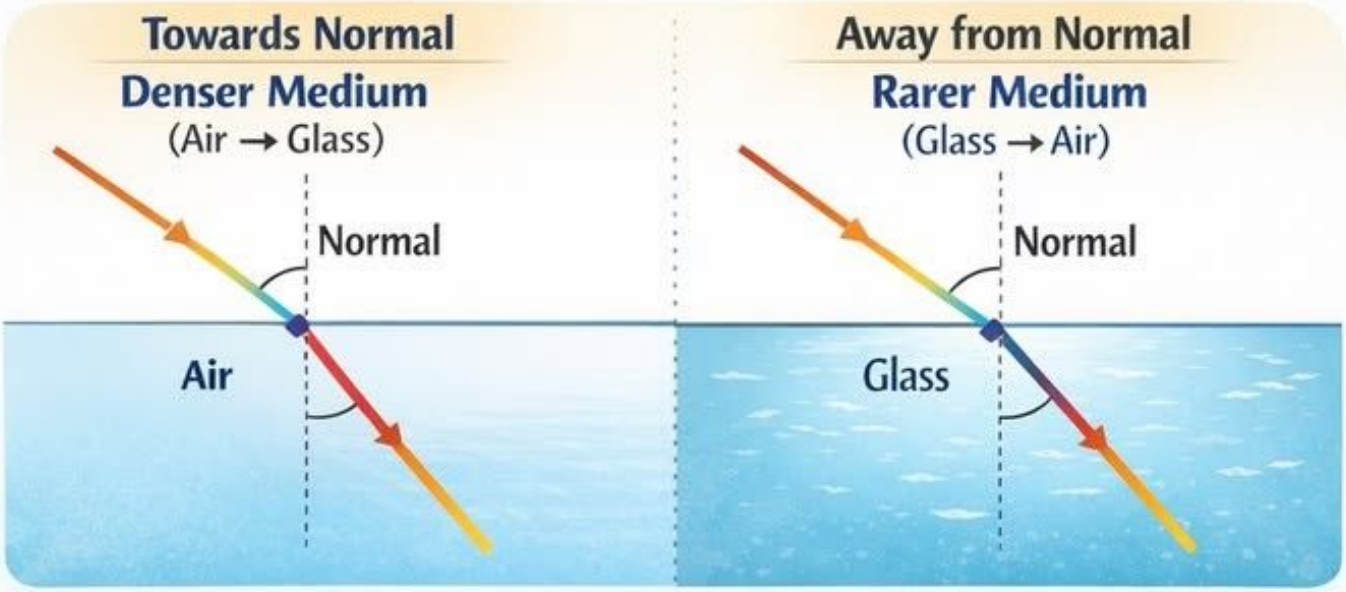
Refraction of Light

Bending of light when it passes from one medium to another (air → water)

Reason : Change in speed of light in different materials.

Rule: $n_1 \sin\theta_1 = n_2 \sin\theta_2$



Refractive Index (n): Measure of bending of light

Examples :

- Pencil looks bent in water
- Pool appears closer





Uses:



Spectacles



Camera



Optical Fibers

REFRACTION OF LIGHT

Medium Change = Direction Change

Definition:

- Bending of light when it moves from one medium to another.

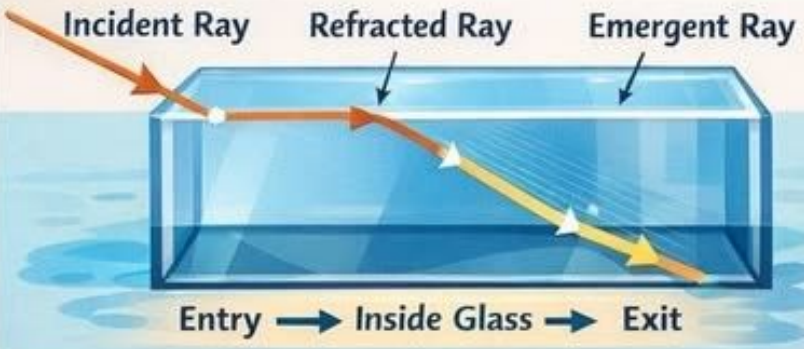
TRICK: → "Medium change = Direction change"

