

SCIENCE • CLASS 10

CHAPTER 10

The Human Eye and the Colourful World

CHAPTER NOTES



THE HUMAN EYE

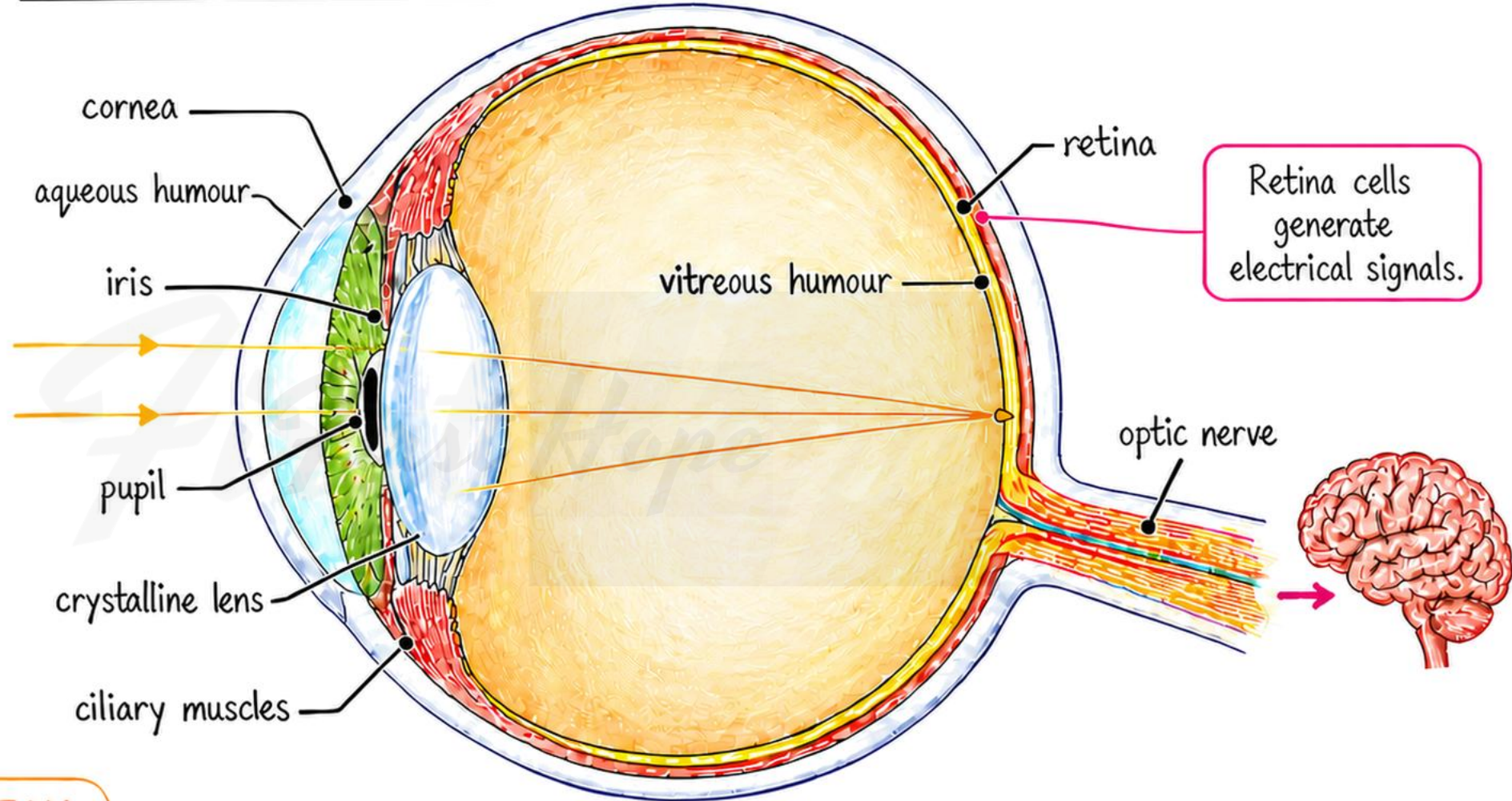
EYE AS A CAMERA

- Eye lens forms a real, inverted image on the retina.
- Most refraction occurs at the cornea; the lens fine-focuses.
- Eyeball diameter ≈ 2.3 cm.

