

This is pages mid 5 – 7.

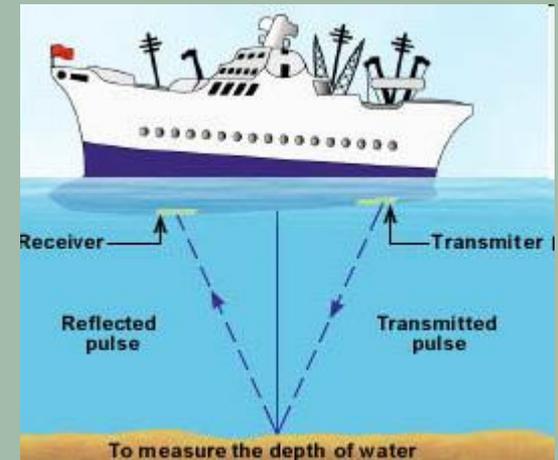
Please EMAIL with any questions.



Determining the Velocity of a Wave

Speed = frequency
times wavelength

$$v = f \lambda$$



Determining the Velocity of a Wave

1. A wave traveling at 5.00×10^4 meters per second has a wavelength of 2.5×10^1 meters. What is the frequency of the wave?



Determining the Velocity of a Wave

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$$f = \frac{v}{\lambda} = \frac{5.00 \times 10^4 \frac{m}{s}}{2.5 \times 10^1 m} = 2.0 \times 10^3 \text{ Hz}$$



Determining the Velocity of a Wave

2. An 8.0 meter long ocean wave passes the end of a dock every 5.0 seconds.
What is the speed of the wave?



Determining the Velocity of a Wave

2. An 8.0 meter long ocean wave passes the end of a dock every 5.0 seconds.
What is the speed of the wave?

$$v = f\lambda = \frac{1}{T}\lambda = \frac{8.0m}{5.0s} = 1.6 \frac{m}{s}$$

Determining the Velocity of a Wave

3. A sound wave has a frequency of 262 Hz and a wavelength measured at 1.29m.



Determining the Velocity of a Wave

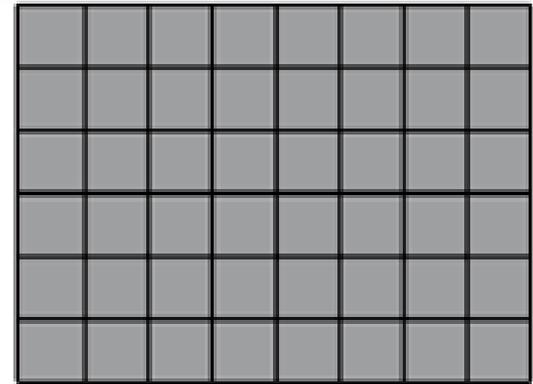
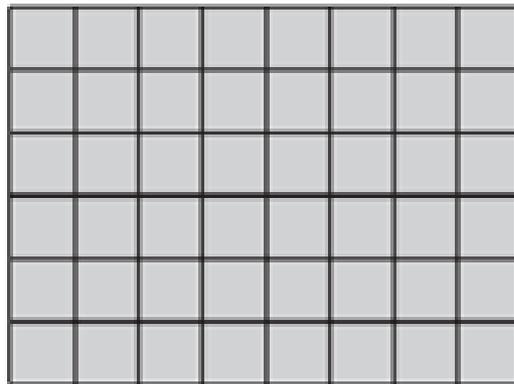
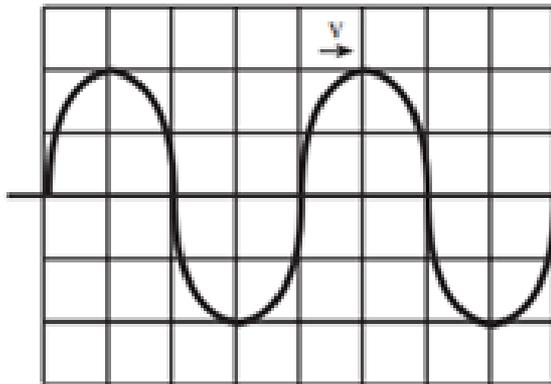
3. A sound wave has a frequency of 262 Hz and a wavelength measured at 1.29m.

