**ACT Alignment for Build Your Own Circuitry Game Kit**

**MATHEMATICS – ACT Alignment: Circuit Calculations & Logical Reasoning**

Students apply mathematical reasoning to analyze circuit performance, calculate resistance, and interpret electrical efficiency. Through hands-on activities, they develop problem-solving skills essential for ACT Math, using formulas like Ohm’s Law and power equations to optimize circuitry game designs.

🔹 **ACT Math Rating Scale – Problem Solving & Data Interpretation**

* (16-19) Understanding basic voltage, current, and resistance concepts.
* (20-23) Applying Ohm’s Law in series and parallel circuits.
* (24-27) Analyzing electrical efficiency through calculations.
* (28-32) Interpreting data from circuit performance experiments.
* (33-36) Solving advanced electrical circuit problems.

**📌 Activity 1: Calculating Circuit Resistance**

**Objective:** Students calculate total resistance in series and parallel circuits.  
**Materials Needed:** Circuitry Game Kit, multimeter, resistors, worksheet.  
**Student Task:**

1. Measure resistance values of individual resistors.
2. Calculate total resistance in series and parallel configurations.
3. Compare calculated values to measured values.

**ACT Question Example:**  
A series circuit has a **6Ω** and **4Ω** resistor. What is the total resistance?  
A) 2Ω  
B) 5Ω  
C) 10Ω  
D) 12Ω  
(Correct Answer: C)

**📌 Activity 2: Voltage Drop Experiment**

**Objective:** Students analyze voltage drops across different components.  
**Materials Needed:** Multimeter, resistors, wires, worksheet.  
**Student Task:**

1. Set up a series circuit with different resistors.
2. Measure voltage drop across each resistor.
3. Compare results with theoretical calculations.

**ACT Question Example:**  
If a **12V battery** powers a circuit with two **equal resistors**, what is the voltage drop across each?  
A) 3V  
B) 6V  
C) 12V  
D) 24V  
(Correct Answer: B)

**📌 Activity 3: Power Consumption Analysis**

**Objective:** Students calculate power consumption of their game circuit.  
**Materials Needed:** Power source, resistors, LEDs, worksheet.  
**Student Task:**

1. Measure voltage and current in a completed game circuit.
2. Use **P = VI** to calculate power consumption.
3. Discuss energy efficiency in circuit design.

**ACT Question Example:**  
If an LED circuit operates at **9V** and **0.5A**, what is the power consumption?  
A) 4.5W  
B) 9W  
C) 18W  
D) 0.5W  
(Correct Answer: A)

**SCIENCE – ACT Alignment: Electricity & Circuitry**

Students explore fundamental scientific concepts related to electricity, circuit behavior, and component interactions. Through hands-on experimentation, they analyze electrical current, resistance, and energy transfer while troubleshooting and optimizing circuit performance. These activities align with ACT Science by strengthening data interpretation, hypothesis testing, and analytical reasoning in real-world electrical applications.

🔹 **ACT Science Rating Scale – Experimental & Data Analysis**

* (16-19) Identifying circuit components and their functions.
* (20-23) Understanding electrical energy transfer.
* (24-27) Applying physics principles to circuit performance.
* (28-32) Evaluating experimental results in circuit design.
* (33-36) Troubleshooting and optimizing electrical systems.

**📌 Activity 1: Conductors vs. Insulators Investigation**

**Objective:** Students test materials for conductivity.  
**Materials Needed:** Wires, multimeter, various materials (metal, plastic, rubber).  
**Student Task:**

1. Test different materials for conductivity.
2. Record resistance measurements.
3. Explain how conductors and insulators affect circuits.

**ACT Question Example:**  
Which material is a **good insulator**?  
A) Copper  
B) Glass  
C) Aluminum  
D) Silver  
(Correct Answer: B)

**📌 Activity 2: LED Circuit Brightness Experiment**

**Objective:** Students analyze how resistance affects LED brightness.  
**Materials Needed:** LEDs, resistors, breadboard, worksheet.  
**Student Task:**

1. Build LED circuits with different resistor values.
2. Compare LED brightness at different resistance levels.
3. Explain findings based on current flow.

**ACT Question Example:**  
How does increasing resistance affect LED brightness?  
A) Increases brightness  
B) Decreases brightness  
C) No effect  
D) Random effect  
(Correct Answer: B)

**📌 Activity 3: Buzzer Frequency Analysis**

**Objective:** Students examine how voltage affects buzzer sound frequency.  
**Materials Needed:** Buzzers, power sources, worksheet.  
**Student Task:**

1. Connect buzzers to different voltage levels.
2. Record changes in sound frequency.
3. Analyze results based on circuit behavior.

**ACT Question Example:**  
What happens to buzzer frequency as voltage increases?  
A) Increases  
B) Decreases  
C) No change  
D) Turns off completely  
(Correct Answer: A)

**READING – ACT Alignment: Technical Comprehension & Analysis**

Students strengthen their reading comprehension by analyzing technical documents, schematics, and research articles related to circuit design. They practice identifying key details, comparing information, and making logical inferences—critical skills for ACT Reading. Activities involve interpreting circuit diagrams, synthesizing information from multiple sources, and evaluating cause-and-effect relationships in electronic systems.

