

What is a Sound Wave?

An At-Home STEM Lesson Plan Crafted by BGCharlem STEM Specialist Chaelee Dalton



Photo: Hearing Doctors

Happy National Music Month! This week, we are building off of last week, where we learned about sound as a vibration in the air. This week, we are exploring the idea of sound as a wave, the different qualities waves have, and how these wave qualities relate to the sounds we hear.

Next week, we will use our understanding of sound to learn more about music to culminate the month in a project where we create musical instruments out of household materials.

If your child cannot read, read the text out loud to them. Ask them the questions and have them respond and/or solve on a separate sheet of paper. If your child can read, simply give them the second page of this handout and have them read the text out loud or in their head.

Materials: Blank paper, pen or pencil, internet access/YouTube

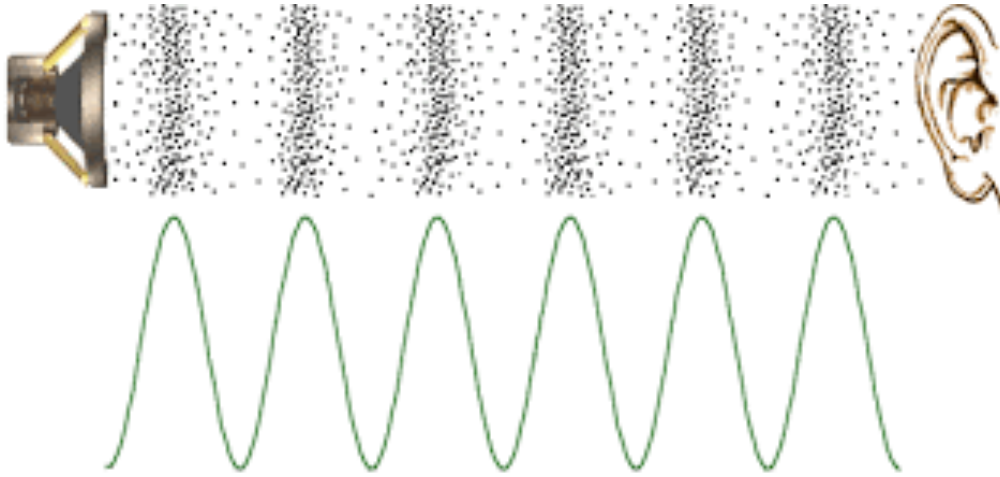
Addresses NGS Standards:

[3-PS2-2](#)

[4-PS4-1](#)

[4-PS3-2](#)

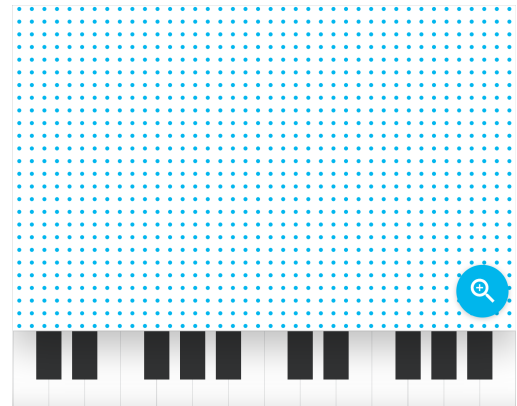
What is a Sound Wave?



Let's begin by returning to the sound wave simulator from last week [here](#).

Play a few different notes.

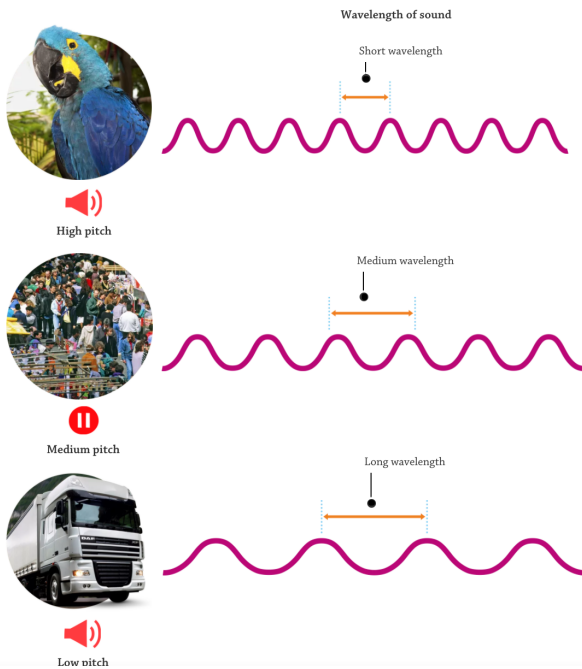
- Does the **loudness** of the sound change?
- What **does change** when you play different notes?