$$v = f\lambda = (1.29 \text{ m})(262 \text{ Hz}) = 338 \frac{\text{m}}{\text{s}}$$

$$t = \frac{d}{v} = \frac{91.4 \text{ m}}{338 \frac{\text{m}}{\text{s}}} = 0.270 \text{ s}$$

$$T = \frac{1}{f} = \frac{1}{262 \text{ Hz}} = 0.00382 \text{ s}$$

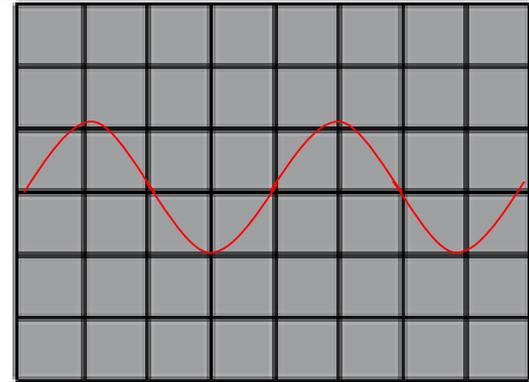
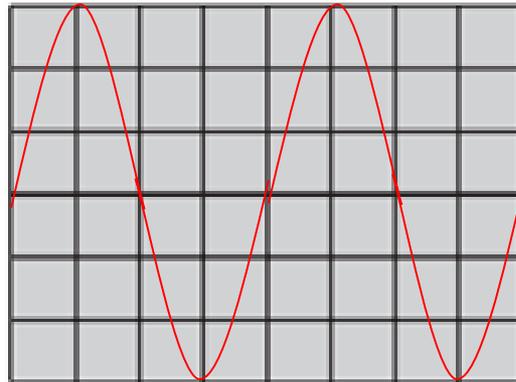
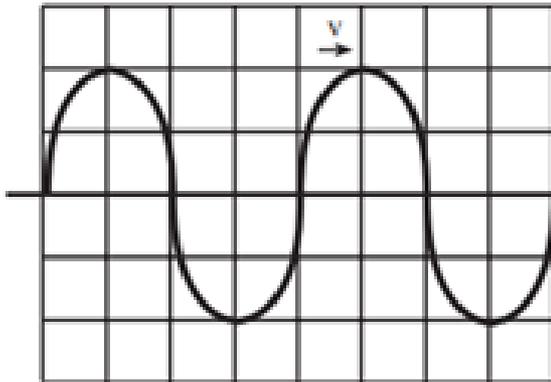
3. Draw a wave with a greater amplitude and a smaller amplitude.



4. Does increasing the amplitude of a wave change the speed of the wave?

- A mechanical wave with a higher amplitude has more . . .

