NAME _____ DATE _____

Pictures You Can Hear: The Ox-cart
MUSSORGSKY "Oxcart" from Pictures at an Exhibition

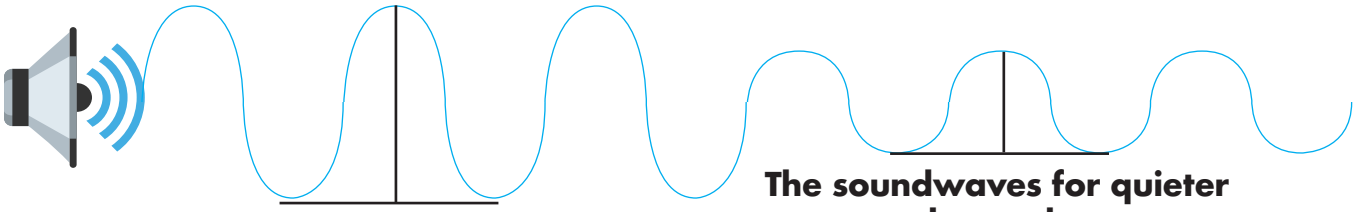
SCIENCE OF SOUND

Can you hear how the music begins quietly, growing louder as the cart moves closer, and then becoming quieter at the end? Have you ever noticed how sounds do this? Think of a fire truck or ambulance siren you've heard go by. Why do think this happens? Let's find out!

WHAT IS SOUND?

Sound is a type of energy you can hear made by vibrations. When an object vibrates, or moves back and forth quickly, the sound travels through the air to your ears in **soundwaves**.

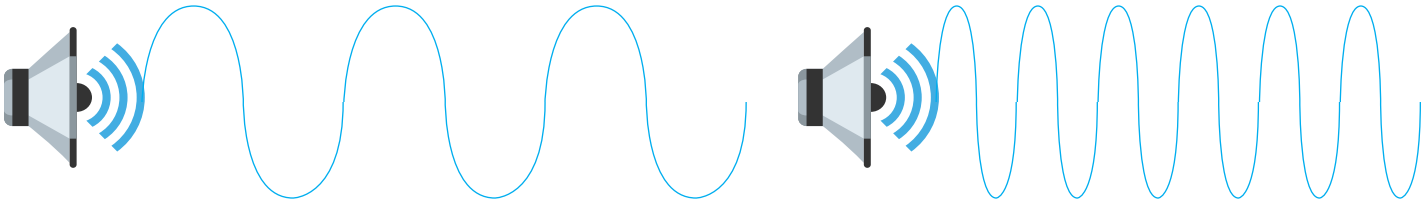
There are lots of different sounds we hear every day. Each sound is different in volume and pitch. **Volume** is how loud or quiet the sound is. The volume of the sound determines how short or tall the soundwaves are.



Louder sounds have taller soundwaves

The soundwaves for quieter sounds are shorter.

Pitch simply means how high or low a sound is to our ears. Pitch is determined by how fast the soundwaves move.



When soundwaves move slowly and are farther apart, the pitch is low.

When soundwaves move fast, the sound is higher in pitch.

How fast the soundwaves move is called **frequency**. Therefore, high pitch sounds have higher frequency, and low pitch sounds have lower frequency.

1. Can you name two animals that make high-pitch sounds?

   _____

   _____

   The soundwaves for high-pitch sounds move FAST or SLOW. [Circle one]

2. What animals make loud sounds? Name two.

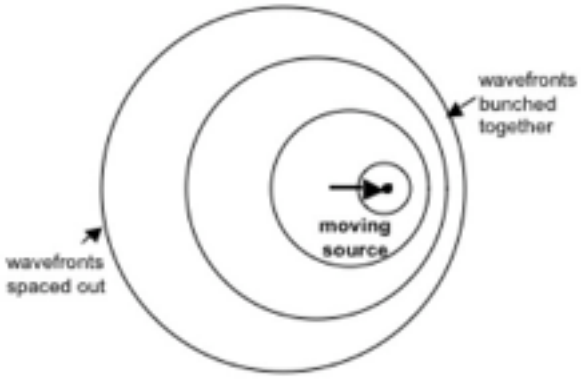
   _____

   _____

   The soundwaves for loud sounds are TALL or SHORT. [Circle one]

HOW DOES SOUND TRAVEL?

Now imagine throwing a rock in a pond; you will notice that the waves in the water get smaller and farther apart as it moves away from where the rock was thrown. Similarly, soundwaves spread out and get smaller the farther away they travel from the source of the sound.



When the source of the sound moves closer to you, the soundwaves become compressed (or squeezed together), reaching your ears quickly. This means the soundwave is moving faster, creating a HIGHER / LOWER [circle one] pitch. When the source of the sound moves away from you, it takes longer for the sound to reach your ears, so the soundwave is moving slower. This makes the sound HIGHER / LOWER [circle one] in pitch. This is known as the Doppler effect. Watch this video to learn more about it!