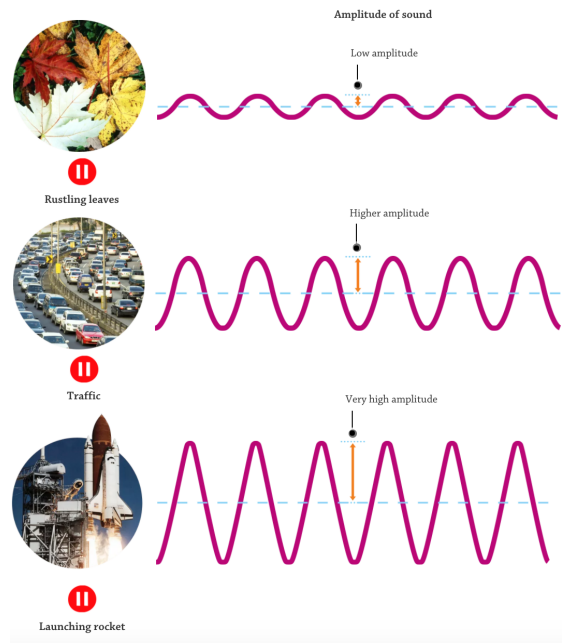
Loudness and **pitch** are two different parts of sound that can be visualized in different ways! Take a look at the pictures below, or explore [this website](#) to learn more about their difference.



Pitch/Wavelength



Loudness/Amplitude



Let's begin by looking at the pictures on the left. We see the parrot makes a **high-pitched sound**, the market makes a **medium pitched sound**, and the truck makes a **low-pitched sound**.

Next to each picture is a drawing of the corresponding sound wave.

- How do the waves vary with different pitches?

At different pitches, the _____ varies. High pitches have _____ and low pitches have _____.

Now, let's look at the pictures on the right. We see the leaves make a **quiet sound**, the traffic makes a **loud sound**, and the rocket makes an even **louder sound**. Next to each picture is a drawing of the corresponding sound wave.

- How do the waves vary with different loudness?

At different loudness, the _____ varies. Quiet sounds have _____ and loud sounds have _____.

Draw a sound wave that is quiet and has a high pitch:

(Hint: what is the height/amplitude of the wave? What is the wavelength of the wave?)

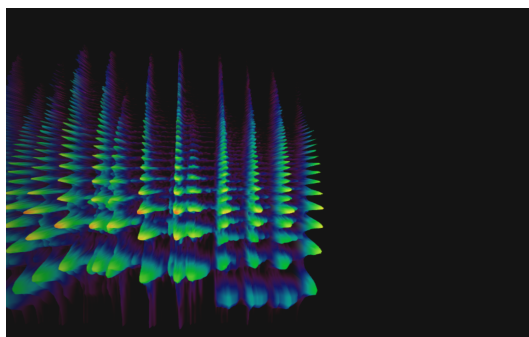
Draw a sound wave that is loud and has a low pitch:

(Hint: what is the height/amplitude of the wave? What is the wavelength of the wave?)

Sound waves can also be represented by something called a **spectrogram**. Let's explore a spectrogram [here](#).

Try out some of the recorded sounds, then use the record button to make your own sounds.

Try varying your **pitch** and **loudness**. What changes do you see on the spectrogram?



- When I change my pitch, _____ changes on the spectrogram.
- High pitches have _____ and low pitches have _____.
- When I change my loudness, _____ changes on the spectrogram.
- Quiet sounds have _____ and loud sounds have _____.

Next week, we will apply what we know about sounds and sound waves to begin to explore the science behind music!