

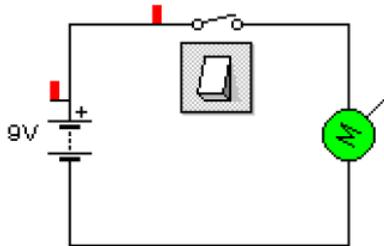
## UNIT 10: ELECTRICAL CIRCUITS

### PRACTICES OF ELECTRICITY WITH CROCODILE CLIPS

The following circuits are drawn with the program Crocodile Clips, so the symbols are a little different from the ones we studied in class.

*Answer the following questions in your notebook (it is not necessary to copy the questions or the circuits, since you are going to keep this paper).*

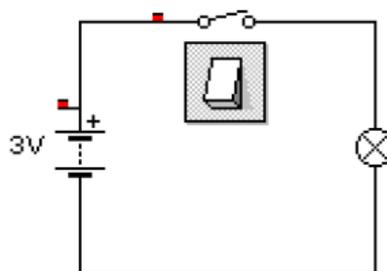
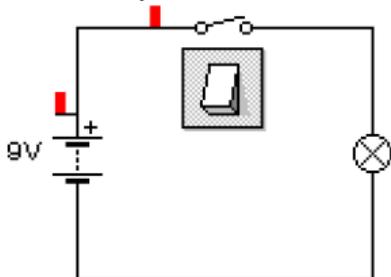
1. In the following circuit:



- a. What are the elements in the circuit?
- b. What type of element is each of them (power source, conductor, control element or load)?
- c. Is the motor working right now?
- d. Why?
- e. Is the motor working when we change the position of the switch?
- f. Why?

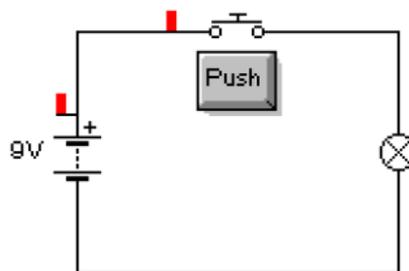
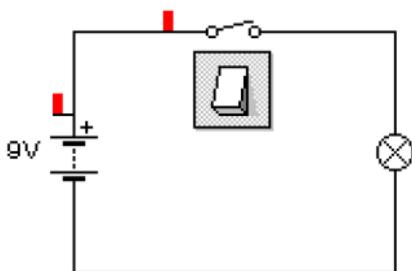
2.

- a. What is the difference between the two circuits?
- b. Do you think the bulb is going to work differently in each circuit?
- c. Why?



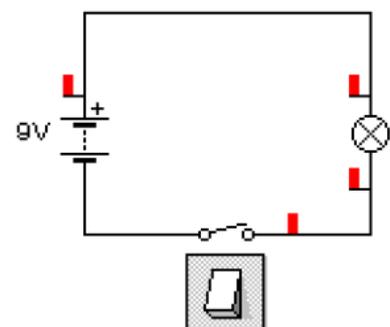
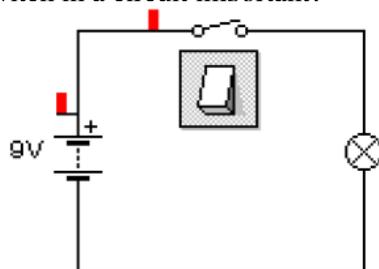
3.

- a. What elements are different in the following circuits?
- b. What is the difference in the way these two elements work?

