

BUZZ WIRE

Students will learn about the electric circuit and will create their own buzz wire game (*like the well-known board game that requires a steady hand* 😊).

MATERIALS

From Your Kit:

- Wood block
- Battery holder (with switch)
- Buzzer
- Bare copper wire
- Insulated wire
- Wire wand (with loop)
- AA Batteries

From Your House:

- Electrical Tape (*other tape will work*)
- Glue (*optional*)

LESSON

Find a light switch in your house and flip the switch. What happened? I'm guessing that the lights either turned ON (*if they were off*) or OFF (*if they were on*). Why does that happen? Is there a magic elf inside the wall that controls the light when you flip the switch? Of course not. The switch actually controls the **ELECTRICITY** that is running to the light. So, what is electricity? Electricity is a form of energy that can power things. We use electricity for lights, phones, TVs, computers, and so much more!

Electricity is not able to go wherever it wants to. When electricity travels from one place to another there must be a **CIRCUIT**. What is a circuit? A circuit is a closed path or loop around which electricity flows (*a CIRCUIT kind of sounds like a CIRCLE*). A circuit is usually made by linking electrical components together with pieces of wire cable.

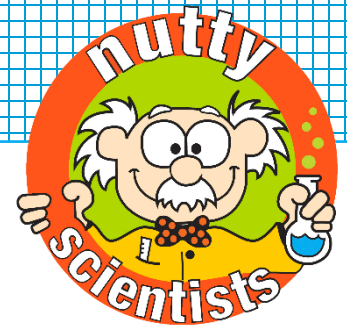
Today we are going to explore a little bit about electricity and circuits with an exciting invention called **BUZZ WIRE**.

WHAT IS BUZZ WIRE???

Buzz wire is a challenging and competitive game. The object of the game is to carefully move the wire wand loop along the copper wire "maze" without touching it. When the loop touches the wire, you will hear a "BUZZ". The goal is to be fast and at the same time to be efficient, having the least amount of touches. A mix of speed and skill!

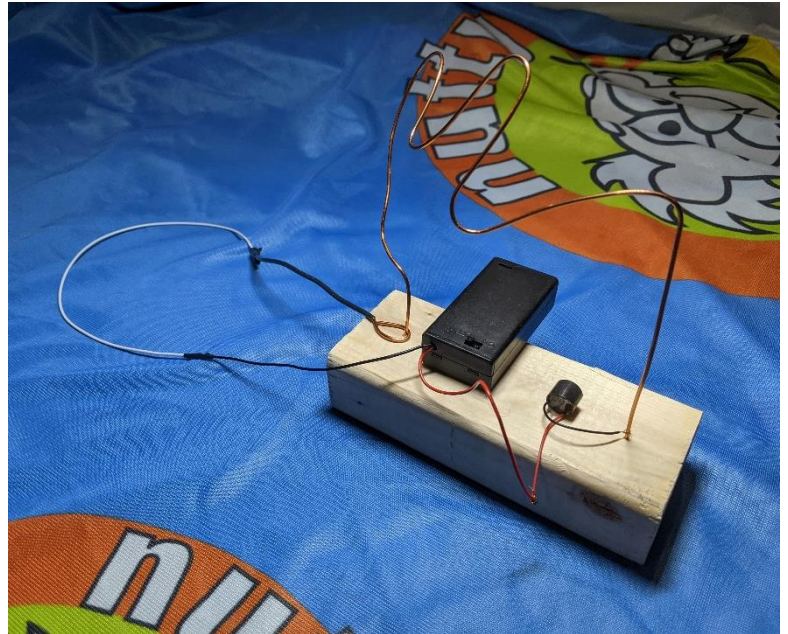
BUILD THE BUZZ WIRE

Before we talk about how the Buzz Wire works, let's build it so it is easier to understand. You will need all of the supplies from your kit along with some creativity. Here are the steps:



STEPS TO BUILD BUZZ WIRE

- 1) Take the block of wood from your kit and place it on a flat surface with the holes facing up
- 2) Attach the battery pack to the block of wood with glue or tape (**Don't cover the holes!**) – (Fig. 1)
- 3) Connect the red wire on the battery pack to the red wire on the Buzzer by twisting the exposed ends of the wires together. You can secure the connections by wrapping them with tape. (Fig. 1)
- 4) Attach the buzzer to the block of wood. Make sure that the black wire from the buzzer can reach one of the holes on the block of wood (Fig. 1)
- 5) Connect the black wire from the battery pack to one end of the colored wire in your kit (*twist and tape*) (Fig. 2)
- 6) Connect the other end of the colored wire to the straight end of the wand with the loop. This connection is more difficult because the wire in the wand is so stiff. Wrap the copper wire from the colored wire around the exposed end of the wand, then tape the connection (*this is very important*) (Fig. 2)
- 7) Take the bare copper wire from the kit and tuck one edge of it into one of the holes on the wood block (Fig. 1)
- 8) Bend and shape the wire and tuck the opposite end of the wire into the other hole on the wood block (*Be creative, you can bend the wire however you want to*) - (Fig. 2)
- 9) Wrap the black wire from the buzzer around the bottom of one of the sides of the bent copper wire (Fig. 1)
- 10) Gently pull the other end of the bent copper wire out of its hole (*temporarily*)
- 11) Feed the loop of the wand onto the free end of the bent copper wire then put the wire back into the hole (*this traps the loop on the bent copper wire*) - (Fig. 2)



