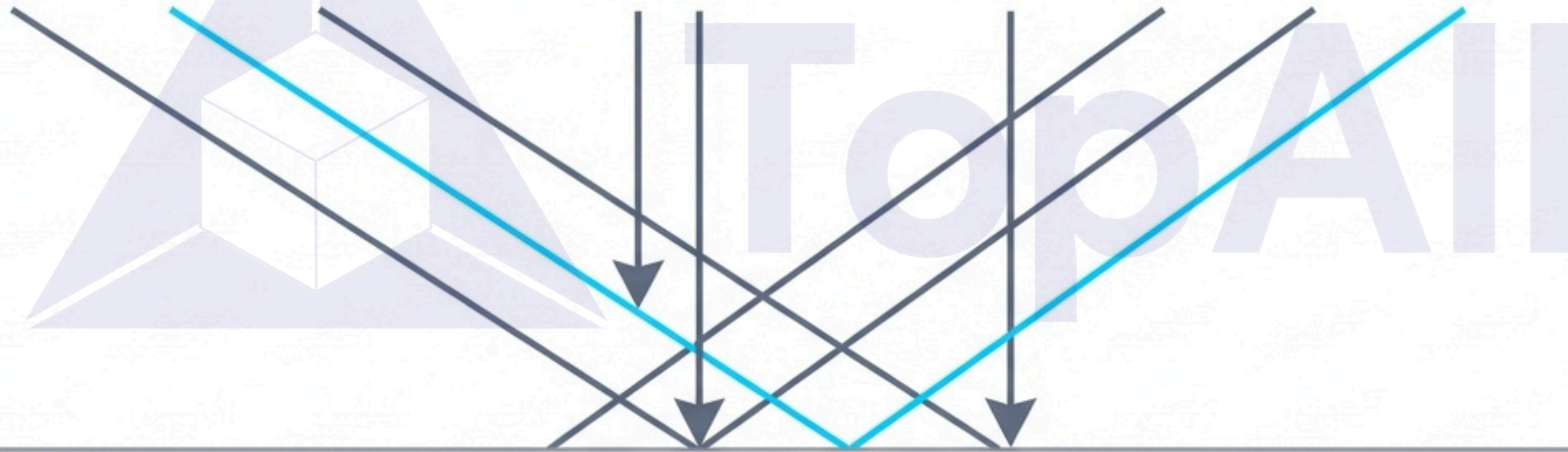
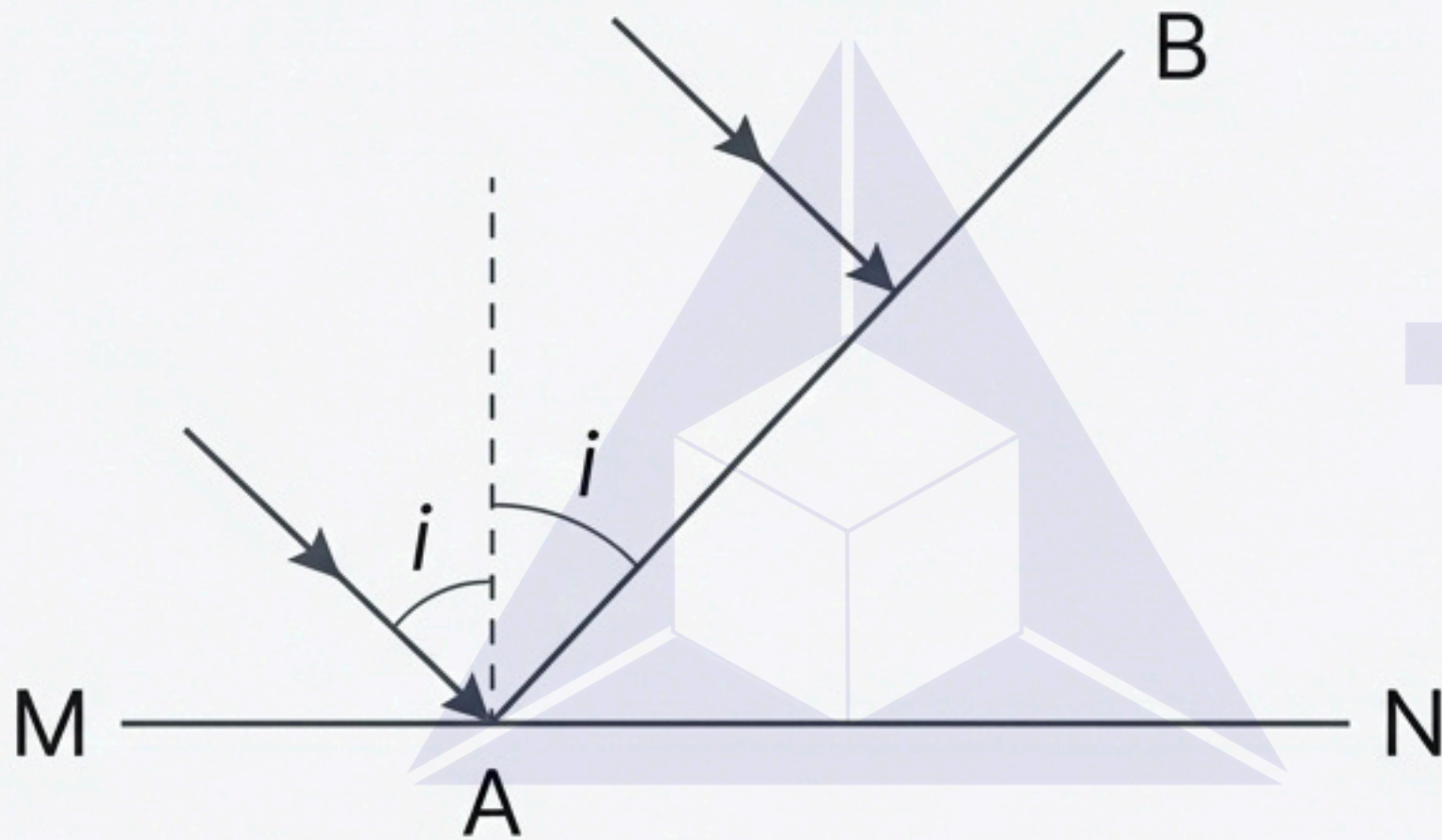


