UNIT: CIRCUITRY GAME

HOT CIRCUITS!

Your Mission:

You’ll explore how **resistance** affects electrical energy. Some resistors slow down current more than others. As electricity encounters resistance, energy can turn into **heat**—just like in real devices!

Focus: Energy Conversion in Circuits – How Electrical Resistance Affects Heat and Light Output

Materials:

* Battery pack (3V–9V)
* LED (with built-in or external resistor)
* Three resistors: 100Ω (low), 330Ω (medium), 1kΩ (high)
* Alligator clip wires or breadboard
* Infrared thermometer or use fingers to carefully sense warmth (ask your teacher first!)
* Stopwatch (optional, for timed tests)

STUDENT DIRECTIONS:

**STEP 1: Set Up Your Circuit**

* Use the battery, LED, and resistor to create a simple series circuit.
* Start with the 100Ω resistor.
* Make sure your LED lights up—long leg = + (positive side).
* Observe the brightness and carefully (or using the thermometer) check for heat near the resistor after it’s been on for 20–30 seconds.

**STEP 2: Repeat the Test**

* Switch out the 100Ω resistor with the 330Ω resistor.
* Repeat the observation: brightness and any heat.
* Then test the 1kΩ resistor (1,000 ohms).
* Wait the same amount of time for each test before checking for heat or brightness.

**STEP 3: Fill in the Data Table:**

| Resistor Value | Brightness | Heat Observed? (Yes/No) |
| --- | --- | --- |
| 100Ω | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No |
| 330Ω | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No |
| 1kΩ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | ☐ Yes ☐ No |

**Think & Record:**

What did you learn about resistance and energy in circuits?  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which resistor let the most current flow? How could you tell?  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In a real-world device, why might we want higher or lower resistance?  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Standards Alignment

NGSS:MS-PS3-3 STEL:STEL 1E, STEL 4E, STEL 6F, STEL 8ECCSS: CCSS.MATH.CONTENT.6.SP.B.4, CCSS.MATH.CONTENT.7.RP.A.2A CCSS.MATH.CONTENT.7.EE.B.4