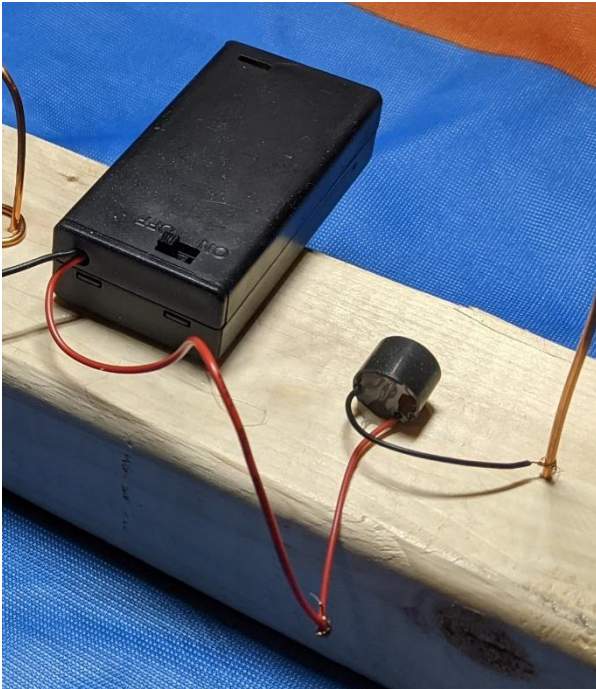
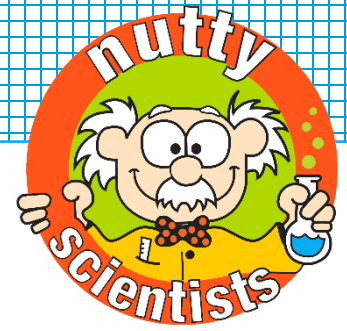


FIGURE 1

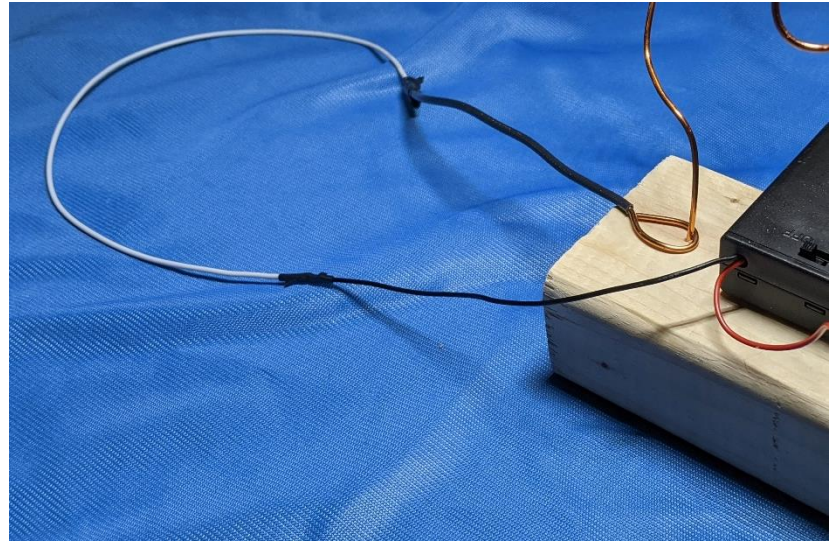
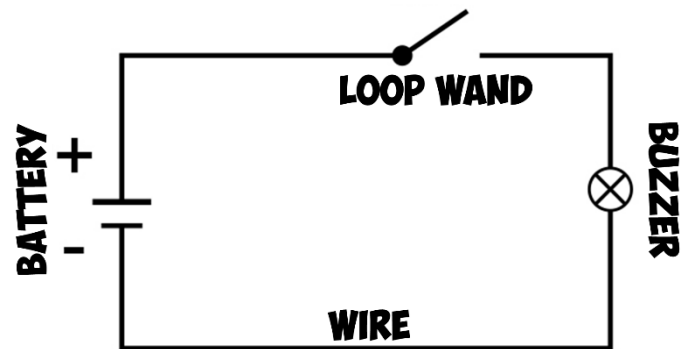


FIGURE 2

HOW DOES THE BUZZ WIRE WORK?

As we learned earlier, **ELECTRICITY** needs a **CIRCUIT** in order to travel. In our buzz wire, the electricity starts from the battery (*stored energy*). That starts with turning on the switch, but that isn't enough. The electricity in the battery can only travel if there is a complete loop back to the other side of the battery. You can see a simple circuit diagram to the right.



As you will see (*and hear*), the loop wand is a very important part of our circuit. When the loop touches the bent copper wire, it completes the circuit and the electricity flows (*causing the buzzer to sound*). However, if the loop **DOES NOT TOUCH** the bent copper wire, the circuit is not closed and we don't hear any sound. The Buzz wire is a big electrical circuit!

NUTTY CHALLENGES

- **Nutty Challenge #1:** Time yourself and see how long it takes you to move the loop all the way across the bent wire (*buzzing is ok for this round*)
- **Nutty Challenge #2:** Time yourself again. This time, every time it buzzes, add 5 seconds to your time!
- **Nutty Challenge #3:** See if you can move the loop all the way across the bent wire with **NO BUZZ!**