



Light Up Constellations (Paper Circuits #2)



A hands-on activity using printable templates and creating simple paper circuits. Good for MakerFaires, libraries, classrooms and other STEM related events where participants can create their own take-away.

What is a Paper Circuit?

Paper circuits help learners of all ages explore the basics of electricity (energy that results from the existence of charged particles like electrons or protons) and conductivity (the degree to which a material can conduct electricity). Paper circuits function as simple low-voltage electronic circuits (a path through which electrons from a voltage or current source flow) made using paper, LED lights, a type of conductive tape such as copper, as well as a small battery for the power source.

Directions: Download the attached .pdf and print double-sided (so the shapes are lined up) and cut in half (you will get two handouts per page)

1. Have participants cut out the rectangle - see handout for instructions
2. Ask participants to fold paper in half on the dashed line so that the directions are on the INSIDE/images are on the OUTSIDE.
3. Punch a hole for the LED light - see template
4. Following the remaining steps outlined on the handout - placing copper tape, finding the positive lead on the LED and affixing the leads to the circuit, and folding over with the coin battery.
5. Use a binder clip to hold battery in place on the circuit (so the light stays on)

Troubleshooting

- Flip the battery over. If the LED was put in backwards, it just means the positive and negative parts of the circuit are reversed
- Check all connections - around the LED leads, alignment with the battery, any broken places in the copper tape. Use more tape to reinforce connection.

Cost: About \$0.50 (50 cents) per item, estimates are provided in the materials list

Time: about 5 minutes to make a single item

Materials:

- Coin Batteries (\$0.30 each)
- Copper tape with conductive adhesive (\$0.10) - Less than 12 inches per badge
- LED's (\$0.05)
- Small binder clips (\$0.05)
- NASA Images of exploding stars/pulsars/neutron stars (download template here chandra.si.edu/make/template.pdf)
- Hand held hole punchers
- Small trash can – little bits of trash are produced during the activity



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The Science: Constellations

“Constellation” is the name we give to seeming patterns of stars in the night sky.

“Stella” is the Latin word for star and a constellation is a grouping of stars. In general, the stars in these groups are not actually close to each other in space, they just appear to be close when viewed from Earth.

If we could travel by spaceship to another part of the galaxy, we would imagine an entirely different set of constellations. In the meantime, for us on Earth, the constellations are a handy way to locate a star in the sky.

On Earth, we see different constellations as we travel to different parts of the globe. The fact that some constellations were visible in the northern hemisphere and not the southern hemisphere, and vice-versa, was used more than 2000 years ago by Greek astronomers to argue that the Earth is round.

The stories associated with the constellations come from many cultures and most exist in several variations. The purpose of this section is to give an overview of the main legends behind a few constellations that mark those parts of the sky in which the NASA images in this activity are located. While we give more details from the story associated with the official name of the constellation (as adopted by the International Astronomical Union), we also mention other legends and stories connected with a particular pattern. However, there are so many stories, from so many cultures, and so many variations on even well-known stories, that only a brief summary is presented here. Continue your own reading about the constellations by searching for other stories online or at your local library.

In the Light Up Constellations activity, participants can find and trace some select constellations and light them up with the paper circuits, or they can create constellations and background stories of their own. Enjoy!