



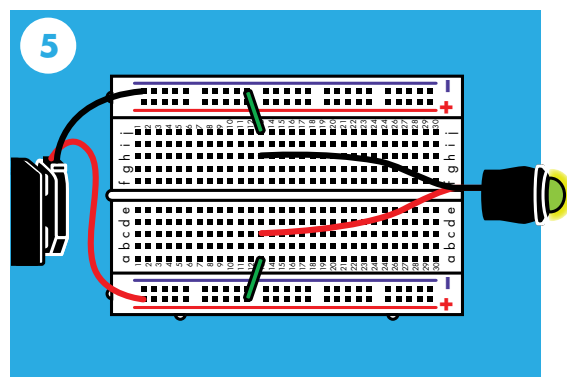
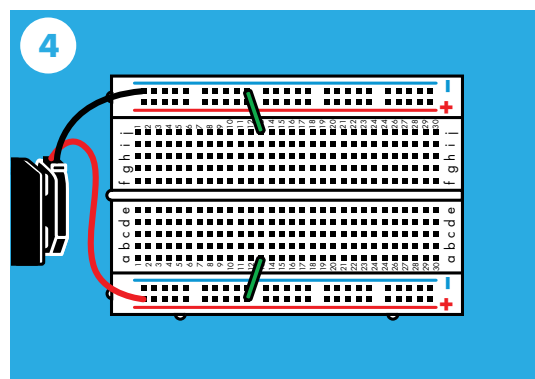
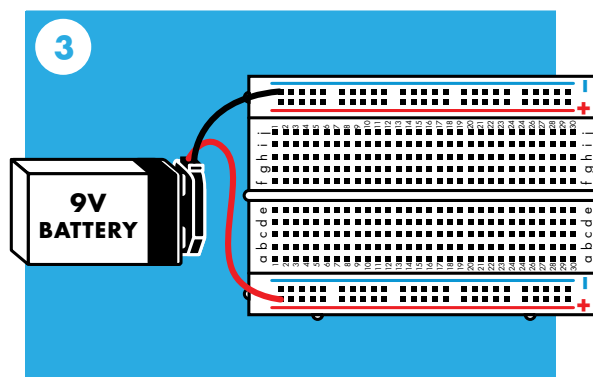
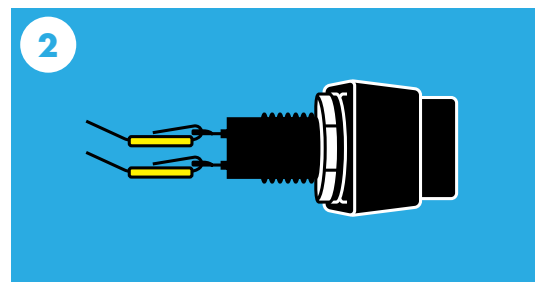
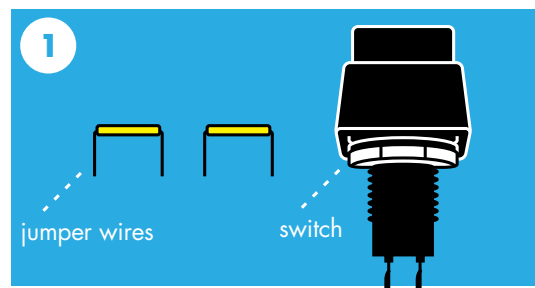
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## IN ADVANCE

1. Unpack switch and two small wires from the jumper kit.
2. Thread wires through the posts at base of the switch. Connect them so the metal portion of the wires is in direct contact with the metal posts on switch.

