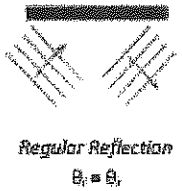
## Topic 6C: Wave Phenomena

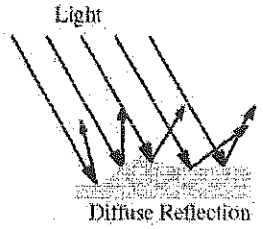
# Skill 52: When Waves Encounter Boundaries, Barriers and New Mediums they can ..... (217. Fill in the blanks)

### Reflection

When a wave hits a surface at least some of the energy is always reflected back. **The angle of reflection is always** equal **to the incoming angle.**



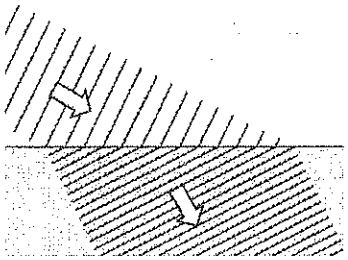

-Regular reflection occurs when you see the image in its clear form (glassy surface)
-Diffuse reflection occurs on rough surfaces when you can see an image but without clarity.



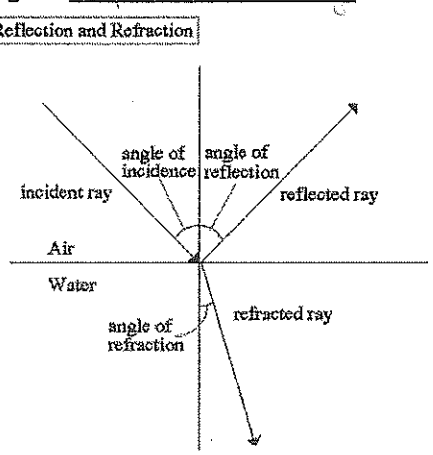

Particles & Waves

### Refraction

When a wave encounter a new medium they often change direction (bend) due to a change in speed and/or wavelength. (Frequency does not change)



If the wave enters straight on you just get a change in speed or wavelength

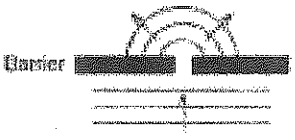



Particles & Waves

For transparent surface light is usually partially transmitted/refracted and partially reflected

### Diffraction

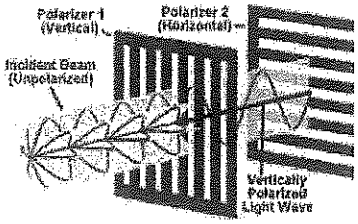
Bending of wave fronts and wave rays **around barriers** and through openings




Waves ONLY

### Polarization

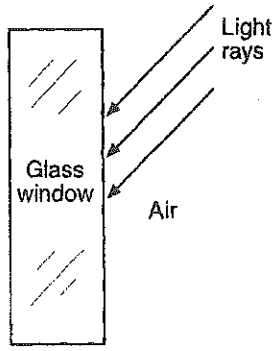
When waves of one orientation are selected.




ONLY HAPPENS TO TRANSVERSE WAVES

# Topic 5C: Wave Boundaries
## Skill 52

218. The diagram below shows light rays in air about to strike a glass window.




When the rays reach the boundary between the air and the glass, the light is

A) totally refracted
B) totally reflected
C) partially reflected and partially diffracted
D) partially reflected and partially refracted

Some light passes through and some passes back

219. A light spring is attached to a heavier spring at one end. A pulse traveling along the light spring is incident on the boundary with the heavier spring. At this boundary, the pulse will be

A) totally reflected
B) totally absorbed
C) totally transmitted into the heavier spring
D) partially reflected and partially transmitted into the heavier spring

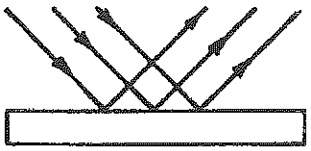
220. The diagram below shows parallel rays of light incident on an irregular surface.

Which phenomenon of light is illustrated by the diagram?