Coin in Water



- **Coin Appears Raised**
  - Light bends when coming from water → Air
  - *"Water makes objects look higher"*

Glass Slab:



Important Property:

- Bends at entry
- Bends at exit

Final result:

- Emergent ray is parallel
- Slight side shift

Simple Understanding

- Incident Ray
- Refracted Ray
- Emergent Ray

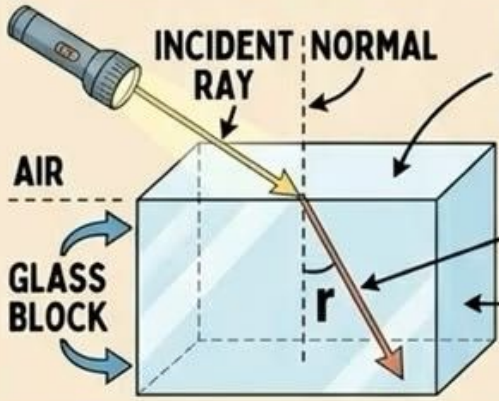
SUPER TRICK!

- Enter → Bend → Exit
- Exit ray = Emergent Ray
- *The emergent ray is parallel to the Incident Ray*
- *But Slightly Shifted Sideways*

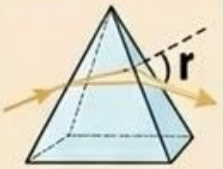
REFRACTION OF LIGHT

STUDENT'S CONCEPT GUIDE & FUNDAMENTALS

1 WHAT IS REFRACTION?



Bending of light as it passes from one medium to another.

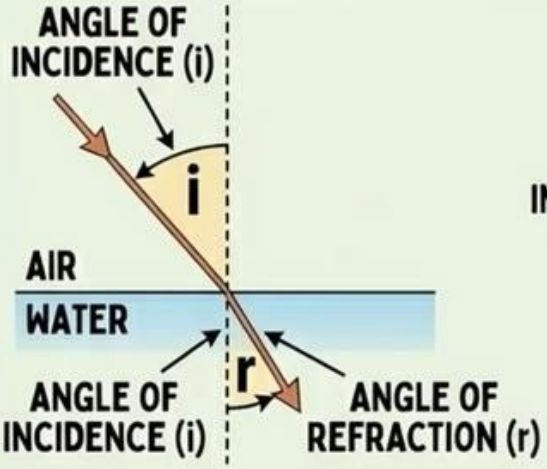


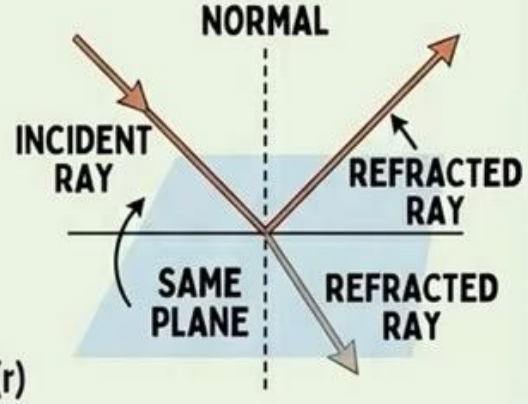
BENDING IN A PRISM



PENCIL IN WATER (APPARENT BEND)

2 THE LAWS OF REFRACTION & SNELL'S LAW





$$\left(\frac{\sin i}{\sin r}\right) = \text{constant} = n$$

(n) = REFRACTIVE INDEX
(e.g., n = 1.0 for Air,
n = 1.33 for Water,
n = 1.52 for Glass)

3 APPLICATIONS OF REFRACTION & REAL-WORLD EXAMPLES

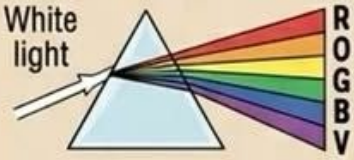
LENSES (e.g., EYEGLASSES)



Corrects near-sightedness (Concave) / far-sightedness (Convex)

PRISM & RAINBOWS

DISPERSION



Dispersion: Separation of light into colors.

