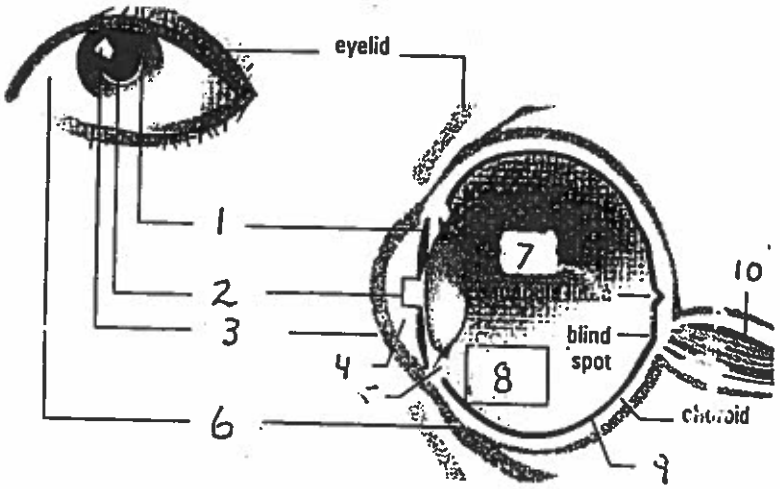
The Human Eye and Vision



	#	Eye Part	Function
*	1	iris	changes size to regulate amount of light
*	2	pupil	hole through which light enters the eye
*	3	cornea	first part of eye where retraction takes place
	4	aqueous humour	colourless, watery fluid to help maintain the shape of the eye
	5	ciliary muscles	muscles used to change the shape of the lens to change focus
	6	sclera	outer coating that protects the eye
*	7	lens	flexible to accomodate a change in focus
	8	vitreous humour	colourless, jelly-like fluid to help maintain the shape of the eye
*	9	retina	"carpet" of light sensitive cells
*	10	optic nerve	transmits neural signals to the brain

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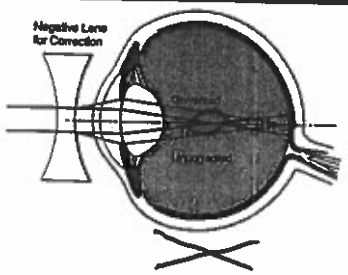
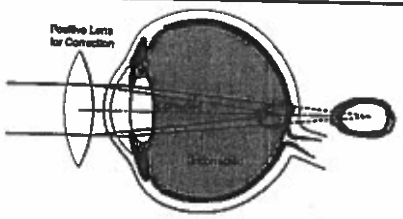
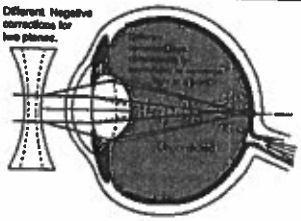
Eye Defects

Problem	Uncorrected (black rays)	Correction (red rays)
Myopia (near-sightedness)	The cornea and lens converge the light from distant objects too much, because the lens cannot become flat enough. The focused image is in front of the retina: the light which should be focused sharply is spread out on the retina making the image of distant objects blurry.	 A corrective diverging lens is used (glasses or contacts), spreading the light out more before it goes in to the eye so that the focussed image is now on the retina.
Hyperopia (far-sightedness)	The cornea and lens do not converge the light from close objects enough, because the lens cannot become bulgy enough. The focussed image is behind the retina: the light is spread out on the retina making the image of close objects blurry.	 A corrective converging lens is used (glasses or contacts), converging the light some before it goes in to the eye so that the focussed image is now on the retina.
Astigmatism	The lens has different focal lengths along different axes. Light coming from points along one line (e.g. horizontal) could be perfectly focused, while light from points in a vertical line is not clearly focused.	 A corrective lens that is asymmetrically ground, having different focal lengths for different axes, is needed.
Glaucoma	Damage to the optic nerve to the brain results in permanent vision loss.	No known way to reverse damage.
Cataracts	Cloudy areas develop in the normally clear lens with age to block and distort light.	Glasses or surgery in severe cases.
Colour Blindness	Not all three cones function properly. Although different colours of light are received, they are not perceived as being different because the cones fire in the same "signal ratio" for different mixes of wavelengths.	Hereditary – it's in the genes!

See page 376-78 for more details on eye defects.