travel several miles, the vibrating molecules of air do not move very far. They only vibrate back and forth from a compression to a rarefaction and back to a compression. It is the wavelike motion of the compression and rarefaction areas that transmits the sound from one place to another, and not the long-distance movement of molecules.

The waves of compressions and rarefactions move much more rapidly through liquids than through gases. They move even faster through solids than through liquids. Thus both solids and liquids are better conductors of sound than gases. For example, you can hear an approaching train by placing your ear on one of the steel rails of the railroad before you can hear its sound through the air.

Since molecules are necessary to form the compressions and rarefactions of sound waves, there can be no sound in a perfect vacuum, which has no molecules. The space between the heavenly bodies is very nearly a vacuum. Therefore, no sound waves can travel between the earth and the moon, regardless how loud the sound.

Why does the bell sound quieter when most of the air is removed from the bell jar?

A table of the approximate speed of sound through various substances is given below.

You notice that the speed of sound in air is about 1/5 mile per second. Using this fact, you can estimate how far away lightning is from you during a thunderstorm by counting the number of seconds between the flash of lightning and its clap of thunder and dividing that number by five. Your answer will be the approximate miles between you and the lightning. You will also be able to observe the time it

The Speed of Sound

Vacuum	**0 feet per second**	**0 miles per hour**
Air	**1,100 feet per second**	**750 miles per hour**
Water	**5,000 feet per second**	**3,400 miles per hour**
Wood	**13,000 feet per second**	**9,000 miles per hour**
Steel	**16,000 feet per second**	**11,000 miles per hour**