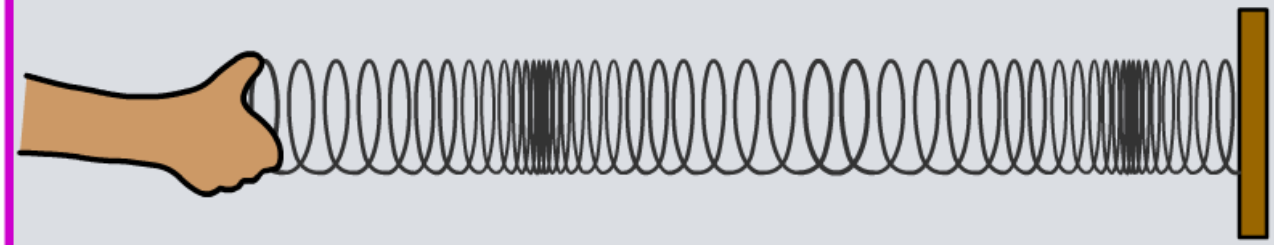
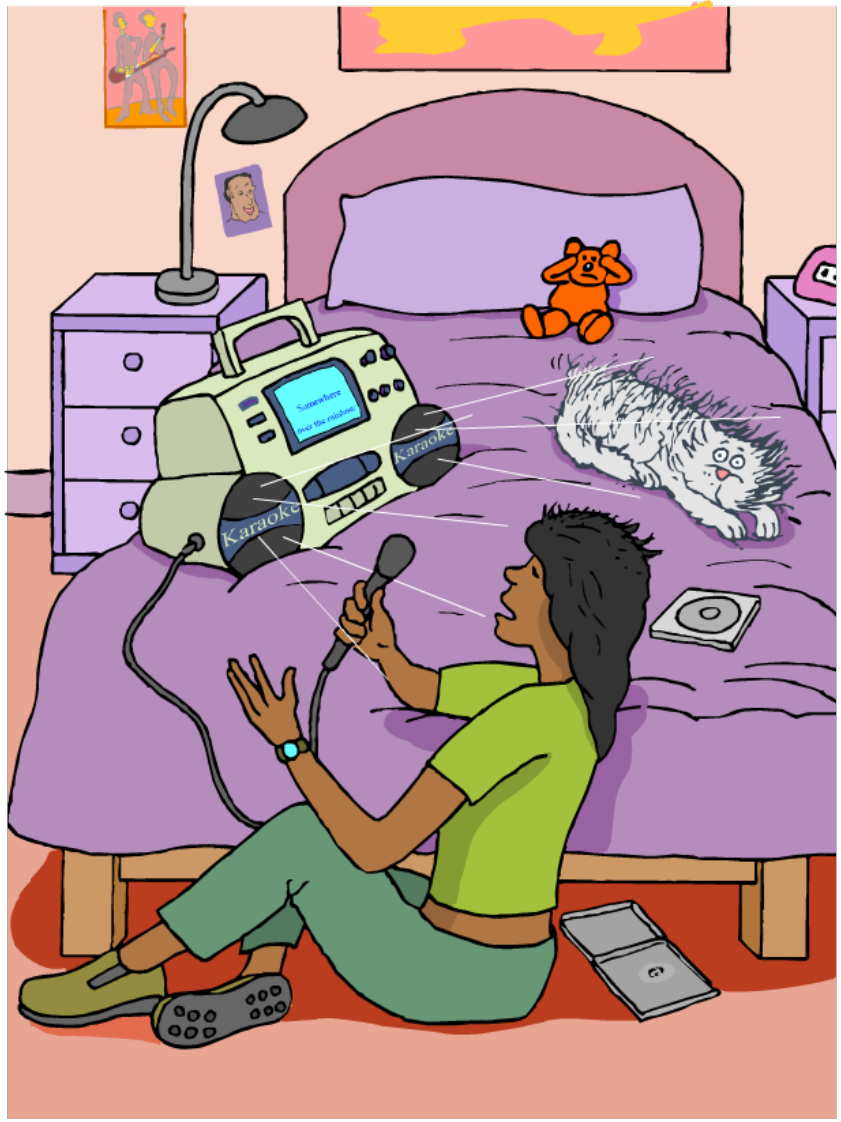
Longitudinal Waves



What are longitudinal waves?



Sound travels as waves made up of vibrating air particles.