3. Draw a wave with a greater amplitude and a smaller amplitude.

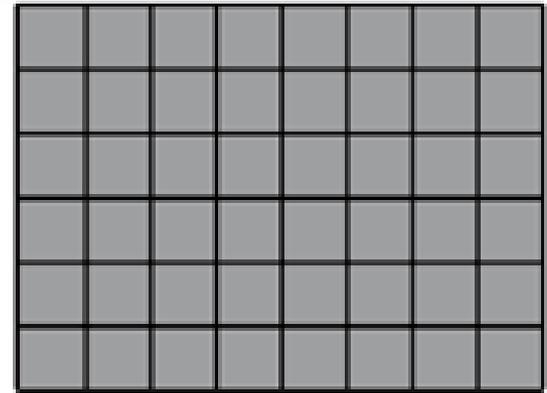
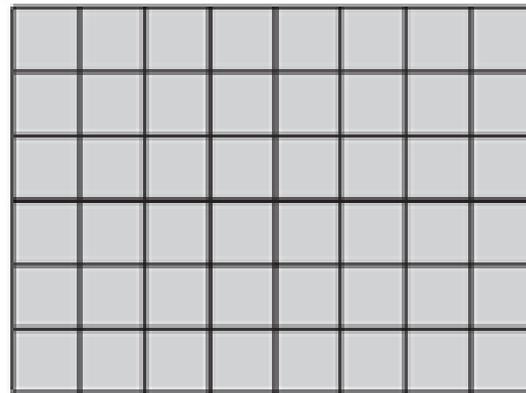
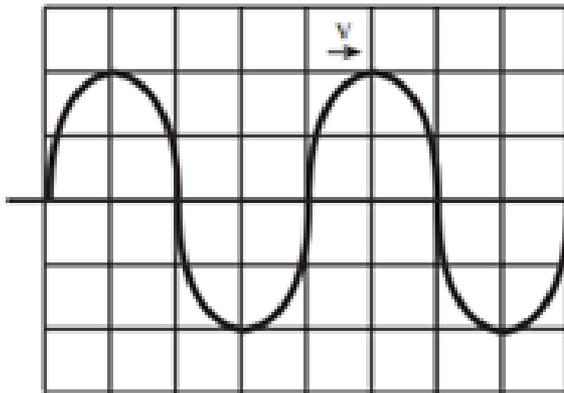


4. Does increasing the amplitude of a wave change the speed of the wave?

No, only the speed of the particle changes

- A mechanical wave with a higher amplitude has more ... **Energy**

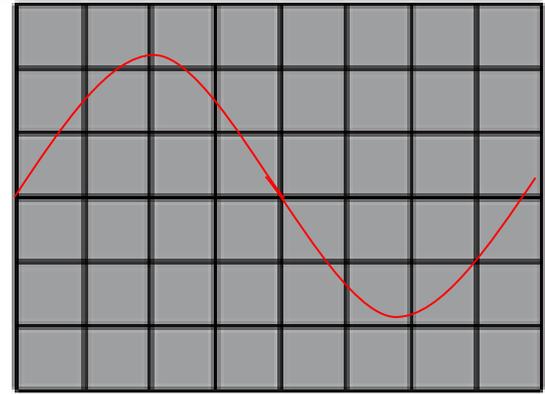
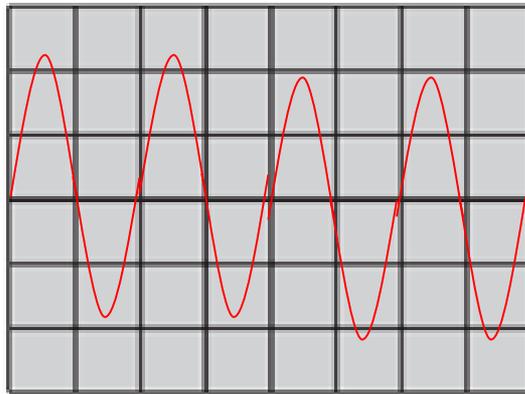
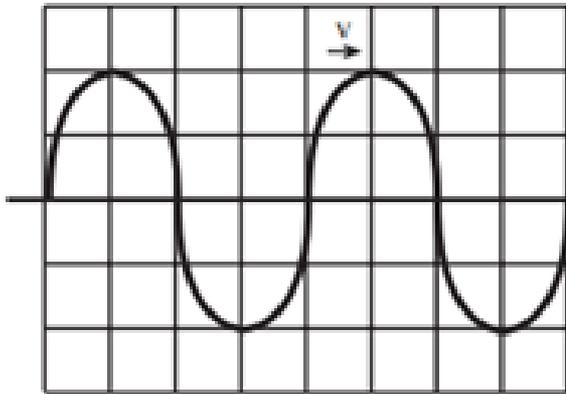
5. Draw a wave with a higher frequency and a smaller frequency.



6. Does increasing the frequency change the speed of the wave?

- A wave with a higher frequency has . . .

