

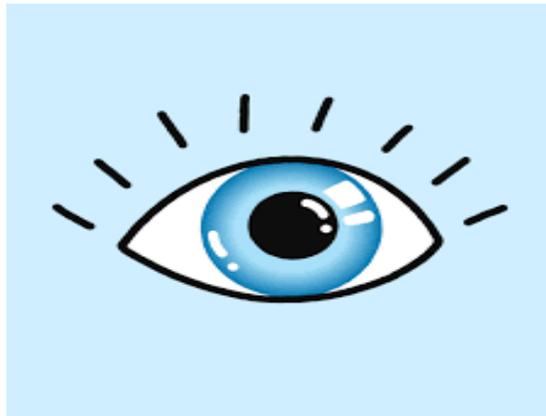


Al-Mustaqbal University

Department of Optics Techniques

Medical and optical physics 1

First stage



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prism

prism: is a transparent optical element, usually made of glass or plastic, with inclined flat surfaces. It is used to change the direction of light or to decompose it into its spectral components.

The operation of a prism is based depended on the phenomenon of **refraction**, where the path of light changes when it passes between two media with different optical densities.

*When light passes through a prism, it is **refracted twice**:

- Upon entering the prism
- Upon exiting the prism

This results in the **deviation of light** and its **dispersion into the colors of the spectrum**.

Second: Types of Prisms

1. **Triangular Prism**
 - The most commonly used type
 - Used for analyzing white light
2. **Right-Angle Prism**
 - Used to change the direction of light
 - Deflection angles of 90° or 180°
3. **Equilateral Prism**
 - Used in educational experiments

Third: Components of a Prism

- Base of the prism
- Apex angle
- Two refracting faces
- Prism medium (material of construction)

Fourth: Principle of prism

The prism works based on:

- **Snell's law of refraction**
- Variation of the refractive index with wavelength

Therefore:

- Each (wavelength) is refracted at a different angle
- A **spectrum** is produced

Fifth: Dispersion of White Light

When white light from the sun or any light source is made up of different colors mixed together.

When the white light strikes the first surface of the glass prism, it **bends (refracts)** because it moves from **air (less dense) to glass (more dense)**.

Each color bends at a different angle.

1) Refraction Inside the Prism

Inside the prism, the light travels **obliquely through the glass**.

- **Wavelength Violet light:** refracted the most
- **wavelength Red light:** refracted the least

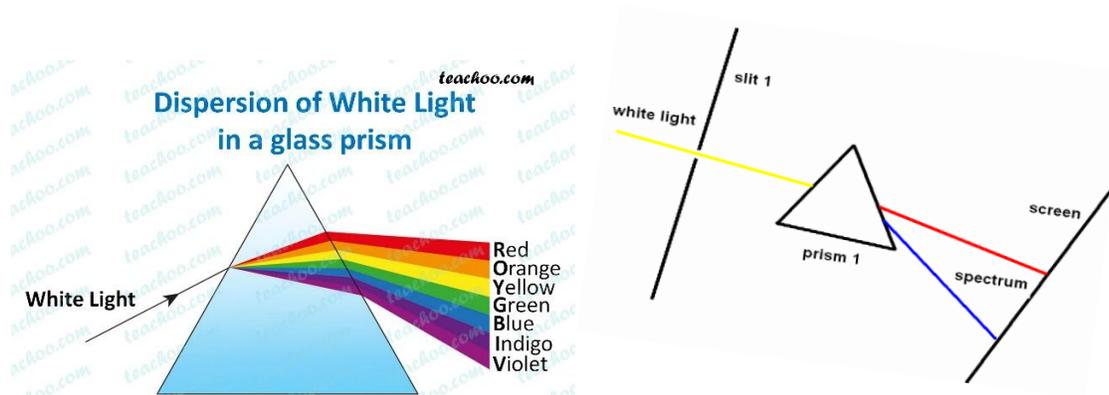
*This phenomenon is called **dispersion of light**.

2) Exit of Light from the Prism

At the second surface of the prism, the light **bends again** as it exits into the air.

The result: **separation of the seven spectrum colors** and the appearance of a **band of colors**.

Red – Orange – Yellow – Green – Blue – Indigo – Violet



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Sixth: Angle of Deviation (Angle of Deviation)

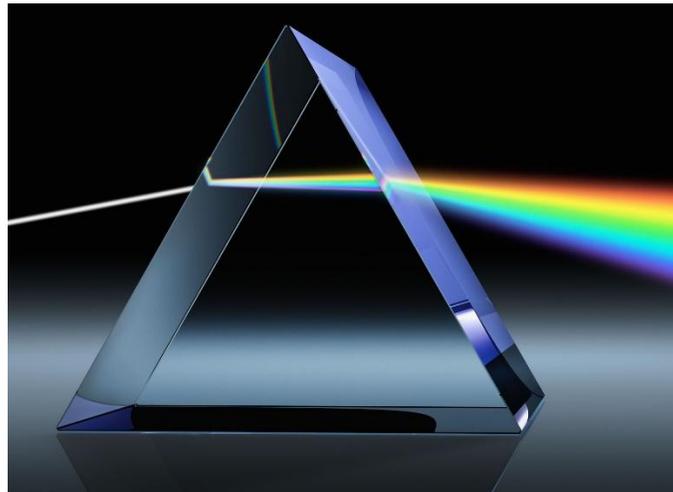
It is the angle between the direction of the incident ray and the direction of the emergent ray from the prism.

It depends on:

- The apex angle of the prism
- The refractive index of the material
- The wavelength of light

Seventh: Practical Applications

- Analysis of white light
- Spectroscopic instruments
- Binoculars and optical viewers
- Medical devices
- Laser systems
- Optical systems



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