

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
		Types of photoreceptors			a curved surface to help refract and focus light on retina	allows light to enter the eyes
		Rod cells	Cone cells			size is controlled by iris
		more numerous	less numerous			
		sensitive to low light intensity	sensitive to high light intensity		no capillaries since it obtains nutrients from aqueous humour	Retina
		important for dim light vision	important for bright light vision	Choroid	middle layer of eyeball	innermost layer of eyeball
		black and white vision	color vision (red, green, blue)		contains black pigment that absorbs light	contains many photoreceptors and nerve fibres
Process of seeing		Distribution of photoreceptors on retina			pigment reduces reflection of light within the eye and helps form sharp images	photoreceptors : rod or cone cells
1	light rays from object enters the eye	Rod cells	periphery of the retina		rich in capillaries as it supplies nutrients to sclera and retina	Optic nerves
	refracted and focused onto retina		none at yellow spot and blind spot			nerve fibres in retina grouped
by	cornea, aqueous humour, lens, vitreous humour	Cone cells	concentrated at yellow spot	Iris	continuous with the choroid	transmits nerve impulses from photoreceptors to cerebrum of brain
cornea	most of the refraction		a few present on periphery of retina			
lens	fine focusing					Yellow spot
2	real and inverted image formed on retina					high density of cone cells
3	photoreceptors stimulated by light generate nerve impulse					no rod cells
	nerve impulse travel along optic nerve to visual centre					Blind spot
4	visual centre in cerebrum interpret nerve impulse as an upright image of object					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 living cells with no nuclei	Light rays (distant)	parallel	Ciliary muscles	contract	Vision problem	cannot see near objects clearly
		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	Short sighted	
Vitreous humour	jelly like fluid between lens and retina	Seeing in bright light		Vision problem	cannot see distant object clearly	Cause	lens too thick eyeball too long
Both	refracts lights on retina maintain shape of eyeball	Circular muscles of iris	contracts	Image	formed in front of retina	Correction	concave lenses (diverges light)
		Radial muscles	relaxes				
		Pupil	constricts				
		Result	less light to enter eye				
		Importance	prevent photoreceptors from being damaged by bright light				

