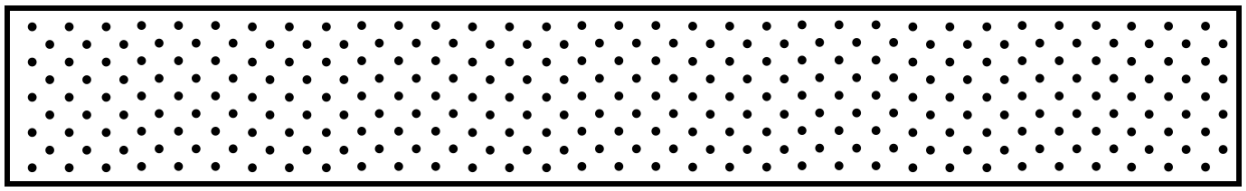
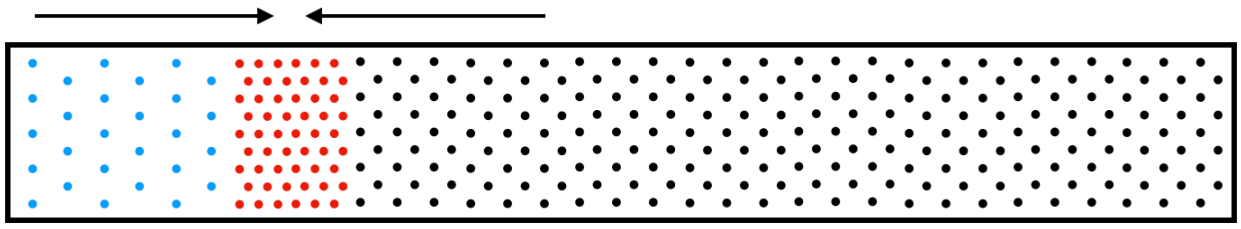
Lesson 2. Longitudinal Waves

The graph of the sound wave in the previous lesson was a **transverse** wave, where the displacement moves perpendicular to the force. Transverse waves are only possible in solids (like a string) where molecules can exert a sideways force on others. The medium itself moves as a sinusoidal wave.

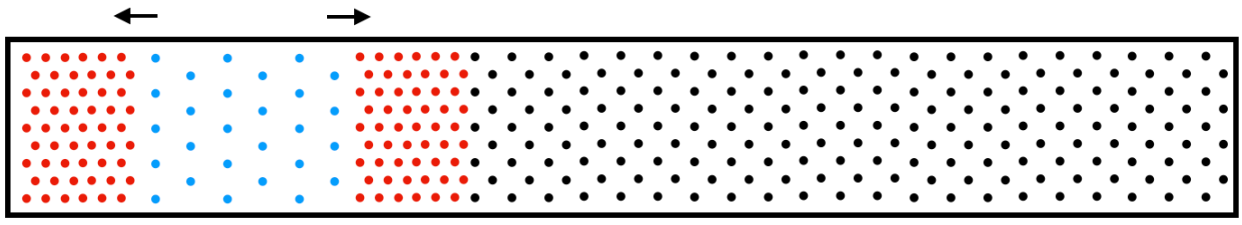
If the displacement (crests and troughs) of a wave caused by disrupting force F_1 moves in the same direction as that force, we have a **longitudinal wave**. Consider the air in a tube. The air molecules inside the tube are evenly distributed in a state of equilibrium.



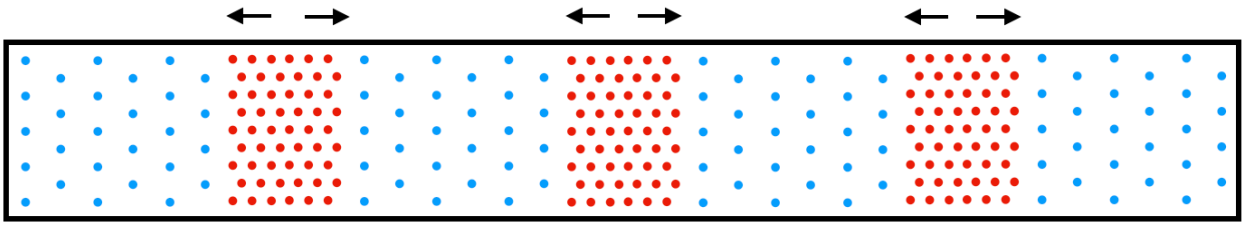
Blowing into the end of the tube will push the air molecules away, creating a low density area with fewer molecules in it called a **rarefaction**. The molecules that moved bump into the molecules in the rest of the tube, causing a high density area called a **compression**.



The compression then presses outward, creating compressions on either side of it and leaving a rarefaction where the compression was.



This process continues and the wave moves down the tube.



Graphing the location of any molecule in the tube across time will result in a sinusoidal wave.