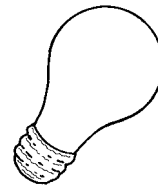

Inventing Circuits



Topic: Electric circuits

Objective: Students will apply what they have learned about circuits and develop combinations of them to increase their understanding of how they work.

Materials:

copy of the worksheet *Will the Circuit Work?* (page 35) for each student

Each Group Will Need the Following:

- 8 wires
- 2 batteries
- 2 battery holders
- 4 sockets
- 4 bulbs

Procedure:

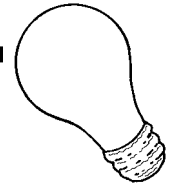
- Give students worksheets and have them predict if the circuits will or will not work.
- Distribute the materials to each student and then divide students into groups of three.
- Let each group use their equipment to see how to find a way to make the circuits work which would not light the bulbs.

For Discussion:

Have students compare their worksheets to show their answers and how they corrected the circuits that would not work. Check them for accuracy.

Follow Up:

- After students have completed the worksheet, have them do the “Challenge” by inventing their own circuits. They should draw them on the backs of the worksheets and identify them as parallel or series circuits.
- Have each group show their circuit invention.

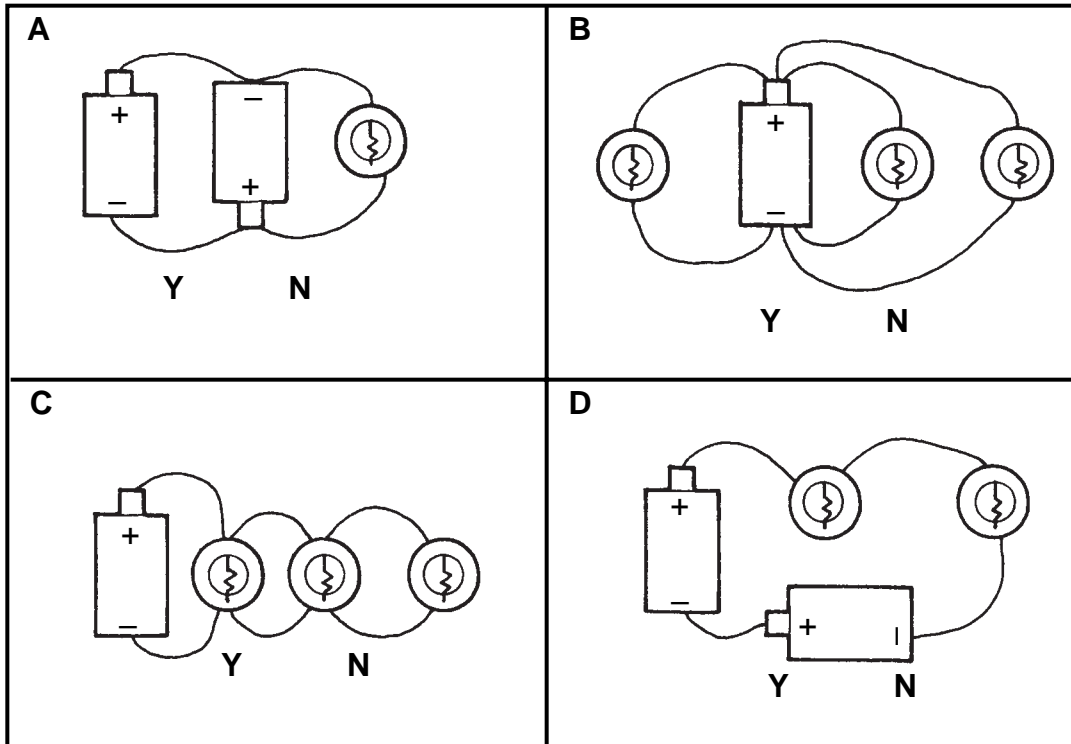


Inventing Circuits (cont.)

Will the Circuit Work?

To the Students: Look at the circuits below carefully to decide if you think the light bulbs will light up or not.

