

[ Class 12 Physics • Ray Optics ]

# 9.7 Optical Instruments

From Theoretical Rays to Practical Reality.

An introduction to the practical applications of reflection, refraction, and the extension of human vision.

# The Purpose of Optical Instruments



Nature endowed the human eye to detect a small range of electromagnetic waves (400 nm to 750 nm). Optical instruments utilize the properties of reflection and refraction to manipulate light and extend this natural sense of vision.

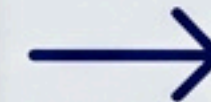
## The Principles

- Reflection
- Refraction
- Dispersion



## The Building Blocks

- Mirrors
- Lenses
- Prisms



## The Extension of Vision

Overcoming the physical limits of the human eye.

# Everyday & Scientific Applications



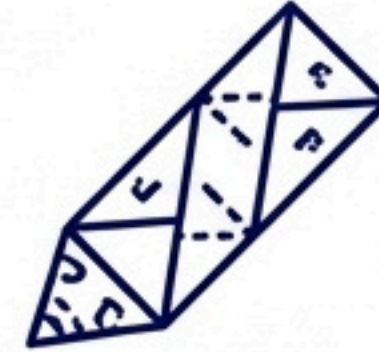
**The Human Eye**

[ Natural Lens ]



**Periscope**

[ Mirrors & Prisms ]



**Kaleidoscope**

[ Multiple Reflection ]



**Binoculars**

[ Lenses & Prisms ]



**Microscope**

[ Converging Lenses ]



**Telescope**

[ Lenses & Large Mirrors ]



**You've Learned the Theory.  
Let's Test Them Now.**

$$E=mc^2$$



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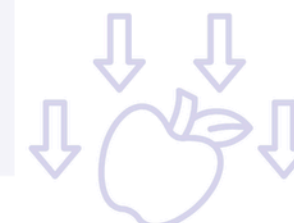
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### Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



# Our Focus: The Instruments of Science



## The Microscope

**Focus:** The Very Small.

**Mechanism:** Converging lenses of small focal lengths.

**Goal:** Produce an erect, highly magnified virtual image of objects held very close to the eye.



## The Telescope

**Focus:** The Very Distant.

**Mechanism:** Large aperture objective lenses (or mirrors) and eyepieces.

**Goal:** Provide angular magnification of massive objects located lightyears away.

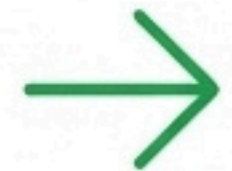
# Key Takeaways



**Vision Extended:** Optical instruments use mirrors, lenses, and prisms to manipulate light and overcome the physical limitations of the human eye (400 nm to 750 nm).



**Diverse Applications:** From everyday tools like periscopes to complex scientific instruments, all devices rely entirely on the foundational laws of reflection and refraction.



**Up Next:** We will now explore the specific construction, ray diagrams, and mathematical magnifying power of Microscopes (Simple & Compound) and Telescopes.



# You've Learned the Theory.

## Now Let's Test It.

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