**🔊 Station 2: The Buzzer Beats**

**NGSS Standard: 1-PS4-1**
**Focus:** Sound from vibrating materials.

**Materials:**

 1 small **buzzer**

 1 **battery pack** (2 AA batteries or 9V)

 2 **alligator clip wires**

 1 **plastic cup** (to act as a sound amplifier)

**Student Directions:**

**Step 1: Build the Circuit:**

* Use alligator clip wires to connect the **buzzer** to the **battery pack**.
	+ Clip **one wire** to the **positive (+)** side of the battery and to one buzzer wire.
	+ Clip the **second wire** to the **negative (–)** side of the battery and to the other buzzer wire.

**Step 2: Listen Up!**

* **What do you hear when the buzzer is connected?**
	+ If you hear nothing, double-check your connections and make sure the buzzer is facing the correct direction.

**Step 3: Amplify the Sound:**

* Place the **buzzer inside the plastic cup**.
* **Listen again** — is the sound louder now?

**Step 4: Feel the Vibration:**

* Gently **touch the buzzer while it’s buzzing.**
	+ Can you **feel it vibrating**? That’s what creates the sound you hear!

**Record Your Observations:**

| **Question** | **Your Answer** |
| --- | --- |
| Sound: | ☐ Loud ☐ Soft ☐ No Sound |
| Vibration (felt when touched): | ☐ Yes ☐ No |
| Did the cup make the sound louder? | ☐ Yes ☐ No |

**What made the buzzer work?**

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**NGSS Standard:** 1-PS4-1 – *Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.*

**✅ ITEEA STEL Standards – Elementary Level**

**STEL 1A** – *The study of technology uses knowledge and skills from other subject areas.*
→ Students apply scientific understanding of sound and vibration in a hands-on circuit investigation.

**STEL 2A** – *Technological systems are designed to meet needs and wants.*
→ The circuit with a buzzer is a simple system demonstrating how technology produces sound, like in alarms or games.

**STEL 7A** – *Energy is the capacity to do work.*
→ Electrical energy from the battery is converted to sound energy through vibration in the buzzer.

**STEL 8A** – *Design is a creative process for meeting human needs and wants.*
→ Students explore how design (e.g., adding a cup) can enhance or modify the function of a simple device.

**STEL 9A** – *Modeling helps convey ideas and communicate solutions.*
→ Students observe, describe, and record how sound is affected by different variables (e.g., adding a cup for amplification).

**✅ Common Core Math Standards – Elementary Level**

**CCSS.MATH.CONTENT.1.MD.C.4** – *Organize, represent, and interpret data with up to three categories.*
→ Students record and interpret observations in a simple data table (e.g., loudness, vibration, cup effect).

**CCSS.MATH.PRACTICE.MP2** – *Reason abstractly and quantitatively.*
→ Students connect the abstract idea of vibration with their physical experience of touching and hearing the buzzer.

**CCSS.MATH.PRACTICE.MP5** – *Use appropriate tools strategically.*
→ Students use clip wires, buzzers, batteries, and cups to explore how energy and vibration interact.

**CCSS.MATH.PRACTICE.MP6** – *Attend to precision.*
→ Students carefully build circuits and record accurate observations about sound and vibration.

**✅ Summary:**

This sound-and-vibration activity aligns with **NGSS** for early physical science, **ITEEA standards** for technological systems and energy transfer, and **Common Core Math** standards by encouraging basic data organization, tool use, and observation skills. It builds STEM foundations through tangible, student-centered exploration.