Vibrations and Waves Quiz
Study Guide

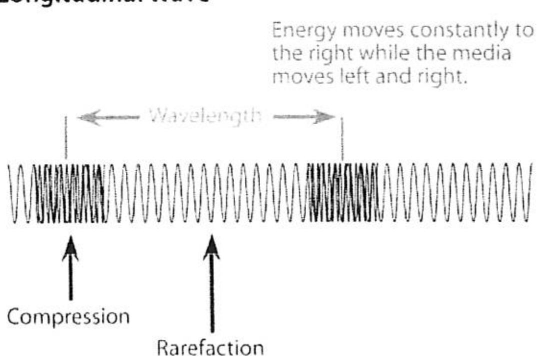
Terms to Know:

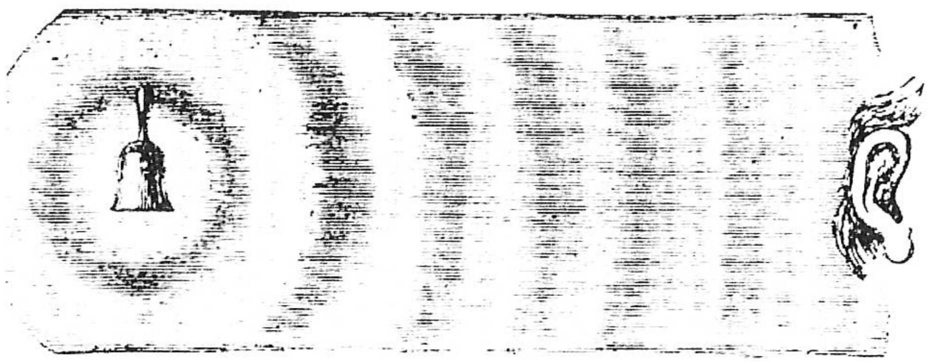
Wave	a moving disturbance created by a vibration
Vibration	a rapid back and forth movement
Medium	any solid, liquid or gas through which sound travels
Vacuum	an area with no molecules; outer space is a vacuum
Longitudinal	a type of wave in which the disturbance moves forward and back in the direction that the energy is moving; sound is a longitudinal wave
Compression	the bunched up areas of molecules in a sound wave
Rarefaction	the spread out areas of molecules in a sound wave
Wavelength	the distance from one wave to the next
Frequency	the number of waves per second, determines the pitch of a sound wave
Amplitude	the intensity of compressions in a sound wave, determines the loudness of a sound

Important Ideas:

1. Waves are caused by vibrations (like a tuning fork, your vocal cords, or tapping something).
2. A sound wave is a traveling disturbance, or forward/back movement, in the molecules that moves outward in all directions.
3. Sound is a longitudinal wave. This kind of wave has compressions (pressed together molecules) and rarefactions (spread out molecules).
4. A wavelength is the length of one complete wave, or the distance from one wave to the next, measuring to the same point on both waves.

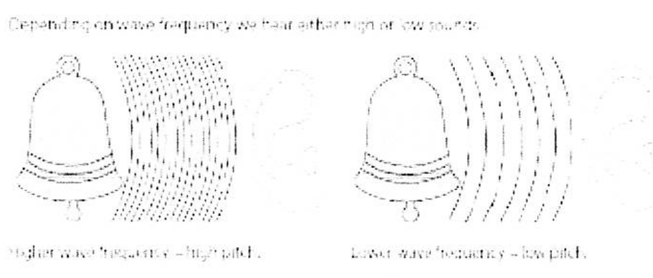
Longitudinal Wave



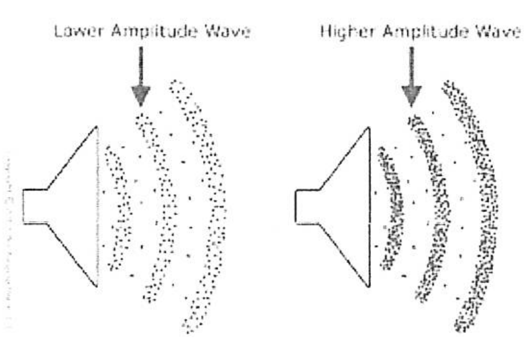


5. Waves carry energy, not matter. Examples:
   a. While floating in an inner tube, a passing wave will not carry you all the way to the shore.
   b. The slinky did not travel to the student when Ms. Tonnos sent waves through it.
   c. The duck is not carried away with the wave.

