Cornell Notes

Name	Date
Paola Ramirez / Fragoso	2/21/12
Topic Ch. 15 Notes: Refraction of Light	**Class/ Subject** Physics. P. 4

Tomorrow → 11:15

* Meet in Computer Lab tomorrow!

Outside Activity

Look at the sun through spectoscope.

purple, blue, green, yellow, red.

Sunlight.

Light Bulb

Solid ~~light~~ lines, similar to sunlight but sharp lights (lines)

Refraction of Light

- The bending of light as it travels from one medium to another is called refraction.
- As a light ray travels from one medium into another medium where its speed is different, the light ray will change its direction unless it travels along the normal.

Refraction.

- Refraction can be explained in terms of the wave model of light.

Speed of Light in Vacuum.

$C = 3.0 \times 10^8$

- The speed of light in a vacuum, c, is an important constant used by physicists.
- Inside of other mediums, such as air, glass, or water, the speed of light is diff. and is

The speed of light is constant in a vacuum. In other mediums, it is slower.

Cornell Notes

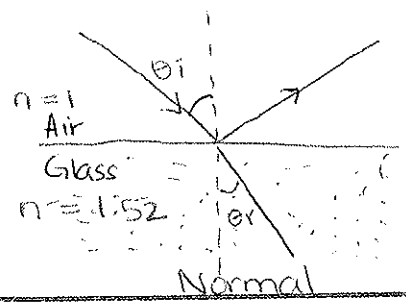
Name	Date
Topic	Class/ Subject

10)

The Law of Refraction

n = index of refraction

IOR = Index of Refraction



From Air to Glass

- Usually less than c
- Light travels faster in air, slower in solids.

Index of refraction = $\frac{\text{speed of light in a vacuum}}{\text{speed of light in medium}}$

$n = \frac{c}{v}$

Air index of refr. is 1.00
Water " " is 1.33
Glass, crown" " is 1.52
Glass, flint " " is 1.66

The highest the value for n, the slower it travels.

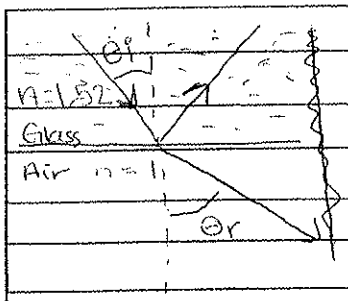
- When light passes from a medium w/ a smaller index of refraction to one w/ a larger index of refraction (like from air to glass), the ray bends toward the normal.
- When light passes from a medium w/ a larger IOR to one w/ a smaller IOR (like from glass to air) the ray bends away the normal

From a lower to higher n, the ray bends toward the normal. From a higher to lower n, the ray bends away from the normal.

Cornell Notes

Name	Paola Rea.	Date	
Topic		Class/ Suject	P.4

From
Glass to Air



n_i = index of refraction of incident medium (where light is coming from)

n_r = index of refraction of refracted medium (where light is going to.)

θ_i = incident ∠

θ_r = refracted ∠

Snell's Law

Determines the angle of refraction

$n_i \sin\theta_i = n_r \sin\theta_r$

A light ray of wavelength 589 nm (produced by a sodium lamp) traveling through air strikes a smooth, flat slab of crown glass at an angle of 30.0° to the normal. Find the angle of refraction θ_r

Cornell Notes

Name	Date
Topic	Class/ Suject

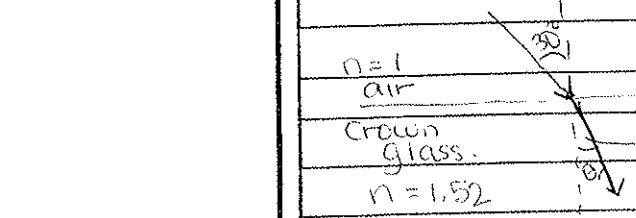
1)

Solution

$n_i \sin\theta_i = n_r \sin\theta_r$

Incident medium = air

refracted medium = crown glass.



$n_i \sin\theta_i = n_r \sin\theta_r$

$1(\sin 30°) = 1.52(\sin\theta_r)$

$\frac{1}{2} = 1.52(\sin\theta_r)$

$\frac{\frac{1}{2}}{1.52} = \sin\theta_r$

$.32894 = \sin\theta_r$

$19.2° = \theta_r$

Complete the missing info in the table (Snells Law)

From (medium)	TO (medium)	θ_i	θ_r
a) Flint Glass	Crown Glass	25°	?
b) Air	?	14.5°	9.80°
c) Air	Diamond	?	12.5

a) $\frac{1.66 \sin 25°}{1.52} = \frac{1.52 \sin\theta_r}{1.52}$

$0.4615 = \sin\theta_r$

$27.5 = \theta_r$

cont...

Cornell Notes

Name	Paola R.	Date	
Topic		Class/ Subject	P.4

HW.

None.

b) $1(\sin 14.5^\circ) = n_r(\sin 9.80^\circ)$

$\frac{\sin 14.5^\circ}{\sin 9.80^\circ} = n_r$

c) $1(\sin \theta_i) = 2.418(\sin 12.5^\circ)$

$\sin \theta_i =$

$\theta_i = 31.57^\circ = 31.6^\circ$

No Homework Today!

Cornell Notes

Name	Date
Topic	Class/ Suject

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