Reflection of a Plane Wave

Wavefront proof of the law of reflection

Class 12 Physics • Chapter 10: Wave Optics





The Wavefront

Plane wavefront AB advancing at speed v .

The Interface

Plane reflecting surface MN.

The Angle

Incident at angle i to the normal.

Tangent plane CE is drawn from C to the sphere. $AE = BC = vt$.



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

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

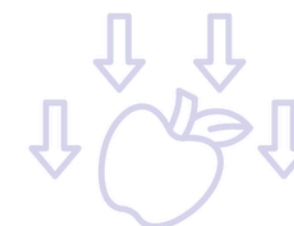
Practice Now



[At prep.topall.app](https://prep.topall.app)

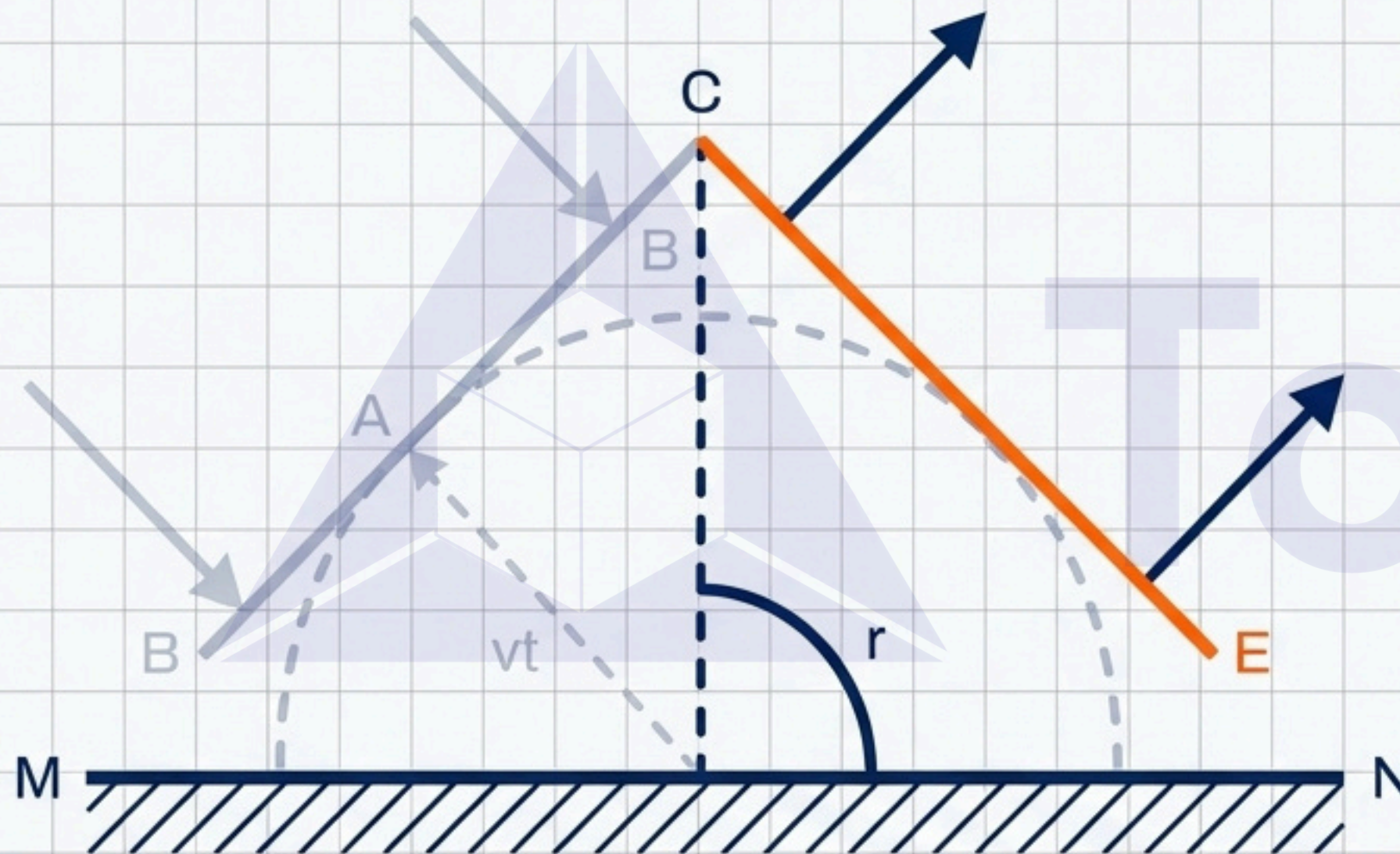


