

Exploring
Computer
Science

Exploring the Circuit Playground Student Guide

An accompanying resource for



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Acknowledgments: Special thanks to Colby Tofel-Grehl, who developed the wristband programming “hack.” See Searle, Tofel-Grehl & Allen (2016). In P. Blikstein, M. Berland & D. A. Fields (Eds), Proceedings of FabLearn 2016, New York, NY: ACM, 105-108.



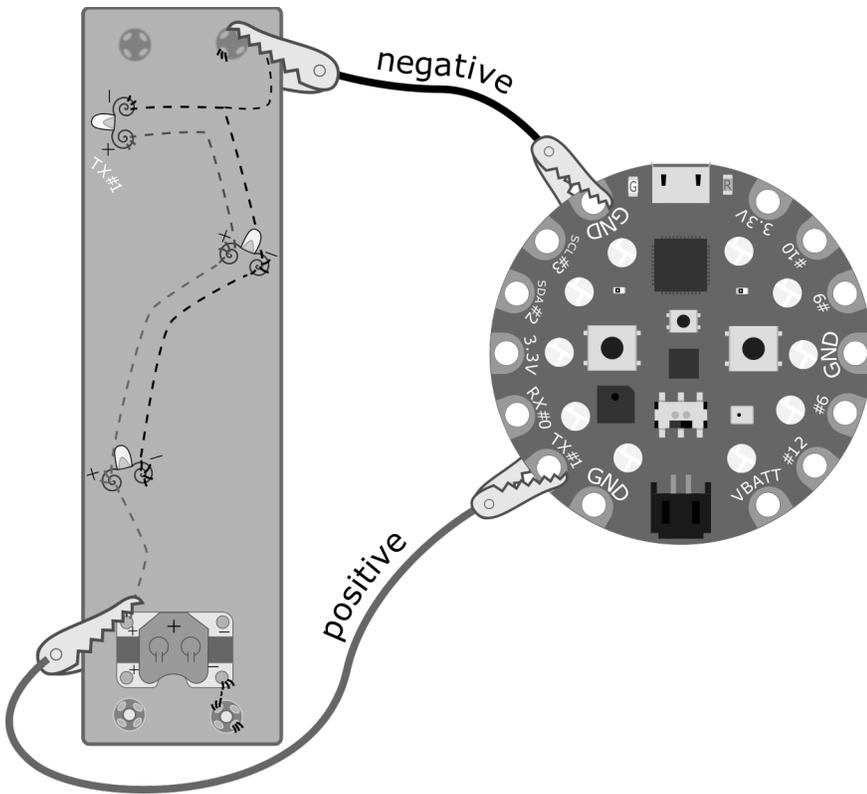
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Circuit Playground - Activity One

Activity 1: Test it Out

The Circuit Playground is a micro-controller, a type of small computer that we have pre-programmed so that the pins below each have a different effect. You can create a circuit using your wristband, the Circuit Playground, and some alligator clips. Try testing out the Circuit Playground yourself. Write out what pins #1, #2, #9, and #12 do below. There may be a hidden effect, so experiment after you get the first four!

1. Remove the coin battery from your wristband.
2. Connect the Circuit Playground battery or the USB cord to the computer.
3. Connect the **positive** circuit of the wristband with an alligator clip to one of the following Circuit Playground pins: **TX #1, SDA #2, #9, #12**.
4. Connect the **negative** circuit of the wristband to one of the **negative** ground pins that are marked with **GND** on the Circuit Playground.
5. Test each of the four pins to find out the effect.
6. Describe each pin's behavior in your own words.



Write out what each pin does:

