

Stretch the Chain and See the Light

Use your strength to light a light bulb!

Materials

- Christmas tree bulb cut from a string of lights -- leave a few inches of wire on the two leads from the bulb when you cut it from the string -- you can use a flashlight bulb and socket, but the Christmas tree bulb is far cheaper
- approximately 3 ft of hookup wire -- # 22 solid copper wire works well, or you can use Radio Shack pre-wired alligator clip leads
- battery – AA
- 2 paper clips – regular size (#1)
- 2 finishing nails – 2 1/2 inches long
- wirestripper
- tape – for taping paper clips to battery
- 18 - 24 inches of steel chain – any size link seems to work – you can experiment to find the chain whose appearance, performance and cost best suits your intended use (e.g., if you want lots of chain for individual student lab use, price might be a factor – if you want sturdier chain for demo purposes, bigger links might be more visible and dramatic – comparing different chains is actually a potential student lab activity)

Assembly

Strip wires as necessary, and use the items above to assemble the simple series circuit shown in Figures 1 - 3.

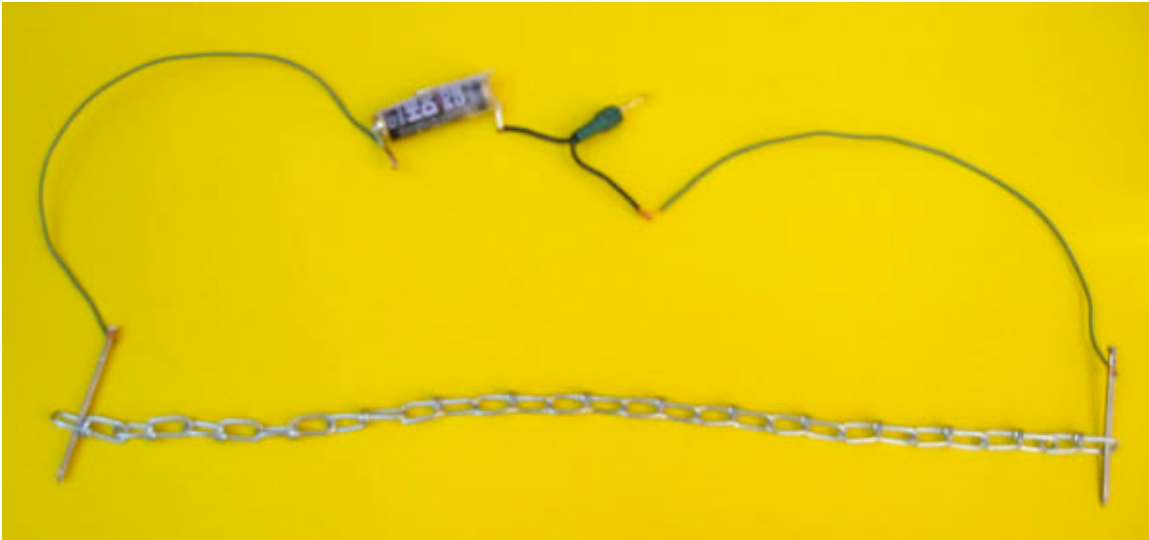


Figure 1



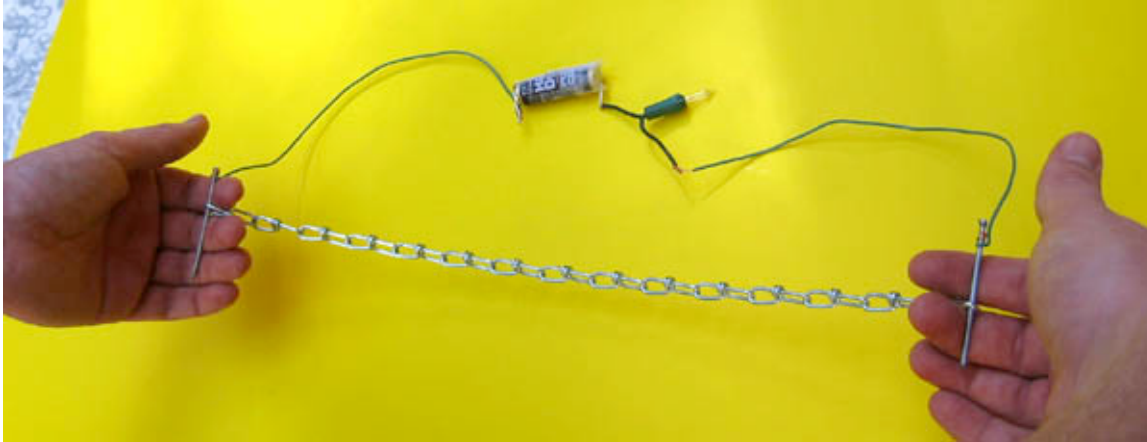
Figure 2



Figure 3

To Do and Notice

1. Notice that for the circuit as assembled above, the bulb will probably not light (or if it lights, it will probably not be very bright).
2. Place your fingers around the nails so that you can use them as holders to stretch the chain (see Figure 4). When you stretch the chain, the bulb should light. Possibly you will find brightness related to the strength with which you stretch the chain.



What's Going On?

As you stretch the chain tight, the links make better electrical contact, decreasing the electrical resistance. This allows the current to increase, and the bulb gets brighter.

Going Further

Compare different lengths of chain. What happens when you use a fairly long piece of chain?

Credit

I was introduced to this activity when it was demonstrated by Dean Baird at the spring meeting of the Northern California-Nevada section of the American Association of Physics Teachers (AAPT) in March, 2004.