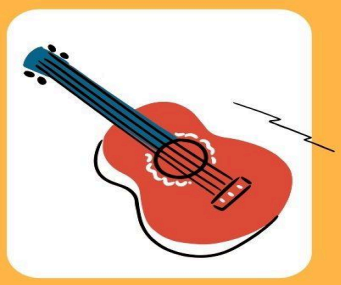
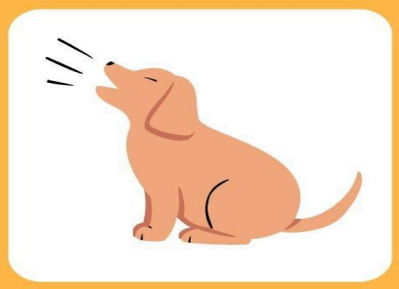
Sound







Discussion Guide (for use during or after reading)

1. What is sound? What makes sound? (What Is Sound?, What Makes Sound, p. 4-7)
    a. Sound is a form of energy that comes from objects that vibrate (move back and forth).

2. Explain how sound enters the ear and travels to the brain. (How Do We Hear Sounds?, p. 8-9)
    a. Sound waves enter your ear and hit your eardrum, a soft, thin tissue that stretches across your inner ear. Next, the sound waves cause the eardrum to vibrate, which causes tiny bones in your ear to move, sending the sound waves to the cochlea, a liquid-filled tube within your ear. Sound waves travel through this liquid and cause hairs to bend, which sends signals to the brain.

3. Why is there no sound in space? (Carrying Sound, p. 10-11)
    a. There is no sound in space because sound waves must travel through some type of material. Because space is a vacuum, there is nothing for the sound waves to travel through. There are no particles in space to vibrate and make sound.

4. Why is it important to understand scattering and absorbing? (Absorbing Sound, p. 12-13)
    a. Scattering sound involves separating sound waves and sending them in different directions. Absorbing sound involves taking in and holding sound waves rather than reflecting them. Scientists and engineers use their understanding of scattering and absorbing to design things that make sounds softer. For example, curtains in a theater both scatter and absorb sound so the audience does not hear what is happening backstage during the show.

5. What is echolocation? How do bats use echolocation to “see?” (What Makes an Echo?, p. 14-17)
    a. Echolocation is the use of sound by certain animals to sense their surroundings. Bats, dolphins, and whales use echolocation to navigate and hunt. Surfaces reflect sound waves. Animals that rely on echolocation listen for these reflections and use that information to determine what is in their surroundings.

6. What is sonar and how is it similar to echolocation? (What Makes an Echo?, p. 14-17)
    a. Sonar is a system humans created that uses sound energy to find objects underwater. It works in a way similar to echolocation because electronic devices send out “pings” and listen for echoes. Sonar can be used to find submarines, map the ocean floor, and track ocean animals.

7. What is amplitude and what does it affect in sound? (How Loud or Soft?, p. 20-21)
    a. Amplitude is a measure of the amount of energy in a wave. In a sound wave, the greater the amplitude, the louder the sound.

8. What is frequency and what does it affect in sound? (How High or Low?, p. 22-27)
    a. Frequency is a measure of the number of waves that pass a point during a given period of time. Frequency determines a sound’s pitch, how high or low it sounds.

9. Why is it important to study sound? (Why Study Sound?, p. 28-29)
    a. Not only does studying sound help scientists better understand how we hear and how to help others hear better, studying sound waves can also help scientists in other areas. For example, sound waves can be used to clean delicate instruments, heal wounds or injuries, and explore dangerous or difficult to reach areas of Earth.

10. What fun fact stood out to you and why? (Can You Believe It?!, p. 36-37)
    a. Students’ answers will vary.