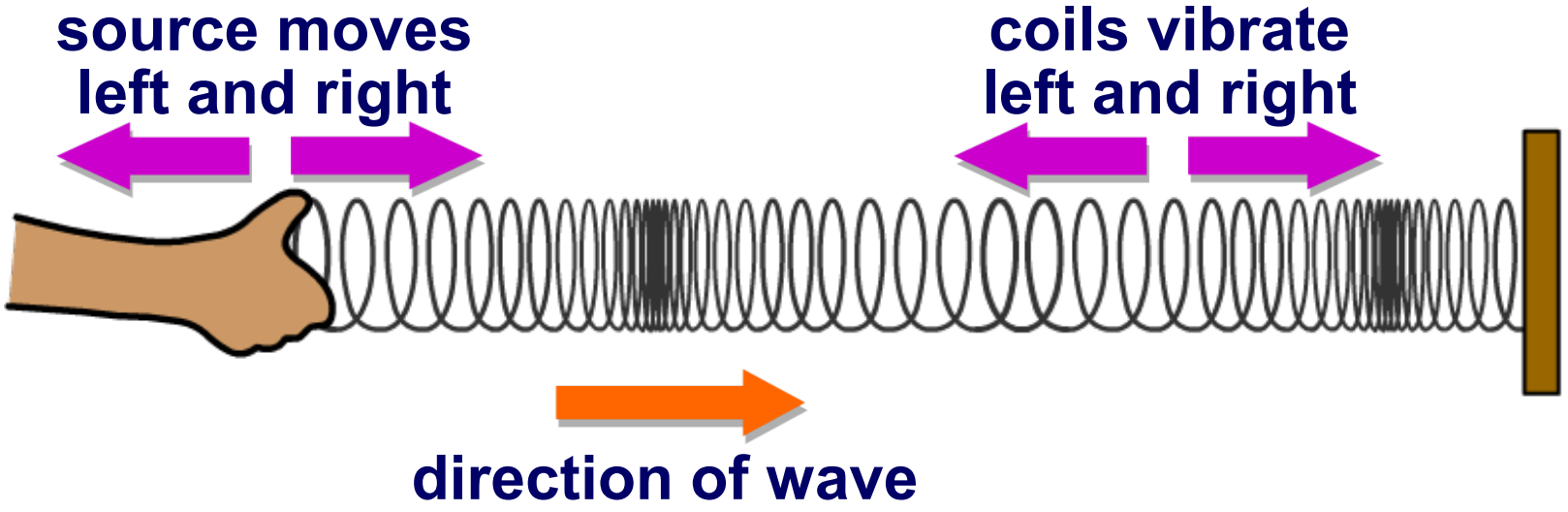
Sound waves are an example of **longitudinal waves**.

In a longitudinal wave, the particles vibrate back and forth, so the direction of their movement is **parallel** to the direction of the wave.

Think about the hairs on this fluffy cat vibrating backwards and forwards, as sound waves from the speaker pass by!

What do longitudinal waves look like?

A Slinky can be used to model longitudinal waves, by moving one end of the Slinky **left and right**.



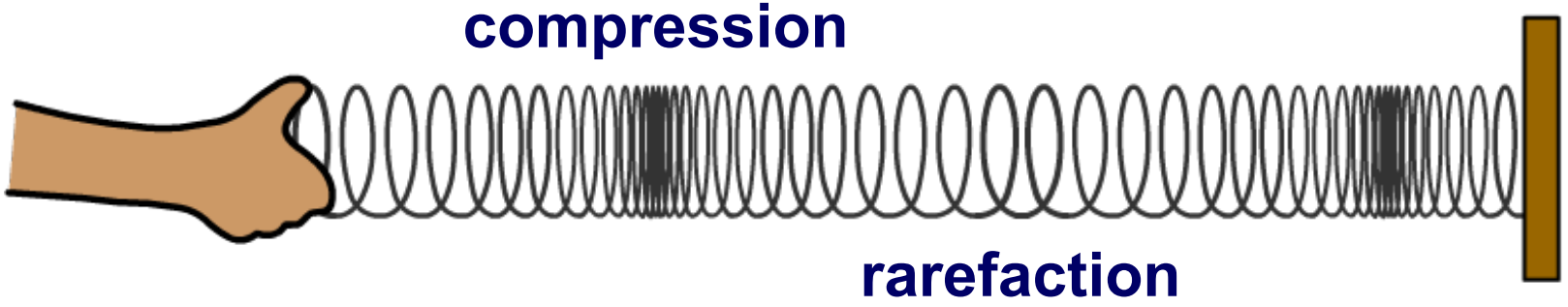
The wave travels away from the source. The direction of the wave is **parallel** to the movement of the source.

In a longitudinal wave, the coils do not travel horizontally; each coil of the Slinky just **vibrates left and right**.

What are the parts of a longitudinal wave?

Certain parts of a longitudinal wave have special names.

Sections that are pushed together are called **compressions**, and sections that are stretched out are called **rarefactions**.

