



Which Materials are the Best Conductors?

https://www.sciencebuddies.org/science-fair-projects/project-ideas/Elec_p018/electricity-electronics/conductors-insulators-basic-circuit

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Last edit date: 2018-04-26

Experimental Procedure

1. Watch this video for an introduction to your Basic Circuits Kit.

Setup instructions for your Basic Circuits Kit.

<https://www.youtube.com/watch?v=7KXkjoJr8kU> (<https://www.youtube.com/watch?v=7KXkjoJr8kU>)

2. Set up your test circuit, as shown in Figure 4.
 - a. Insert three AA batteries into the battery holder (your kit comes with one extra battery). Make sure the "+" symbols on the batteries line up with the "+" symbols inside the battery holder.
 - b. Connect a red alligator clip to the exposed metal part of the red wire from battery holder (in electronics, red wires are usually used for the "positive" connection).
 - c. Connect a black alligator clip to the exposed metal part of the black wire from the battery holder (in electronics, black wires are usually used for the "negative" connection).
 - d. Attach the other end of the black alligator clip to one of the screws on the lightbulb holder. If necessary, use a small Phillips head screwdriver to loosen the screw slightly so it is easier to clip to.
 - e. Screw the lightbulb into the bulb holder.
 - f. Attach one end of the green alligator clip to the other screw on the bulb holder.
 - g. You will connect your test materials to the free ends of the red and green alligator clips.
 - h. Test your circuit by touching the exposed metal ends of the red and green alligator clips together. This creates a closed circuit and your lightbulb should light up. If it does not light up, then check the following:
 - i. Make sure the lightbulb is screwed tightly into the base.
 - ii. Make sure none of your alligator clip connections are loose.
 - iii. Make sure none of your batteries are backwards.
 - i. **Important:** throughout the project, only connect the lightbulb for long enough to assess its brightness, then disconnect it when not in use. Leaving the lightbulb connected for a long time can cause it to burn out prematurely.



Figure 4. The test circuit for this experiment. The twist ties are not required, but they can help keep your circuit neat by bundling up the alligator clip leads.

3. Make a data table like Table 1 in your lab notebook.

Material	Lightbulb (On or Off?)	Conductor or Insulator?

Table 1. Example data table.

4. Gather the different household materials and objects you will test. Write their names down in the first column of your data table.
5. Take your first object and connect opposite sides of it to the free ends of the red and green alligator clips.
 - a. If possible, you should "clip" the alligator clips to the objects. This is easy for some objects, like a sheet of paper or aluminum foil; however, it might be difficult for rounded or larger objects, like a coffee mug or a basketball. For larger objects, you can firmly press the metal ends of the alligator clips up against the object to do your tests. See Figure 5.

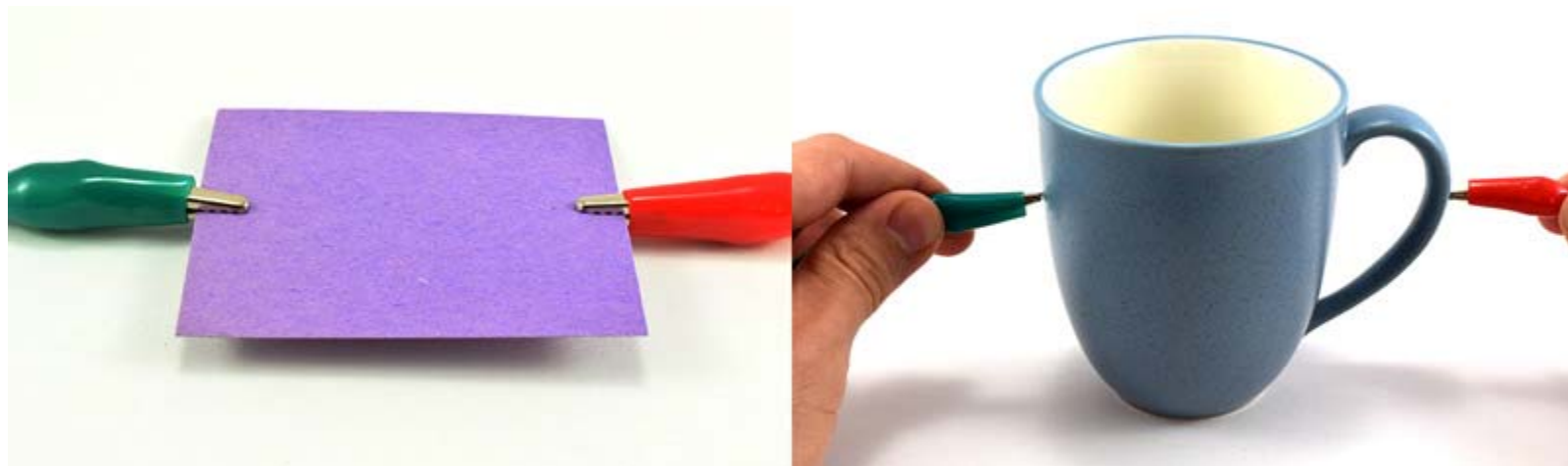


Figure 5. To test small or narrow objects, you should clip them in between the alligator clips (left). For larger objects, firmly press the metal ends of the alligator clips against them (right).

6. Observe whether or not the lightbulb lights up. Record your observation for that material in your data table. Remember to disconnect the material from your circuit as soon as you are done testing it. This will prolong the life of your lightbulb.
7. Now determine whether the material is a conductor or an insulator. Record your result in your data table. *Hint:* Look back to the [Introduction](#) (#background) for the definitions of conductor and insulator. Which one allows electricity to flow, and which one does not?

8. Repeat steps 4–7 for each of your additional test materials.
9. Analyze your results. What types of materials (for example, wood, plastic, metal, rubber) are the objects you tested made out of? Which ones caused the lightbulb to turn on? Does this match what you predicted based on your background research about what types of materials are conductors and insulators?

Frequently Asked Questions (FAQ)

FAQ for this Project Idea available online at https://www.sciencebuddies.org/science-fair-projects/project-ideas/Elec_p018/electricity-electronics/conductors-insulators-basic-circuit#help (http://www.sciencebuddies.org/science-fair-projects/project-ideas/Elec_p018/electricity-electronics/conductors-insulators-basic-circuit#help).