

SCIENCE • CLASS 10

CHAPTER 10

The Human Eye and the Colourful World

NCERT SOLUTIONS



ACCOMMODATION AND CILIARY MUSCLES

Exercise 1 — The eye adjusts its focal length to focus on objects at different distances. This is due to:

- | | |
|----------------------|---------------------|
| (a) Presbyopia | (b) Accommodation |
| (c) Near-sightedness | (d) Far-sightedness |

Answer: (b) Accommodation.

It is the eye's ability to adjust its focus for different object distances.

Exercise 4 — A change in the eye lens's focal length is caused by:

- | | |
|---------------------|------------|
| (a) Pupil | (b) Retina |
| (c) Ciliary muscles | (d) Iris |

Answer: (c) Ciliary muscles.

Their action changes the curvature of the eye lens.

RETINA AND NEAR POINT

Exercise 2

The human eye forms the image of an object on its:

- (a) Cornea (b) Iris (c) Pupil (d) Retina

Answer: (d) Retina.

The eye forms a real, inverted image on the light-sensitive retina.

Exercise 3

The least distance of distinct vision for a young adult with normal vision is about:

- (a) 25 m (b) 2.5 cm (c) 25 cm (d) 2.5 m

Answer: (c) 25 cm.

This is the usual near point: the nearest distance for clear vision without strain.

FOCAL LENGTHS OF CORRECTIVE LENSES

Exercise 5 — A person needs corrective lenses with the following powers for distant and near vision. Find each lens's focal length.

Distant-vision power: -5.5 D

Near-vision power: $+1.5 \text{ D}$

$P = 1/f$, with f in metres

(i) Distant vision

$$f = \frac{1}{(-5.5)} \text{ m} \approx -0.182 \text{ m} = -18.2 \text{ cm}$$

Answer: $f \approx -18.2 \text{ cm}$; a concave lens.

(ii) Near vision

$$f = \frac{1}{(+1.5)} \text{ m} = +\frac{2}{3} \text{ m} \approx +0.667 \text{ m} = +66.7 \text{ cm}$$

Answer: $f \approx +66.7 \text{ cm}$; a convex lens.

The sign identifies the lens type.

MYOPIA: LENS POWER

Exercise 6 – A myopic person's far point is given below. What is the nature and power of the corrective lens?

Far point: 80 cm in front of the eye

The lens must form a virtual image of a distant object at the eye's far point.

$$u = -\infty; \quad v = -80 \text{ cm} = -0.80 \text{ m}$$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{(-0.80)} - 0$$

$$f = -0.80 \text{ m}$$

$$P = \frac{1}{f} = \frac{1}{(-0.80)} = -1.25 \text{ D}$$

Answer: A concave, diverging lens of power -1.25 D .

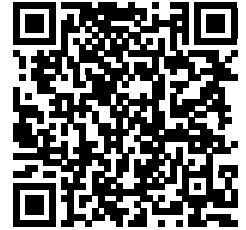


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