LIGHT CONTROL

Iris: muscular diaphragm

Pupil: opening that regulates light entry



FROM LIGHT TO VISION



object light

cornea

pupil

lens

retina

optic nerve

brain

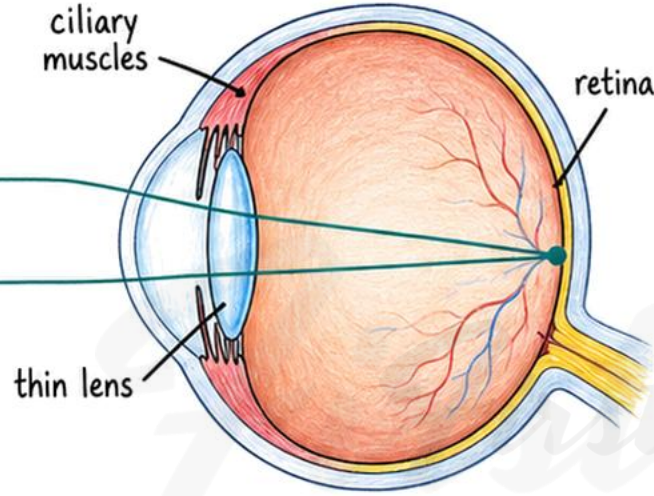
POWER OF ACCOMMODATION

The eye adjusts lens curvature and focal length to focus at different distances.

DISTANT OBJECT



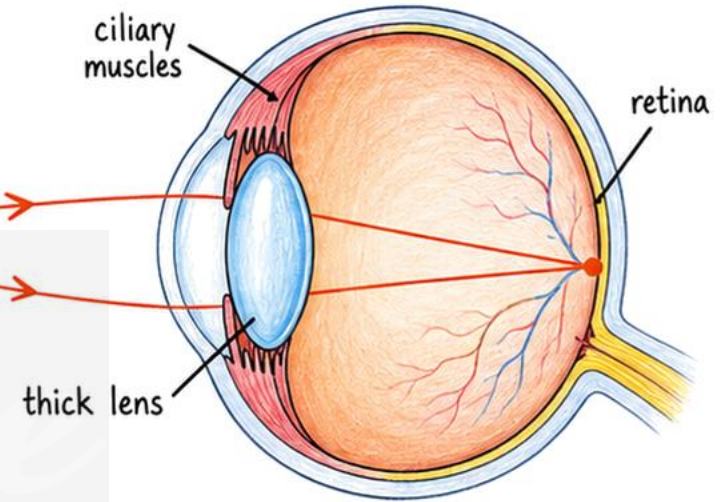
Ciliary muscles relaxed
↓
Lens thin / less convex
↓
Focal length increases
↓
Distant image focused on retina



NEAR OBJECT

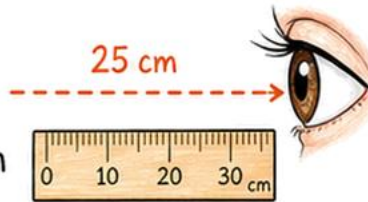


Ciliary muscles contract
↓
Lens thick / more convex
↓
Focal length decreases
↓
Near image focused on retina



NEAR POINT

Least distance of distinct vision ≈ 25 cm



FAR POINT

Infinity for a normal eye



Normal clear range: about 25 cm to infinity

CATARACT

Clouding of the crystalline lens; surgery can restore vision.

