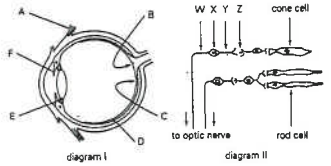
Past HKCEE Questions
Detection of Environmental Conditions in Mammals
Paper I

1. Diagram I below shows a section of a human eye. Part of the retina has been magnified in diagram II to show the arrangement of some cells.
(The parts are not drawn to the same scale.)

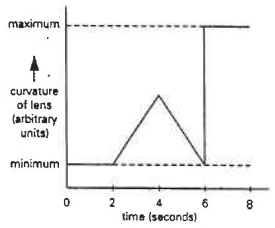


(i) Using letters from diagram I, indicate
(1) a part whose function is sensory, and
(2) a part whose function is motor.
(ii) Name W, X, Y and Z.
(iii) State one reason each, why diagram II cannot represent
(1) the blind spot, and
(2) the fovea (yellow spot).
(iv) State the cause of
(1) colour blindness, and
(2) night blindness.
(v) If the eye were focused on a nearby burning candle, draw a simple diagram to show
(1) the light rays, and
(2) the image formed on the retina.
(vi) What is the size of the image formed in when compared to the object?
(12 marks)
(HKCEE 1983)

2. A young lady, with one of her eyes covered, is using her uncovered normal eye to observe, at random and one at a time, the following objects within a period of eight seconds:

(W) a stationary object nearby
(X) a stationary object far away
(Y) an object approaching her
(Z) an object moving away from her

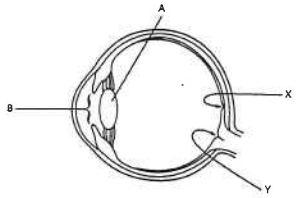
The change in the curvature of the lens of the uncovered eye during these eight seconds is shown in the sketch below:



(i) Using the letters (W), (X), (Y) and (Z), indicate which object is being observed during the following periods:
(1) 0 - 2 seconds
(2) 2 - 4 seconds
(3) 4 - 6 seconds
(4) 6 - 8 seconds

(ii) What is the state of the suspensory ligaments of the uncovered eye
(1) for observing object (W)?
(2) for observing object (X)?
(iii) Which structure, other than the suspensory ligament in the eye, is responsible for changing the curvature of the lens?
(iv) Draw a simple diagram to show the path of the light rays when the eye was watching object. (9 marks)
(HKCEE 1985)

3. The diagram below shows a section of a human eye:

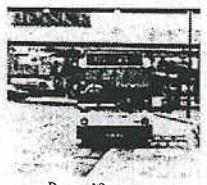


(i) If a person is watching a nearby object which is moving away from him, what change will occur in the shape of structure A? Describe how this change can be brought about. (3 marks)
(ii) State the change in the size of B when the person walks out from a dark room into bright daylight. What is the significance of this change? (2 marks)
(iii) Describe how the eye and the nervous system work together to bring about the reflex in (ii). (4 marks)
(iv) How may a small object be seen by the person when its image falls on spot
(1) X?
(2) y?
Briefly explain your answer. (4 marks)
(HKCEE 1988)

4.

(i) A man came out of the cinema as shown in the diagram on the opposite page. Describe how his eyes would adapt to the bright daylight. Explain why this would be necessary. (4 marks)
(ii) After looking at his watch, the man tried to locate the bus stop at the end of the street. Describe and explain the changes that occurred in his eyes. (3 marks)
(iii) The man had an eye defect in which he was unable to see clearly the number painted on the sign post of the bus stop. Draw a simple diagram to show the path of the light rays when his eye was focusing on the number on the sign post. (2 marks)
(iv) The man tried to shield his eyes from the strong sunlight by putting his hand above his forehead as shown in the diagram. Is this action reflex or voluntary? (1 mark)
(HKCEE 1992)

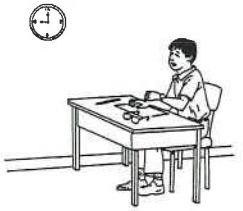
5. A boy was standing by the roadside and saw a bus moving towards him. The photographs below show what he saw when the bus was 10 m and 5 m away from him respectively:


Bus at 10 m away

Bus at 5 m away

(i) (1) What kind of eye defect did the boy probably have? (1 mark)
(2) State two features of the eyeball that might have caused this eye defect. (2 marks)
(ii) Draw a ray diagram to show the pathway of light entering the eye of the buy when he was lurking at the bus 10 m away from him. (3 mark)
(iii) How could this eye defect he corrected? (1 mark)
(iv) The boy had normal colour vision, but when it was getting dark, he found it difficult to distinguish the colour of the cars on the road. Explain this briefly. (2 marks)
(HKCEE 1996)

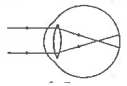
6. The diagram below shows a boy, Bill, sitting for an examination in the school hall. Before the examination started, Bill took off his glasses and relaxed.



(i) Bill looked at the clock on the wall. It was 9:00 a.m. Draw the image of the two hands of the clock formed on the retina of his eye. (1 mark)

(ii) Describe how the image on the retina

(iv) Drawing (D): large, clear and accurate diagram (accuracy includes outline of eyeball, lens of eye, straight lines for light rays) 1
(L): Parallel rays from object (with arrow sign), focus in front of retina, rays extended to retina (3 x 0.5) 1.5
Title (T) 0.5



Ray diagram showing light rays entering a short-sighted eye

9. (i) (1) To allow the transmission of light to the retina without obstruction. 1
(2) aqueous humour / choroid 1
(ii) (1) It helps to reduce the amount of light entering the eyes, so as to prevent over-stimulation / damage of the lightsensitive cells. 1 1
(2) reflex action 1
(3)

Constriction of B	Putting on sunglasses
Does not involve the cerebrum	Involves the cerebrum
Inborn	Learned action
Faster in action	Slower in action
Stereotyped response i.e. same stimulus always evokes the same response	Variable responses to the same stimulus

any two 2

(iii) Dark-coloured sunglasses reduce the light intensity entering the eye, so the pupil will not constrict / constrict to a smaller extent in bright sunlight. 1
As a result, more UV light can enter the eye and cause damage. 1

10. (i) (1) * ciliary muscles 1
(2) When the man is looking at a near object, the weakened ciliary muscle contract with less force 1
and the tension of the suspensory ligament remains high 1
Hence, the lens is not thick enough 1
and fails to converge light to form a clear image on the retina 1
Effective Communication 1C
(ii) The lens becomes less elastic / cloudy 1
(iii) Layer B contains light sensitive cells cannot obtain nutrients / oxygen from layer C 1
As a result, light sensitive cells die 1+
Light falling on layer B cannot be detected / no nerve impulse can be produced 1
Therefore the vision is impaired

Paper II

90-50	A
91-44	D
91-45	D
93-31	C
93-35	C
94-27	A
94-28	D
95-39	C
97-33	A
97-34	D
97-35	B
97-38	A
99-30	B
99-33	D
02-48	B
02-49	B
02-59	A
04-36	C
04-50	D
05-23	D
05-24	A
05-51	A
06-10	C
06-11	D
06-40	C
06-41	B
06-42	D
07-48	B