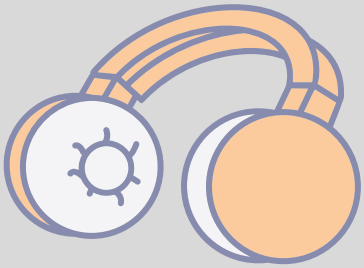
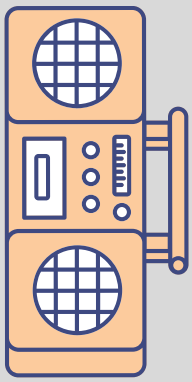


BUILDING BLOCKS OF MUSIC

LESSON 3

SURF BALLROOM & MUSEUM

VOLUME & PITCH

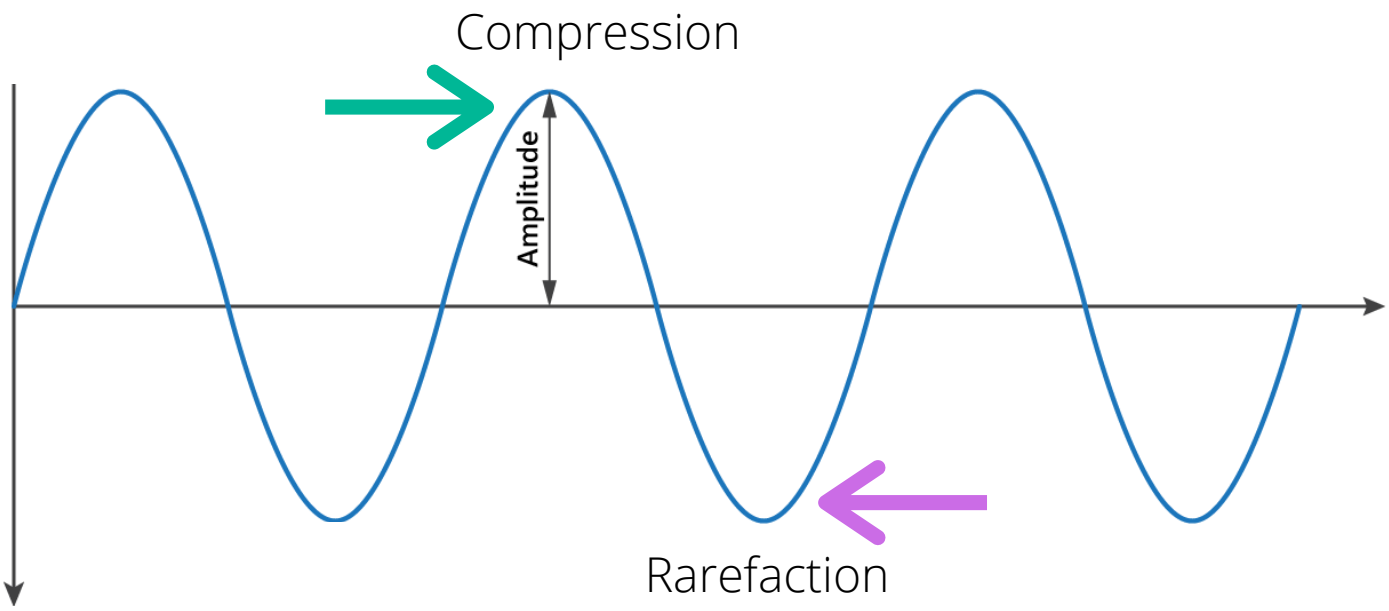


Volume and Pitch

Understanding Sound-Waves

Sound travels in waves, called sound-waves. Sound-waves are characterized by their **wavelength**, **amplitude**, and **frequency.**

Sound-waves are produced by vibrations in the air. As these vibrations travel through the air, they go though stages of compression (high density) and rarefaction (low density). That's how the wave is formed!



Sound needs a medium to travel through. To help us understand how sound travels in air, let's consider another avenue. Have you noticed how your voice sounds muffled when you talk under water? That's because water is more dense than air, so it creates more resistance on the sound-waves!

Pitch & Frequency

Sound is used for many different purposes. We use sound to communicate, send warnings, and to entertain us. Animals, weather, and nature all have unique sounds. All of these sounds around us have their own pitch. **Pitch** is the degree of highness or lowness in a tone. The pitch is determined by the speed of vibrations that produced the sound.

Frequency is the rate at which vibrations occur over a particular period of time. Different pitches have different frequencies. For example, high pitches (such as a whistle blowing) have higher frequency levels. Low pitches (such as thunder) have lower frequency levels. This means that high pitches have faster vibrations in their sound-waves, and low pitches have slower vibrations in their sound-waves. **Hertz** (Hz) are the unit of measurement used to measure frequency.

