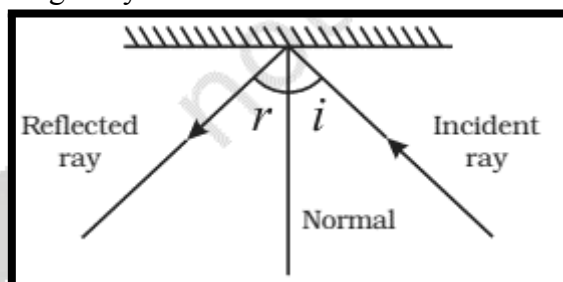


1. Light

- Light is a form of energy that enables us to see objects when it is reflected into our eyes.
- Light travels in a straight line.
- It can be reflected, refracted, or absorbed when it meets a surface.

1.2 Reflection of Light

Reflection of light occurs when light rays bounce off a surface.



1.3 Laws of Reflection

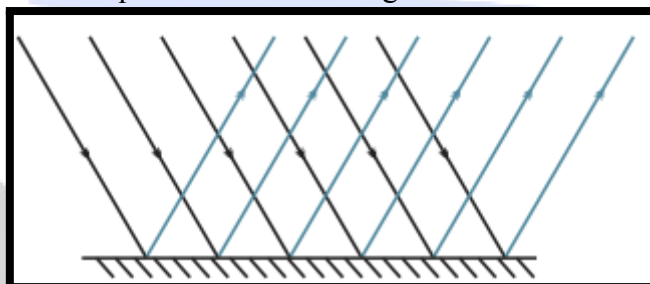
- Law 1: The angle of incidence (angle between the incident ray and the normal) is equal to the angle of reflection (angle between the reflected ray and the normal).
- Law 2: The incident ray, the reflected ray, and the normal (perpendicular to the surface at the point of incidence) all lie in the same plane.

Important Terms:

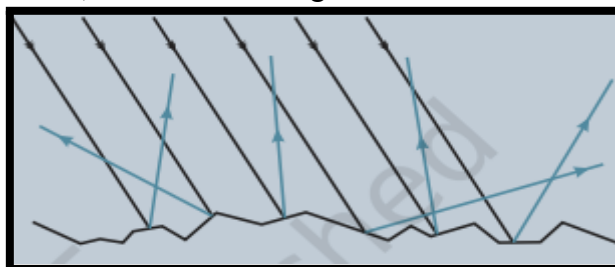
- Incident Ray: The incoming ray of light that strikes a surface.
- Reflected Ray: The ray of light that bounces back after hitting the surface.
- Normal: An imaginary line perpendicular to the surface at the point of incidence.

1.4 Types of Reflection:

- Regular Reflection: When light reflects off a smooth, shiny surface (e.g., mirror), the reflected rays are parallel. This produces a clear image.



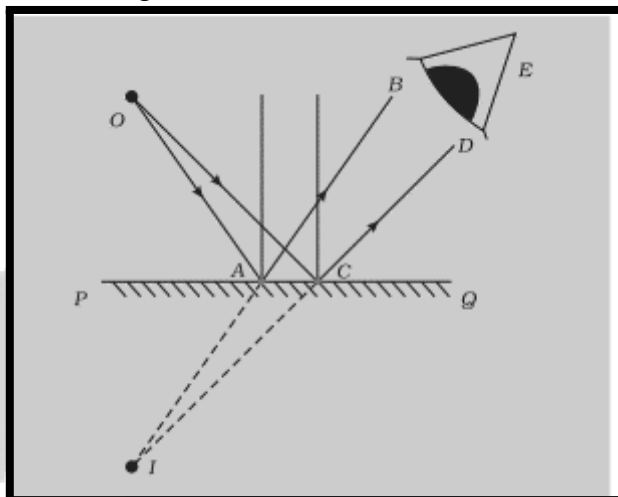
- Diffuse Reflection: When light reflects off a rough or uneven surface, the reflected rays scatter in different directions, and no clear image is formed.