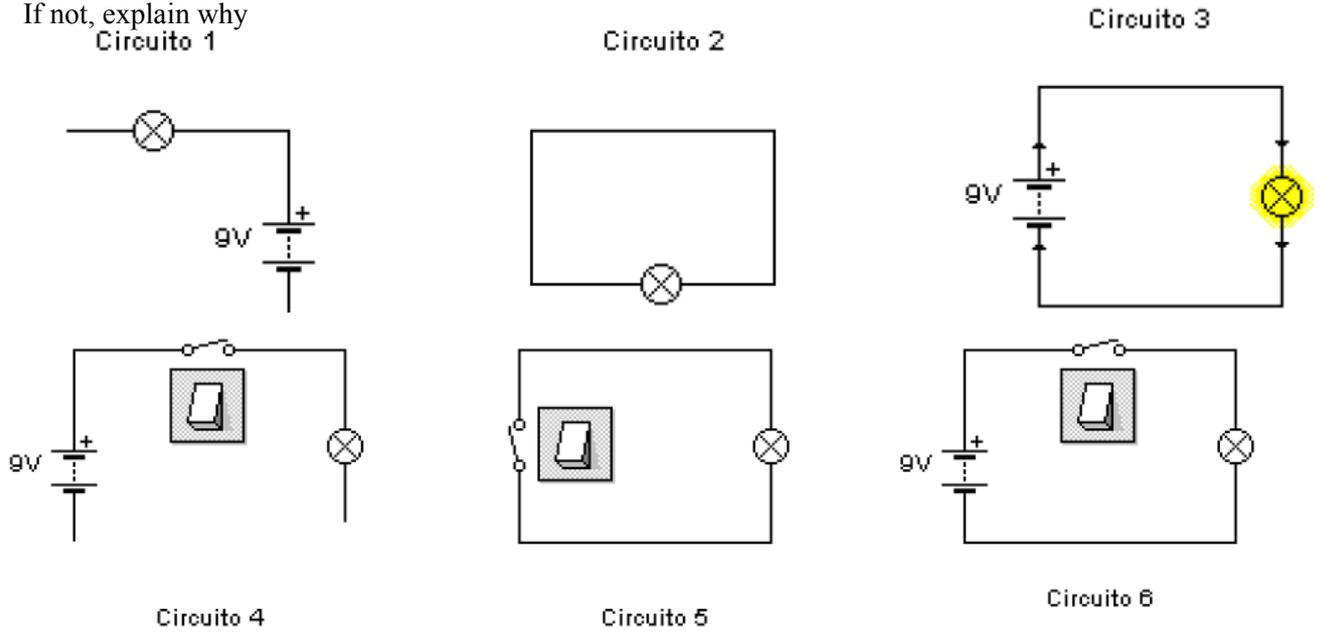


4.

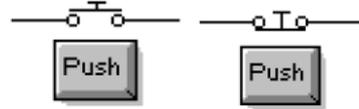
- a. Is there any difference in the way the following circuits work?
- b. Is the position of the switch in a circuit important?
- c. Why?



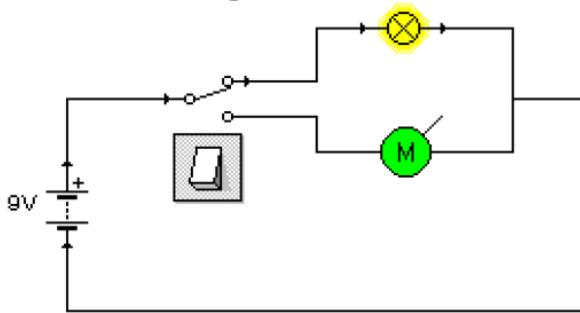
5. a. Is each of the following circuits working?  
 b. If not, explain why



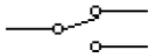
6. What is the difference between how these two control elements work?



7. In the following circuit:

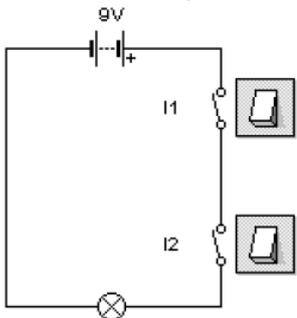


- a. What is the name of the control element?  
 b. Explain how the circuit works

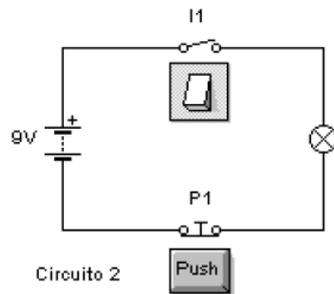


8. In each of the following circuits, explain which control elements are necessary to click/push in order to switch the bulb on.

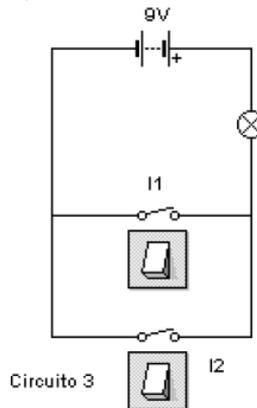
Example -> *Circuit 1: To turn the light on it is necessary to click in the standard switches I1 and I2*



