UNIT: CIRCUITRY GAME

ACT-Based Science: Conductors vs. Insulators Investigation

### Here are ACT-aligned science activities for the **Build Your Own Circuitry Game** that help students engage in real-world scientific practices such as experimental analysis, data interpretation, and variable testing related to voltage, current, and resistance in circuit design.

### Objective:

Students test materials for conductivity.

MATERIALS NEEDED:

* Wires, multimeter
* Various materials (metal, plastic, rubber)

Student Directions:

**Goal:**  
You will test different materials to find out which allow electricity to pass through (conductors) and which block it (insulators). This hands-on experiment builds your understanding of how materials impact circuits and helps you practice data collection and scientific reasoning—just like on the ACT Science test.

**Step 1: Set Up Your Testing Circuit**

* Connect wires to your multimeter or simple circuit tester.
* Make sure your setup allows you to place a material between two contacts to test whether electricity flows through it.

**Step 2: Test Each Material**

* One by one, place each test material (e.g., copper wire, plastic straw, rubber band, foil, glass bead) into the circuit or across multimeter leads.
* Use the multimeter to measure the **resistance** (in ohms) of each material.
  + **Low resistance = good conductor**
  + **High resistance or no reading = insulator**

**Step 3: Record Your Results**

* Use the worksheet to log:
  + Name of each material
  + Resistance measurement (or conductivity result)
  + Label as "Conductor" or "Insulator"

| **Material** | **Resistance (Ohms)** | **Conductor or Insulator?** |
| --- | --- | --- |
| Copper wire | 0.2 | Conductor |
| Plastic straw | Infinite/High | Insulator |
| Aluminum foil | 0.5 | Conductor |
| Rubber band | Infinite/High | Insulator |

**Step 4: Analyze and Discuss**

* Look at your data. What do all the conductors have in common? What about the insulators?
* Explain how using the wrong material in a circuit could affect whether it works or not.
* Why is it important to know the difference when building a game circuit?

**Step 5: Reflect and Conclude**

* Write a short paragraph:
  + What did you learn about conductivity?
  + How can this help in designing safer and more effective circuits?
  + Were any results surprising?

## ACT-Style Question:

## Which material is a **good insulator**?

## Copper

## Glass

## Aluminum

## Silver

## **Why These Activities and Questions Matter**

By engaging in science-based activities connected to the **Build Your Own Circuitry Game**, students:

✅ Practice interpreting experimental data from circuit tests, including voltage, current, and resistance readings.  
✅ Strengthen their ability to analyze variables, make predictions, and draw conclusions from electrical experiments.  
✅ Develop scientific reasoning skills by designing circuits, testing hypotheses, and troubleshooting system performance.

These skills reflect the ACT Science section’s emphasis on **data representation, experimental analysis, and scientific inquiry**—helping students become confident, analytical thinkers ready for college-level science and STEM careers.