5. Draw a wave with a higher frequency and a smaller frequency.



6. Does increasing the frequency change the speed of the wave?

No, only the speed of the particle changes

- A wave with a higher frequency has . . . **Shorter wavelength and lower period**

Determining the Velocity of a Wave

How can the speed of a wave be changed?

by changing the characteristics (properties) of the medium through which it is traveling

Examples:

Water Waves		
Sound Waves		Air
Waves on a Spring		

Watch the video

<https://www.youtube.com/watch?v=q9ezMbDpIHl>

Determining the Velocity of a Wave

- water waves travel faster in deeper water
- sound travels faster in solids than gases
- slinky waves travel faster in tighter slinkies

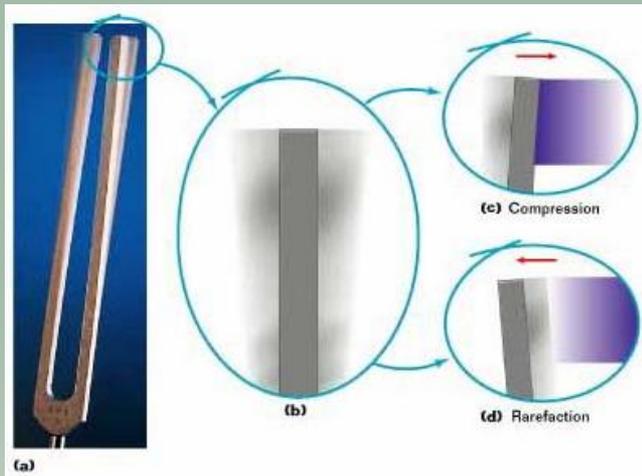
Water Waves		
Sound Waves		Air
Waves on a Spring		



Sound Waves

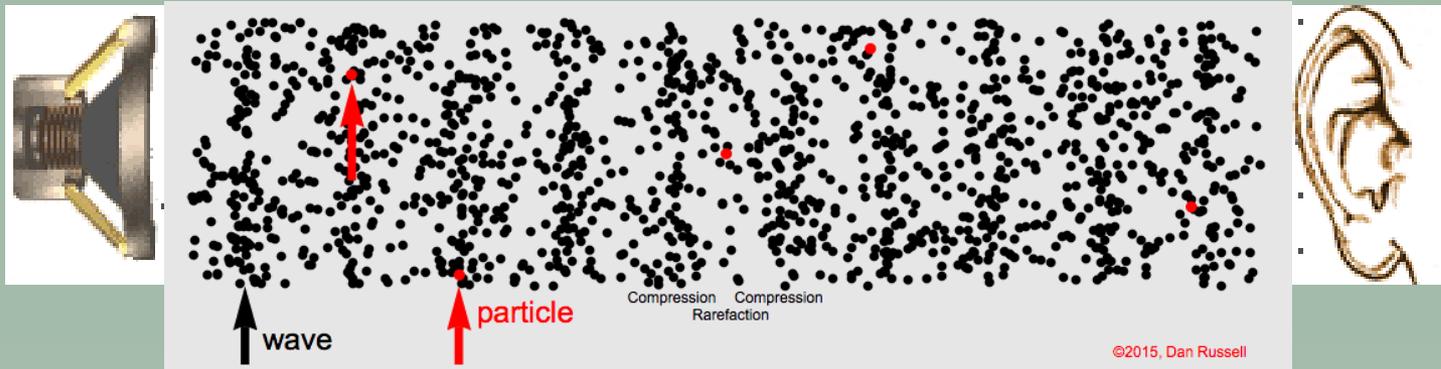
- What type of wave is sound?

Sound waves are mechanical & longitudinal waves.



