REFRACTION

Keywords

- 1. Refraction
- 2. light
- 3. angle of incidence,
- 4. angle of refraction

Learning Objectives

1

- Define Refraction and know light bends when it passes through different medium

2

- Understand that the angle of incidence affects the angle of refraction.

3

- Use the PhET simulation effectively to predict and explain how light behaves when transitioning between different materials.

Starter – Looking through water

ANALYSE

A pencil placed in a glass of water appears bent at the water surface. **Explain why this happens using refraction.**

Refraction

To remember what happens to light when it is refracted, think of the word:

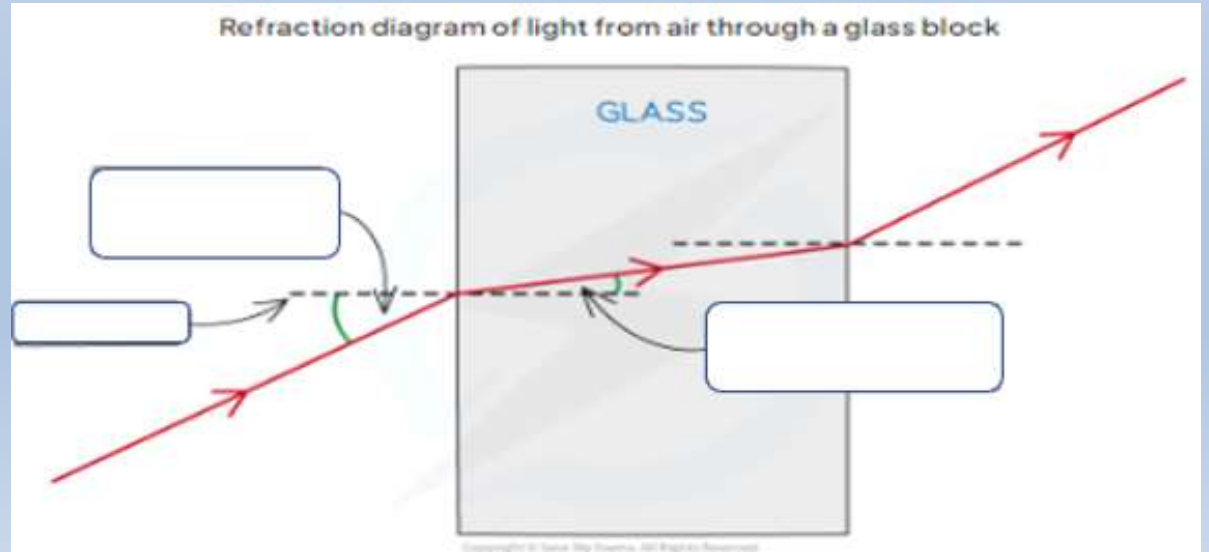
TAGAGA

Towards (normal)
Air
Glass
Away (from normal)
Glass
Air

Refraction:
It is bending property of light when it is travelling from one medium to another medium. This happens due to change in speed of light with different densities of the two medium

Refractive Index: it is a measure of how slow the light is travelling in a specific medium

Formula
Refractive Index = speed of light in vacuum / speed of light in medium



To remember what happens to light when it is refracted, think of the word:

FAST

Towards (normal)
Slow down
Away (from normal)
Fast

What happens in refraction: glass to air

When light is refracted as it travels from air to glass:

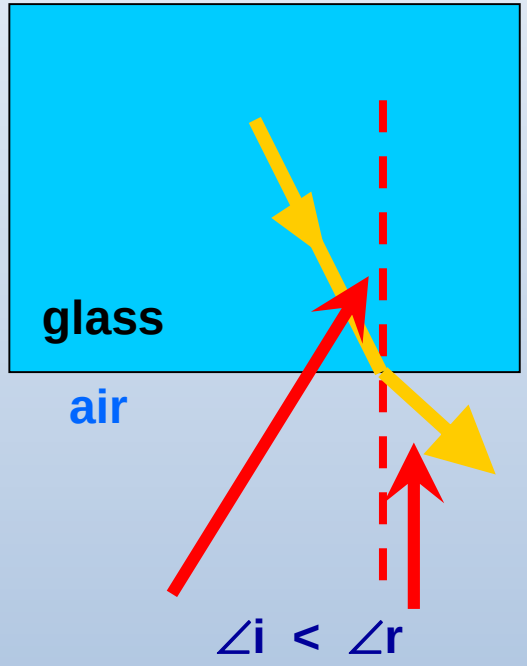
angle of incidence < angle of refraction

$\angle i < \angle r$

PREDICT

1.Predict what happens to a ray of light travelling from glass into air.

