PRACTICE	LABS	TESTS
Practice Problems (1-13)	• Wave Interactives	Unit 14 Test Thursday (5/2/19)

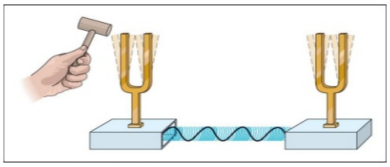
Properties and Detection of Sound

14.4	I can define, analyze, and solve problems involving sound behavior.

Refraction

Sound waves bend when parts of the wave fronts travel at different speeds. This bending of sound is called **refraction**.

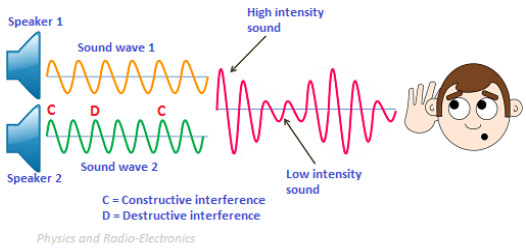
Resonance



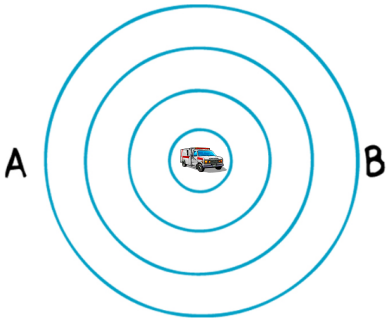
- When one tuning fork is struck, the other tuning fork of the same frequency will also vibrate in resonance.
- The periodic "driving force" here are the sound waves.

Beats

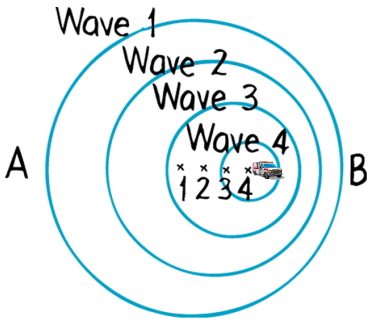
When two sound waves of different frequency approach your ear, the alternating constructive and destructive interference causes the sound to be alternatively soft and loud - a phenomenon which is called "beating" or producing **beats**.



Sound Waves



Sound Waves



The Doppler Effect

The **Doppler Effect** describes the change in frequency of a wave for an observer moving relative to the source of the wave.

The Doppler Effect

$$f_d = f_s\left(\frac{v - v_d}{v - v_s}\right)$$

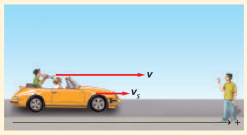
d - detector
s - source

EXAMPLE Problem 1 — **In-Class Problem**

5. A trumpet player sounds C above middle C (524 Hz) while traveling in a convertible at 24.6 m/s. If the car is coming toward you, what frequency would you hear? Assume that the temperature is 20°C.

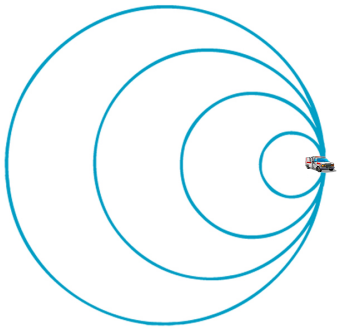
Known:
$v = +343$ m/s
$v_s = +24.6$ m/s
$v_d = 0$ m/s
$f_s = 524$ Hz

Unknown:
$f_d = ?$

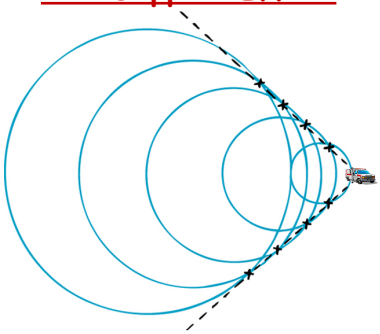


$$f_d = f_s\left(\frac{v - v_d}{v - v_s}\right) = (524\text{ Hz})\left(\frac{343\text{ m/s} - 0}{343\text{ m/s} - 24.6\text{ m/s}}\right) = 564\text{ Hz}$$

The Doppler Effect



The Doppler Effect



Problems
(14-17)