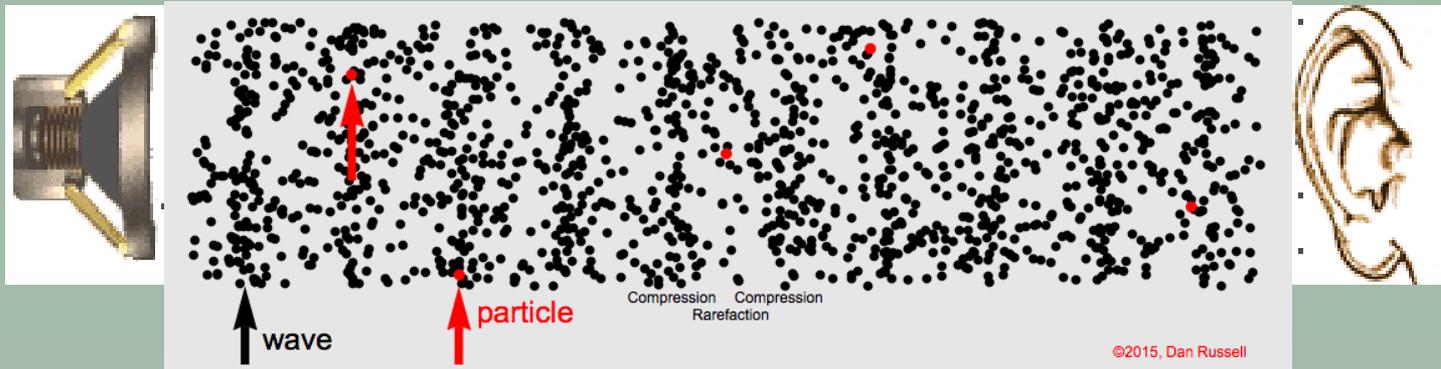
Sound Waves

- A sound wave traveling eastward through air causes the air molecules to vibrate in what directions?



Sound Waves

- A sound wave traveling eastward through air causes the air molecules to vibrate in what directions?



EAST TO WEST ONLY

Sound Waves

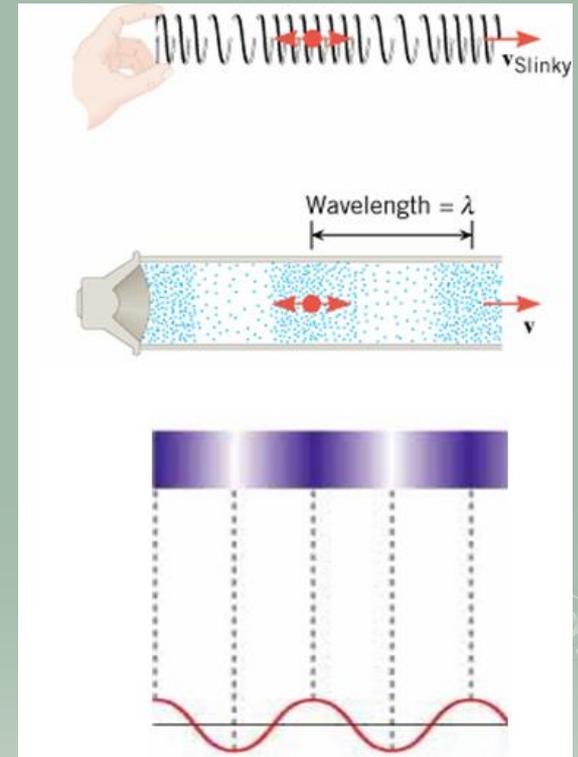
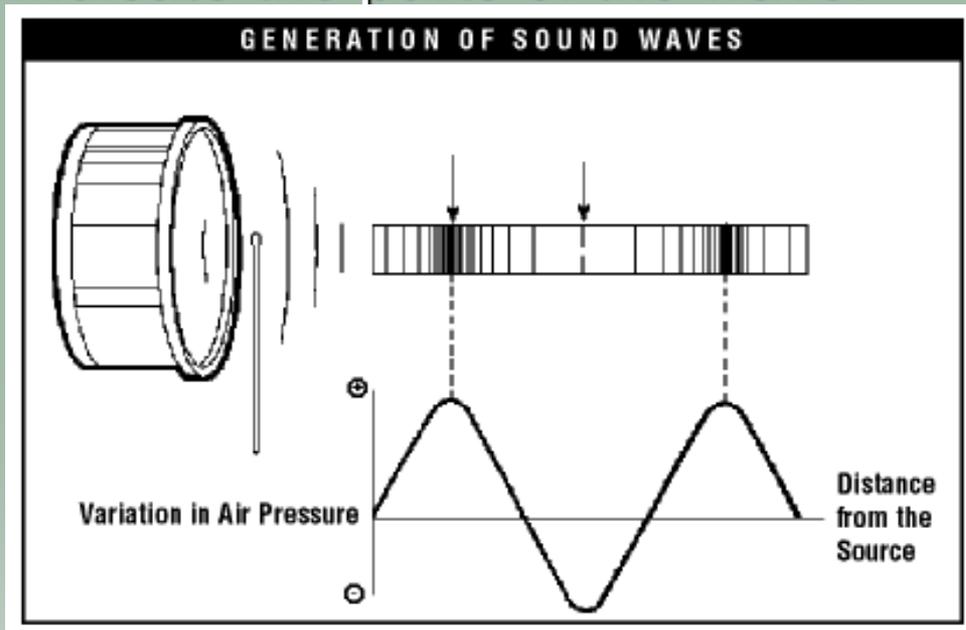
How are sound waves produced?

