UDAAN 3.0

2025

LECTURE- 01

PHYSICS

LIGHT – REFLECTION & REFRACTION

Shailendra Pandey Sir

B.Tech. HBTI, M.Tech. HBTI & M.Sc. Physics

TOPIC *to be covered*

1. BASICS OF LIGHT
2. OBJECT & IMAGE
3. REFLECTION OF LIGHT
4. QUESTIONS

CHAPTER NAME

LIGHT – REFLECTION & REFRACTION

LIGHT

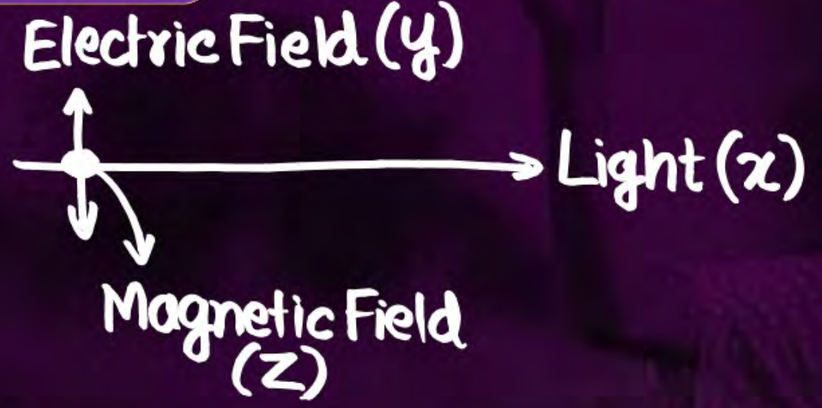
Light is form of energy which enables us to see objects which emit or reflect light. Light is a type of energy which can **produce sensation of vision in our eyes**.

LIGHT

Dual Nature
- Particle → Photons (energy packet)
- Wave → Electromagnetic Transverse Wave

- It travel in straight line in form of particles and waves.
- With the help of light we see all colours of nature.
- Our eyes are mostly sensitive for yellow colour and least sensitive for violet and red colour.

PROPERTIES OF LIGHT



- Light is an **electromagnetic wave**.
- Light **travels in a straight line**.
- Light is a **transverse wave**, and **does not need any medium** to travel.

Non-Mechanical Wave

- Light can **travel through vaccum**. Its speed through vaccum is $3 \times 10^8 m/s$.

↓

3 Lakh Km/s.

PROPERTIES OF LIGHT

$$v = \frac{d}{t} = \frac{\lambda}{T}$$

$$V = f\lambda$$

Speed

frequency

Wavelength

- The **velocity** of light **changes** when it travels from one medium to another.
- The **wavelength** (λ) of light **changes** when it goes from one medium to another.
- The **frequency** (f) of the light wave **remains same** in all media.

frequency is property of source.

PROPERTIES OF LIGHT

- Light gets **reflected back** from polished surfaces, such as mirrors, polished metal surfaces, etc.

- Light **undergoes refraction** (bending) when it travels from one transparent medium to another.

PROPERTIES OF LIGHT

- Light does not need a material medium to travel, that is, it can travel through a vacuum too. Scientists have assigned a value of **299,792,458 m/s** to the speed of light in vacuum.

$\hookrightarrow 3 \times 10^8$ m/s.

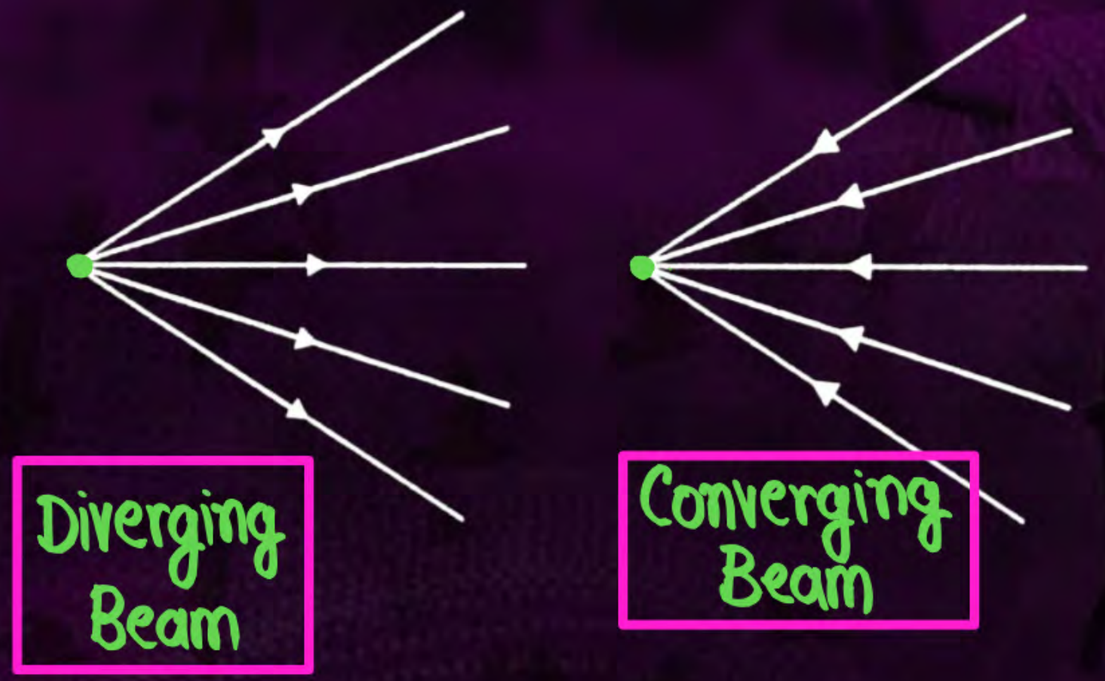
- According to current scientific theories, no material particle can travel at a speed greater than that of light in vacuum.

