StandardRise Revision Notes | Class 8 | Physics | Chapter: Light

Light is the invisible energy that makes our visible world possible.

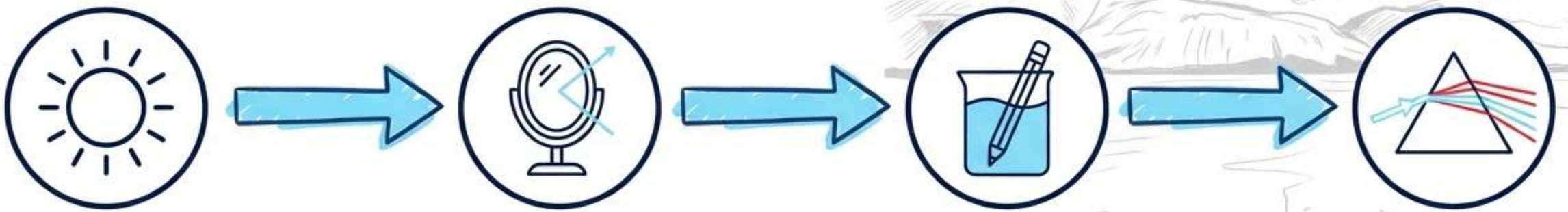
Speed in a vacuum: 3×10^8 m/s.

Why do stars twinkle?
(Atmospheric Refraction)

Why does a pool look shallow?
(Apparent Depth)

Why do we see rainbows?
(Dispersion of Light)

The Journey of a Ray



Creation
(Sources & Rays)

Bouncing
(Reflection)

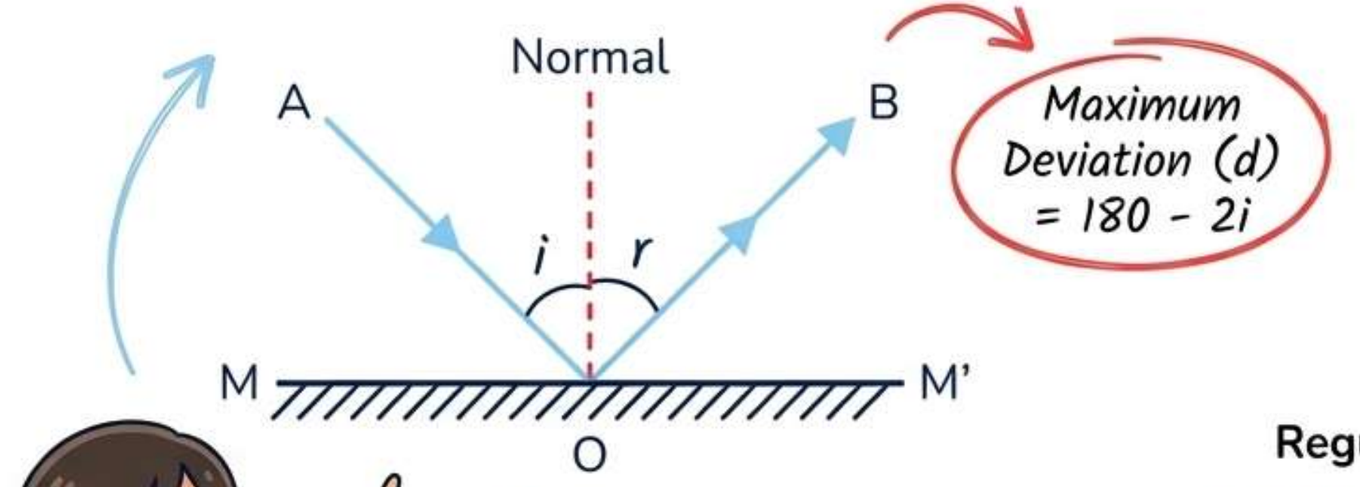
Bending
(Refraction)

Splitting
(Dispersion)

Core Concept 1: Bouncing Light (Reflection & Mirrors)

The Laws of Reflection

- The incident ray, reflected ray, and normal all lie in the same plane.
- Angle of Incidence (i) = Angle of Reflection (r).



