**🔍 Station 1: Material Match-Up – Conductors vs. Insulators**

**NGSS Connection:** *HS-PS2-6 – Evaluate materials based on their properties for electrical applications*
**Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Partner(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**🎯 Your Mission:**

You're a circuit repair technician! A wire has broken in your system, and you need to find a material that can **complete the circuit** and allow electricity to flow. You'll test different everyday objects to see if they are **conductors** or **insulators**.

**🛠️ Materials at This Station:**

* Copper tape or wire
* Coin cell battery or AA battery pack
* LED light
* Testing materials: paper clip, foil, plastic, rubber band, pencil lead (graphite), wood, etc.
* Tape (if needed to hold materials in place)
* Worksheet or notebook for recording results

**👣 Step-by-Step Student Directions:**

**STEP 1:Build a Simple Circuit**

* Create a basic circuit using copper tape or wires, battery, and LED.
* Leave a **small open gap** in the circuit where you will test each material.

**STEP 2: Test Materials One at a Time**

* Place one test material across the gap.
* Observe: **Does the LED turn on?**
	+ **Yes?** → The material is a **conductor** (electricity flows).
	+ **No?** → The material is an **insulator** (electricity does not flow).

**STEP 3: Repeat for Each Item**

* Be sure to test **at least 5 materials**.
* Record your observations in the table below.

**📊 Data Table:**

| **Material** | **LED On? (Yes/No)** | **Conductor or Insulator?** | **Notes (How well did it work?)** |
| --- | --- | --- | --- |
| Paper Clip |  |  |  |
| Aluminum Foil |  |  |  |
| Plastic Strip |  |  |  |
| Rubber Band |  |  |  |
| Pencil Lead (Graphite) |  |  |  |
| (Add your own) |  |  |  |

**⚡ Challenge Question:**

**Which material worked best to “patch” the broken wire, and why do you think it worked so well?**
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**💬 Discussion Prompt:**

* What do conductors have in common?
* Why are insulators important in real circuits and electronics?

**5.OA.B.3** – Analyze patterns and relationships.
 → Learners analyze what conductors have in common, looking for material traits such as metal content.

💡 **Summary:**
This station engages students in hands-on material testing to understand electrical conduction. It encourages data collection, analysis, and problem-solving, directly supporting NGSS, ITEEA standards in material properties and design, and Common Core Math skills in data representation and pattern analysis.

🔍 **Station 1: Material Match-Up – Conductors vs. Insulators**
🔬 **NGSS Connection:**
**HS-PS2-6** – Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

✅ **ITEEA STEL Standards – High School**

**STEL 1H** – Technological systems include input, processes, output, and feedback.
→ Students test different materials as system inputs to evaluate how they affect the circuit’s output (LED lighting up).

**STEL 3G** – Materials are selected for products and systems based on their properties.
→ The activity focuses on testing and selecting materials based on their electrical conductivity.

**STEL 4J** – The engineering design process involves defining problems, generating ideas, selecting solutions, testing, and evaluating.
→ Students test multiple materials to solve a circuit continuity problem, following a real-world engineering process.

**STEL 8H** – Applying science, math, and engineering principles helps solve practical problems.
→ Students apply scientific reasoning to evaluate which materials conduct electricity effectively.

**STEL 11G** – Testing and evaluation are used to determine the success of a design.
→ Learners evaluate the effectiveness of materials by observing whether the circuit works with them.

✅ **Common Core Math Standards – High School**

While this station is more focused on engineering practices, it supports math reasoning skills, including:

**HSN-Q.A.1** – Use units as a way to understand problems and guide the solution of multi-step problems.
→ Students could extend this station by measuring resistance or current and using units to analyze conductivity.

**HSS-IC.B.6** – Evaluate reports based on data.
→ Students analyze test results to determine which materials function as conductors or insulators.

**HSS-ID.A.1** – Represent data with plots on the real number line (dot plots, histograms, box plots).
→ Students may graph which materials conducted best or group materials by observed conductivity.

💡 **Summary:**
This station integrates engineering practices (ITEEA), data-driven analysis (Common Core Math), and real-world science (NGSS) by asking students to test, evaluate, and reason about how material properties affect electrical functionality—essential for careers in technology, electronics, and energy systems.