STEM 101
Powered by THE STEM ACADEMY

Name: _____
Period: _____

UNIT: ELECTRICAL CIRCUITS

ENGINEERING OPTIMIZATION CHALLENGE

OBJECTIVE:

Improve one of your circuits to reduce energy loss and increase performance.

MATERIALS:

- ✓ Any previously used circuit
- ✓ Optional: buzzer, motor, second battery
- ✓ Multimeter
- ✓ Stopwatch (for timing response)

STUDENT DIRECTIONS:

Step 1: Choose a Circuit to Improve

1. Pick one of your designs from a previous activity.
2. Identify problems like dim lights, overheating, or low power.

Step 2: Make Modifications

Try one or more of the following:

- Reduce resistance
- Use parallel layout
- Add a more powerful battery
- Add a motor or buzzer for multifunctional output

Test & Record Results:

Change Made	Outcome	Better/Worse?

Name: _____
Period: _____

Reflection Prompts:

- How did your design change improve circuit performance?

  _____

  _____

- What trade-offs did you have to consider (e.g., cost, heat)?

  _____

  _____

Wrap-Up Challenge: Circuit Speedway Blueprint

Create a blueprint for a racing garage system that uses at least **two energy conversions**.

- Label input energy, output energy, components used.
- Optional: Add switches, sensors, or safety features.

Sketch & Describe Below:

_____

_____

_____

_____

_____

STANDARDS ALIGNMENT

NGSS: HS-ETS1-3 **STEL:** STEL 1E, STEL 2E, STEL 3E, STEL 4E, STEL 5E, STEL 6E, STEL 7E **CCSS:** CCSS.MATH.CONTENT.HSN.Q.A.1–3, CCSS.MATH.CONTENT.HSA.CED.A.1, CCSS.MATH.CONTENT.HSA.REI.B.3, CCSS.MATH.PRACTICE.MP2, CCSS.MATH.PRACTICE.MP4, CCSS.MATH.PRACTICE.MP5