PhyzGuide: Making Waves 3

SOUND WAVES

0

The undisturbed medium. In this case, we have a volume of air contained in an open-ended tube (the dots represent individual particles of air).

1

The air at the left end is compressed by the energy-loading source (a speaker). Air that was between the speaker and the tube is pushed into the tube. We now have a **compression.** This region of higher-pressure air will travel down the length of the tube at the speed of sound.

2

The speaker pulls back and forms an expansion of air at the left end of the tube. This region of lower-pressure air, sometimes called a **rarefaction**, will also travel down the length of the tube at the speed of sound.

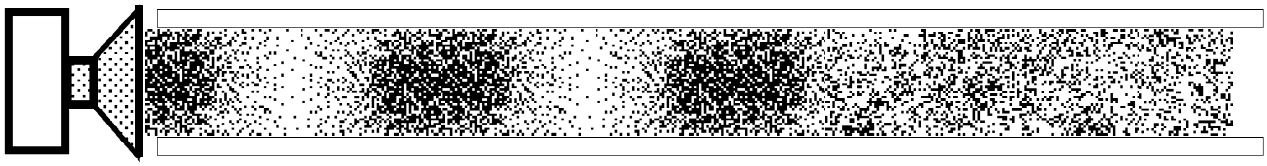
3

The speaker once again pushes forward, compressing air into the left end of the tube. Another compression is launched to chase the rarefaction which is itself chasing the first compression.

4

The speaker pulls back and forms a second rarefaction. The **wavelength** of a sound wave is the distance between successive compressions or rarefactions.

5



Is sound composed of transverse or longitudinal waves?

PhyzGuide: Making Waves 4
COMBINATION WAVES

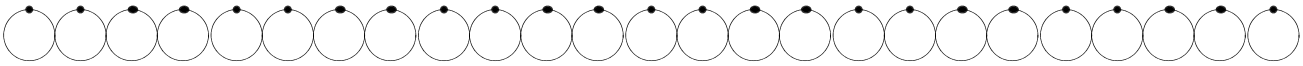
TRANSVERSE WAVES REVISITED

Recall that transverse waves involve particles that oscillate perpendicular to the velocity of the wave itself. The diagram above shows an undisturbed medium (the black dots represent particles). The diagram below shows the same medium when transverse waves are passing through it. The wave itself is moving horizontally; the particles in the medium move vertically.

LONGITUDINAL WAVES REVISITED

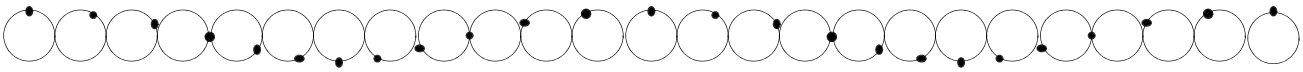
Recall that longitudinal waves involve particles that oscillate parallel to the velocity of the wave itself. The diagram above shows an undisturbed medium (the black dots represent particles). The diagram below shows the same medium when longitudinal waves are passing through it. The wave itself is moving horizontally; the particles in the medium also move horizontally.

COMBINATION WAVES



Combination waves involve particles that oscillate both perpendicular and parallel to the velocity of the wave itself. These transverse and longitudinal oscillations occur simultaneously, resulting in a circular or elliptical path for each particle. The diagram above shows an undisturbed medium (the black dots represent particles). The diagrams below show two such media when combination waves are passing through. The waves are moving horizontally from left to right. In the case of water waves, each particle travels in a circle (or ellipse) so that it moves in the direction of the wave at the crest and opposite the direction of the wave at the trough. Rayleigh waves (one form of seismic waves that travel along the surface of the Earth) are somehow different. Can you tell how?

Water Waves



Rayleigh Waves