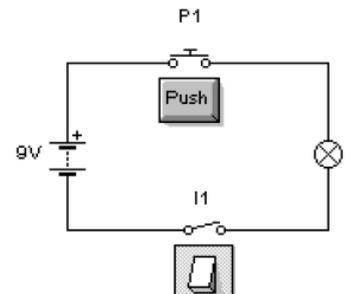
Circuito 1



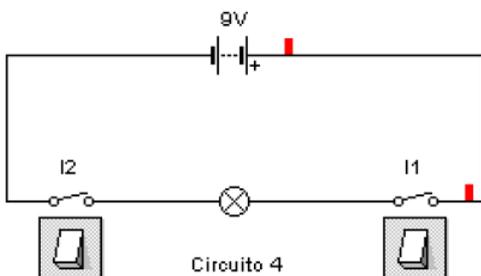
Circuito 2



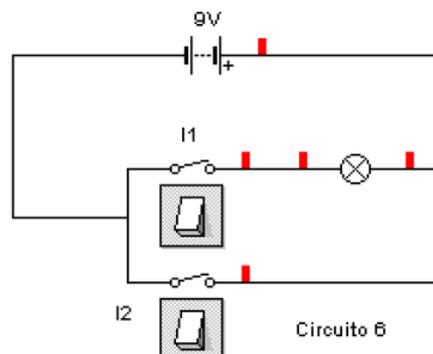
Circuito 3



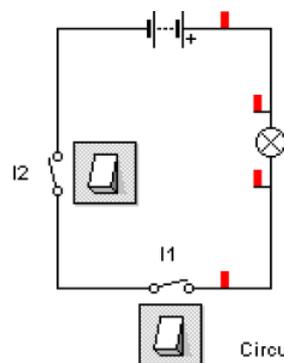
Circuito 4



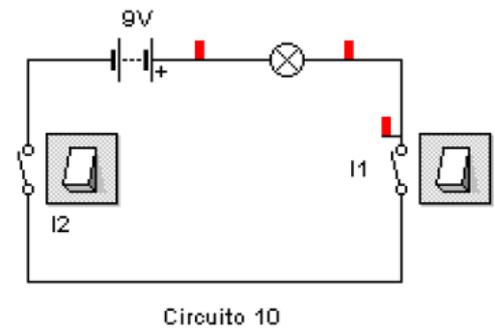
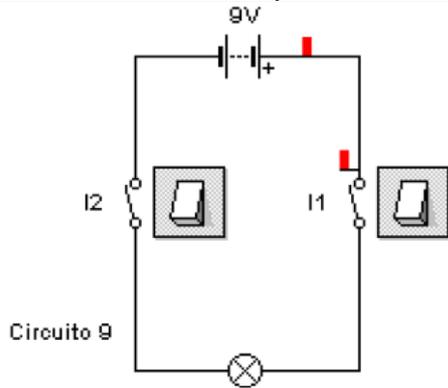
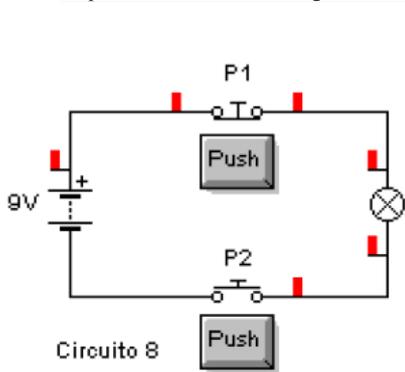
Circuito 4



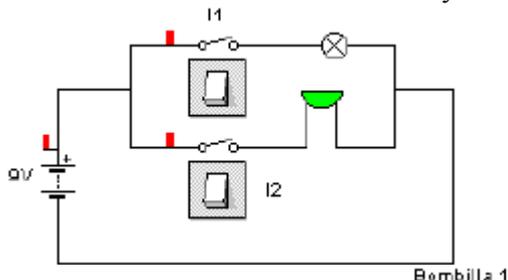
Circuito 6



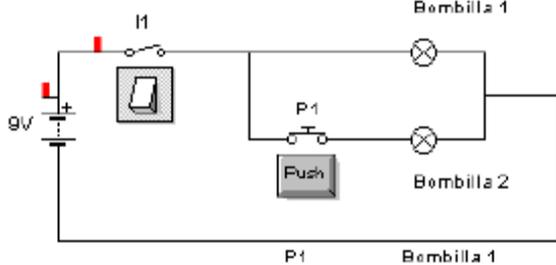
Circuit 6



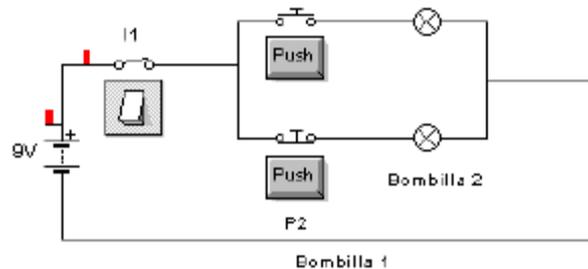
9. What control element is necessary to click on each of the following circuits to turn the loads on?