Did You Know?

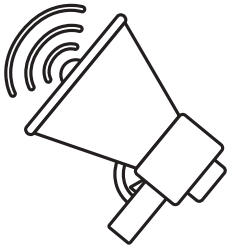
Humans can detect a wide range of frequencies. However, some animals hear frequencies that are too high-pitched or low-pitched for humans to hear! These frequencies are called **ultrasonic** and **infrasonic** sounds. Some animals with excellent hearing include: owls, elephants, dogs, cats, and dolphins!

Volume & Intensity

Volume is the degree of loudness or quietness that comes from a sound-wave. Most of us are pretty familiar with volume. Turning the TV volume up creates a louder sound whereas turning it down creates a quieter sound. However, have you ever though about volume in a scientific way? To do so, let's think of volume as energy. The energy that comes from a sound wave travels over a certain area over a certain amount of time. When we are standing close to a sound source, we perceive the sound as louder. When we are standing farther away from the sound source, we perceive the sound as quieter. What we are hearing is the **intensity** of the sound-wave. High intensity sound-waves are louder and low intensity sound waves are quieter. Intensity is measured using the **decibel** scale. Normal conversation generally falls around 60 decibels. A whisper is more like 20 decibels, while a vacuum cleaner runs as loud as 80 decibels.

Can you guess how many decibels these sounds produce?

- Airplane Engine - (140dB)
- Train Whistle - (140dB)
- Dog Barking - (80dB)
- Breathing - (10dB; barely detectable)
- Bird Chirping - (40dB)