RAINBOW: Multiple refraction in raindrops.

OPTICAL FIBERS

Light travels by total internal reflection.



Uses: Medical endoscopes, high-speed data transmission.



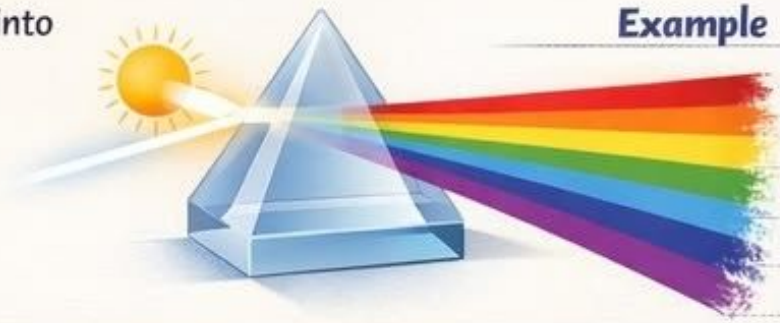
MASTER YOUR PHYSICS CONCEPTS

Dispersion of Light

Definition

- Splitting of white light into its different colours through a prism.

Example



Cause of Dispersion

- Different wavelengths
- Violet bends most
- Red bends least



Spectrum



Band of Colours (Spectrum)