## MODELING THE BACTERIAL PHOTOGRAPHY GENETIC CIRCUIT WITH ELECTRONICS

3. Power the breadboard by connecting ground from a 9V battery (**black wire**) to the blue (-) rail of the breadboard and connecting the plus side of the battery (**red wire**) to the red (+) rail on the opposite side of the breadboard.
4. Run power to the central portions of the breadboard using two small wires.
5. Power the LED. *Besides unplugging things, is there a way to turn the light on/off? Is there a way to dim the light?*



6. Move the ground wire on the LED to a new row and then connect the switch to LED. *Why does the switch need to be connected in a new row to turn the light on/off? Is there a way to dim the light?*
7. Further separate the connection between the LED and the switch. *Is such compartmentalization possible in a living cell?*
8. Connect the switch to the LED through a resistor. *What impact does this resistance have on the on/off behavior of the light?*

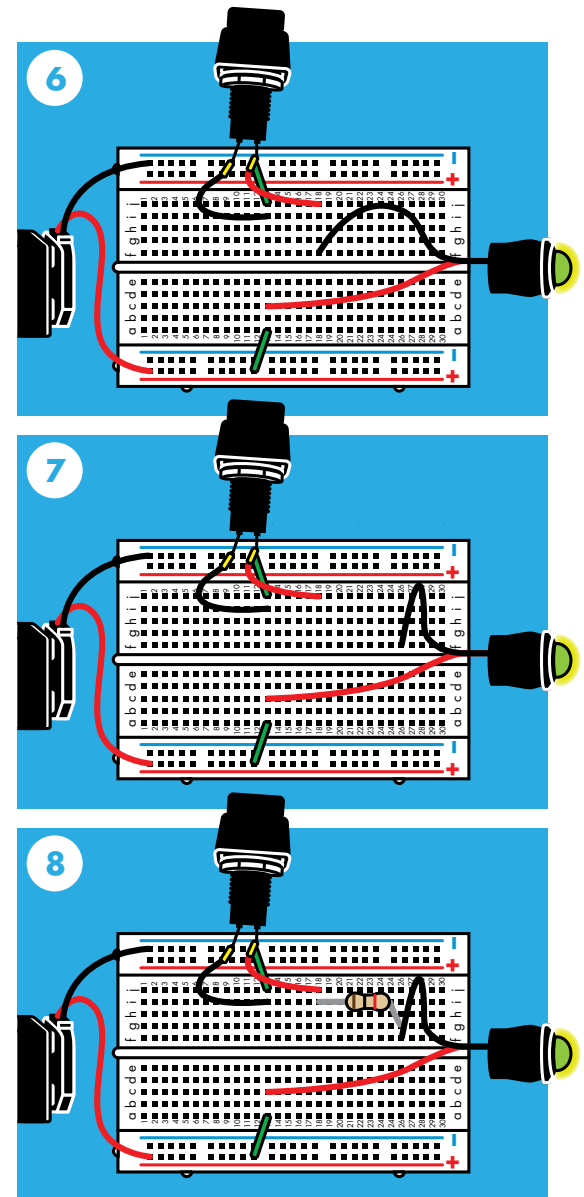
*Use the behavior you've observed in this electronic model to think about the genetic circuitry and the flow of information through it.*

## SAFETY NOTES AND GUIDANCE

Always unplug the battery when working with components on the breadboard.

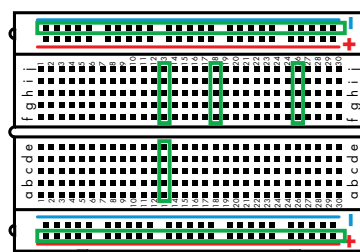
If your breadboard set up does not work at first:

- check that the connections are all made.
- check that you've followed these directions.
- replace one part at a time with working parts from another setup.

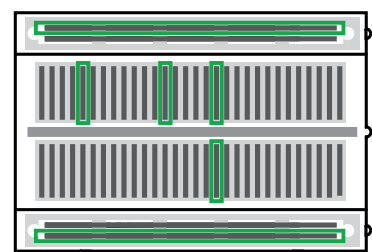


## UNPACKING THE CONNECTIONS MADE BY THE BREADBOARD

Only some of the holes you see in the top of the breadboard are electrically connected underneath. The holes seen in the "Top View" are connected by metal strips as shown in the "Back View", with green boxes drawn around some holes for emphasis.



Top View



Back View,  
if backing peeled away