Clear lens



Cloudy (cataract) lens



MYOPIA (NEAR-SIGHTEDNESS)

WHAT YOU NOTICE

- Near objects: clear
- Distant objects: blurred
- Far point: nearer than infinity

WHY IT HAPPENS

Image forms in front of the retina

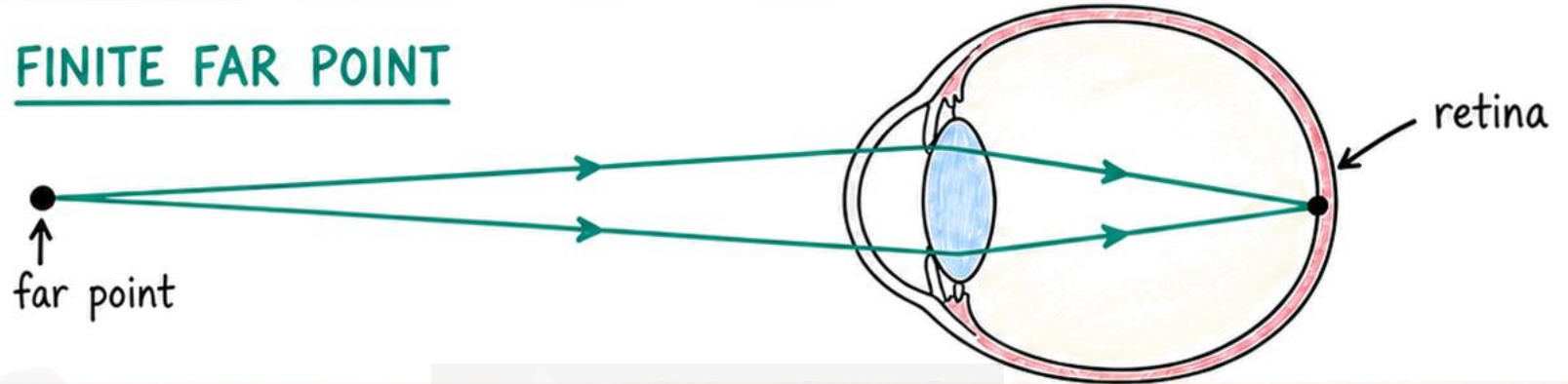
- eye lens too curved / too powerful
- eyeball elongated

CORRECTION

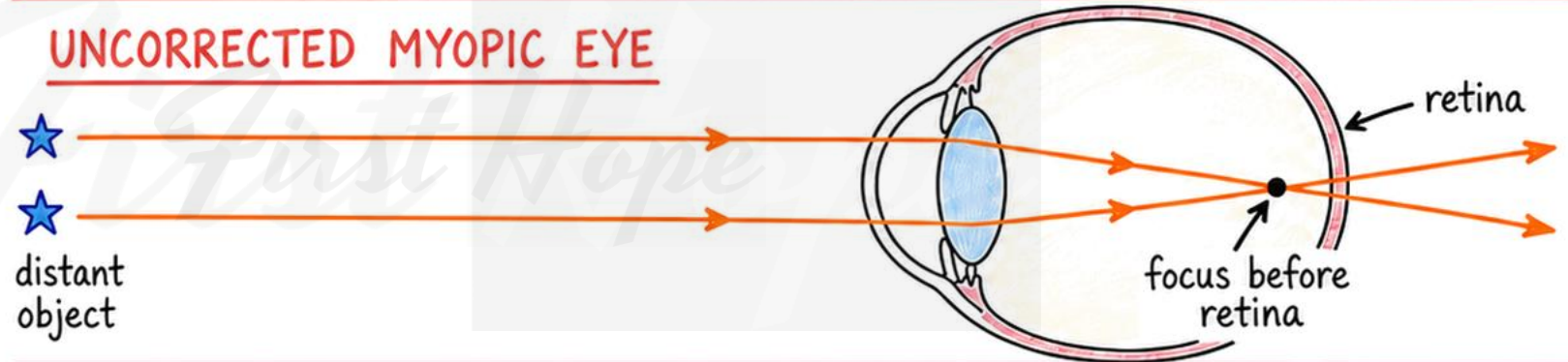
Concave (diverging) lens of suitable power

Concave lens moves the final focus back onto the retina.

