UNIT: circuitry game

TRIGGER THE GATE- GAME MECHANISM DESIGN

Your Mission:

You’ll explore **how mechanical actions (like pressing, tilting, or pulling)** can complete an electrical circuit—and convert **mechanical energy into electrical energy**.

Focus: Mechanical-to-Electrical Energy Conversion & Circuit Control Using Switches

Materials:

* Battery (coin cell or 9V)
* Buzzer or LED light
* Wires or copper tape
* Paperclips, magnets, sponges, rubber bands, cardboard
* Aluminum foil, foam, ball bearing, tape, scissors
* Optional: Reed switch or small motor

STUDENT DIRECTIONS:

**STEP 1: Explore Switch Options**

**Pick one or more designs to build:**

* Pressure Plate Switch: Layer foil and sponge so the circuit closes when pressed.
* Tilt Switch: Create a simple seesaw or pathway with a metal ball or paperclip that bridges a circuit when tilted.
* Magnetic Switch: Use a magnet and a metal paperclip or reed switch to create contact.

**STEP 2: Build and Test Your Switch**

* Connect your battery, switch, and buzzer/light in a simple circuit.
* When the switch is triggered, your output device (light or buzzer) should turn on.
* Troubleshoot as needed: Is the connection tight? Does the circuit close completely?

**STEP 3: Incorporate into a Game Mechanism**

* Imagine this switch is part of an escape room puzzle.
* Mount it onto a board or inside a box.
* Think: How does a player *trigger* the circuit? Is it fun and challenging?

**Record Your Results:**

| **Switch Type Tried** | **Did It Work? (Y/N)** | **Easy to Use? (✔/✘)** | **Notes or Observations** |
| --- | --- | --- | --- |
| Pressure Plate |  |  |  |
| Tilt Switch |  |  |  |
| Magnetic Switch |  |  |  |

**Analysis Questions:**

What kind of energy conversion occurred in your system?  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What was the most reliable switch design and why?  
→ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
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**Design Tip:**

Think like an engineer! The best switch is not just cool—it’s **reliable**, **reproducible**, and **safe** for others to use in your game setup.

Standards Alignment

NGSS: HS-PS3-3 STEL: STEL 1H, **STEL 4J**, **STEL 5H**, STEL 8H, **STEL 9I** CCSS: CCSS.MATH.CONTENT.HSN.Q.A.1, CCSS.MATH.CONTENT.HSS-IC.B.6, CCSS.MATH.CONTENT. **HSG-MG.A.3,** CCSS.MATH.CONTENT. **HSS-ID.A.1**