UNIT: CIRCUITRY GAME

ACT-Based Math: Power Consumption Analysis

### Here are ACT-aligned math activities for the Build Your Own Circuitry Game that help students apply real-world skills in electrical measurement, formula application, and data interpretation relevant to voltage, current, and resistance in circuit design.

### Objective:

Students calculate power consumption of their game circuit.

MATERIALS NEEDED:

* Power source
* Resistors
* LEDs
* Worksheet

Student Directions:

**Goal:**  
You will measure and calculate the power consumed by your game circuit using the formula **P = V × I**, where:

* **P** = Power (in watts, W)
* **V** = Voltage (in volts, V)
* **I** = Current (in amps, A)

This activity will help you understand how electrical energy is used and how to evaluate circuit efficiency—skills aligned with the **ACT Math standards**.

**STEP 1: Build and Test Your Circuit**

* Use the **Circuitry Game Kit** to assemble a **working circuit** that includes a **power source**, **resistors**, and at least one **LED**.
* Double-check all connections to make sure the LED turns on and the circuit is functioning correctly.

**STEP 2: Measure Voltage and Current**

* Use a **multimeter** to measure:
  + The **voltage (V)** across the power source or the LED.
  + The **current (I)** flowing through the circuit.

*Tip:* Set your multimeter to the correct units. Voltage is measured in volts (V) and current in amps (A or mA).

* **Record both values** accurately on your worksheet.

**STEP 3: Calculate Power Using the Formula**

Use the equation:

**P = V × I**

* Multiply the measured voltage (V) by the current (I) to calculate the **power consumption (P)** in watts (W).
* **Show your work** on your worksheet.  
  Example:

Voltage = 9V, Current = 0.5A  
P = 9 × 0.5 = **4.5W**

**STEP 4: Analyze Your Results**

* Answer the following questions on your worksheet:
  + What is the **total power consumption** of your circuit?
  + Which component(s) likely consume the most power?
  + If you wanted to make the circuit more energy efficient, what changes could you make?

*Extension Challenge:*  
Try using **multiple LEDs** or changing resistor values and recalculate how these changes affect the total power usage.

## ACT-Style Question:

## If an LED circuit operates at **9V** and **0.5A**, what is the power consumption?

## 4.5W

## 9W

## 18W

## 0.5W

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

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

✅ Practice organizing electrical concepts into clear, structured calculations and formulas.  
✅ Strengthen their ability to explain circuit design, Ohm’s Law, and electrical efficiency in mathematical terms.  
✅ Develop problem-solving and analytical reasoning skills using real-world topics like voltage, current, and resistance.

These skills mirror the **ACT Math** requirements—helping students become confident, effective problem-solvers, prepared for college-level math and careers in STEM fields.