Key Highlights



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- » Push Your Limits with Level-Based Challenges
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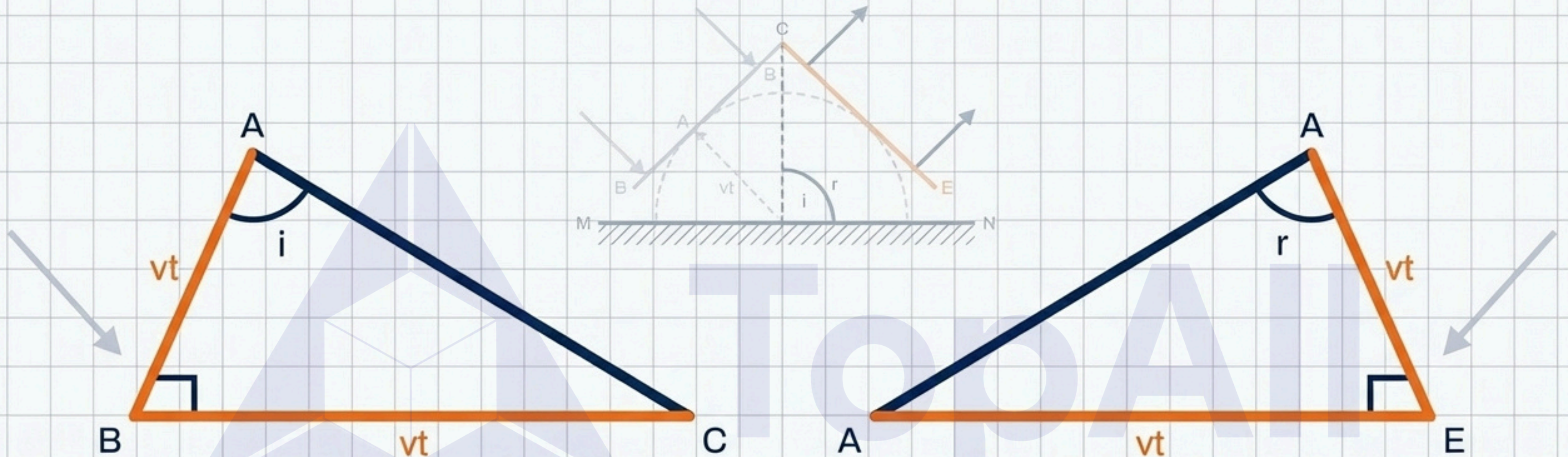
Defining the Reflected Wave



CE represents the reflected wavefront.

As the spherical wavelet expands, the tangent line connecting C to the envelope defines the new continuous wavefront, moving away at angle r .

The Law of Reflection Emerges



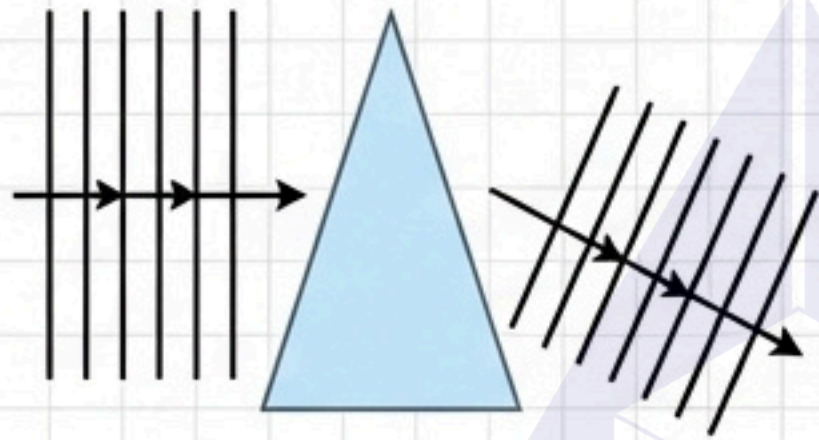
1. Right Angles:
 $\angle ABC = \angle AEC = 90^\circ$