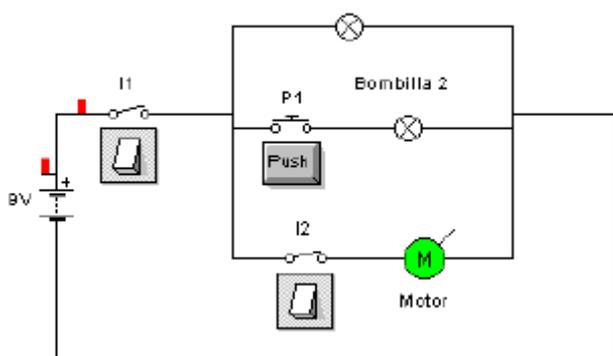
To switch on ...	You need to click/push...
Bulb	
Buzzer	
Both of them	



To switch on ...	You need to click/push...
Bulb 1	
Bulb 2	
Both of them	



To switch on ...	You need to click/push...
Bulb 1	
Bulb 2	
Both of them	

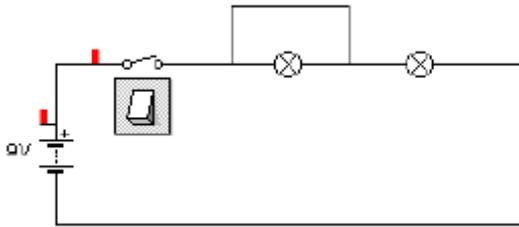


To switch on ...	You need to click/push...
Bulb 1	
Bulb 2	
Motor	

10. Draw the following circuits:

- Circuit with a 9-volt battery, a PTM push switch and two bulbs that shine at the same time when you push the switch.
- Circuit with a 9-volt battery, a general switch to turn everything on/off and a double throw switch to select what is working: a motor or a buzzer
- Circuit with a 6-volt battery and two PTM push switches, one of them used to turn on a bulb when you push it, and the other to turn a motor on when you push it.
- Circuit with a 9-volt battery, a PTB push switch and three bulbs that are switched off at the same time when you push the switch.

11. A *short circuit* is an accidental connection between the two terminals of an element. In the following circuit there is a shortcut in one of the bulbs.

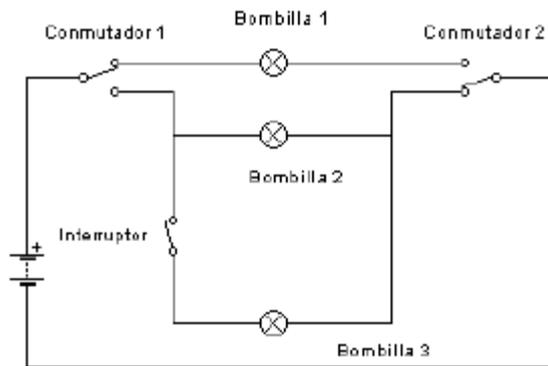


- Explain what will happen in the circuit when the switch is turned on.
- What would happen in the circuit if the short circuit is eliminated?

12. Using a battery, a PTM push switch, a standard switch, a buzzer and a bulb, draw a circuit in which the buzzer sounds if we push the PTM push switch and the standard switch turns the bulb on/off.

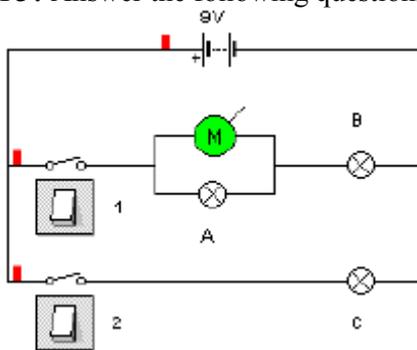
13. Using a battery, a PTM push switch, a double throw switch, a motor and a bulb, draw a circuit in which the motor will work in one of the positions of the double throw switch, and in the other position the bulb will light if the push switch is also pushed.

14. Write down what control elements must be click/pushed so the bulbs work:



Bulb	Control elements
Bulb 1	
Bulb 2	
Bulb 3	

15. Answer the following questions about the circuit:



What happens if ...

- You close only switch 1?
- If you close only switch 2?
- If you close switches 1 and 2?
- What do you need to make bulbs B and C light and the motor work?

16. Using a battery and three bulbs, draw a series circuit and a parallel circuit, and answer the following questions:

- How can we know that a circuit is series or parallel?
- What happens in each of them if one of the bulbs blows out? Why?
- Adding a switch to the circuits, can we switch only one of the bulbs on/off in each of the two circuits? Why?
- In which one the circuits will the bulbs light brighter? Why?

(These activities are adapted from a document by Manuel Torres. You can get it in <http://elprofesormanuel.wordpress.com/2011/01/27/crocodile-clips-tecnologia-3%C2%BA-e-s-o/>)