2.If a material has a very high refractive index, how will it affect light passing through it?

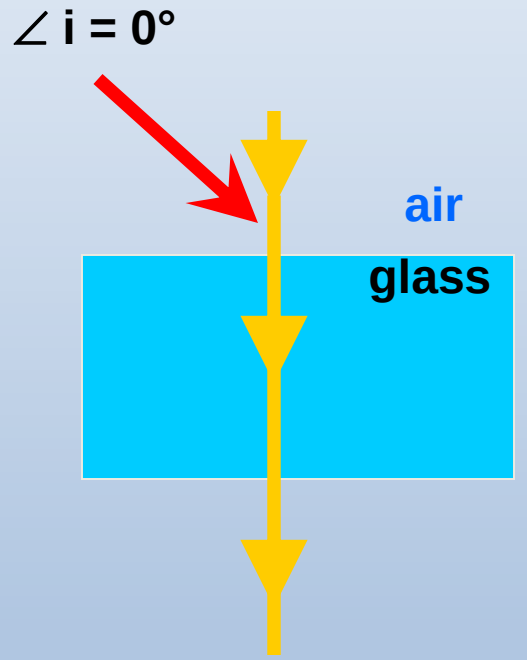


SHARE NEW INFORMATION

Refraction – angle of incidence = 0°

What happens to light travelling from air through a glass block when the **angle of incidence is 0°**?

When the angle of incidence is 0° the light ray is **not deviated** from its path.



undeviated light ray

Why does refraction not occur when light enters water at 90° to the surface?

