

Name: _____

Skill Sheet 9-B

Open and Closed Circuits



As you know, a circuit is a path for electric current. Electric current can move only through a closed circuit. A closed circuit provides a complete path with no breaks so that the current may travel out of and back to the power source. For this reason, the closed circuit is also known as a complete circuit.

An open circuit, on the other hand, has a break in it. No current flows and we say that the circuit is incomplete.

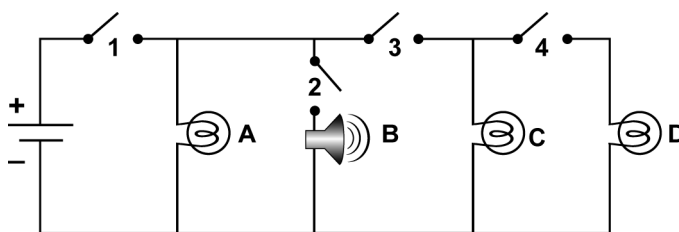
A familiar example of a closed and open circuit occurs when you turn a light switch on and off. When the switch is turned on, it closes the circuit and the lamp lights up. When the switch is turned off, the circuit is opened, and, therefore, the lamp turns off.

Open and closed circuits can be found in both series and parallel circuits. However, in a series circuit, it takes only one break in the current's path to open the entire circuit. This is because there is only one path for the current to flow. However, since a parallel circuit has more than one path for the electric current, a break in one path of the circuit may open that path but not the others.

Solving problems

It is now time for you to test your knowledge of open and closed circuits in both series and parallel. You will use the circuit diagrams pictured below to answer the questions. You may wish to write on the diagrams in order to keep track where the current is flowing. As a result, each diagram is repeated several times.

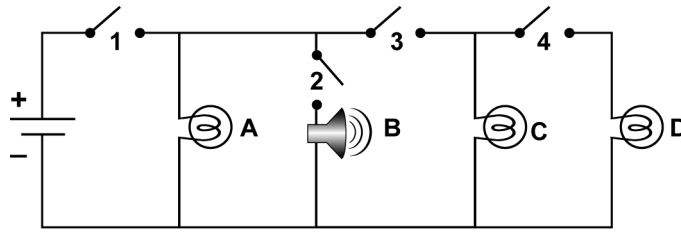
1. Which devices (A, B, C, or D) in the circuit pictured below will be *on* when the following conditions are met? For your answer, give the letter of the device or devices.



- a. Switch 3 is open, and all other switches are closed.

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- b. Switch 2 is open, and all other switches are closed.

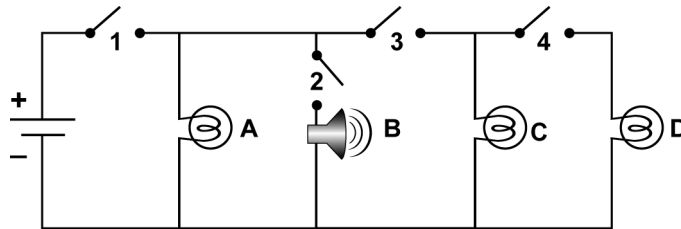
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- c. Switch 4 is open, and all other switches are closed.
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d. Switch 1 is open, and all other switches are closed.

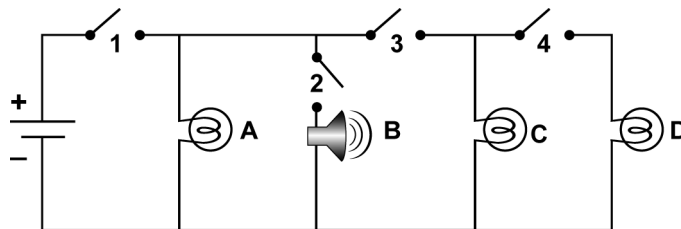
e. Bulb C blows out, and all switches are closed.

f. Bulb A blows out, and all switches are closed.



g. Switches 2 and 4 are open, and switches 1 and 3 are closed.

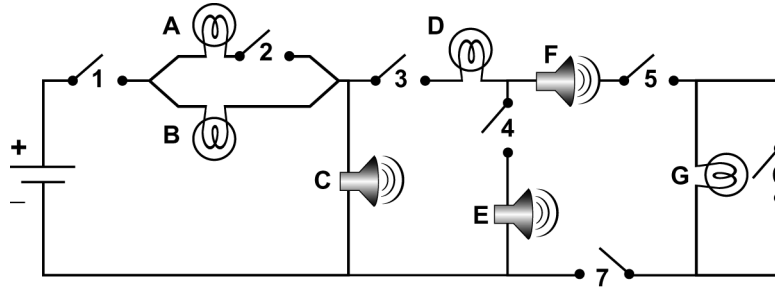
h. Switches 2 and 3 are open, and switches 1 and 4 are closed.



i. Switches 2, 3, and 4 are open, and switch 1 is closed.

j. Switches 1 and 2 are open, and switches 3 and 4 are closed.