A) diffraction
B) refraction
C) regular reflection
D) diffuse reflection

all waves stay aligned

221. Which phenomenon of light is illustrated by the diagram below?



A) regular reflection
B) diffuse reflection
C) diffraction
D) refraction

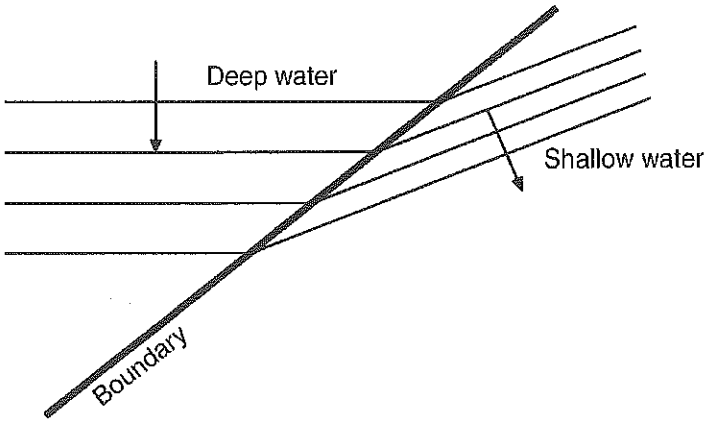
222. When a student looks into a plane mirror, she sees a virtual image of herself. However, when she looks into a sheet of paper, no such image forms. Which light phenomenon occurs at the surface of the paper?

A) regular reflection
B) diffuse reflection
C) polarization
D) resonance

no image forms just color

# Topic 5C: Wave Boundaries

223. The diagram below represents straight wave fronts passing from deep water into shallow water, with a change in speed and direction.



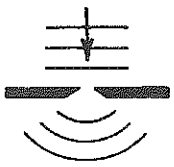

Bending of light due to a boundary
- Wavelength decreases
- frequency remains the same

Which phenomenon is illustrated in the diagram?

A) reflection B) refraction C) diffraction D) interference

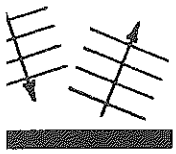
224. Which diagram best illustrates wave refraction?

A)



diffraction

B)

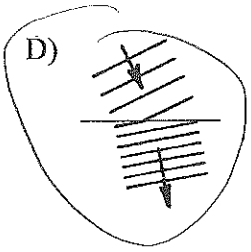


reflection

C)

Diffraction

D)



refraction

225. The change in the direction of a wave when it passes obliquely from one medium to another is called ↘ oblique angle

A) diffraction B) interference
C) refraction D) superposition

↗ change of medium

226. If the speed of a wave doubles as it passes from shallow water into deeper water, its wavelength will be

A) unchanged B) doubled
C) halved D) quadrupled

$v = f\lambda$ direct

$\lambda = \frac{v}{f}$

227. A change in the speed of a wave as it enters a new medium produces a change in

A) ~~frequency~~ B) ~~period~~
C) wavelength D) phase

frequency remains the same

228. Compared to the wavelength of a wave of green light in air, the wavelength of this same wave of green light in Lucite is

(A) less B) greater
C) the same

$n_{air} = 1$ $n_{Lucite} = 1.5$

$\frac{n_2}{n_1} = \frac{\lambda_1}{\lambda_2}$ $n_2\lambda_2 = n_1\lambda_1$ $\lambda_2 = \frac{n_1\lambda_1}{n_2}$ inverse

229. As a monochromatic beam of light passes obliquely from flint glass into water, how do the characteristics of the beam of light change?

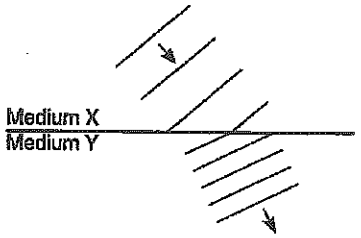
oblique angle

A) Its wavelength decreases and ~~its frequency decreases.~~
B) Its wavelength decreases and its ~~frequency~~ increases.
C) Its wavelength increases and it bends toward the normal.
(D) Its wavelength increases and it bends away from the normal.