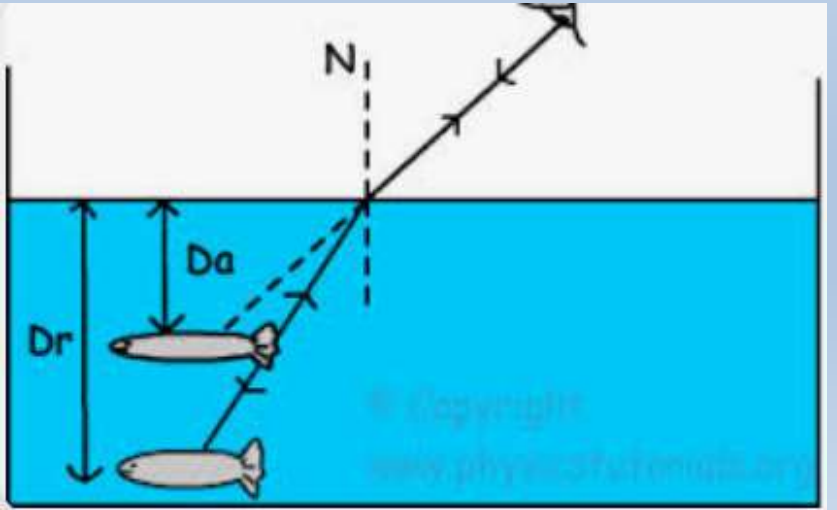
SHARE NEW INFORMATION

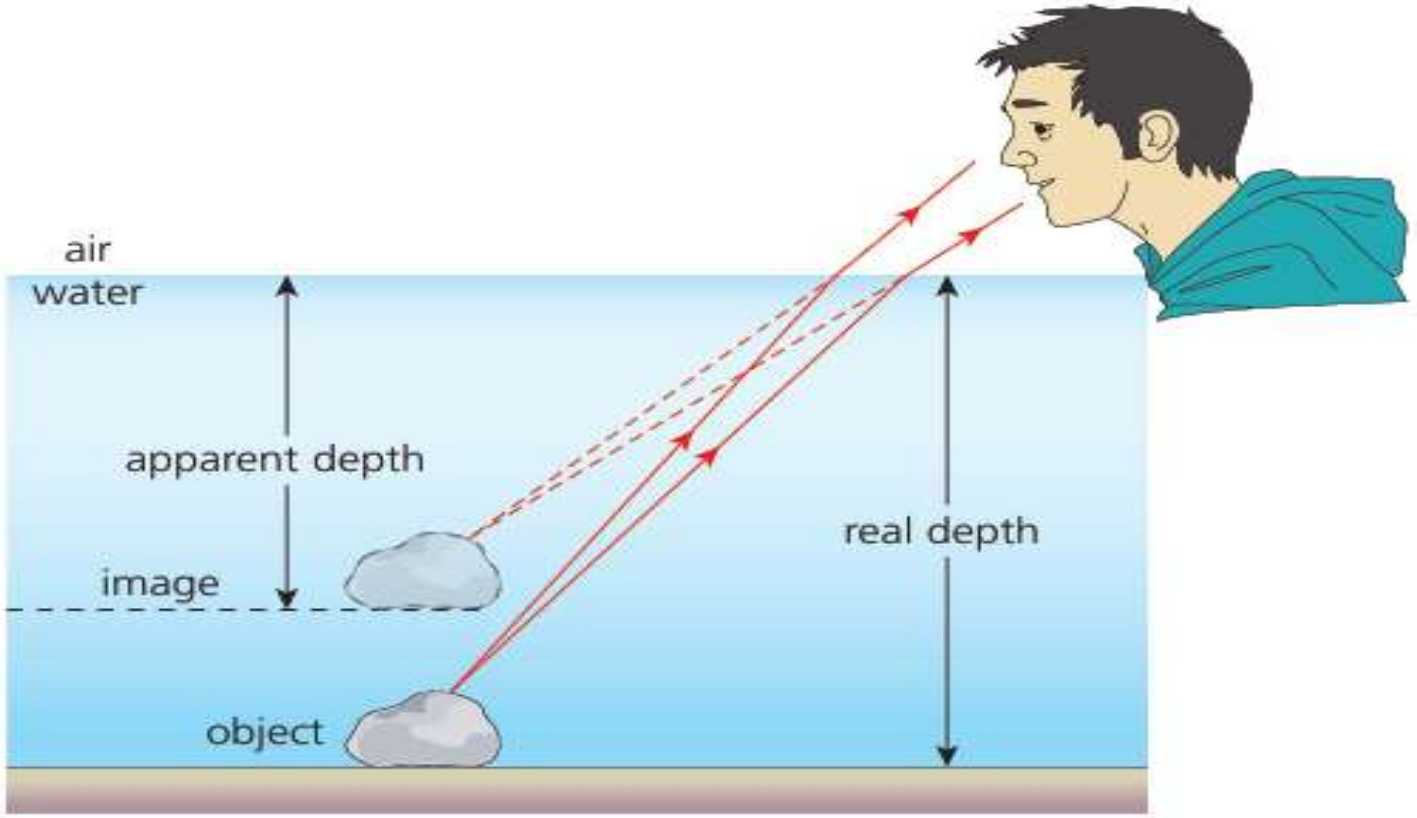
Refraction

APPLY

A swimmer sees the bottom of a pool as shallower than it really is.