Plane Mirror Characteristics

VESSL

Virtual
Erect
Same Size
Same Distance
Laterally Inverted

Diagnostic Matrix

Regular Reflection

- Smooth surface, parallel rays stay parallel.
- Forms images.

Diffused Reflection

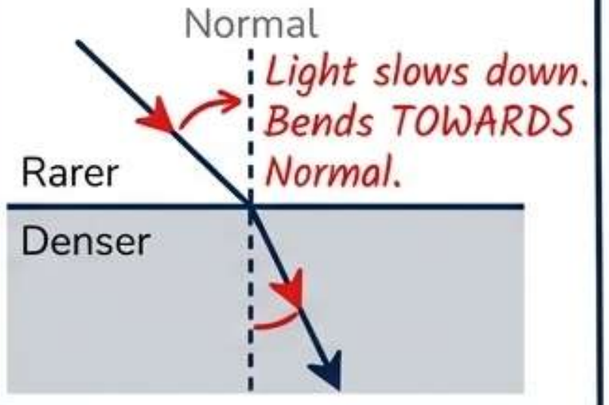
- Rough surface, rays scatter.
- Makes non-luminous objects visible.

Core Concept 2: Bending Light (Refraction)

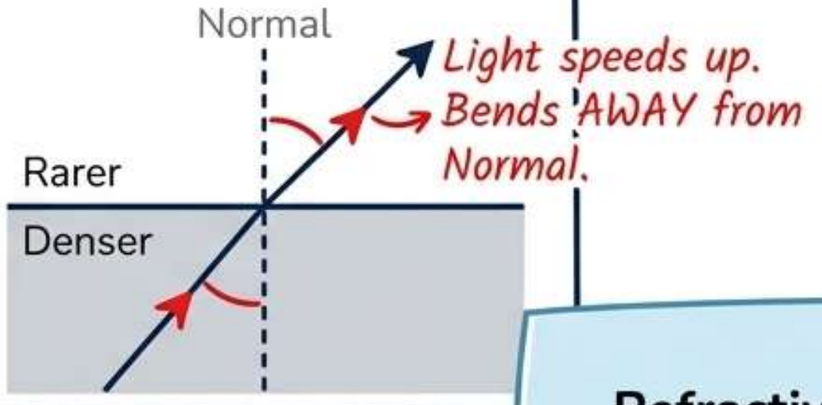
Refraction is light changing its path (bending) because its speed changes when moving between mediums of different optical densities.

The Golden Rules of Bending

Rarer → Denser



Denser → Rarer



What You See vs. Reality

Light rays coming from the denser water bend *away* from the normal in the rarer air, shifting the apparent image upwards!

