

Eye: Click images/formation

Cornea

- Outermost part
- Causes refraction of light
- Used in eye donation

Aqueous humour

- Provides nourishment to cornea
- Maintains eye pressure

Iris

- Dark muscular structure
- Controls the size of pupil
- It also determines colour of the eye

Pupil

- To control the amount of light entering the eye

Lens

- focuses the light ray on the retina

Retina

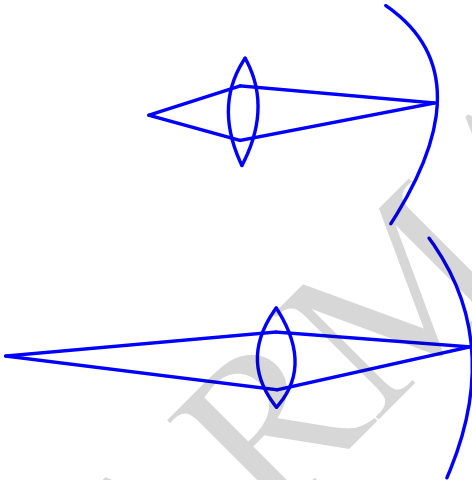
- It is the spot where image is formed
- Here optical energy is converted to electrical energy

Blind Spot

- Optic nerves meet retina
- No image is formed here

Power of Accommodation

- Eye can change focal length (situation based) → Ciliary muscles

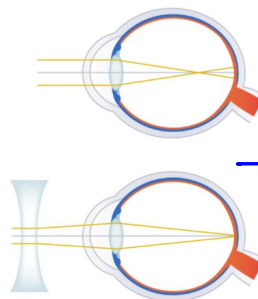


- **Least distance of distance of distinct vision: 25 cm**

Defects of Eye

Myopia/Near Sightedness

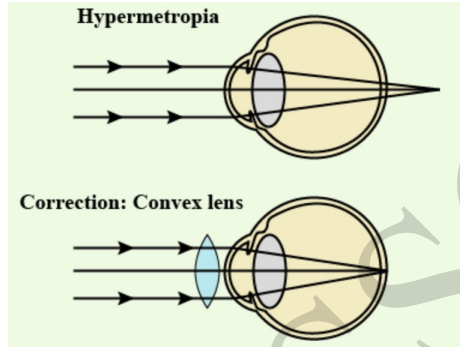
- Far object not visible clearly
- Correction: $-ve$ power lens → Concave lens



- Focal length decreases and Power increases
- Image is formed in **front of the retina**

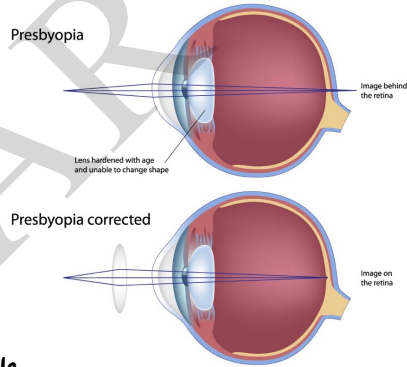
Hypermetropia/Far Sightedness → Cannot see nearby objects

- Image formed **behind the retina**
- Light focuses behind the retina
- instead of focusing on the retina
- Correction: +ve lens → Convex lens
- Usually occurs above 40 yrs



Presbyopia

- Lens hardens with age → Loses flexibility
- Age: 55+
- Correction: Concave + Convex lens (Bifocal lens)



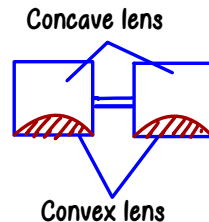
Glaucoma/Trachoma

- Both caused due to increase in eye pressure
- Glaucoma is **hereditary** → Not curable
- Trachoma is **bacterial infection** → Not curable
- **Tonometry**: to measure your eye pressure

