Virtual Breadboard LED Activity

Physical Science and Technology

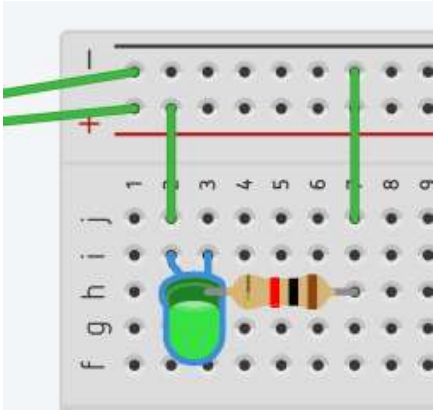
For this activity you will use the virtual breadboard available through the Tinkercad Circuits app located at https://www.tinkercad.com/circuits. You will need to create an account: **make sure you have signed into Chrome using your Corvallis School District Google ID**, then click on the "Sign in" button in the top right-hand corner of the screen and click "Sign in using social providers". Choose "Google" and complete any verification steps.

Once you've signed in, select the "Circuits" option on the left side of the screen and click the "Create new Circuit" button. Then, follow these steps to explore the app.

1. Start by experimenting with the different features of the app. You can add different circuit components by clicking on the "+ Components" button. You can start or pause the simulation to test the circuits you create. Note that breadboards will clearly show how different rails and strips are connected. **Show an instructor what you've done before you move on to the next step.**

2. Remove everything from your circuit, then start again by adding a 9V battery and a breadboard. Connect the positive terminal of the battery to the positive rail of the breadboard and the negative terminal of the battery to the negative rail of the breadboard. **Show an instructor what you've done before you move on to the next step.**

3. Add three LEDs (use three different colors) and three 1000 Ohm (1 kOhm) resistors. Connect each LED to the breadboard as follows:
    a. Attach a wire to the positive rail of the breadboard and connect it to an empty strip.
    b. Connect the anode (the bent leg) of the LED to the strip and the cathode (the shorter, straight leg) of the LED to another strip.
    c. Connect a resistor to the second strip and a third strip.
    d. Use a wire to connect the third strip to the negative rail of the breadboard.
    e. Click "Start Simulation" to test your lights and adjust the wiring if they don't all turn on.



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4. Click “Stop Simulation” to re-enable editing of your circuit. Next, remove the battery and the wires to the breadboard rails and add an Arduino. Connect the “GND” pin of the Arduino to the negative rail of the breadboard. Delete the wires from the positive rail of the breadboard leading to the strips. Then, connect the Arduino pins 11, 12, and 13 to each strip containing an LED. **Show an instructor what you’ve done before you move on to the next step.**

5. Click on the “Code Editor” button and modify the existing code in order to cause all three lights to blink in a similar pattern. Click “Start Simulation” and verify that your circuit works (adjust the wiring and code if necessary). **Show an instructor what you’ve done** – and congratulations! You have just completed your first basic Arduino circuit.

6. Lastly, click on the Tinkercad logo in the upper left-hand side of the screen to show the list of all your circuits. Click on the gear icon of the circuit you just created to change the name to something more meaningful (this will allow you to re-use this circuit and keep track of all the circuits you create over time).