2. Common Base:
Hypotenuse AC is shared.

3. Equal Sides:
 $AE = BC = vt$

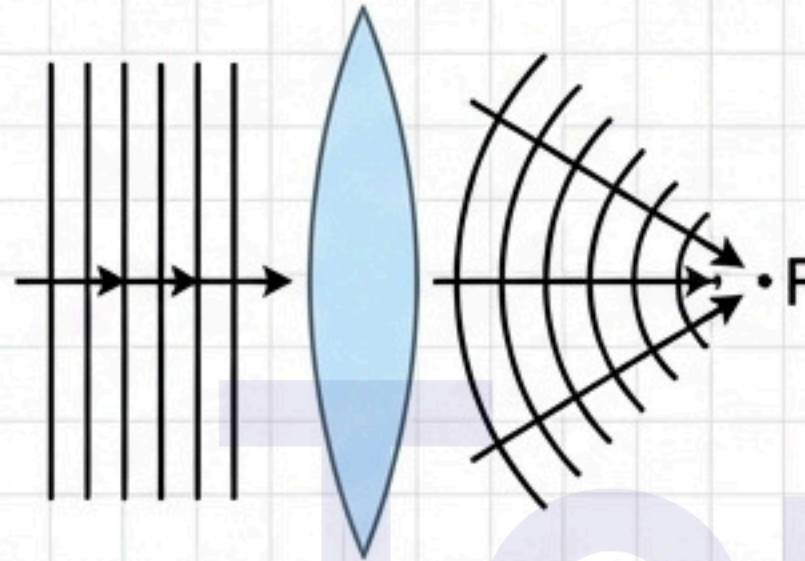
Therefore, $\triangle EAC \cong \triangle BAC$ (RHS Congruence). This perfectly proves that the angle of incidence (i) equals the angle of reflection (r).

Beyond Flat Reflection: Optical Devices



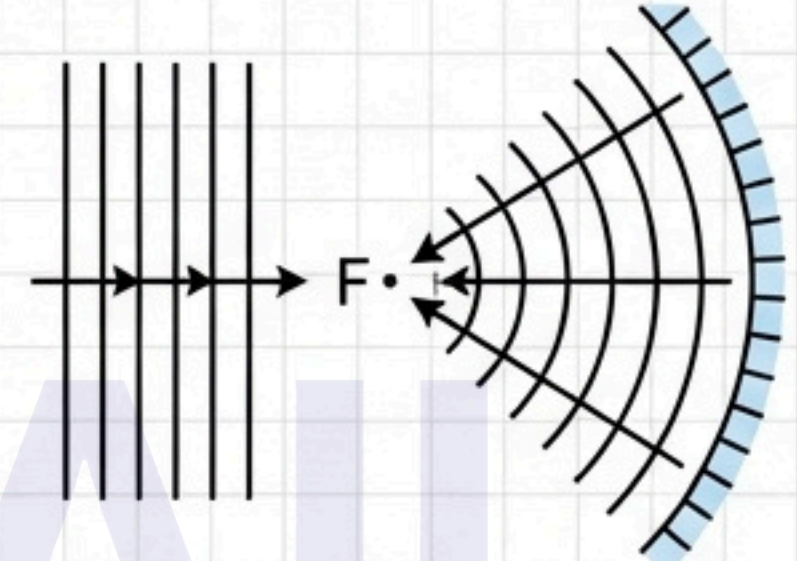
Prism Tilt.

Slower speed in thicker glass delays the lower wavefront, causing a downward tilt.



Lens Focus.

The thick central glass delays the wave the most, creating a depression that converges to Focus F.



Mirror Convergence.

The edges reflect first while the center travels further, creating a spherical wave converging to Focus F.

Key Takeaways



Geometric Origin

The law of reflection ($i = r$) is not arbitrary; it emerges naturally and inevitably from the geometry of expanding wavefronts (Huygens' Principle).

Universal Application

Whether reflecting or refracting, tracing physical wavefront delays perfectly explains the behavior of all optical devices, including mirrors, lenses, and prisms.

Constant Time Principle

The total time taken for light to travel from an object point to its corresponding image point is exactly the same measured along any valid ray.



You've Learned the Theory.

Now Let's Test It.

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