1.5 Plane Mirror and Image Formation

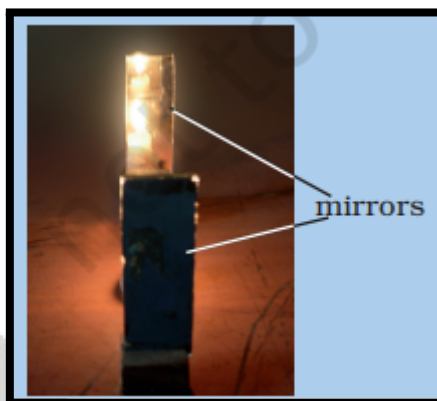
Characteristics of Image Formed by Plane Mirrors:

- **Virtual and Erect:** The image cannot be projected on a screen (virtual) and appears upright (erect).
- **Same Size as Object:** The image size is the same as the object size.
- **Laterally Inverted:** The image is flipped sideways (left becomes right, and vice versa).
- **At the Same Distance:** The image appears as far behind the mirror as the object is in front.
- and laterally inverted image formation.



1.6 Multiple Images

When two or more mirrors are placed at an angle to each other, they can form multiple images of an object.



Formation of Multiple Images:

- **Two Mirrors at an Angle:** When two mirrors are placed at an angle θ to each other, the number of images formed can be calculated using the formula:

$$\text{Number of Images} = \frac{360^\circ}{\theta} - 1$$

For example:

- o If two mirrors are placed at an angle of 90° , the number of images formed will be:

$$\frac{360^\circ}{90} - 1 = 3 \text{ images}$$
- o If the mirrors are at 60° , the number of images will be:

$$\frac{360^\circ}{60} - 1 = 5 \text{ images}$$

More Mirrors: The more mirrors are used, the more images are formed, as long as they are placed at certain angles to each other.

Characteristics of Multiple Images:

- The images formed by mirrors at an angle are usually virtual and upright.
- The images may appear to be fainter as more reflections occur.
- The images are formed by the interference of light rays coming from different reflections.

Example of Multiple Image Formation:

When an object is placed between two mirrors forming an angle, it produces a series of reflections that are seen as multiple images. These images seem to be located at various positions depending on the angle between the mirrors.

Applications of Multiple Images:

- Decorative mirrors: Common in places like funhouses, where multiple mirrors are placed at different angles to create a series of images.
- Periscope: In submarines, periscopes use mirrors to form multiple images to view the outside world when submerged.

1.7 Dispersion of Light

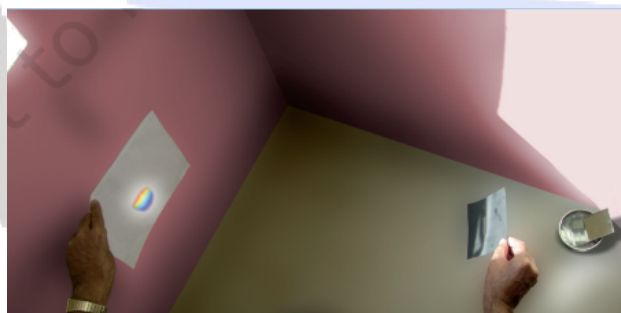
- Dispersion is the splitting of white light into its constituent colors (VIBGYOR) when it passes through a prism.
- White light is made of seven colors. When it passes through a prism, each color bends at a different angle, producing a spectrum of colors.

Activity: Creating a Spectrum Using a water and mirror.

Materials: Water, mirror, white screen, and light source.

Procedure: Pass a beam of light through the mirror and water onto a screen.

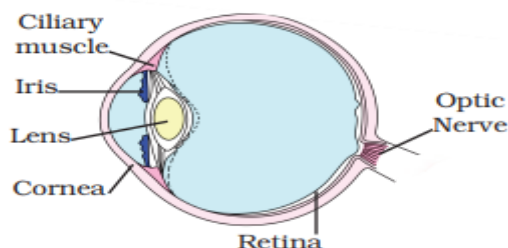
Observation: A band of colors appears on the screen, showing the dispersion of light.