A vibrating object produces variations in air pressure

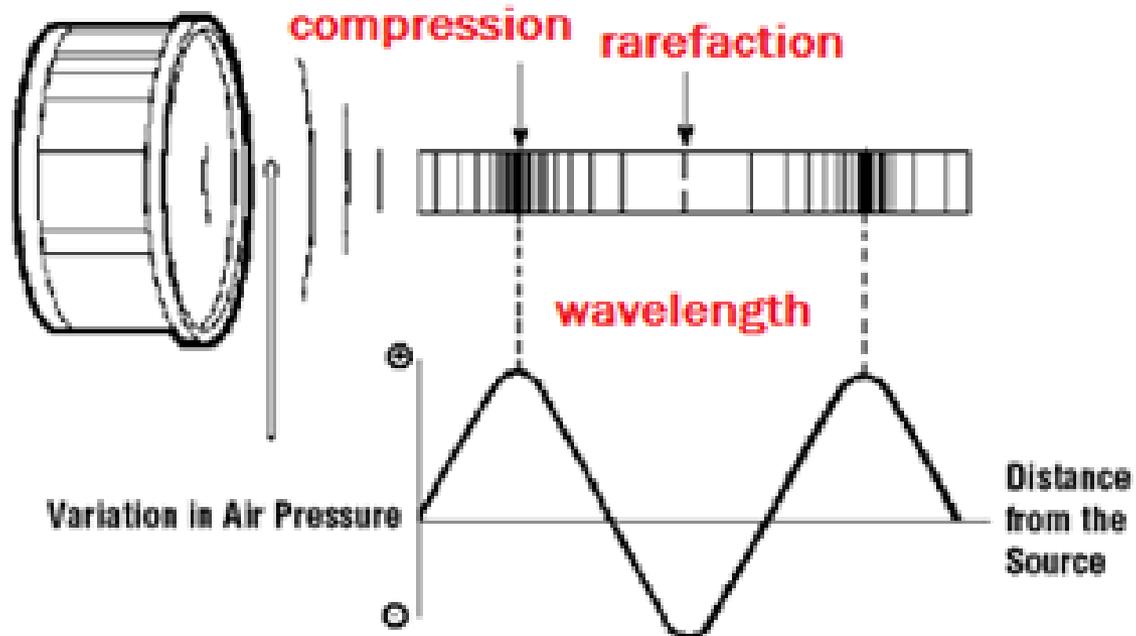


Sound Waves

- Indicate the parts of the wave.



GENERATION OF SOUND WAVES



Sound Waves

- Can sound be heard in outer space?

Since there's no air in space, sound can't travel. It's totally silent.