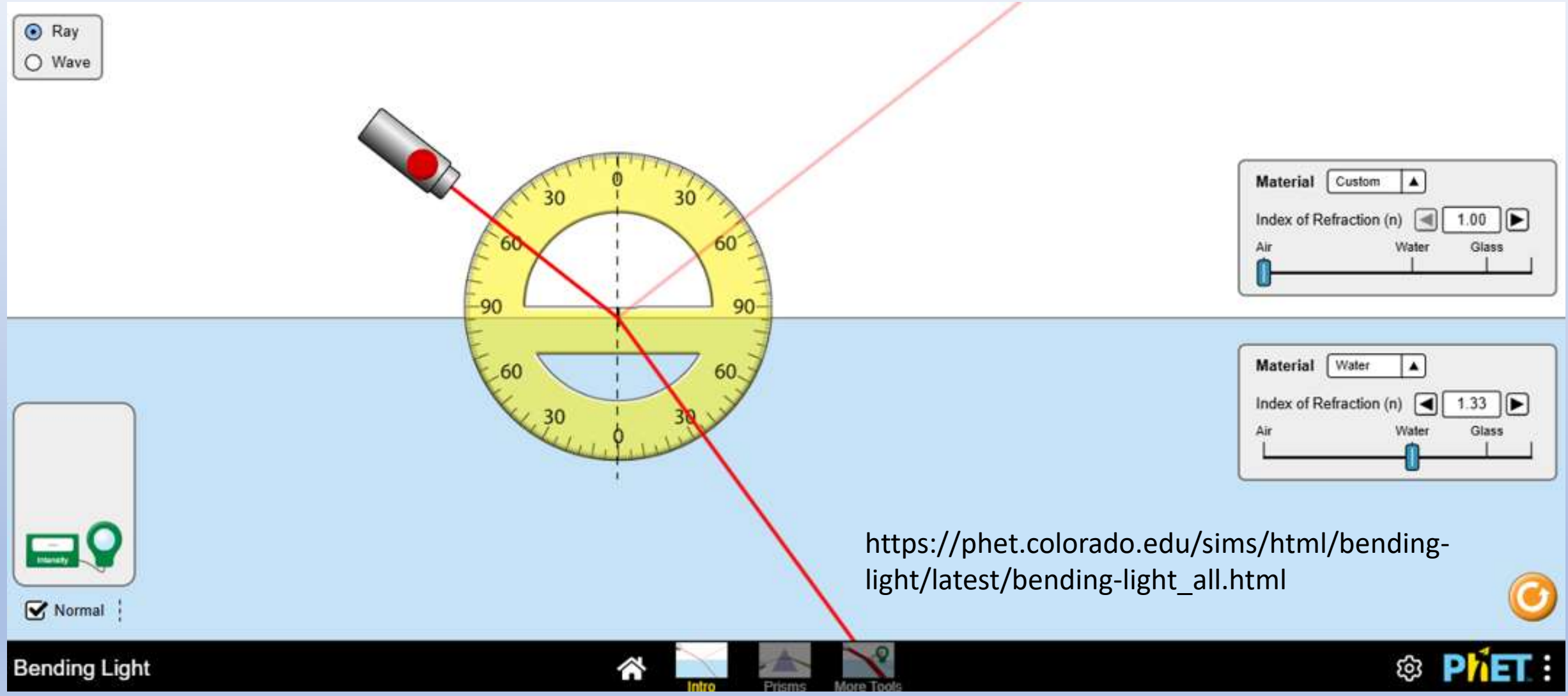
Explain why this happens.





When light reaches your eye, your brain assumes that it has travelled in a straight line. So you see the rock as being in a different place. The depth that the rock appears to be is called the **apparent depth**, which is shallower than the **real depth**.