RAY OF LIGHT

A straight line showing the direction of light is called **ray of light**.

BEAM OF LIGHT

A collection of rays of light is called **beam of light**. However, if the number of rays is too small then such a collection of rays is called **Pencil of light**.



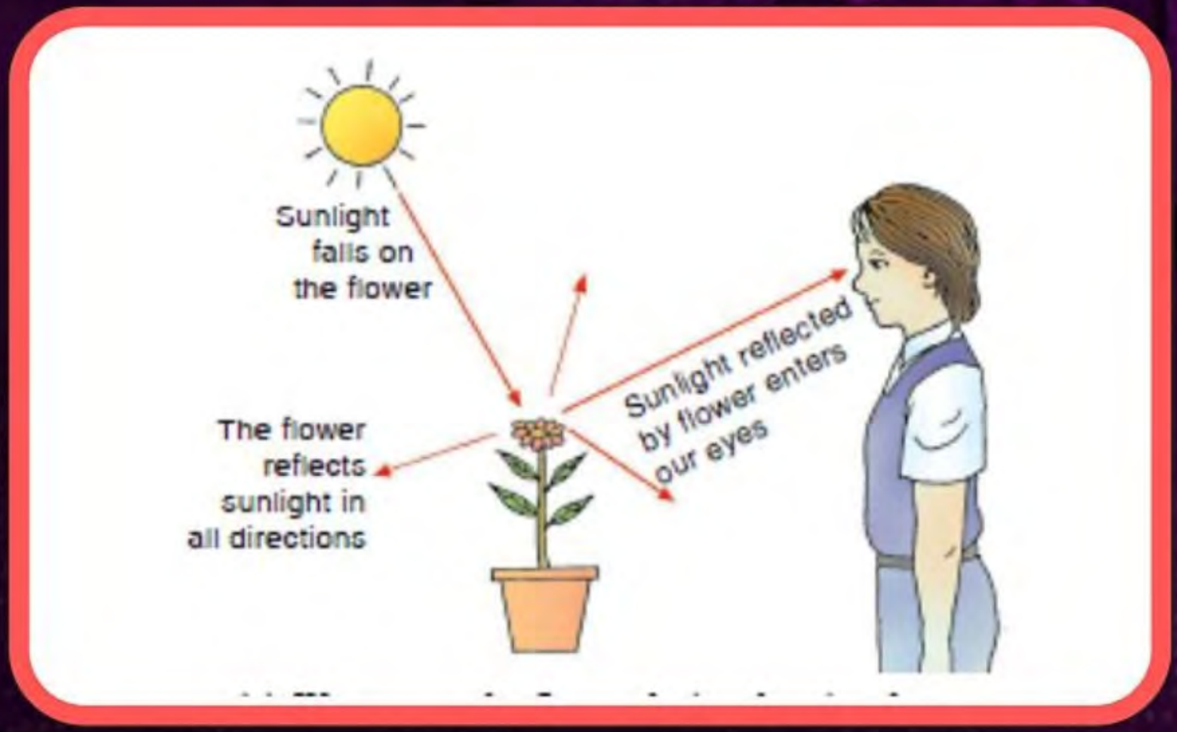
BEAM OF LIGHT

Parallel Beam :

When the rays of light travel parallel to each other, then the collection of such rays is called parallel beam of light. For example, **sun rays** constitute a parallel beam.

HOW WE SEE?

When a light ray is falling on the surface of any object which reflect and reflected light reached our eyes. Due to this our eyes feel a sensation then we see the object.