Order of Colours

Violet ~ Indigo ~ Blue ~ Green ~ Yellow ~ Orange ~ Red

Important Points

- White light = **7 Colours**
- Different Wavelengths
- Rainbows in nature



Rainbow Formation

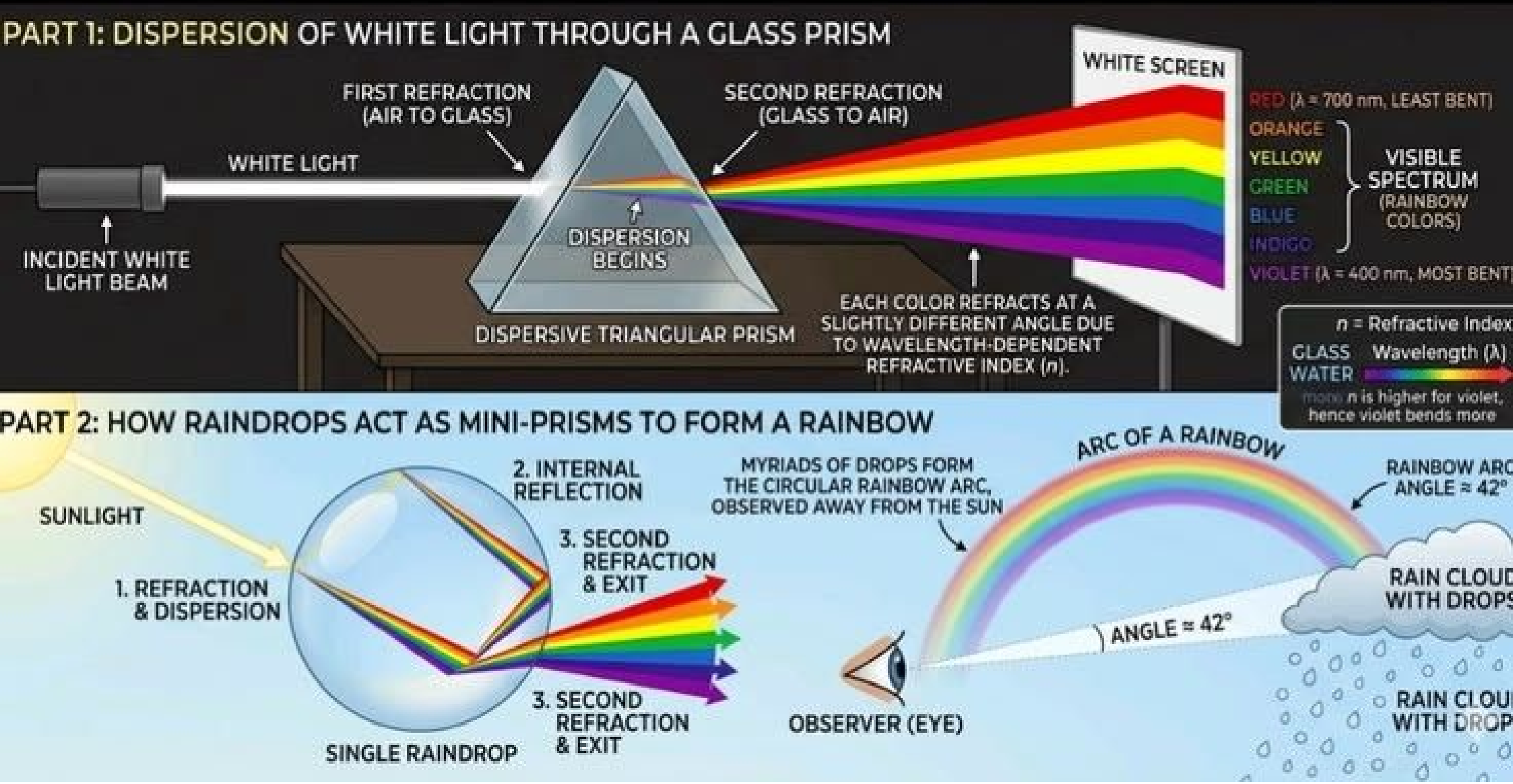


Used in **Spectrometers**



Study of Light

UNDERSTANDING RAINBOW FORMATION BY PRISM AND RAINDROP



D.A.V. PUBLIC SCHOOL, PTPS, PATRATU

CHAPTER: REFRACTION AND DESPERSION OF LIGHT

ASSIGNMENT PHYSICS CLASS- VIII

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1. **Define refraction of light.**
2. **Define diffraction of light.**
3. **Define dispersion of light.**
4. **What is a transparent medium?**
5. **What is a prism?**
6. **What is the normal in refraction?**
7. **What is the angle of incidence?**
8. **What is the angle of refraction?**
9. **What is white light?**
10. **Name the seven colours obtained during dispersion.**

Section B: Short Notes

11. **Write a short note on refraction.**
12. **Write a short note on diffraction.**
13. **Write a short note on dispersion of light.**
14. **Explain why a pencil appears bent in water.**
15. **Why does a swimming pool appear shallower than its actual depth?**
16. **What is the role of a prism in dispersion?**
17. **What is a rainbow?**
18. **Explain the term "spectrum."**
19. **Why does light bend when it passes from air to water?**
20. **State two examples of refraction in daily life.**

Section C: Laws of Refraction

21. **State the First Law of Refraction.**
22. **State the Second Law of Refraction.**

23. What is meant by the incident ray?

24. What is the refracted ray?

25. Draw a neat diagram showing refraction through a glass slab.

26. What happens when light travels from a rarer medium to a denser medium?

27. What happens when light travels from a denser medium to a rarer medium?

28. Why does light change direction during refraction?

29. Define optical density.

30. Name two optically denser media than air.

Section D: Practical Applications

31. Explain how spectacles use refraction to improve vision.

32. How does a magnifying glass work?

33. Explain the formation of a rainbow.

34. Why do diamonds sparkle?

35. How is dispersion used in spectrometers?

36. Explain why stars appear to twinkle.

37. How does a camera use refraction?

38. How does a microscope use refraction?

39. Mention two uses of diffraction in science and technology.

40. Explain why we can hear sound around corners due to diffraction.

Section E: Competency-Based Questions

41. Riya places a coin in an empty bowl. When she moves back, the coin disappears from view. Her friend pours water into the bowl, and the coin becomes visible again.