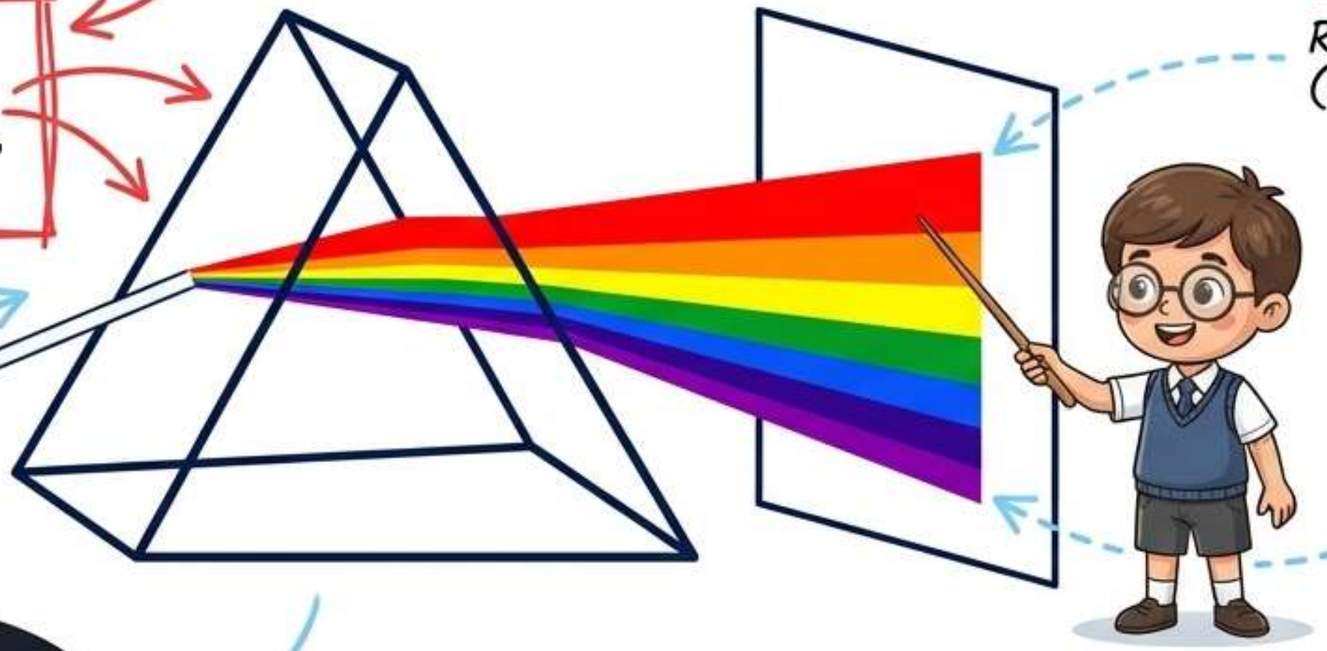
Refractive Index (n)

$$n = \frac{\text{Speed of Light in Air}}{\text{Speed of Light in Medium}}$$

Core Concept 3: Splitting Light (Dispersion & Colors)

Caveat:

White light is a mixture of 7 colors. Because they travel at slightly different speeds in glass, they bend at different angles!

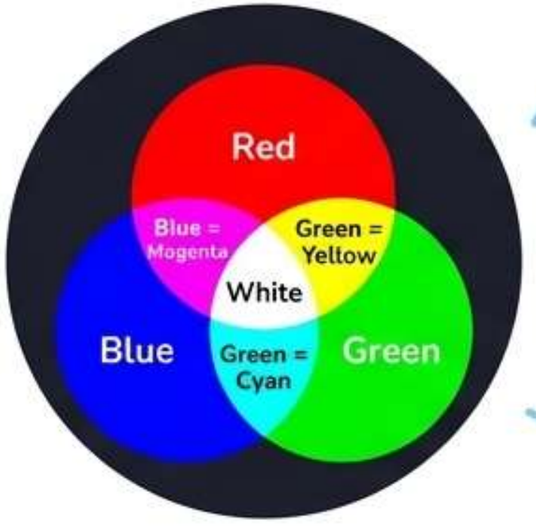


Caveat:

Red bends the LEAST (fastest in glass).

Caveat:

Violet bends the MOST (slowest in glass).



The Science of Color Mixing

- **Primary Colors:** Red, Green, Blue.
- **Secondary Colors:** Cyan, Magenta, Yellow.
- **Complementary Magic:** Any two colors that mix to make **White** (e.g., Blue + Yellow).

Quick Recall: Flashcards & Formulas

Luminous vs. Non-Luminous

Luminous: Emits own light (Sun, Candle).
Non-Luminous: Reflects light to be seen (Moon, Book).

Ray vs. Beam

Ray: Single path of light energy.
Beam: A group of parallel rays.
Caveat

Optical Density

Higher Refractive Index = Optically Denser (light travels slower).

Total Internal Reflection (TIR)

Conditions:
Caveat
1. Denser to Rarer medium.
2. Angle of Incidence > Critical Angle.

Multiple Images Formula

Caveat

$$n = (360 / \theta) - 1$$

(Where θ is the angle between two mirrors).

