

UNIT 2: SOUNDS GOOD

IN THIS UNIT, students explore sound by making stringed instruments and headphones and then playing tunes.*

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String Thing, a Design Squad interactive online game (pages 17–18)

- **Overview:** Students change a virtual string’s tension, length, and gauge to create different pitches and write a melody—just what they do in a “non-virtual” way in *Build a Band*.
- **Learning outcomes:** Use *String Thing* to: a) introduce the unit by defining relevant terms and giving students experience manipulating the variables they’ll work with in *Build a Band*, or b) end the unit, as a culminating activity, review, or assessment of the unit’s concepts.

Build a Band challenge (pages 19–22)

- **Overview:** Students stretch four rubber bands around, over, or across a shoebox and tune them to different pitches by adjusting the strings’ tensions and lengths. To maximize volume, they design an instrument that transmits vibrations well whenever a string is plucked. Finally, they work in pairs to tune their instruments and play a melody.
- **Learning outcomes:** Students will be able to design and build a tunable instrument and discuss how a string’s tension, length, and gauge affect pitch. They will also be able to describe how they used the design process to design and build their instruments.

Headphone Helper challenge (pages 23–26)

- **Overview:** Students apply what they learned about sound in *Build a Band* to design and build a headphone system. They choose either a string-telephone system or a tube-based option to carry the sound waves from the instrument to their ear. Then they determine the best place to attach the string or tube—where the instrument vibrates a lot when a string is plucked.
- **Learning outcomes:** Students will be able to explain how sound waves travel and describe how they used the design process to design and build a headphone.

Making It Real: The Sounds Good Unit (pages 27–29)

- **Overview:** Students present their instruments and discuss the science and engineering behind their designs. They also watch two short videos: They meet a young engineer who uses sound to navigate a submarine, and they see how the *Design Squad* teams use the design process to refine their instruments.
- **Learning outcomes:** Students will be able to identify the science concepts exhibited in their work (e.g., sound energy, pitch, waves, amplitude, frequency, and wavelength), explain how the design process encourages them to think creatively to tackle a challenge, point out how they are thinking and working like engineers, and cite examples of how engineering is a profession centered on designing and building things that matter to people.

PLANNING YOUR TIME

Only have one class period available? Do *Build a Band*.

Two class periods? Do *Build a Band* and *Making It Real*.

Three? Do *Build a Band*, *Headphone Helper*, and *Making It Real*.

When should I do *String Thing*? Use *String Thing* to introduce or end a unit—or both! For details, see page 17.

“Solving a real problem is a turn-on, especially for kids with learning problems.”

Rosemary B.
Fairgrounds Middle School
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* For specific STEM standards, see Appendix, page 48.