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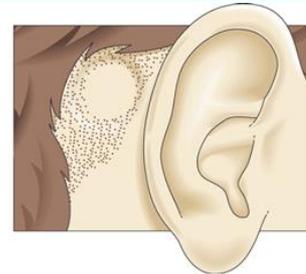
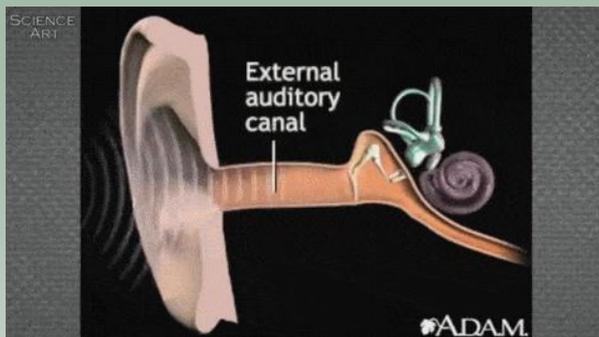
There is no medium to transmit energy.



Sound Waves

What happens when this wave of varying air pressure reaches your ear?

Vibration of ear drum sends electrical signal to brain

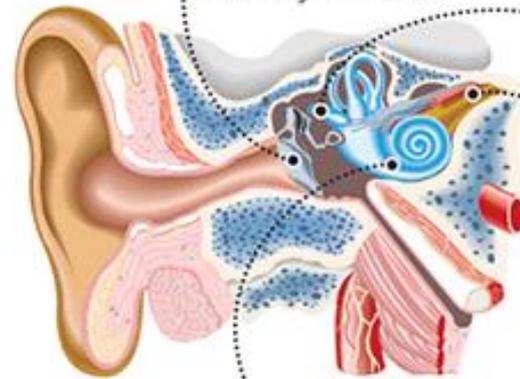


1.

Sound waves enter your outer ear and travel through the ear canal to your eardrum.

2.

Your eardrum vibrates with the incoming sound and sends the vibrations to three tiny bones in your middle ear.



3.

The bones in your middle ear amplify the sound vibrations and send them to your inner ear, or cochlea. The sound vibrations activate tiny hair cells in the inner ear, which in turn release neurochemical messengers.

4.

Your auditory nerve carries this electrical signal to the brain, which translates it into a sound you can understand.

Watch the video – pay attention to when you can hear it and when you can't hear it again.

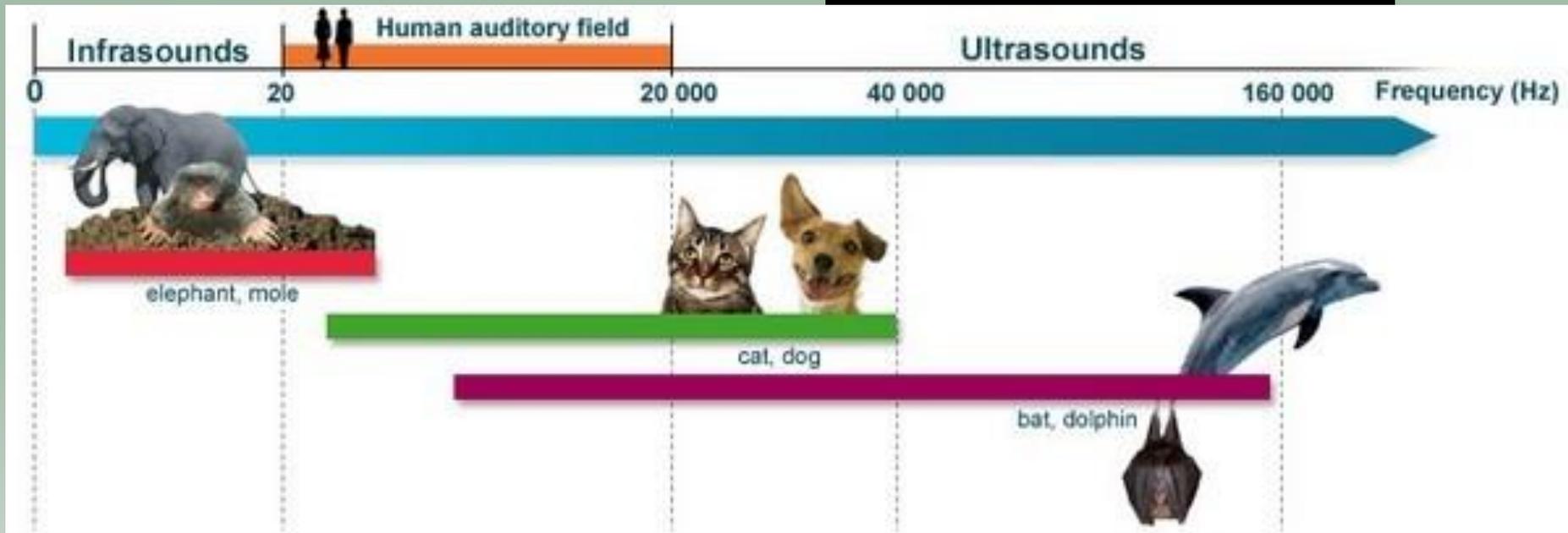
<https://www.youtube.com/watch?v=qNf9nzvr>