Virtual lab – Refraction - Activity

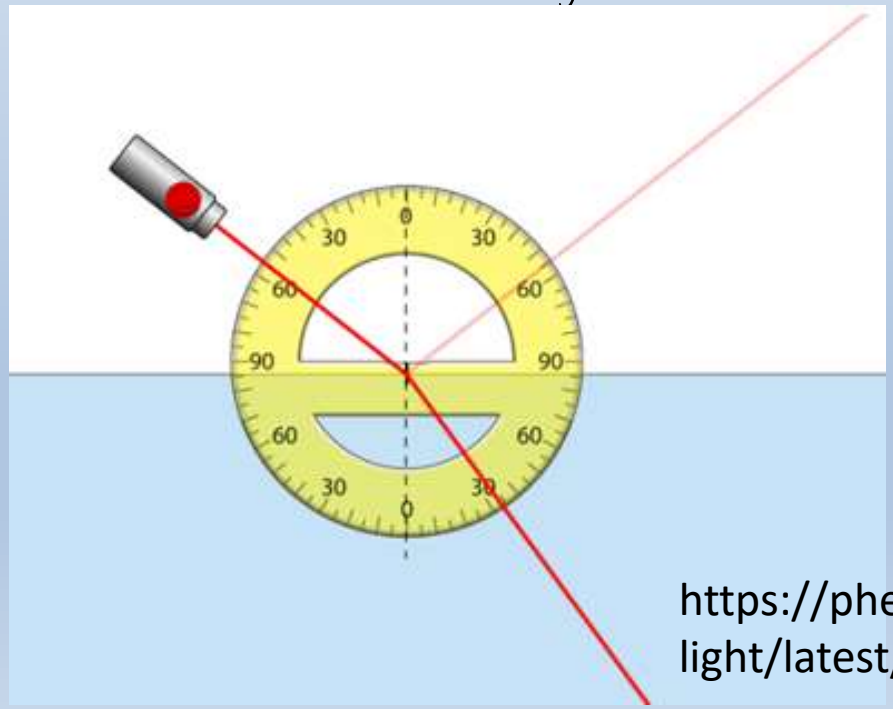


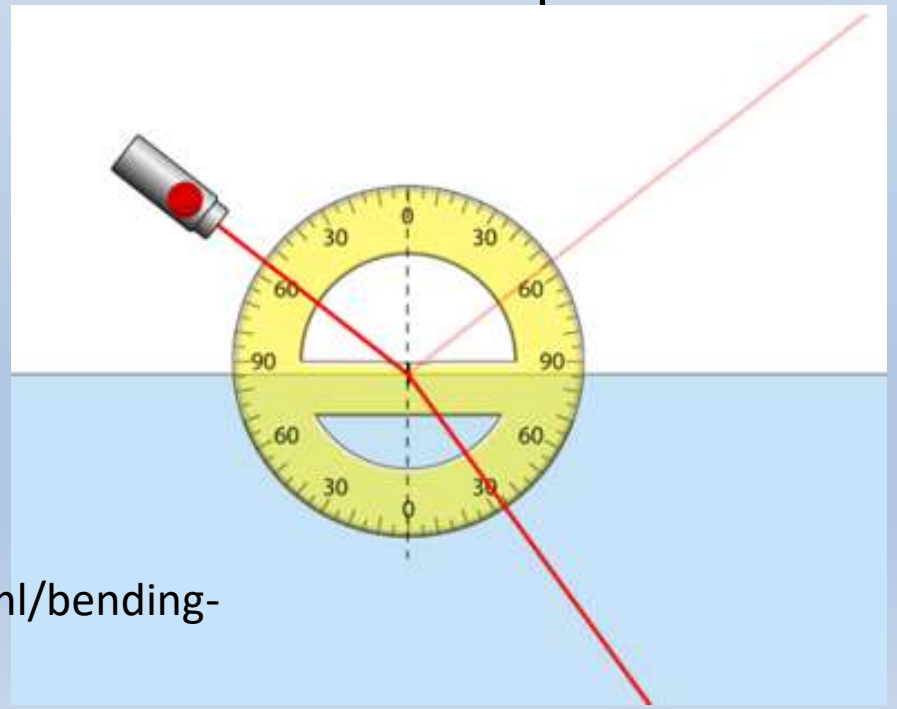
Virtual lab – Refraction – Activity 1

Assume that light is travelling from Air to water

Use Phet simulation tool
set angle of incidence =26 degree and show that angle of refraction = 17 degree
Draw a refraction ray diagram with i=26 degree and r=17 degree and label it

Extension: How do you confirm light is travelling from Air to Water? Explain





https://phet.colorado.edu/sims/html/bending-light/latest/bending-light_all.html

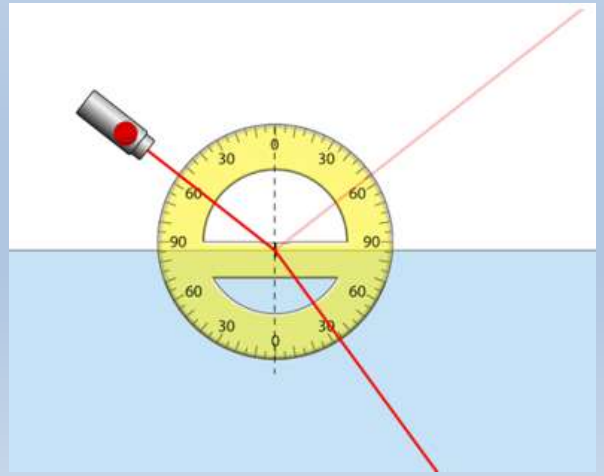
L1

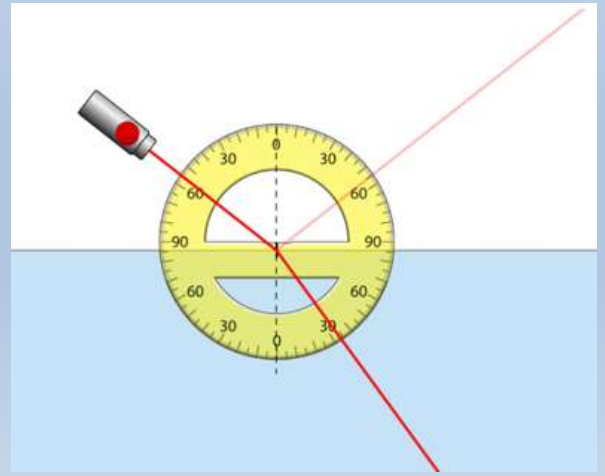
Virtual lab – Refraction – Activity 2

Assume that light is travelling from Glass to Air

Use Phet simulation tool
1.set angle of incidence =35 degree and measure the angle of refraction =
2.Predict how the angle of refraction will be?
3.Measure the angle of refraction
4. Prove that your Prediction is correct or not
Draw a refraction ray diagram with i=35 degree and r=measured angle and label it