- **a) Which phenomenon is responsible?**
- **b) Explain why the coin becomes visible.**

42. Rahul observes a rainbow after rain.

- **a) Name the phenomenon responsible.**
- **b) Which device demonstrates the same phenomenon in a laboratory?**

43. A student dips a straight straw into a glass of water and observes that it appears bent.

- **a) Why does this happen?**
- **b) Name the scientific principle involved.**

44. During a science exhibition, a student shines white light through a prism and obtains seven colours.

- **a) What is this phenomenon called?**
- **b) Why do different colours separate?**

45. A fish in a pond appears nearer to the surface than it actually is.

- **a) Which phenomenon causes this?**
- **b) Explain briefly.**

46. A photographer adjusts the lens of a camera before taking a picture.

- **a) Which property of light helps the camera focus images?**
- **b) Explain briefly.**

47. During sunset, the Sun appears flattened near the horizon.

- **a) Which optical phenomenon contributes to this effect?**
- **b) Name the phenomenon.**

48. A student shines a laser beam through a narrow slit and observes spreading of light on a screen.

- **a) Name the phenomenon.**
- **b) What does this show about light?**

49. A person standing outside a room can hear someone speaking inside even without seeing them.

- **a) Which wave phenomenon is responsible?**
- **b) Explain briefly.**

50. An engineer designs optical instruments using lenses and prisms.

- **a) Which two phenomena of light are mainly involved?**
- **b) Give one application of each phenomenon.**

Answer Key

1. **Bending of light when it passes from one medium to another.**
2. **Bending or spreading of light around obstacles or through narrow openings.**

3. **Splitting of white light into its constituent colours.**
4. **A medium through which light passes easily.**
5. **A transparent optical object with flat polished surfaces that disperses light.**
6. **An imaginary line perpendicular to the surface at the point of incidence.**
7. **The angle between the incident ray and the normal.**
8. **The angle between the refracted ray and the normal.**
9. **Light containing all visible colours.**
10. **Violet, Indigo, Blue, Green, Yellow, Orange, Red (VIBGYOR).**

11–20. Based on textbook explanations.
21. Incident ray, refracted ray and normal lie in the same plane.
22. For a pair of media, the ratio of sine of angle of incidence to sine of angle of refraction remains constant.
23. Ray striking a surface.
24. Ray after entering another medium.
25. Diagram.
26. Bends towards the normal.
27. Bends away from the normal.
28. Due to change in speed of light.
29. Measure of how much a medium slows light.
30. Water, Glass.

31.Spectacles use lenses to refract light and form clear images.

32.Magnifying glass uses a convex lens.

33.Rainbow forms due to refraction, dispersion and reflection of sunlight in water droplets.

34.Due to repeated refraction and dispersion.

35.Used to study spectra of light.

36.Due to atmospheric refraction.

37.Camera lenses focus light by refraction.

38.Microscope lenses magnify objects by refraction.

39.Spectroscopy, optical instruments.

40.Sound waves diffract around obstacles.

41.Refraction; light bends through water making the coin visible.

42.Dispersion; prism.

43.Refraction; change of medium bends light.

44.Dispersion; colours have different wavelengths.

45.Refraction; rays bend at the water-air surface.

46.Refraction; lenses focus light.

47.Atmospheric refraction.

48.Diffraction; light behaves as a wave.

49.Diffraction; sound bends around obstacles.

50.Refraction and dispersion; spectacles/camera (refraction), prism/rainbow study (dispersion).