Deviation Formula

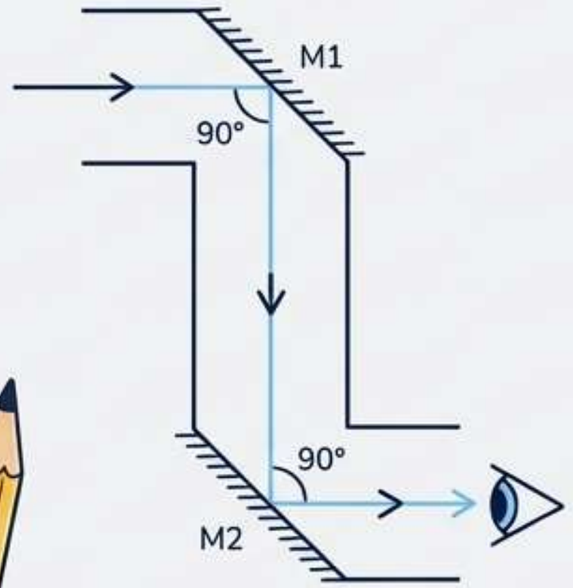
Caveat

Angle of Deviation = 180 - 2i

(Max deviation is 180° when i = 0°).

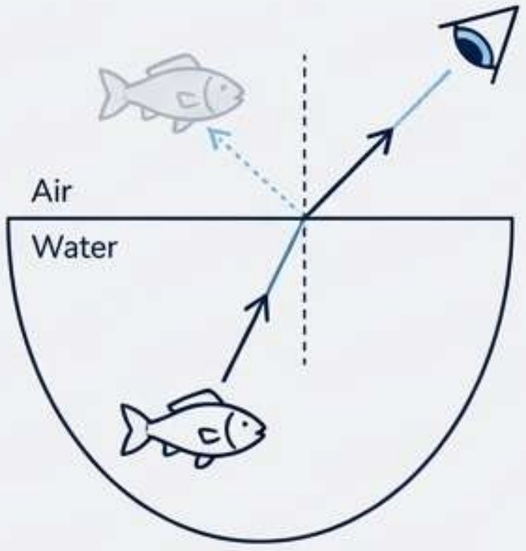
Essential Board Diagrams (Draw These to Get Full Marks)

The Periscope



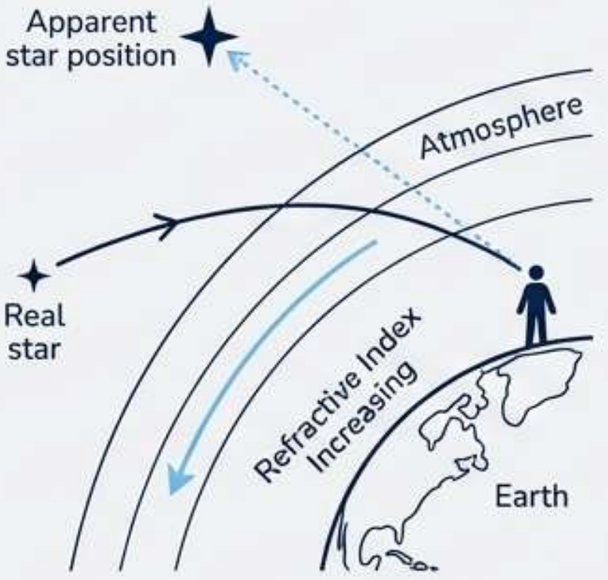
Drafting Rules:
- Mirrors must be exactly parallel.
- Mirrors at a 45° angle to the tube.
- Arrows on light rays are mandatory.

Apparent Depth



Drafting Rules:
- Use solid lines for real rays in water.
- Dotted lines extending back to the virtual (higher) fish.

Atmospheric Refraction



Drafting Rules:
- Show refractive index increasing dwd.
- Curve starlight path towards the normal as it enters Earth.

Most Asked Board Questions & Examiner Keywords

Include these exact red keywords to steal full marks!