$n_1 = 1.60$ $\frac{n_2}{n_1} = \frac{\lambda_1}{\lambda_2}$ inverse
$n_2 = 1.33$

$n \downarrow$ so $\lambda \uparrow$ n is inverse to wavelength, speed and angle from normal

230. The diagram below represents wave fronts traveling from medium *X* into medium *Y*.




f remains the same

All points on any one wave front shown must be

A) traveling with the same speed
B) traveling in the same medium
(C) in phase
D) superposed

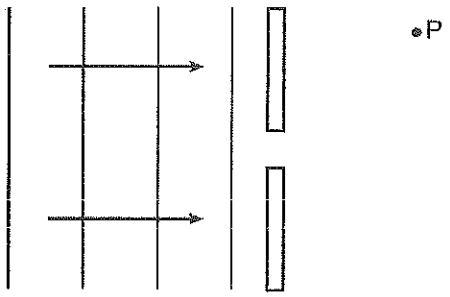
231. What happens to the frequency and the speed of an electromagnetic wave as it passes from air into glass?

A) ~~The frequency~~ decreases and the speed increases.
B) ~~The frequency~~ increases and the speed decreases.
C) The frequency remains the same and the speed increases.
(D) The frequency remains the same and the speed decreases.

as $n \uparrow$ $v \downarrow$

$n_1$ = air
$n_2$ = glass

232. The diagram below shows a series of wave fronts approaching an opening in a barrier. Point *P* is located on the opposite side of the barrier.



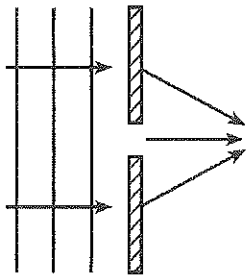

The wave fronts reach point *P* as a result of

A) resonance B) refraction
C) reflection (D) diffraction

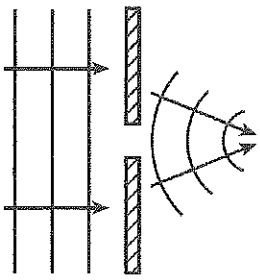
## Topic 5C: Wave Boundaries

233. Which diagram best represents the shape and direction of a series of wave fronts after they have passed through a small opening in a barrier?

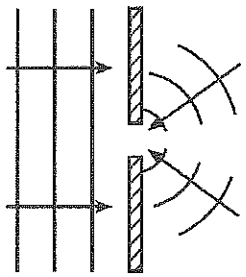
A)



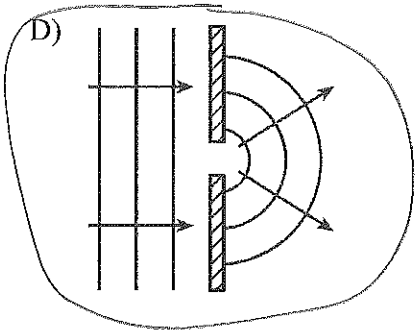
B)



C)



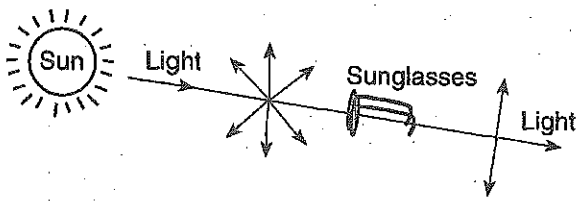
D)



234. Which phenomenon can *not* be exhibited by longitudinal waves?

A) reflection B) refraction
C) diffraction D) polarization

235. The diagram below shows sunglasses being used to eliminate glare.




Which phenomenon of light is represented in the diagram?

A) dispersion B) diffraction
C) internal reflection D) polarization

236. Which phenomenon can not be exhibited by longitudinal waves?

A) reflection B) refraction
C) diffraction D) polarization

237. Which two characteristics of light can best be explained by the wave theory of light?

~~A) reflection~~ and ~~refraction~~
B) ~~reflection~~ and interference
C) ~~refraction~~ and diffraction
D) interference and diffraction

look for wave only phenomena

light is both a wave & a particle
Wave theory refers to things only waves can do.

reflection - both waves & particles
refraction - both waves & particles