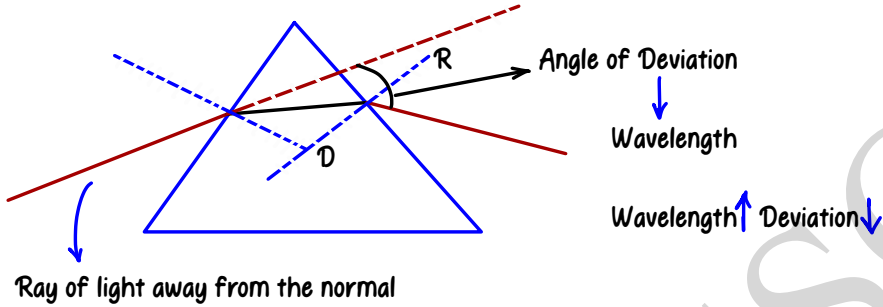
Colour Blindness

- It is hereditary
- Retina made of cone cells and rod cells

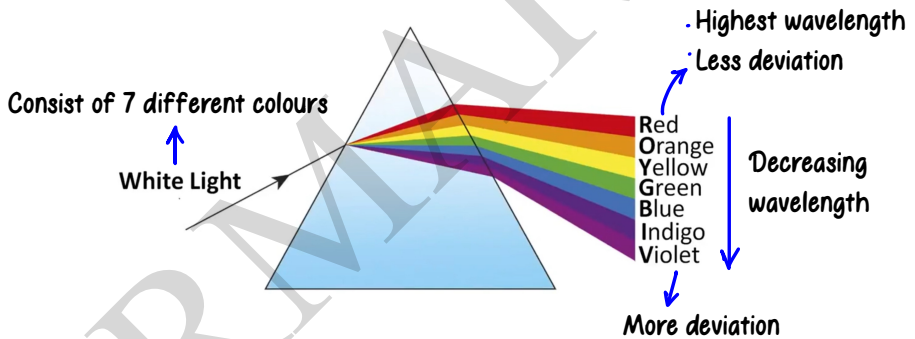
↓
Not present in colourblind people



Refraction of Light by a PRISM



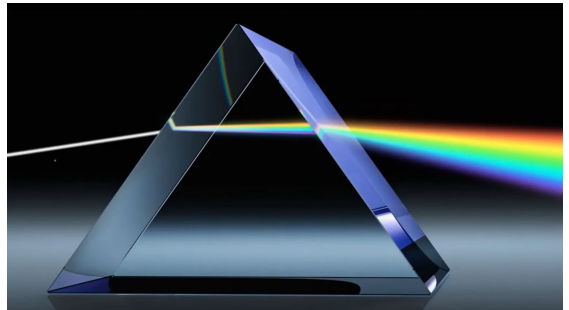
Dispersion of White Light in a Glass Prism

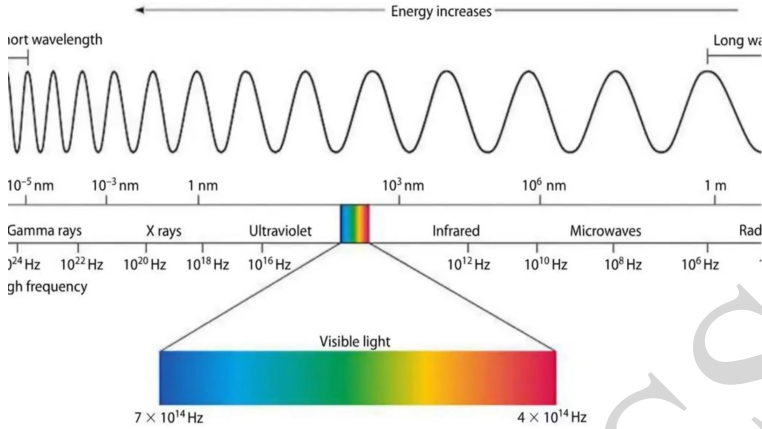


Red: more speed → Less refractive index

Violet: less speed → More refractive index

$$n = \frac{\text{Speed of light in air}}{\text{Speed of light in prism}}$$





Electromagnetic Spectrum

TRICK

Rich **Man** **in** **Victor** **Uses** **X** **Gold**
 ↓ ↓ ↓ ↓ ↓ ↓ ↓
Radio waves **Micro waves** **Infrared** **Visible** **UV rays** **X-ray** **Gamma rays**

