Reading glasses or bifocals bend the light rays to move the focal point onto the retina.

Amblyopia

- „lazy eye“
- It is decreased visual acuity of one eye (uncorrectable with lenses) in the absence of organic eye disease insufficient enough to explain the level of vision.
- It is caused by visual deprivation due to any cause (congenital or acquired) during the critical period of development (up to age 8-9 yrs) that prevents the establishment of normal vision in the involved eye.





Correction of amblyopia

- **Amblyopia is not correctable by glasses or contact lenses**
- **Patching** or covering one eye may be required for a period of time ranging from a few weeks to as long as a year. The better-seeing eye is patched, forcing the "lazy" one to work, thereby strengthening its vision.
- **Medication**—in the form of eye drops or ointment—may be used to blur the vision of the good eye in order to force the weaker one to work. This is generally a less successful approach.



Keywords

Acquired...získaný

Ageing...stárnutí

Blurry...neostrý, rozmazaný

Congenital...vrozený

Curvature...zakřivení

Focus...zaostřovat

Fatigue...únava

Insufficient...nedostatečný

Steep...příkrý, strmý

Squinting...šilhavý, šilhající

Uncorrectable...nekorigovatelný

Uneven...nepravidelný, nerovnoměrný

Visual acuity...zraková ostrost