1.8 Human Eye and Its Working

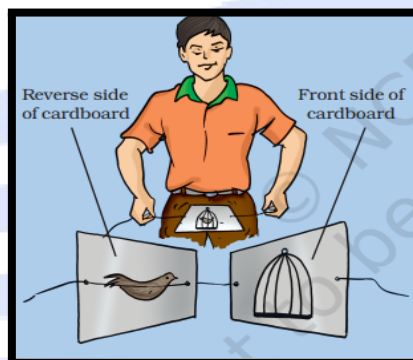
Structure of the Eye:

- Cornea: Transparent front part that refracts light.
- Lens: Focuses light onto the retina.
- Retina: Light-sensitive layer where the image forms.
- Optic Nerve: Carries signals from the retina to the brain.
- Working of the Eye: Light enters through the cornea and passes through the lens, focusing on the retina. The retina converts this light into electrical signals sent to the brain, which interprets them as images.



Persistence of Vision

- Persistence of vision is the phenomenon where an image remains on the retina for a brief moment ($\frac{1}{16}$ th of a second) after the object is removed.
- Application: This principle is used in movies and animations to create the illusion of moving images.



the Eyes:

1.8 Importance of Eye Care:

- Eyes are essential organs for vision and should be protected from damage.
- Many eye problems can be prevented with proper care.

Precautions to Protect Eyes:

- Avoid straining the eyes: Don't stare at screens (phones, computers, TVs) for long periods; take breaks every 20-30 minutes.
- Use proper lighting: Ensure there's enough light while reading or working. Avoid reading in dim light.
- Wear sunglasses: Protect eyes from harmful UV rays when outdoors.
- Follow a balanced diet: Eat food rich in vitamin A, like carrots and leafy vegetables, to maintain good vision.
- Regular eye check-ups: Visit an eye specialist regularly to monitor eye health.
- Prevention of Injuries: Be cautious while handling sharp objects, and wear protective gear when playing sports or doing activities that may cause eye injury.

1.9 Visually Challenged Persons Can Read and Write:

Challenges for Visually Impaired People:

- People with visual impairments cannot read standard printed materials.
- They rely on different methods and tools to access information and communicate.

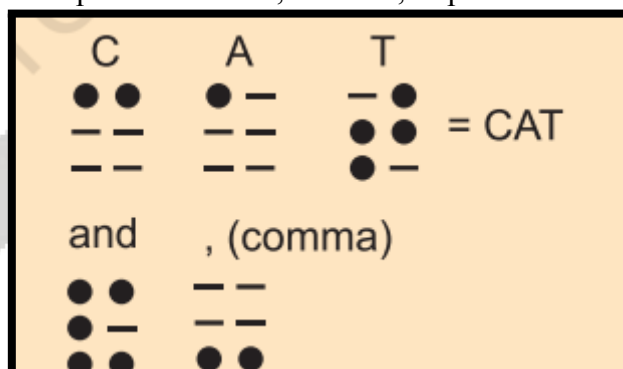
Methods for Reading and Writing:

- Braille is the primary system used by visually challenged people to read and write.
- Some individuals use audio books, text-to-speech software, or screen readers for reading.

- Tactile writing methods, like handwriting in raised letters, are also used.
- Assistive technologies like voice-activated devices, electronic magnifiers, and specialized keyboards help visually impaired people in their daily lives.

1.10 Braille:

- Braille is a tactile writing system used by visually impaired individuals to read and write.
- It consists of patterns of raised dots arranged in cells, each containing six dots (2 rows of 3 dots).
- Each combination of dots represents a letter, numeral, or punctuation mark.



How It Works:

The braille system uses a total of 63 possible combinations (excluding the empty cell). It allows users to read with their fingers by feeling the raised dots.

o Applications of Braille:

Books: Many books, including textbooks and novels, are available in Braille.

Signs: Braille is used on public signs, elevators, and bathroom doors.

Currency: Some countries print banknotes with Braille markings for easy identification.

Technology: Modern electronic devices, including smartphones, use Braille displays or braille-based apps for communication.

o Importance of Braille:

Braille allows visually impaired individuals to access education, information, and literature independently.

It empowers people to engage in literacy, communication, and professional activities.