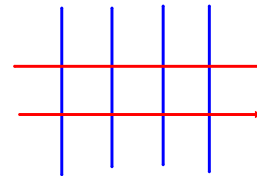
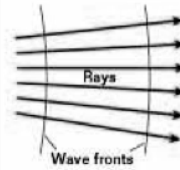
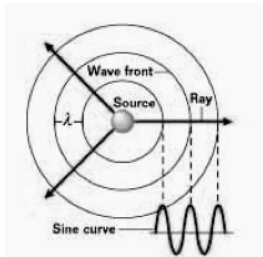
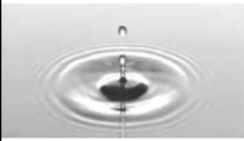


Waves in Two or Three Dimensions

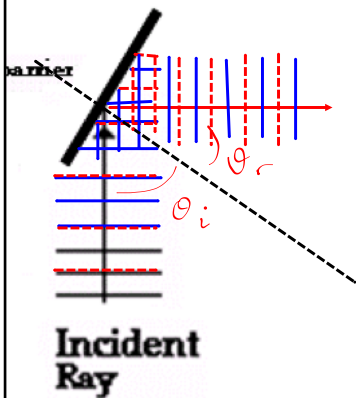
Point Source – a single point that acts as a source of waves



Very far from point source

Two-Dimensional Wave Phenomena

Reflection: change in direction of a wave when it hits a barrier



Sketch in the reflected ray and wavefronts

Normal line:

Angle of incidence:

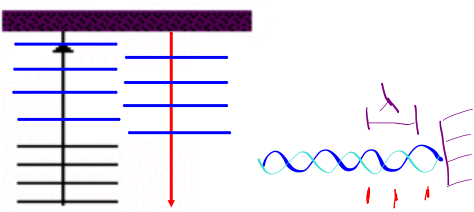
Angle of reflection:

Law of Reflection: $\theta_i = \theta_r$

When a wave reflects from a barrier, are there any changes in

- a) direction? ✓
- b) speed?
- c) wavelength?
- d) frequency?
- e) phase? ✓

barrier



Incident Ray

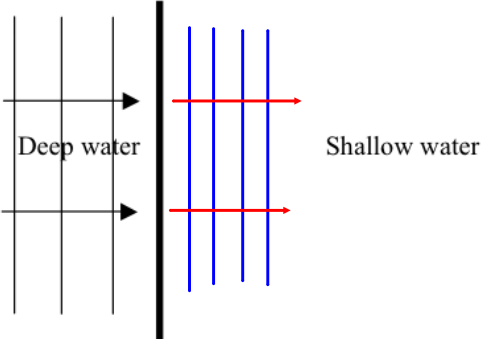
Sketch in the reflected ray and wavefronts.

What is the angle of incidence? 0°

What is the angle of reflection? 0°

Sketch and label the wavelength of a standing wave.

Complete the diagram below showing the wave moving into shallow water.

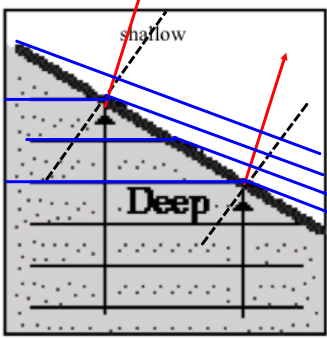


When a wave travels from deep water to shallow water, how do its characteristics change?

$\lambda \downarrow$ $v \downarrow$ $f, \text{phase const.}$

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Refraction: change in direction of a wave due to a change in speed when it crosses a boundary at an angle

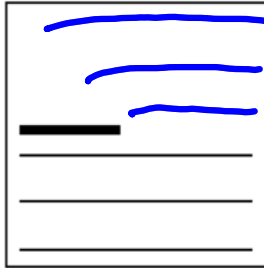


Complete the diagram showing the refraction of the wave.

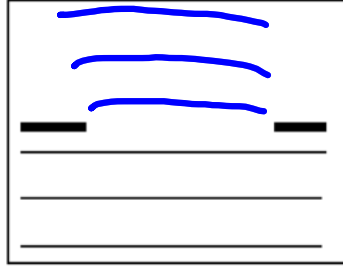
When a wave refracts, are there any changes in

a) direction? b) speed? c) wavelength? d) frequency? e) phase?

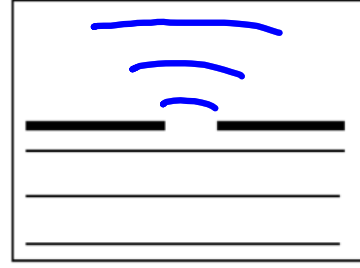
Diffraction:



Complete the diagram showing the diffraction of a wave around the edge of a barrier.



Complete the diagram above showing diffraction through a wide opening.



Complete the diagram above showing diffraction through a narrow opening.

- When a wave diffracts, are there any changes in
 - direction?
 - speed?
 - wavelength?
 - frequency?
 - phase?



- What happens to the diffraction pattern as the width of the opening decreases?

amount of diffraction increases

- Condition for noticeable diffraction to occur:

$$w \sim \lambda$$

- Why can you hear around a corner but can't see around a corner?

sound waves have longer wavelength, diffract much more