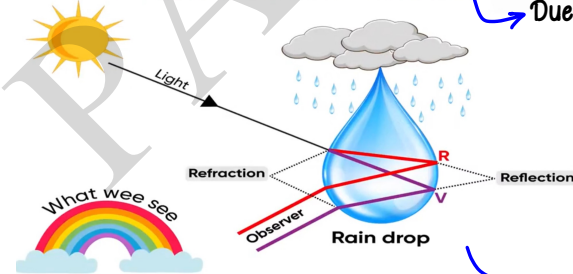
Left to right Wavelength decreases and frequency increases and energy increases

SI unit: Hertz

$$\begin{aligned} E &= hf \\ E &= \frac{hc}{\lambda} \end{aligned}$$

↑
wavelength

HOW IS A RAINBOW FORMED?



Due to dispersion

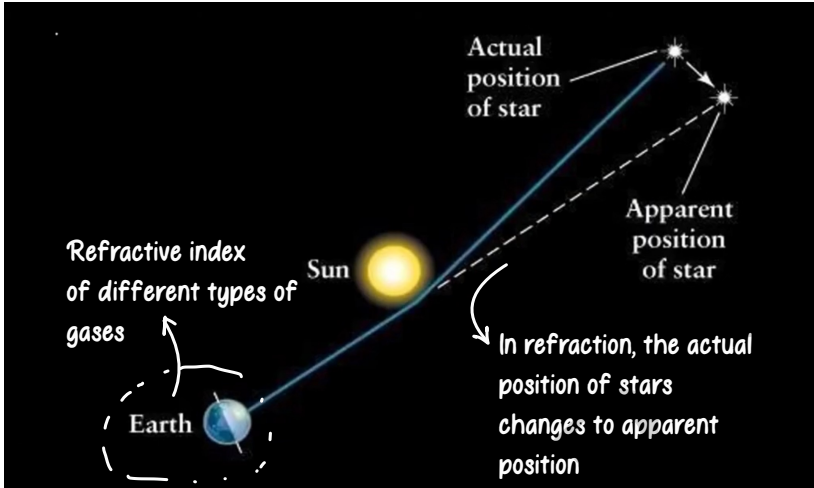
2 refraction and 1 reflection

Dispersion of white light here

→ Rainbow is formed to the opposite direction of the Sun

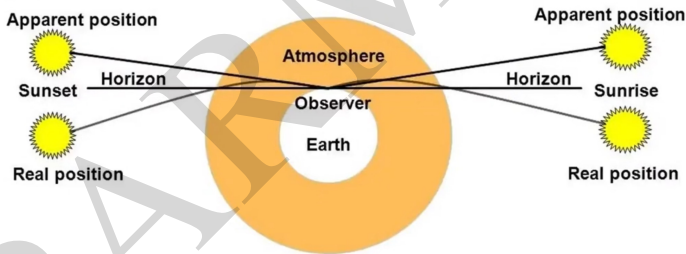
Refraction in Atmosphere

Twinkling of Stars → Due to effects of the Earth's atmosphere (atmospheric refraction of star light)



Advance Sunrise and Delayed Sunset

Advance sunrise and delayed sunset :-



- In this phenomenon, the sun appears to rise early by two minutes and set late by two minutes. When the rays from the sun hit atmosphere, they get refracted