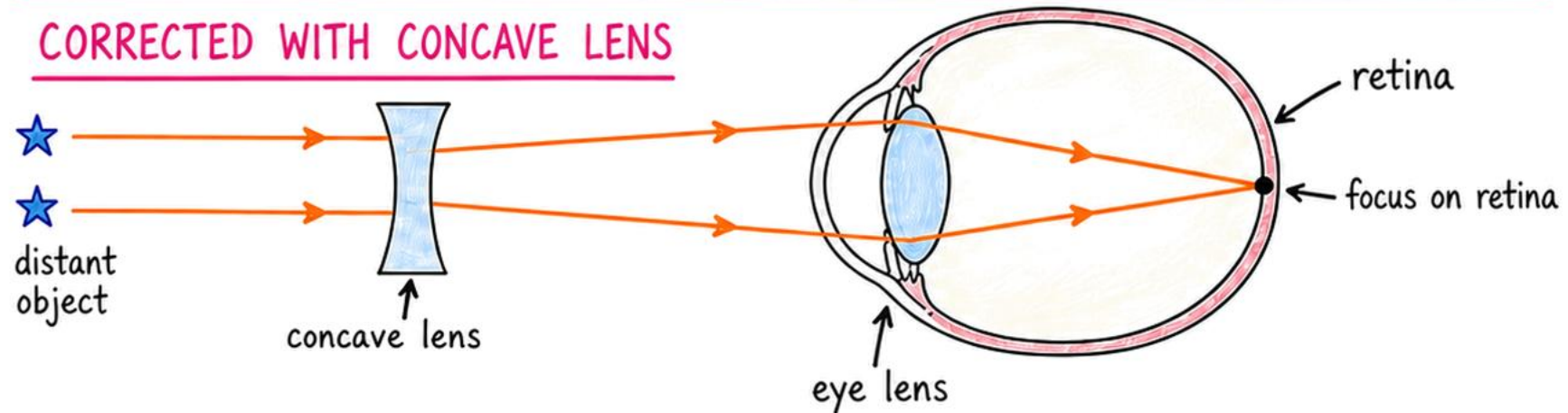
FINITE FAR POINT



UNCORRECTED MYOPIC EYE



CORRECTED WITH CONCAVE LENS



HYPERMETROPIA (FAR-SIGHTEDNESS)

WHAT YOU NOTICE

- Distant objects: clear
- Near objects: blurred
- Near point: farther than 25 cm

WHY IT HAPPENS

Image forms behind the retina

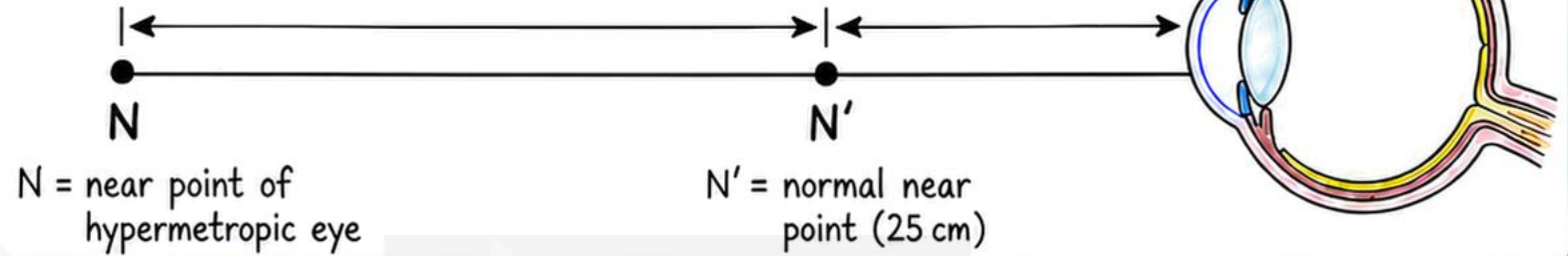
- eye lens too weak / focal length too long
- eyeball too short