Q1: Differentiate between Regular and Diffused reflection. Does diffused reflection mean laws of reflection failed?

Regular reflection occurs on smooth surfaces; diffused on rough surfaces. **NO**, the laws of reflection do not fail. They apply at every specific point, but the varying surface angles cause rays to scatter.

Q2: Why is the word AMBULANCE written inverted on vehicles?

Due to the phenomenon of **Lateral Inversion** in plane mirrors, the rearview mirror of the car ahead flips the image horizontally so it reads correctly.

Q3: What causes the twinkling of stars but not planets?

Atmospheric Refraction. Starlight bends continuously as it enters Earth's atmosphere. Planets are closer and act as extended sources, canceling out the twinkling effect.

Q4: A ray hits a mirror normally. What is the angle of reflection?

Zero degrees (0°). Since it travels along the Normal, i=0, therefore r=0.

Common Mistakes + Exam Traps

Trap 1: The Naked Ray

Not This

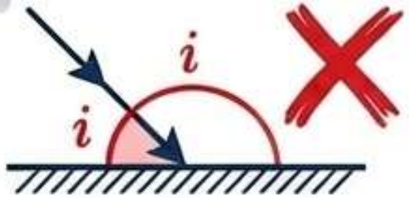
Mistake: Drawing a straight line and calling it a light ray.

Do This

Correction: Always draw arrows!
(No arrow = No marks).

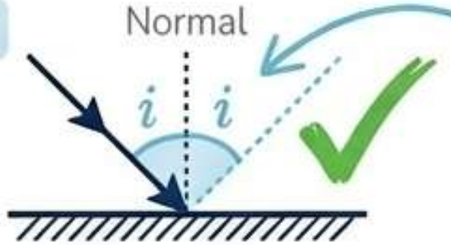
Trap 2: Measuring Angles from the Mirror

Not This



Mistake: Measuring the angle (i) from the mirror surface.

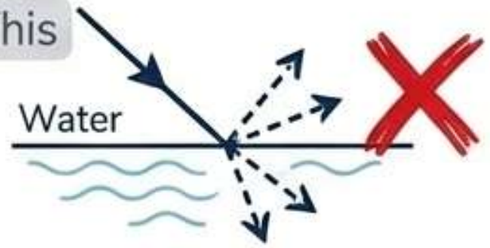
Do This



Correction: Always measure angles from the Normal.

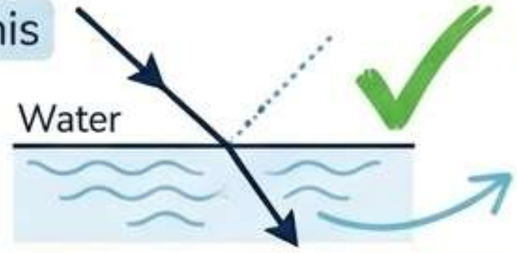
Trap 3: Confusing Refraction with Diffused Reflection

Not This



Mistake: Thinking light bends into water because of reflection.

Do This



Correction:
Bouncing = Reflection.
Bending through a new medium = Refraction.

Rapid Revision Sheet (Last-Minute Look)

mc24

LIGHT
(3 × 10⁸ m/s)

Mirrors
- $i = r$
- Plane Mirror = VESSL
- Multiple Images = $360/\theta - 1$

Refraction
- Speed Changes!
- Rarer to Denser = TOWARDS normal
- Twinkling Stars

Dispersion


VIBGYOR
- Red (fast/least bend)
- Violet (slow/most bend)

Normal = 90° perpendicular line.
All angles measured from here!

Answer Writing Framework (How to Steal Every Mark)

The Physics Framework (3 to 5 Marks)

Step 1: The Core Definition (1 Mark)
[MUST be precise & clear!]

Step 2: The Principle/Formula (1 Mark)
↳ Mention the CAUSE!

Step 3: The Ray Diagram (1–2 Marks)
↳ NEAT, Labelled, ARROWS!