Extension: How do you confirm light is travelling from Glass to Air ? Explain





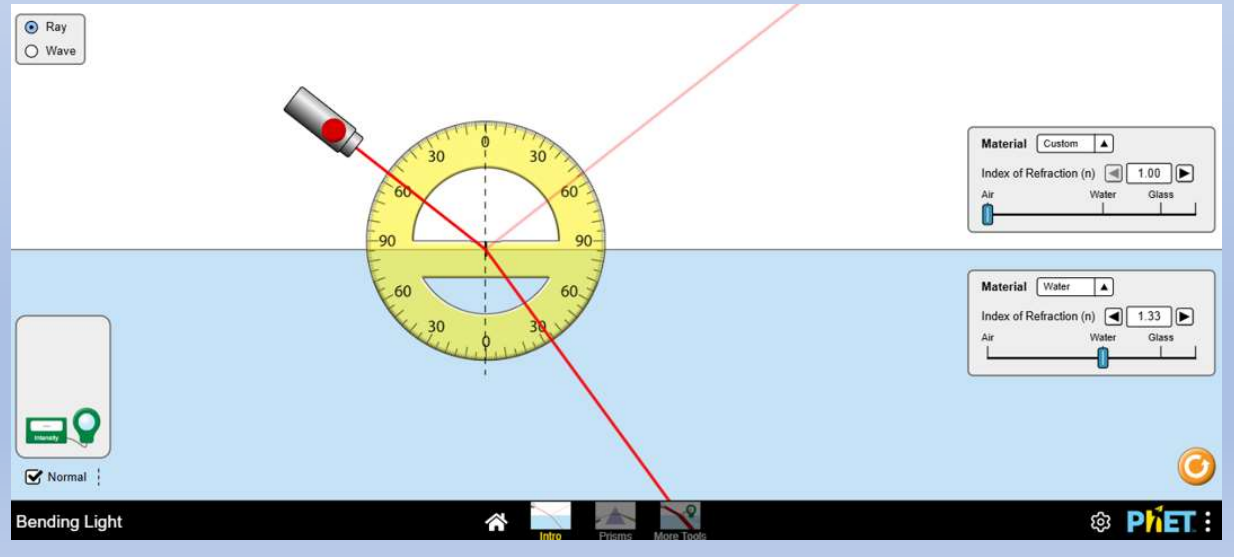
L2

Activity - Virtual lab – Refraction measure angle of refraction using Phet simulation tool

Study the refraction when light travels from air to glass

1. Set different angle of incidence 25, 30, 35, 40, and 45 degree
2. Predict how the angle of refraction will be?
3. measure its corresponding angle of refraction using Phet simulation tool
4. Prove that your Prediction is correct or not

Extension: How do you confirm light is travelling from Air to Glass? Explain



Angle of incidence	Angle of refraction
25	
30	
35	
40	
45	

L3

UAE IDENTITY

Discuss how the concept of light refraction is applied in the design of modern UAE buildings, such as the use of glass façades in iconic structures like the Burj Khalifa.

Complete the following paragraph with suitable keywords given below

Light [redacted] is a key element in the design of modern UAE buildings, particularly in structures like the Burj Khalifa. The application of glass façades in these buildings not only [redacted] their [redacted] appeal through dynamic visual effects but also plays a critical role in energy [redacted],

Keywords:

Aesthetic, Refraction, efficiency, enhances

Plenary

GL Question

Question:

When light travels from air into water, it slows down and bends. This bending of light is known as **refraction**. Which of the following statements best explains why the light bends when it enters the water?

A) The light moves faster in water than in air, causing it to bend.

B) The light waves are absorbed by water, causing them to slow down and bend.

C) The speed of light is slower in water than in air, which causes the light to bend toward the normal.

D) The light is reflected by the surface of the water, causing it to change direction.

Exit Ticket

- - Write down:
- - One thing you learned.
- - One question you still have.
- - One action you can take to embrace globalization while preserving culture.