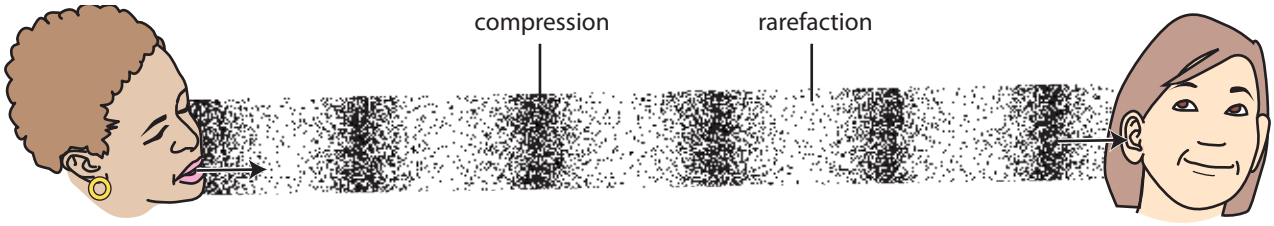
Part B

9. The diagram below shows a model of a sound wave traveling through air in a tube. In some parts of the wave, the air molecules are squeezed together. These areas are called **compressions**. Compressions are regions of high air pressure. Between each compression, there are areas where the air molecules are spread out. These are called **rarefactions**. Rarefactions are regions of low air pressure.



In your group of four, use the diagram above and the long spring to create a model of a sound wave that moves through air. Use the coils of the spring to represent groups of air molecules.

10. Adjust the long spring to model a louder sound.

    Hint: Refer to the patterns that you noticed in Part A.

11. Adjust the long spring to model a higher frequency.

12. Discuss with your group how to model a sound wave of high or low intensity. Adjust the long spring to model a high-intensity sound.

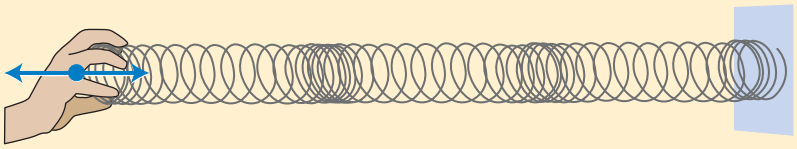
ANALYSIS

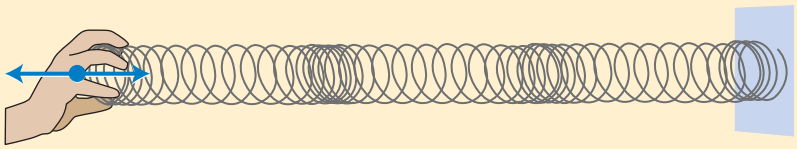
1. A **wave** is a disturbance that repeats regularly in space and time and that transmits energy from one place to another with no transfer of matter. Do the sounds discussed in this activity fit the definition of a wave? Explain, using an example from this activity.

2. Predict what happens to the amount of energy transmitted by a wave if
   a. the frequency is increased.
   b. the loudness is reduced.

3. Sound is known as a *pressure wave*. Did your model support this claim? Explain how it did or did not.

4. Make two tables like the one below, and fill in the missing diagrams to show changes in loudness and frequency. Then explain what your diagrams model.

Wave Characteristic: LOUDNESS

a. diagram of a louder sound
b. diagram of a softer sound

Wave Characteristic: FREQUENCY

a. diagram of frequency decrease
b. diagram of frequency increase

5. Match the following descriptions of people to their audiograms:

   a: José has decreased hearing in the right ear at higher frequencies.

   b: Leon has noticed lately that he has trouble deciphering women's speech.

   c: Shannon has moderate hearing loss involving sounds of 3,000–6,000 Hz.

   d: Sophia has severe to profound hearing loss in both ears.