1. Circle **Y** if you think the circuit will work or **N** if you think it will not.



2. Construct each circuit and check your answers.
3. Write the letter(s) of those circuit(s) where your prediction was wrong. _____
4. Which circuit did not work? _____ Why? _____

Work with the batteries and light bulb to make the circuit work. Describe what you had to do to get the circuit to work. _____

Inventing Circuits *(cont.)*



Will the Circuit Work? *(cont.)*

5. Find the circuits which are parallel and write their letter(s)._____
6. Find the circuits which are series and write their letter(s)._____
7. Check your answers for #5 and #6 by constructing the circuits and unscrewing one bulb.
Remember that in a series, if one bulb is out, none of the others will light. If the circuit is parallel, all bulbs will still light up even if one is out.

Challenge: Use the batteries, wires, sockets, and bulbs to invent a circuit which you have not ever built. Draw the circuit you invented below in the box and tell if it is a parallel or series, or a combination of these.

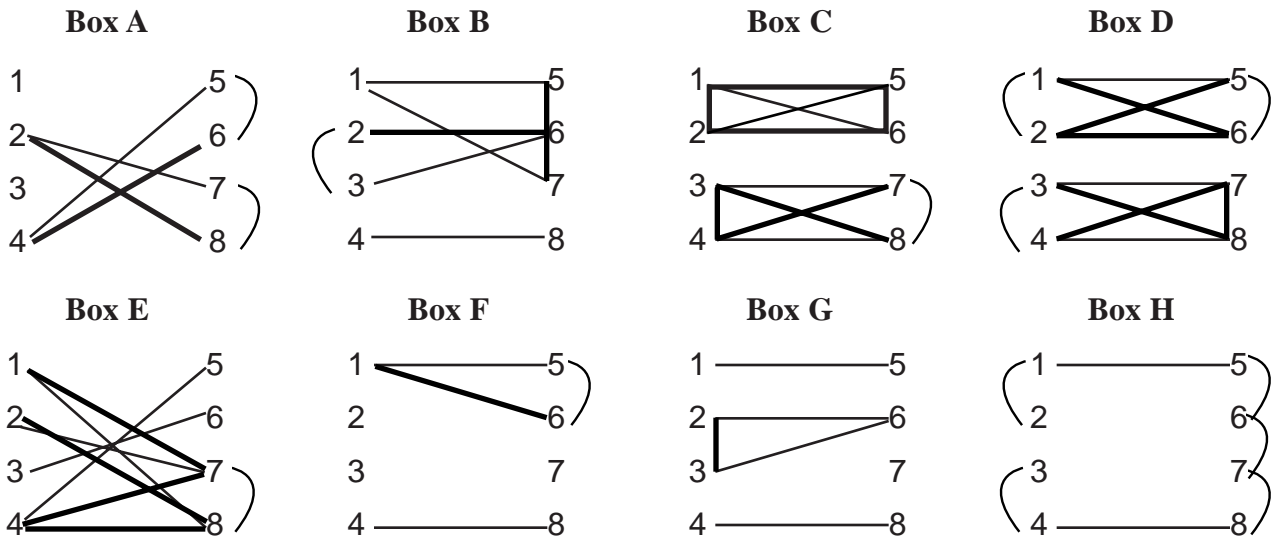
Answer Key *(cont.)*

Will the Circuit Work? (pages 35 and 36)

- 1–4. Circuit A does not work; circuits B, C, and D will work. Electricity looks for the shortest path, which in circuit A is between the two batteries. This is called a short circuit, and electricity never flows through the bulbs. To correct this, one battery can be removed or turned around. When the batteries are linked in this way, the bulb will light but not burn any more brightly with two batteries. Electricity flows from battery to battery and then to the light bulb without giving the full power of two batteries.
5. Circuits B and C are parallel.
6. Circuit D is a series.

Mystery Connections Record (page 41)

The lighter lines are the actual wires which should appear on the record of the connections students make. The dark lines in the diagrams show possible connecting lines students will show on their record sheets but which are not actual wires. All of the lines for each box show the way electricity can flow to make the connections between the brads.



Pilot Alphabet (page 76)

- This is Alpha Romeo 1 7 6 = This is plane AR176
- This is Zulu Charlie 3 4 5 = This is plane ZC345
- Take taxiway papa = Take taxiway P
- Take taxiway Hotel = Take taxiway H