Objects

Anything which gives out light rays (either its own or reflected by it) is called an object.

Luminous Object

- Natural → Sun
- Artificial → Bulb

Non-Luminuous Object

- Moon
- Planet
- Man

luminous objects

The objects which emit (give) light are called luminous objects. It may be natural or manmade. **Sun is a natural source of light** and electric lamp, and oil lamp, etc. are manmade source of light.

Non-luminous objects

The Non-luminous objects do not emit light. However, such objects become visible due to the reflection of the light falling on them. **Moon does not emit light.** It becomes visible due to the reflection of the sunlight falling on it.

Images

In physics, image is an **optical appearance** produced when light rays coming from an object are reflected from a mirror (or refracted through a lens).

Real Image

⇒ Obtained on screen.

Virtual Image

⇒ Can't be obtained on screen.

Real Images and Virtual Images

The image which can be obtained on a screen is called a real image. In a cinema hall, we see the images of actors and actresses on the screen. So, the images formed on a cinema screen is an example of real images

HW

Real Image	Virtual Image
1. A real image is formed when two or more reflected rays meet at a point in front of the mirror.	1. A virtual image is formed when two or more rays appear to be coming from a point behind the mirror.
2. A real image can be obtained on a screen.	2. A virtual image cannot be obtained on a screen.
3. A real image is inverted with respect to the object.	3. A virtual image is erect with respect to the object.

REFLECTION OF LIGHT

When rays of light falls on any object it return back in the same medium from the surface, this phenomenon is called **reflection of light**. Due to reflection of light we can see all the nature.

QUESTION

एक जैसा

The path along which light travels in a homogeneous medium is called a

A beam of light

B ray of light

C pencil of light

D none of these

QUESTION

Air is not visible because it

A is nearly a perfectly transparent

B neither absorbs nor reflects light

C transmits whole of light

D all of the above are correct

QUESTION

According to laws of reflection of light

A Angle of incidence is equal to the angle of reflection

B Angle of incidence is less than the angle of reflection

C Angle of incidence is greater than the angle of reflection

D None of these

QUESTION

Which of the following correctly represents graphical relation between angle of incidence (i) and angle of reflection (r) ?

$\angle i = \angle r$

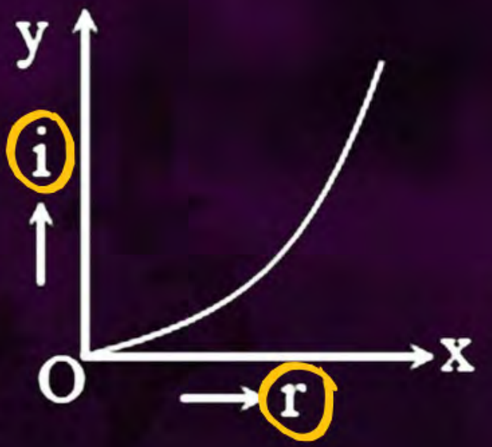
$y = x$

$y = mx$

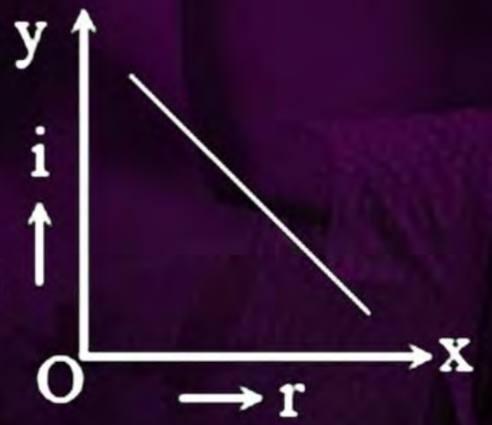
↓

Straight Line passing through origin.

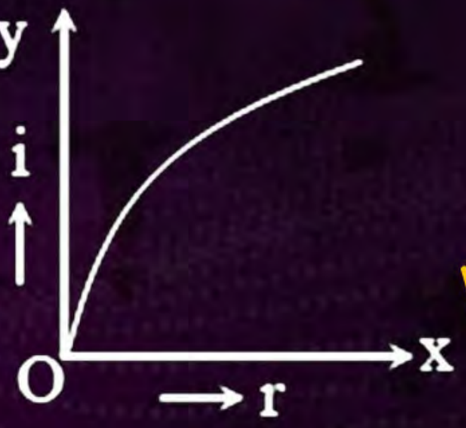
(A)