CORRECTION

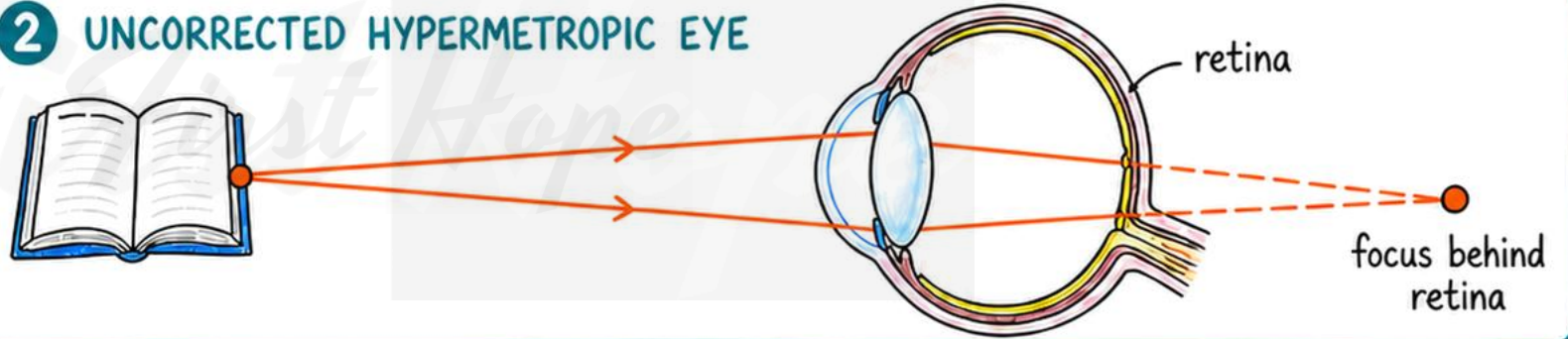
Convex (converging) lens of suitable power

Convex lens adds focusing power so the image forms on the retina.

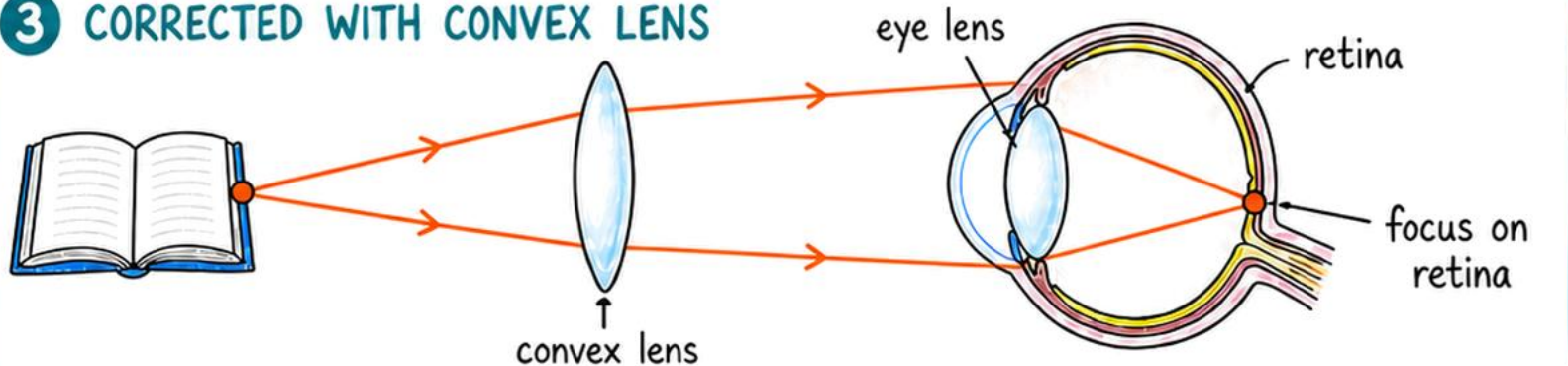
1 RECEDED NEAR POINT



2 UNCORRECTED HYPERMETROPIC EYE



3 CORRECTED WITH CONVEX LENS





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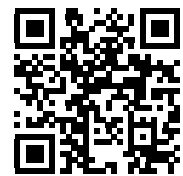


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