

RAFT IDEAS

Topics: Electricity,
Parallel & Series Circuits

Materials List

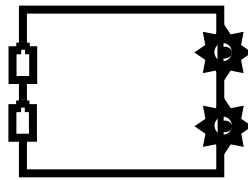
- ✓ Rubber steel sheet (white)
- ✓ Full –page labels
- ✓ Flexible magnet sheet, light color such as gray
- ✓ Matte board or other stiff material, 13 cm x 17+ cm (5" x 6½")
- ✓ Adhesive to attach rubber steel to matte board
- ✓ Access to a paper cutter and/or scissors
- ✓ Small bags (for storage of pieces)
- ✓ Optional: access to a laminator

This Activity can be used to teach:

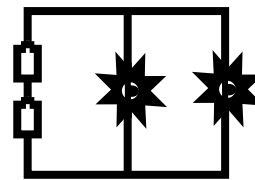
- Energy can be transferred from place to place and converted from one form to another (Next Generation Science Standards, Grade 4, Physical Science 3-2 & 3-4)
- Engineering Practices (Next Generation Science Standards: Grades 4-8)



Make-a-Circuit



Series circuit



Parallel circuit

These materials will greatly aid students in designing basic electrical circuits. Open (off) and closed (on) circuits can be modeled with the lit and unlit symbols.

Assembly (The full-page labels could be **laminated before mounting**, if desired.)

1. Trim the sheet of symbols on the outer thin lines to create a 25 cm x 20 cm (10" x 8") section.
2. Peel part of the backing and align the 25 cm (10") side of the page of adhesive symbols with the 25cm side of the colored **magnet** sheet. Peel backing and apply.
3. Trim the excess magnet sheet. Cut into 4 sections with matching sets of symbols.
4. Take a symbol section, cut apart the symbols, and put all the pieces in a separate bag. Repeat with the other 3 sections, creating 4 bags of symbols.
5. Cut the 4 rectangles apart to make 10 cm x 14 cm (4" x 5½") sections. Peel the backing, align and apply to 13 cm x 15 cm (5" x 6") **rubber steel** sections, in the upper left corner. The extra space on the bottom and right side can hold symbols that are not being used.
6. Cut matte board into sections of 13 cm x 17 cm (5" x 6½") or longer.
7. Adhere each rubber steel section to the matte board or other stiff surface.

To Do and Notice

Have the students create different types of circuits using the symbols and rectangle.

- 2 bulbs in series, 2 bulbs in parallel
- 2 bulbs in parallel that in turn are in series with a third bulb
- 2 bulbs in series that in turn are in parallel with a third bulb
- 2 batteries in series, 2 bulbs in series; 2 batteries in series, 2 bulbs in parallel
- 2 batteries in parallel, 2 bulbs in series; 2 batteries in parallel, 2 bulbs in parallel

If this activity precedes work with an actual circuit, have students predict the relative brightness of the bulbs in the different circuits. What will happen when one bulb burns out in a series circuit or in a parallel circuit? Build the circuits and see! After students build the circuits the symbols can be used for reinforcement or testing.

The Science Behind the Activity

A closed circuit requires a continuous path of conducting material going from one contact of a battery (or other power source) to the other contact. An open circuit will have a break or gap in the circuit. A closable gap is a switch, which can open or close the circuit as desired by the user. In a series circuit a burned out bulb creates a gap in the continuous path and stops the flow of electrons in the circuit. A burned out bulb in a parallel circuit will not break the flow of electrons in the other part(s) of the circuit.

Taking it Further

The symbols for the 3 way switch can be used to model more advanced circuits such as the light in a hall that is controlled by 2 switches.

Web Resources (Visit www.raft.net/raft-idea?isid=207 for more resources!)

