

## Student Worksheet

### Ultimate Transistor Design Challenge: Guided Inquiry

#### Safety

Hot glue guns can burn. Scissors can cut. Use them with care.

**Introduction:** The secret is out! Because of the high demand for electronics, the Earth's supply of transistor materials, titanium and chromium, has run out! The world's richest computer companies are offering huge rewards to the team of scientists that can build a working circuit of transistors out of everyday objects. Do you have what it takes to turn a pile of household clutter into a mechanical marvel?

*Warm-up! Write down ideas from the class discussion...*

1. Write or draw 3 ideas about transistors.
  - a.
  - b.
  - c.
  
2. What can be changed in a transistor model to produce different effects in flow rate?
  - a.
  - b.
  - c.
  - d.

## Materials

- plastic cup
- styrofoam cup
- paper
- water bottle
- paper towel tube
- toilet paper tube
- poster tube
- paper plate
- balloon
- plastic wrap
- aluminum foil
- soda bottle cap
- Gatorade bottle cap
- play-dough
- Elmer's glue
- hot glue gun with glue
- clear tape
- masking tape
- scissors
- sprinkles
- large cardboard square
- student worksheet
- cardboard
- rubber stopper
- bendy straw
- popsicle sticks
- pipe cleaner
- wire
- pencils

**Challenge: Can your group build model transistors that trigger each other in a circuit?**

**Make a Design:** With your team of scientists, devise a plan of action! In the box on the left, circle the materials you intend to use. Then, in the space below, explain how you will use them. Draw a diagram of your model in the space below and label its parts before you begin to build. Once your design is completed, you will demonstrate and explain it to the class.

### Transistor Design:

Material	Explanation	Schematic

**Record Your Observations:**

1. What is going on? During the construction process, record 3 intriguing observations:

a.

b.

c.

2. Sketch your device. Label the *source*, *drain*, *gate*, and any other parts that allow your model transistor to function.

### **Analyze the Results:**

What types of design problems did your group run into? Explain how you fixed these issues.

1. Problem:

Solution:

2. Problem:

Solution:

### **Draw Conclusions:**

*After all teams have presented their transistors, answer the following questions:*

1. Name one aspect of the transistor design that was similar for all the teams. Why might this be so?

