

Human eye		structure		Functions		Functions (cont)
Eyebrows	prevent sweat from running into the eyes	Orbit	socket in the skull	Sclera	tough white coat	made up of muscles which controls the size of pupil to regulate the amount of light entering the eyes
Eyelash	traps dust and prevent it from running into the eyes		attached by 3 pairs of eye muscles		protects inner structure	
Eyelid	protect eyes from dirt and strong light	3 eye muscles	allow eyeball to rotate in different direction		maintain shape of eyeball	contains pigment that determine the colour of iris
	spread tears over eye surface when blinking	Conjunctiva	transparent membrane		surface for the attachment of eye muscle	
Tear gland	produces tears (sodium, chloride..) kills bacteria		keeps front of eyes lubricated and moist	Cornea	transparent layer of tissue	Pupil
Tear duct	drains tear into nasal cavity				allows light to enter the eye	an opening at centre of the iris
Process of seeing		Types of photoreceptors			a curved surface to help refract and focus light on retina	allows light to enter the eyes
1	light rays from object enters the eye	Rod cells	Cone cells			size is controlled by iris
	refracted and focused onto retina	more numerous	less numerous			
by	cornea, aqueous humour, lens, vitreous humour	sensitive to low light intensity	sensitive to high light intensity			Retina
cornea	most of the refraction	important for dim light vision	important for bright light vision	Choroid	middle layer of eyeball	innermost layer of eyeball
lens	fine focusing	black and white vision	color vision (red, green, blue)		contains black pigment that absorbs light	contains many photoreceptors and nerve fibres
2	real and inverted image formed on retina	Distribution of photoreceptors on retina			pigment reduces reflection of light within the eye and helps form sharp images	photoreceptors : rod or cone cells
3	photoreceptors stimulated by light generate nerve impulse	Rod cells	periphery of the retina		rich in capillaries as it supplies nutrients to sclera and retina	Optic nerves
	nerve impulse travel along optic nerve to visual centre		none at yellow spot and blind spot			nerve fibres in retina grouped
4	visual centre in cerebrum interpret nerve impulse as an upright image of object	Cone cells	concentrated at yellow spot	Iris	continuous with the choroid	transmits nerve impulses from photoreceptors to cerebrum of brain
			a few present on periphery of retina			Yellow spot
						high density of cone cells
						no rod cells
						Blind spot
						no photoreceptors
						Lens
						transparent, elastic, biconvex
						refracts and focuses light on retina

Functions (cont)		Drawing ray diagrams		Near objects		Long sighted	
	thickness adjusted by ciliary body	Light rays (distant)	parallel	Ciliary muscles	contract	Vision problem	cannot see near objects clearly
	living cells with no nuclei	Light rays (near)	come from the same point of object	Tension	reduced	Cause	lens too thin
				Suspensory ligaments	slackened		eyeball too short
	no capillaries as it obtains nutrients from aqueous humour	Reminders	add arrows dotted lines behind retina	Lens	thicker (more convex) refracts more light	Image	formed behind the retina
Suspensory ligament	connected to ciliary body	Seeing in dim light		Eye strains	ciliary muscles contracting for a long time	Correction	convex lens (converge light)
Ciliary body	contains ciliary muscles	Circular muscles of iris	relaxes	Distant objects		Color blindness	
	controls tension of suspensory ligaments	Radial muscles	contracts	Ciliary muscles	relaxes	Problem	cannot distinguish colors
	controls thickness of lens	Pupil	dilates	Tension	increases	Cause	deficiency of one or more cone cells
Aqueous humour	watery fluid produced by ciliary body between cornea and lens	Result	more light enters eyes	Suspensory ligaments	tightened	Correction	no cure wear lenses
	supplies nutrients and o ₂ to cornea and lens by diffusion	Importance	allow photoreceptors to be stimulated so a clear image forms	Lens	thinner (less convex) refracts light less		
Vitreous humour	jelly like fluid between lens and retina	Seeing in bright light		Short sighted			
Both	refracts lights on retina	Circular muscles of iris	contracts	Vision problem	cannot see distant object clearly		
	maintain shape of eyeball	Radial muscles	relaxes	Cause	lens too thick eyeball too long		
		Pupil	constricts	Image	formed in front of retina		
		Result	less light to enter eye	Correction	concave lenses (diverges light)		
		Importance	prevent photoreceptors from being damaged by bright light				