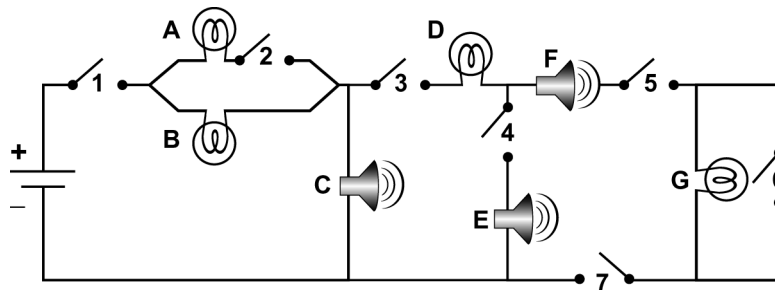
2. Which of the devices (A-G) in the circuit below will be *on* when the following conditions are met? For your answer, give the letter of the device or devices.



a. Switch 5 is open, and all other switches are closed.

b. Switch 6 is open, and all others are closed.

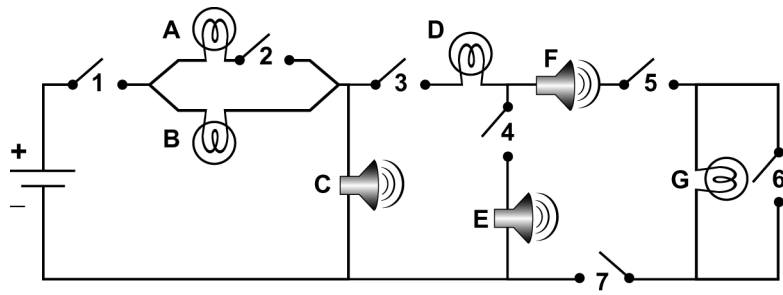
c. Switch 7 is open, and all others are closed.



d. Switch 4 is open, and all others are closed.

e. Switch 3 is open, and all others are closed.

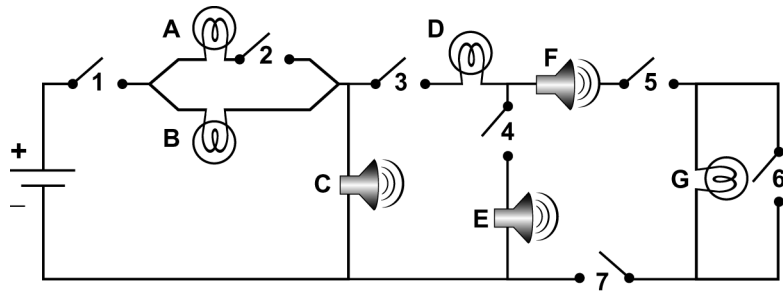
f. Switch 2 is open, and all others are closed.



g. Switch 1 is open, and all others are closed.

h. Switches 2 and 4 are open, and all others are closed.

i. Switches 4 and 6 are open, and all others are closed.

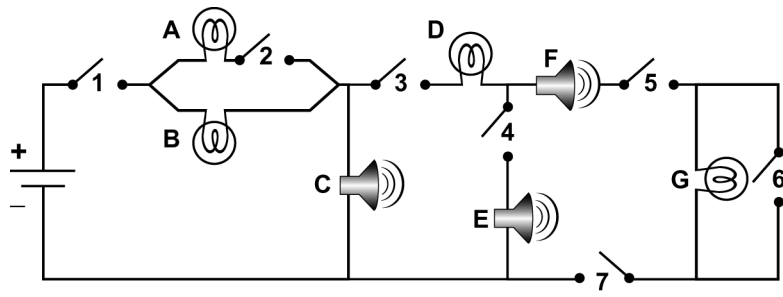


j. Switches 4 and 7 are open, and all others are closed.

k. Switches 5 and 7 are open, and all others are closed.

l. Switches 2 and 3 are open, and all others are closed.

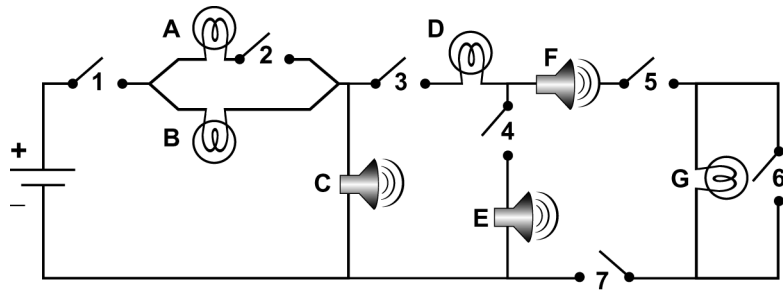
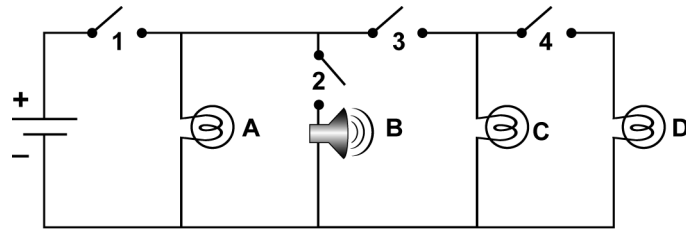
m. Bulb D blows out with all switches closed.



n. Bulbs A and B blow out with all switches closed.

o. Bulbs A and D blow out with all switches closed.

3. Use arrows to draw the direction of the current in each of the circuits below. Make sure to show current direction in all paths of the circuits within each diagram.



4. How many possible paths are there in circuit diagrams in questions (1) and (2)?

5. Draw a circuit of your own. Use one battery, show at least 4 devices (bulbs and bells), and use both parallel and series branches with switches in each. Finally, use arrows to show the direction of the current in all parts of your circuit.