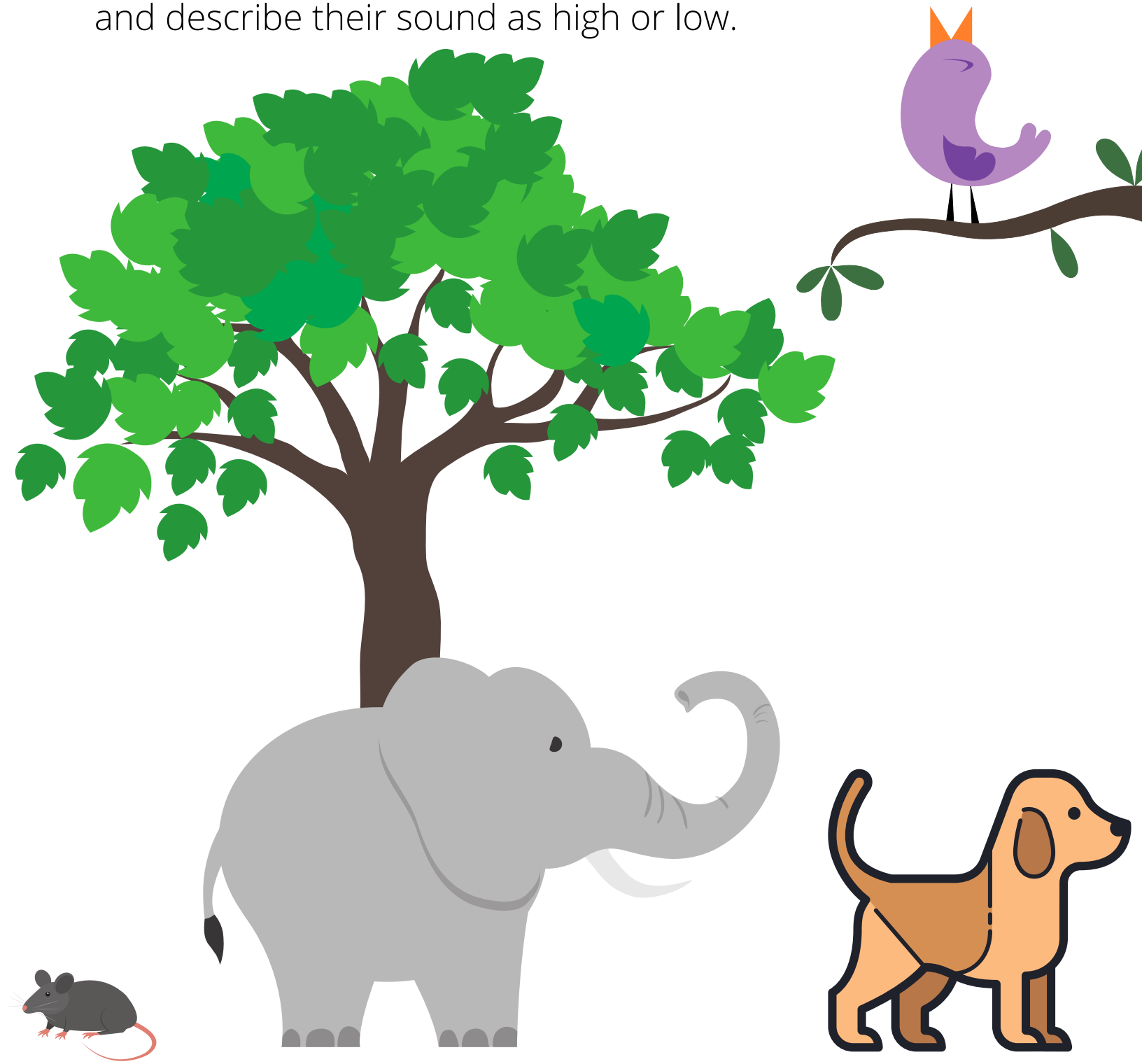


K-2 Animal Sounds- Volume

Can you think of animals that make loud sounds? How about animals that make quiet sounds? Describe the sounds of the animals you see here, then draw your own animals and describe their sound as loud or quiet.

K-2 Animal Sounds- Pitch

Can you think of animals that make high sounds? How about animals that make low sounds? Describe the sounds of the animals you see here, then draw your own animals and describe their sound as high or low.



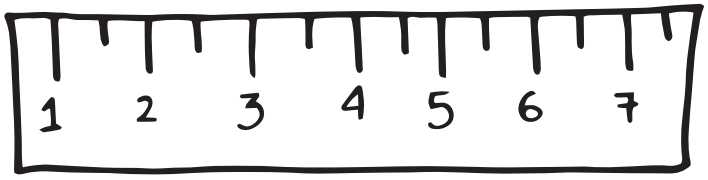
3-8 Volume and Pitch Scavenger Hunt

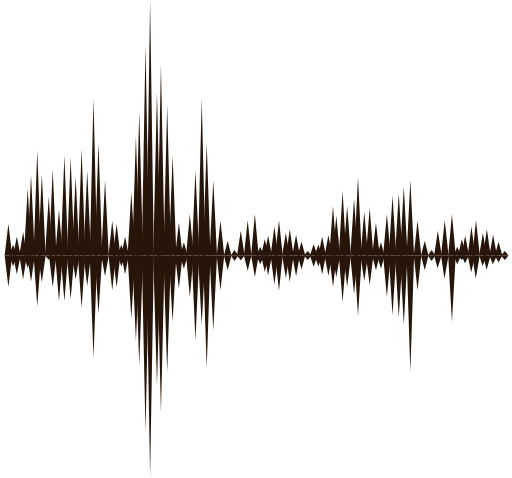
Now that we know all about volume and pitch, students can take their knowledge on a scavenger hunt! Search for sounds that have different pitches and volumes outdoors or in different rooms. Students can bring a recording device with them, such as a smart phone or computer, to record the different sounds they find. For an added challenge, students can look for sounds that have more than one pitch or volume. Create a 'surprise sound' by having students close their eyes and then search the room for what made the sound.

Sound Source	Description of Sound	Volume: High /Low	Pitch: High /Low

3-8 Volume and Pitch Ruler Experiment

- Have students hold one end of a ruler flat against a table. Have the access length of the ruler extend off the edge of the table. Gently hit the end which extends beyond the edge of the table and observe the speed of vibration and the sound that is produced.
- Repeat this action, each time pulling more of the ruler onto the table.
- Ask the students how changing the length of the ruler that hangs past the table changes the sound-waves that are produced. How do the pitch and frequency change? (Answer: The longer the amount of the ruler beyond the table edge, the lower the pitch / frequency.)
- Students can even record the length of time that the ruler produces sound and the length of the ruler extending beyond the table to create a graph to support the concepts they learned about pitch and frequency.





9-12 Volume and Pitch
Water Creates Pitch Experiments

Give students four empty glass water bottles. Fill each bottle to the top with water. Remove 100 ml of water from the first bottle, 200 ml from the second, 300 ml from the third and 400 ml from the fourth. Have students tap the side of each bottle with a metal spoon. The sound made when the spoon taps the bottle should change depending on the amount of water in each bottle. Challenge students to add more bottles to create more sounds. Challenge them further to play a tune that they recognize, or create their own melody.

Create a C-scale by lining up eight empty 8-oz. glasses. The first glass should be completely full (low C). The next glass should be 8/9 full (D note), the third 4/5 full (E note), the fourth 3/4 full (F note), the fifth 2/3 full (G note), the sixth 3/5 full (A note), the seventh 8/15 full (B note) and the eighth 1/2 full (high C note). Try playing a song with the C scale!