6. The frequency of the sound wave determines its pitch (how high or low it sounds). A wave with a shorter wavelength has a higher pitch. This means that a faster vibration creates a higher frequency, and higher pitch. A slower vibration creates a lower frequency and a lower pitch.

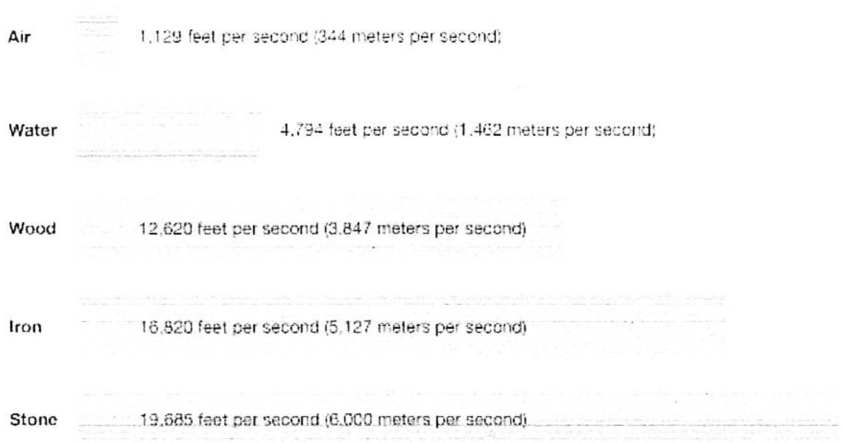


7. The intensity of the compressions (how tightly packed the compressions are) determines the amplitude of the sound wave. This is how loud the sound will be. A harder vibration (hitting the tuning fork harder, or pushing air out of your vocal cords with more force) will create tighter compressions and a louder sound.

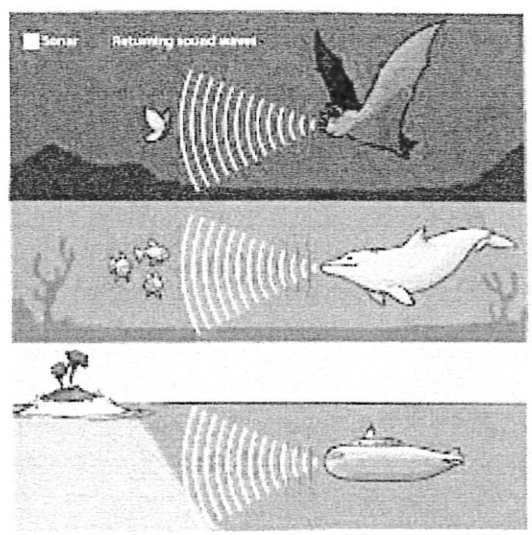


8. The density (how tightly packed the molecules are) of the medium determines the speed of the sound wave. Sound travels fastest through more dense matter because it is easier and faster for molecules to bump into each other. Sound travels slower through less dense matter (like gases) because it takes longer for each molecule to travel to and bump the next one.
9. Sound travels fastest through solids and slowest through gases.
10. Sound will travel faster through a more dense solid than a less dense solid. The same is true for liquids and gases.
11. Since sound waves pass energy by vibrating molecules, sound can not pass through an area without molecules. (a vacuum, like outer space) TV and movies are often wrong about this!

Conductivity of sound in different mediums



12. Echoes are reflected sound waves. Uses of echoes include Echolocation, SONAR and Ultrasound/Sonagraphy.



13. Echolocation is used by bats, dolphins and whales. The animal sends a sound out and receives an echo back when it bounces off an object. Echolocation is used for navigation and hunting for prey.
14. SONAR is Sound Navigation and Ranging. It is used by the Navy, scientists and fishing boats. A sound wave is sent out from the ship. The amount of time it takes to return to the ship is calculated into a distance and location.
15. Ultrasound uses high frequency sound waves to see inside a body. Sound waves are reflected back differently by hard and soft tissues, showing a “real time” image of the organ or developing baby.