Sound Waves

Signal frequency: 891 Hz



www.youtube.com/adminofthisite

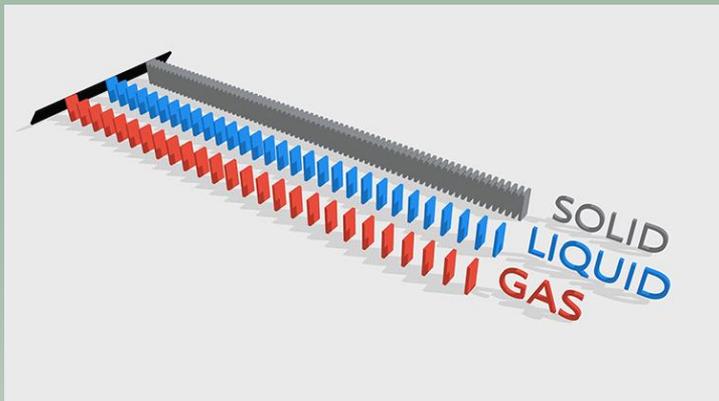




If a tree falls in the woods and no one's around, does it make a sound?

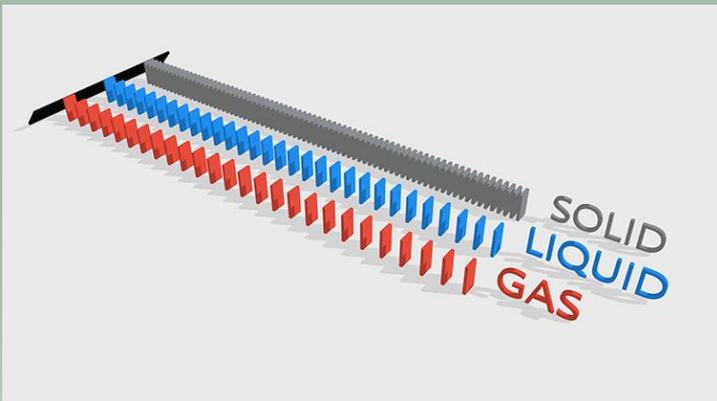
Sound Waves

Does sound travel faster in a solid, liquid, or a gas? Explain.



Sound Waves

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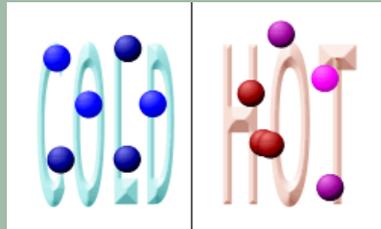
Solid – molecules are closer together

Sound Waves

How fast does sound travel in . . .

air at **STP**

331 m/s



air at room temperature

340 m/s

How is the speed of sound related to air temperature? Explain.

As temp increases, speed increases – molecules move faster in hotter air