Scattering of Light

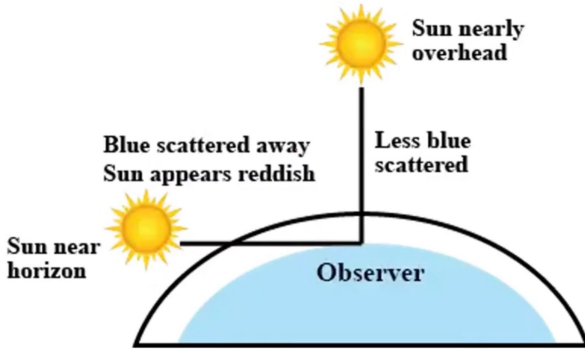


- Blue colour of sky: blue light is scattered more than the other colours because it travels as shorter, smaller waves
- Our sky appears black without atmosphere

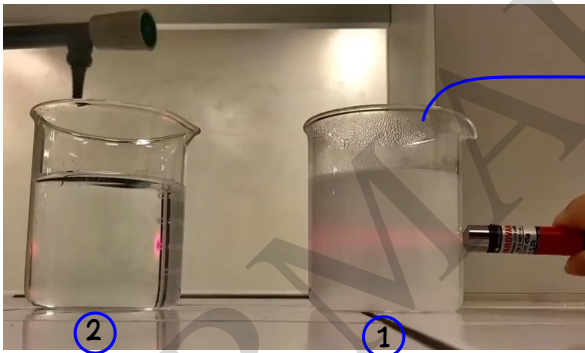


- Red colour of Sun during sunrise and sunset: red light scatter the least by the molecules present in the air, so at sunset and sunrise, the sunlight travels longer path through the atmosphere to reach our eyes. The blue light catches the most and has been mostly removed, leaving the red light remaining which reaches our eyes.

↪ More wavelength



Tyndall Effect



Colloidal solution scatter the light most because the dispersed particles of colloid are bigger and they defect light

Why are danger signs red?



→ Red has maximum wavelength and is least scattered allowing it to travel long distances without getting scattered

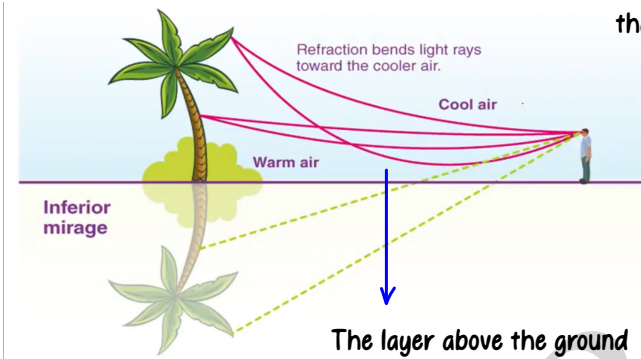
Total Internal Reflection

• This phenomenon is responsible for optical illusions

Examples: Mirage, optical fibers

• Condition of TIR

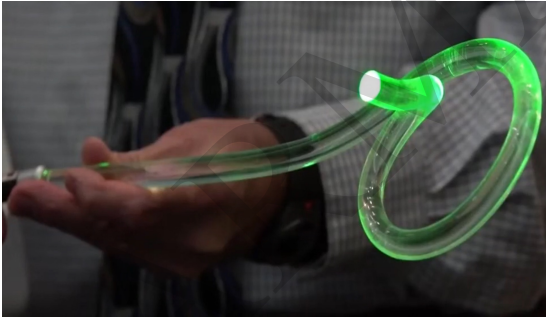
1. Light should travel from denser to rare medium
2. light should hit an angle greater than critical angle



The layer above the ground gets warmed. The light ray gets refracted when light moves

→ Total internal reflection

through the cold air and into the hot air layer



Optical Fibers



ONE LINERS (MCQs)

- The materials through which things can be seen are called transparent materials
- The reflection on the bathroom mirror, the lake and the glare on pair of glasses are caused by specular reflection
- Gold and copper happen to absorb blue and violet light, leaving the yellow light
- The phenomenon which deals with scattering of light by molecules of a medium when they are excited to vibrational energy levels is called Raman Effect
- The phenomena in which mountain tops acquired a rose or orange hue around the sunrise and sunset is called Alpenglow
- Canada balsam has refractive index closes to that of crown glass

PARMAR SSC