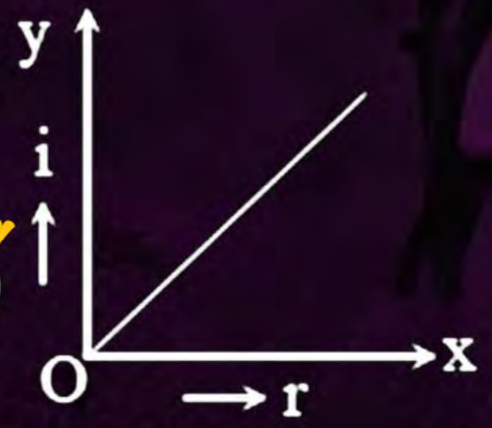
(B)



(C)



(D)



QUESTION

Light shows

A Random propagation

B Curvilinear propagation

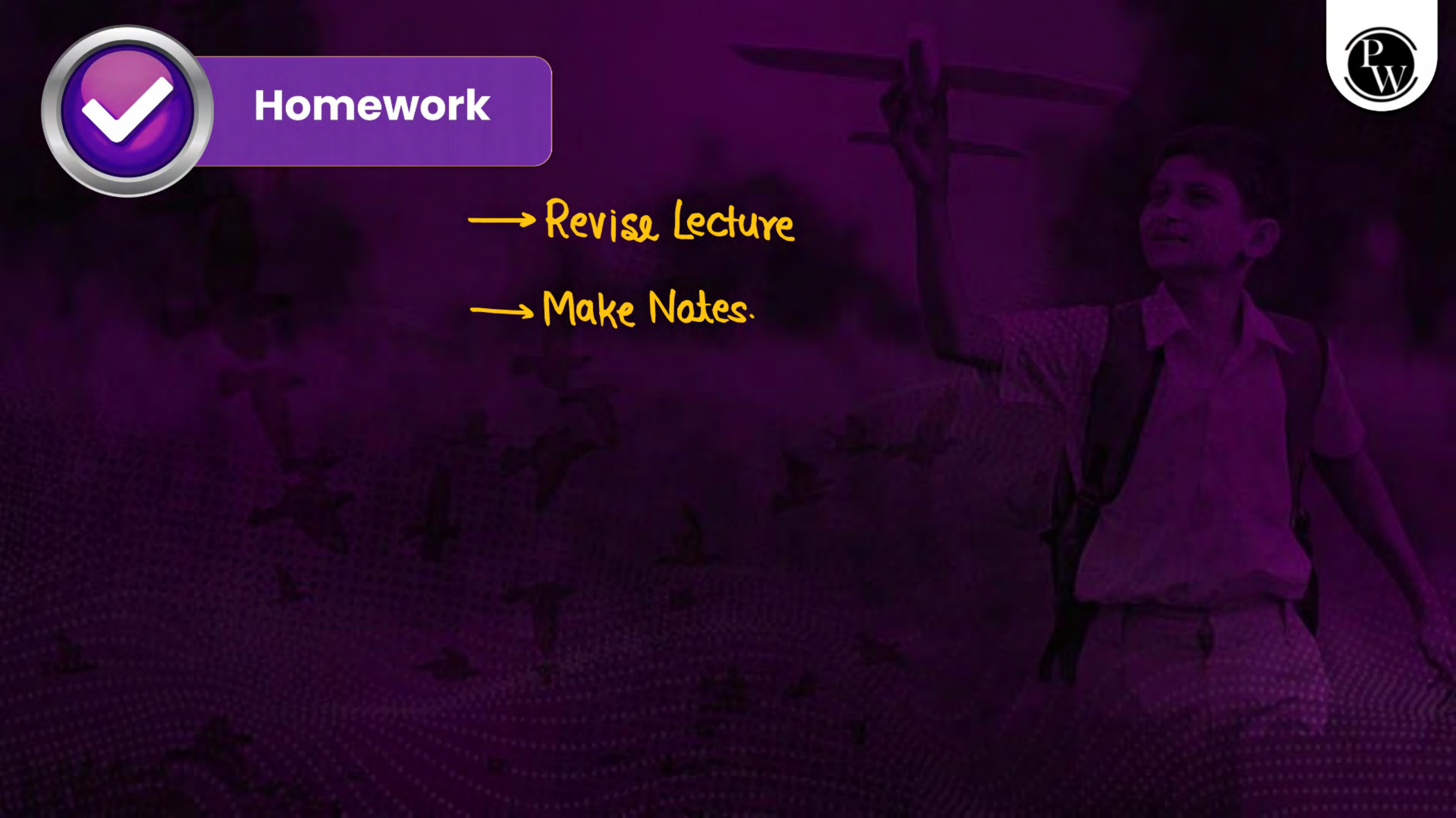
C Rectilinear propagation

D None of these

Homework

→ Revise Lecture

→ Make Notes.




THANK
You