

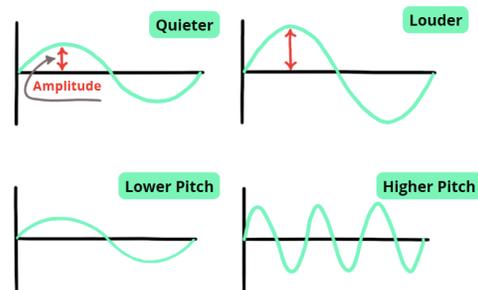
**Your task is to build an instrument that produces sounds with different pitches.**

We want you to make your own instrument using materials you have at home. Further, your instrument must produce at least four sounds with different pitches. Once you have your instrument made, you will investigate how the sound changes in different rooms.

Sound waves are created when materials vibrate (and, conversely, sound waves can also make a material start to vibrate). There are two main qualities of sound: (1) How loud a sound is (i.e. its **volume**, measured in decibels). (2) A sound's **pitch** (i.e. its **frequency**, meaning whether the sound is high or low, measured in hertz).

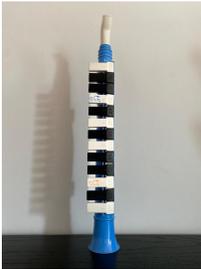
Volume is connected to a wave's **amplitude**: a larger amplitude results in a louder sound. **Wavelength** is connected to frequency, or a sound's pitch: the shorter the wavelength the higher the pitch.

But what causes a wavelength to be shorter or longer? *That is for you to explore!*



**Step One: Get inspired!**

Music instruments often are one of these three categories.

Wind Instrument	Percussion Instrument	String Instrument
<i>Instruments that have wind blown through them.</i>	<i>Instruments that make sound when they are hit.</i>	<i>Instruments that make music with strings. Strings can be plucked (like a guitar), bowed (like a violin), or even struck (like a dulcimer)</i>
		

**Step Two: Choose your Materials**

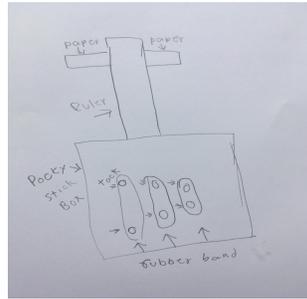
Gather your materials to make an instrument! The materials may be **hollow items** (ex. straws, cardboard boxes, cups) or **stretchy items** (ex. rubber bands or string). You may want to use items that can be **shaken** (ex. rice, marbles or pebbles) or **hit a surface** (ex. spoons or popsicle sticks). You may also want to use tape, glue and/or scissors.

### Step Three: Design your Instrument

Start your instrument project with a drawing of your design!

*Up for the challenge?* In your design, show where the three different sound pitches come from. How would you represent each sound wave as it travels from your instrument?

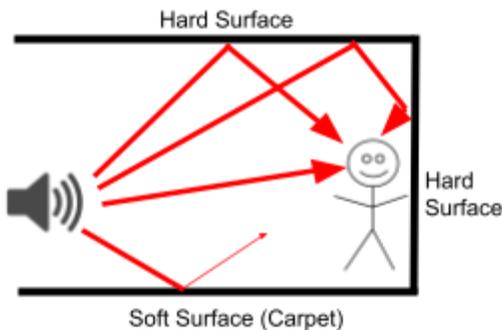
Using [this video](#), play a piano and see how sound travels through the air when you play different sounds.



### Step Four: Build your Instrument

After having collected your materials and having a design, begin building your instrument. Even if your instrument does not work right away, keep at it! **If you need help...**

- Consider collaborating with those around you!
- Think about more or different materials you can use.
- Take a short break and give yourself time to rest and think of new ideas!



Once you have successfully created an instrument that makes several different sounds, we want you to test it out in different spaces. When we talk about a room's **acoustics**, we are referring to the aspects of the room that determine how sound is transmitted. Some surfaces allow soundwaves to bounce off of them whereas others absorb the sound; this, in turn, changes how we hear the sounds. Take your instrument into different areas of your home. For example, you could take the instrument into a room with hard surfaces (like a bathroom) and then a room with softer surfaces (like a bedroom).

Does your instrument sound the same? Why or why not?

**If you liked this challenge click the links below to find out more!**

(Activities) [See Sound Waves](#) // [Play and Watch String Instrument Vibrate](#)

(Videos) [Science of instrument making](#) // [How to make a violin](#) // [How sound works](#)

### Step 5: Sharing your Instrument on Instagram or email.

We want to see your instrument! With permission from your parent, or guardian, share a picture of your instrument for our instagram page. Direct messaging or emailing an image of your challenge gives us the written consent to redistribute the image on our [website](#) and official instagram page.

**Instagram:** @sciencecircuswhittier

**Email:** [sciencecircuswhittier@gmail.com](mailto:sciencecircuswhittier@gmail.com)