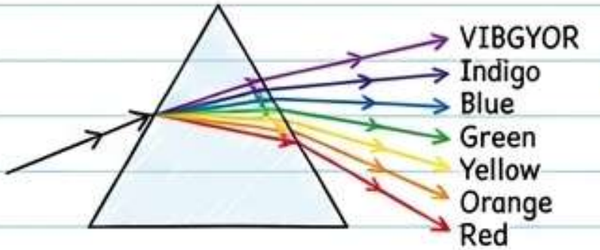
Step 4: Real-Life Example (1 Mark)
↳ Bonus points for creativity!

Application Example: "Explain Dispersion of Light (3 Marks)"

Explain Dispersion of Light (3 Marks)

Dispersion is the splitting of white light into its constituent seven colors when passing through a transparent medium. ✓ +1 Mark for Definition

it occurs because different colors travel at different speeds in the glass, causing them to bend at different angles. ✓ +1 Mark for Principle



✓ +1 Mark for Diagram

Total: 3/3 Marks!

Chapter Mind Map

LIGHT

Properties

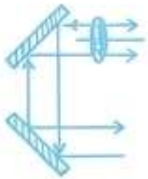
- Form of invisible energy
- Straight-line propagation (Rectilinear)
- Speed = 3×10^8 m/s

Phenomena

- Reflection (Bouncing, i=r, Regular/Diffused)
- Refraction (Bending, Speed change, Apparent depth)
- Dispersion (Splitting, Prism, VIBGYOR)

Instruments & Applications

- Periscope (Reflection, 2 mirrors at 45°)
- Kaleidoscope (Multiple reflections, patterns)



Human Eye

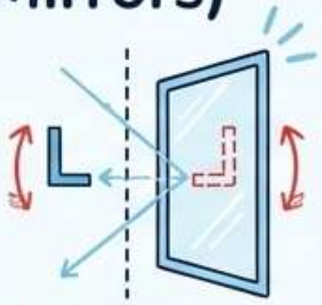
- Cornea
- Iris
- Retina

Memory Tricks & Exam Hacks

Hack 1: VESSL (For Plane Mirrors)

VE
SL

- **V**irtual
- **E**rect
- **S**ame size
- **S**ame distance



Leteral inversion

↳[CRUCIAL EXAM TRAP!]

Hack 2: RDT & DRA (For Refraction)

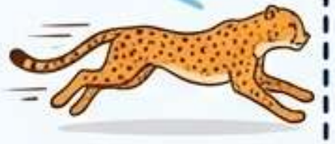
Rarer to Denser → Towards normal (RDT)

↳[RDT = Rarer -> Denser -> Towards!]

Turtle (Slow)

Denser to Rarer → Away from normal (DRA)

↳[DRA = Denser -> Rarer -> Away!]



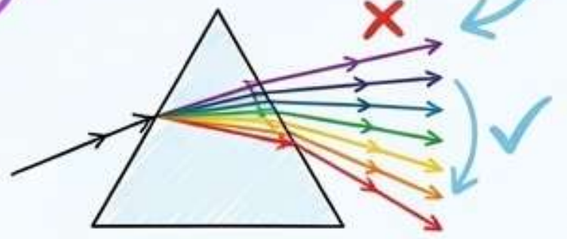
Cheetah (Fast)

Hack 3: The VIBGYOR Speed Limit

V
I
B
G
Y
O
R

Red runs fastest in glass (bends the least).

Violet runs slowest in glass (bends the most).



Final Exam Checklist: Are You Ready?

- [ ] I can state the Laws of Reflection.
- [ ] I understand the difference between regular and diffused reflection.
- [ ] I can calculate the number of multiple images (360/θ - 1).
- [ ] I can draw the ray diagram for a Periscope.
- [ ] I know why a pencil bends in water (Refraction).
- [ ] I can explain Atmospheric Refraction (twinkling stars).
- [ ] I have memorized VIBGYOR and know which color bends the most.
- [ ] I remember to ALWAYS draw arrows on my light rays!

You've got this. Good luck on your exam!