

Question 12 (b)

State the laws of refraction of light.

Draw a labelled diagram showing the optical structure of the eye

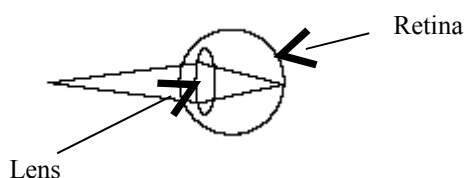
How does the eye bring objects at different distances into focus?

The power of a normal eye is $+60 \text{ m}^{-1}$. A short-sighted person's eye has a power of $+65 \text{ m}^{-1}$. Calculate (i) the power, (ii) the focal length, of the contact lens required to correct the person's short-sightedness.

State the laws of refraction of light

1. The incident ray, normal and refracted ray are in the same plane
2. The sin of the angle of incidence is proportional to the sin of the angle of refraction.

Draw a labelled diagram showing the optical structure of the eye.



How does the eye bring objects at different distances into focus?

Muscles attached to the lens change its shape, and hence change its focal length so that the image is focussed onto the retina, no matter how distant the object is.

The power of a normal eye is $+60 \text{ m}^{-1}$. A short-sighted person's eye has a power of $+65 \text{ m}^{-1}$. Calculate (i) the power, (ii) the focal length, of the contact lens required to correct the person's short-sightedness.

(i) the power

normal eye power is required from the combination of the eye and the contact lens, i.e.,

$$\begin{array}{rclcl} \text{For the two combined,} & P & = & P_1 + P_2 & \\ & 60 & = & 65 + P_2 & \\ & P_2 & = & -5 \text{ m}^{-1} & \end{array}$$

(ii) the focal length

$$f = 1/P = 1/-5 = -0.2 \text{ m} = -20 \text{ cm}$$