TX #1 _____

SDA #2 _____

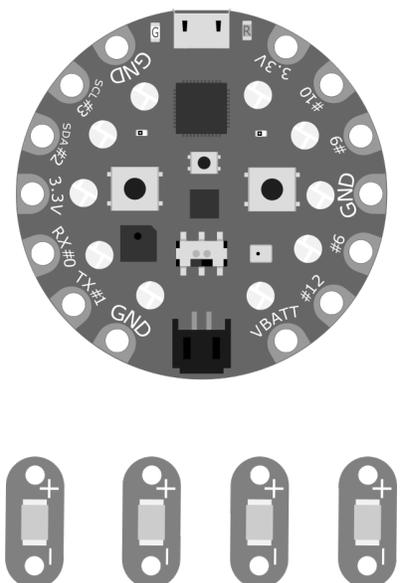
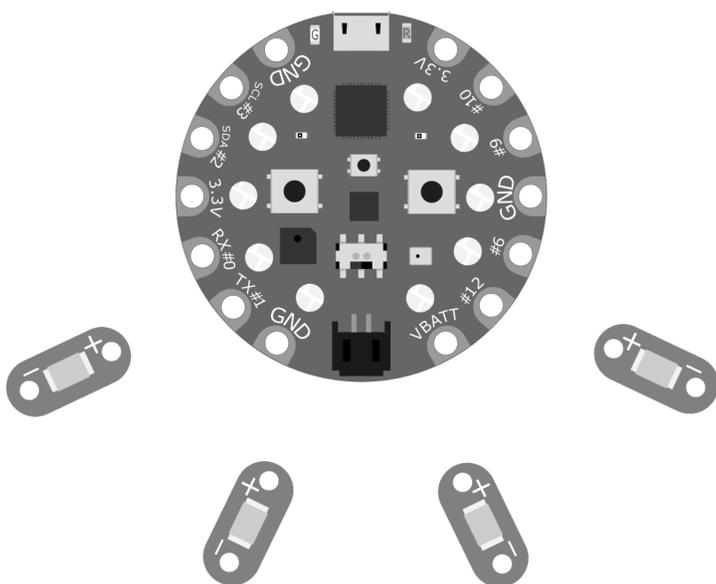
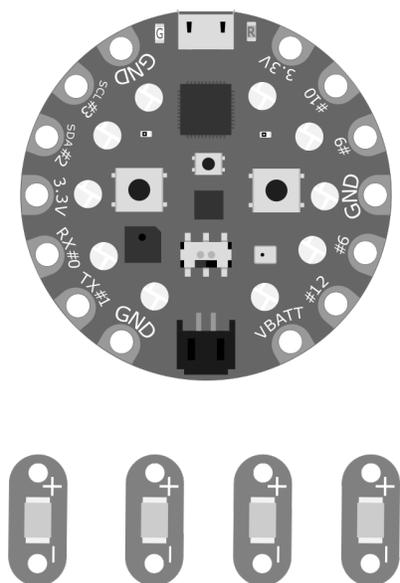
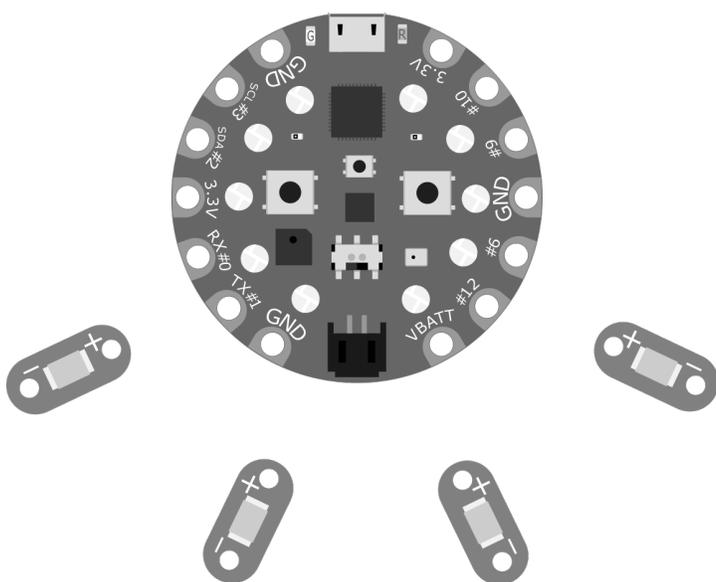
#9 _____

#12 _____

Circuit Playground - Activity Two

Activity 2: Designing Computer Circuits

Using the Circuit Playground, you can connect each light to a different pin to make several independent circuits, or you can connect several lights to a single pin to make a parallel circuit. How many different ways can you connect the LED lights to the Circuit Playground? Use the diagrams below to sketch four different ways to connect the LED lights to the Circuit Playground to create a complete circuit.

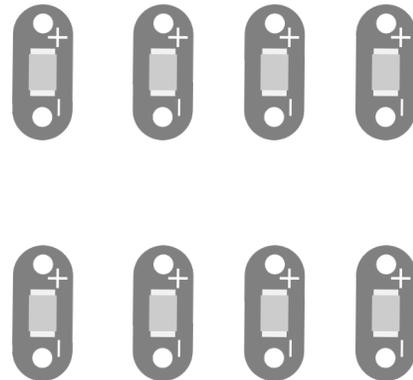
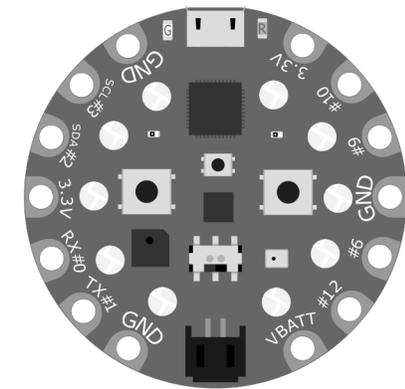
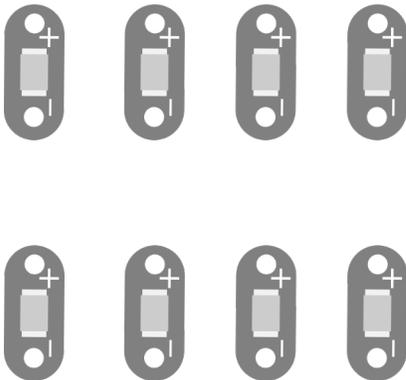
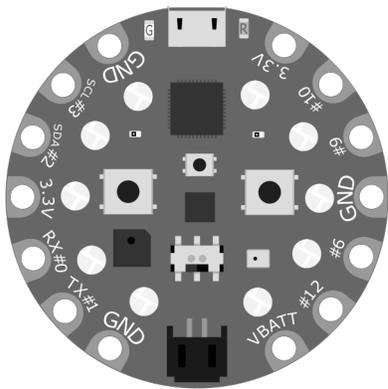


Circuit Playground - Activity Three

Activity 3: Add More Lights with Parallel Circuits

We do not always have to make each light blink independently. We can also use parallel circuits to add in extra lights.

In the challenge below, connect each set of lights using a combination of independent and parallel circuits to the Circuit Playground. Color the box next to Negative and Positive to make a key for your diagram.



Negative

Positive