🔹 **ACT Reading Rating Scale – Comprehension & Analysis**

* (16-19) Identifying key details in technical texts.
* (20-23) Recognizing main ideas in circuit design.
* (24-27) Evaluating cause-and-effect relationships in electrical circuits.
* (28-32) Analyzing advanced electronic explanations.
* (33-36) Synthesizing information from multiple technical sources.

**📌 Activity 1: Reading Circuit Diagrams**

**Objective:** Students interpret circuit schematics.  
**Materials Needed:** Circuitry game schematics, worksheet.  
**Student Task:**

1. Identify components in circuit diagrams.
2. Explain connections between components.
3. Answer comprehension questions.

**ACT Question Example:**  
What symbol represents a resistor in a circuit diagram?  
A) Zigzag line  
B) Circle  
C) Square  
D) Triangle  
(Correct Answer: A)

**📌 Activity 2: Analyzing a Technical Manual**

**Objective:** Students analyze a technical manual for clarity and accuracy.  
**Materials Needed:** Sample game kit manual, worksheet.  
**Student Task:**

1. Identify key steps in a game circuit assembly guide.
2. Compare written instructions to circuit diagrams.
3. Summarize the key points of the manual.

**ACT Question Example:**  
What is the purpose of a wiring diagram in a technical manual?  
A) To provide an artistic representation of components  
B) To show the logical flow of electricity  
C) To list all required tools  
D) To replace written instructions  
(Correct Answer: B)

**📌 Activity 3: Troubleshooting Guide Evaluation**

**Objective:** Students evaluate troubleshooting guides for common circuit issues.  
**Materials Needed:** Sample troubleshooting guides, worksheet.  
**Student Task:**

1. Read troubleshooting steps for a circuit that won’t power on.
2. Identify the most effective solution.
3. Explain the reasoning behind the chosen solution.

**ACT Question Example:**  
If an LED does not turn on in a circuit, what should you check first?  
A) The brightness level  
B) The polarity and connections  
C) The room temperature  
D) The size of the LED  
(Correct Answer: B)

**ENGLISH – ACT Alignment: Grammar & Technical Writing**

Students develop their grammar, sentence structure, and technical writing skills by analyzing and revising instructions, descriptions, and explanations for their circuitry game. They practice organizing ideas logically, enhancing clarity, and improving sentence mechanics—key competencies in ACT English. Activities focus on editing, sentence cohesion, and clarity in technical writing.

🔹 **ACT English Rating Scale – Sentence Structure & Clarity**

* (16-19) Identifying and correcting sentence structure errors.
* (20-23) Revising unclear or redundant technical descriptions.
* (24-27) Improving conciseness and coherence in instructions.
* (28-32) Refining advanced technical writing for precision.
* (33-36) Enhancing logical flow and argumentation in technical reports.

**📌 Activity 1: Editing Circuitry Instructions**

**Objective:** Students refine unclear or incorrect game assembly instructions.  
**Materials Needed:** Sample game assembly instructions, editing checklist, worksheet.  
**Student Task:**

1. Identify unclear or incorrect steps in a set of instructions.
2. Rewrite steps for clarity and conciseness.
3. Justify changes using ACT writing principles.

**ACT Question Example:**  
Which revision best improves the clarity of this instruction?  
A) "Connect wire to power before adding other parts."  
B) "Ensure power is connected before assembling the remaining components."  
C) "Hook up the circuit, then do the rest of the work."  
D) "Attach things in order for better function."  
(Correct Answer: B)

**📌 Activity 2: Jumbled Circuit Descriptions**

**Objective:** Students rearrange mixed-up technical descriptions for logical flow.  
**Materials Needed:** Jumbled sentences about circuitry, worksheet.  
**Student Task:**

1. Organize sentences to form a clear and logical description.
2. Identify transitional words that improve coherence.
3. Compare their work with a correctly structured version.

**Jumbled Sentences**

 **in / circuit / flows / current / a / closed / only**  
→ (Correct answer: Current flows only in a closed circuit.)

 **resistors / the / electric / reduce / flow / of / current**  
→ (Correct answer: Resistors reduce the flow of electric current.)

 **pathways / electricity / multiple / circuits / travel / in / parallel / has**  
→ (Correct answer: Parallel circuits have multiple pathways for electricity to travel.)

 **a / device / LED / emits / when / forward-biased / light**  
→ (Correct answer: An LED emits light when forward-biased.)

 **power / connected / is / the / game / before / the / ensure**  
→ (Correct answer: Ensure the game is connected to power before use.)

**ACT Question Example:**  
Which sentence logically follows: "A resistor limits current in a circuit."  
A) "The circuit is complete when the power is turned off."  
B) "It prevents components from overheating due to excessive current."  
C) "Parallel circuits share the same voltage."  
D) "Electrical engineers use software to simulate circuits."  
(Correct Answer: B)

**📌 Activity 3: Writing a Game Circuit Troubleshooting Guide**

**Objective:** Students draft a troubleshooting guide for common circuitry game issues.  
**Materials Needed:** Circuitry troubleshooting scenarios, worksheet.  
**Student Task:**

1. Identify common problems and solutions.
2. Write step-by-step troubleshooting instructions.
3. Peer-review for clarity and accuracy.

**ACT Question Example:**  
What is the most precise way to describe a loose connection issue?  
A) "Your game might not work right."  
B) "A loose wire may prevent current from flowing, causing the game to malfunction."  
C) "Check if your wires are where they should be."  
D) "Sometimes things just stop working."  
(Correct Answer: B)