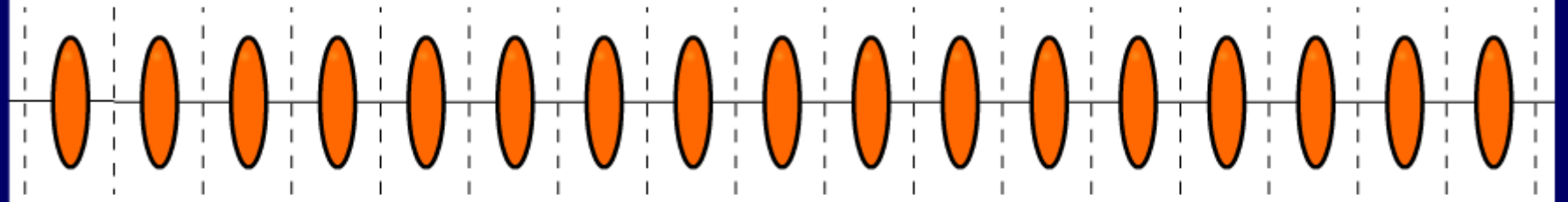


Sound waves are longitudinal waves. When someone speaks, the air particles vibrate as a longitudinal wave, and so compressions and rarefactions are formed in the air.

P waves, the primary waves produced by earthquakes, are also longitudinal waves, which push and pull the Earth.

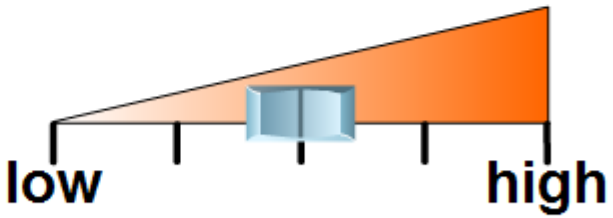
Simulation of a longitudinal wave

How do particles in a longitudinal wave move?



In a longitudinal wave, each particle vibrates **left and right**. These vibrations are **parallel** to the wave direction.

Use the controls to investigate the motion of particles in a longitudinal wave.



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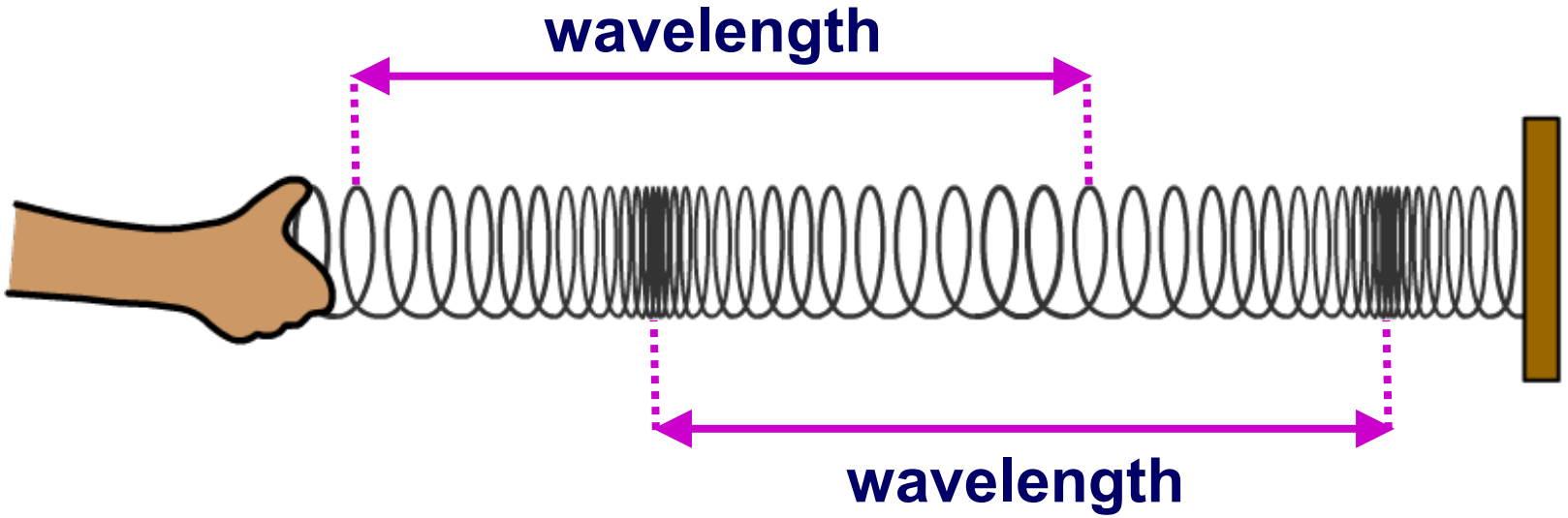
Wavelength of a longitudinal wave

The **wavelength** of any wave is the distance between two matching points on neighboring waves.



The wavelength is the same whichever two matching points are used to measure this distance.

The symbol used to represent wavelength is λ.