



MetroParent



LESSON #4

SCIENCE

CIRCUIT TRAINING



VIRTUAL CAMP:
SUMMER OF
SCIENCE
2017

CIRCUIT BOARD *TRIVIA* *GAME*

STUFF YOU'LL NEED

- String of holiday lights
- Insulated wire (about 7 feet)
- Wire strippers **G**
- 9-volt battery
- 12 metal fasteners
- File folder or 8" x 11" piece of cardboard
- Masking tape
- Two paper clips
- Ruler
- Pen
- Paper

G = Grown-up step. Safety first!

THE CHALLENGE

Here's a bright idea:

Make your own circuit trivia board and you can (safely) play with electric currents.



ELECTRICITY CONCEPTS!

Electric circuit: This is the path that electricity flows along. As you'll see in the trivia game, when you touch a wire to the correct question and answer, you complete the circuit, allowing electricity to flow – which turns on the lights. A basic circuit has three parts: a source, the conductor and the use or load.

Source: This is where the electricity comes from – in this case, a battery.

Conductor: This is what the electrons flow through. Wire is a great conductor, but some materials, like wood, plastic or rubber, are not.

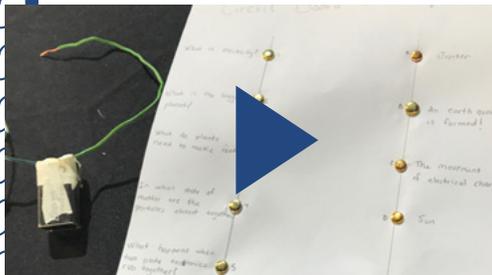
Insulator: Material that offers great resistance to the flow of electricity or does not allow electricity to flow through it at all. The rubbery coating on wires is an insulator designed to keep you safe.

Use/load: This is the outcome of electrons flowing through the circuit. In our case, that'll be turning on the light.

Switch: A control device that controls whether the current is flowing or cut off – like an ordinary light switch. We'll use paperclips in our experiment.

SCIENTIFIC PROCEDURE

- 1 **Cut a section of holiday lights** so that you have one bulb with about 6 inches of wire on each side. Strip ends off last half-inch of both ends of wire with wire strippers. **G**
- 2 **Cut the insulated wire** into seven sections about 12 inches long. Again, strip the ends of the last half-inch on both ends of each cut piece. **G**
- 3 **Use the ruler** to draw a line along the left side of the cardboard, starting about an inch from the top and ending about an inch from the bottom. Repeat on the right side. Write "questions" above the line on the left. Write "answers" above the line on the right.
- 4 **Starting at the top of each line, mark six evenly spaced dots.** They should be at least 1 inch apart. Number each dot on the left line 1 to 6 and label the dots on the right line A to F.
- 5 **On a separate sheet of paper, write six trivia questions** and number them 1 to 6. Then, write the answers to each question and label them A to F, but scramble them so the questions don't line up with the answers.
- 6 **Poke a metal fastener** through each dot on the lines on the cardboard.
- 7 **Using your Q&A sheet as a guide, turn over the cardboard** and use a piece of wire to connect each "question" metal fastener to the correct "answer" fastener. Attach the wire by twisting the stripped ends of wire around each fastener and folding the ends of the fastener down to help hold them in place. Repeat this process for the other five questions. **G**
- 8 **Twist one end of another piece of wire around a prong** on the battery and tape into place. Twist the other end around a large paper clip. **G**
- 9 **Take one end of the holiday lights and attach it to the other prong** on the battery and tape it, too, into place. Twist the other end of the lights around another paper clip. **G**
- 10 **Test your circuit board!** Touch one paperclip to a "question" fastener, and touch the other paper clip to an "answer" fastener. If the light bulb lights up, it's the correct answer! If it doesn't, the answer is incorrect.



SEE IT IN ACTION

Watch Izzy, our STEM-loving puppet, and her Michigan Science Center friends Taylor and Jeanane quiz each other with their circuit board trivia game!



G = Grown-up step. Safety first!

SHOCKING, ISN'T IT?

Ever touch something and feel a zap? When electricity builds up on the surface of an object, it's generating static electricity. That zap you felt was a small electric shock. The electricity was neutralized, fast, by an opposite charge – in this case, your hand.



YOU'RE ELECTRIFIED

Electricity isn't just in nature – it's in your body. Inside your brain are billions of bitty cells called neurons. If you move, laugh, see, think or even dream, chemical and electrical signals zip between them. Sure, solo neurons don't make much electricity, but put 'em all together and you could light up a low-wattage bulb.

TRIVIA TIME DID YOU KNOW?

Electricity is everywhere!
See for yourself with these
fun facts.



A BIG BOLT

Lightning is a giant version of static electricity. Warm air rises and gets colder, and water vapor chills into big thunderclouds. There are tiny drops of ice in those clouds and, when they bump into each other, an electrical charge builds up. Eventually, those charges turn into a ginormous spark – which is lightning.

EEL THE POWER

Electric eels have around 6,000 specialized cells called electrocytes that store electricity like little batteries. When they're attacked or hunting, the cells discharge all at once, producing a shock of at least 600 volts – five times more than a standard wall socket.

SPEED RACER

Electricity is no slowpoke; it travels at the speed of light, which is more than 186,000 miles per second. That's why when you flip on a light switch, the light seems to turn on instantly: It completes the circuit, so the electricity can flow and turn on the bulb.



LEARN MORE *GREAT RESOURCES*

Browse, read and play your way to becoming an electricity expert.

Energy Stick

Want more circuit fun? Kids ages 8 and up can hold on to this 7.5-inch long tube-like gadget by Be Amazing! Toys and become a human circuit. Grab your friends and let the current pass through all of you.

Science Kids

Kids ages 8 and up can learn about electricity in a fun and interactive way. This website is packed with projects, games, quizzes, videos and fun facts to help shed light on circuits, batteries, lightning and lots more.

Electronics for Kids

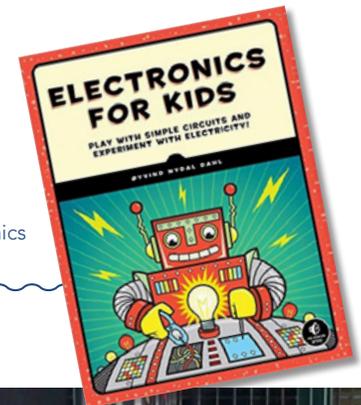
By Oyvind Nydal Dahl • Ages 10-14
Do more than just read about electricity. This book gives you hands-on opportunities to really understand how it works. Dive deeper into various concepts – from how R/C toys move to why microwave lights blink – through experiments and simple circuits that become more involved as you learn.

DTE Energy Sparks Theater at MiSci

To see electricity in action, catch the Sparks Electricity Show at the Michigan Science Center. Here, you can learn about static electricity, electromagnets, plasma and more. Using things like the Tesla coil, Van de Graaff generator and an exploding wire, prepared to be “shocked” by all you’ll learn!



Energy Stick



Electronics for Kids

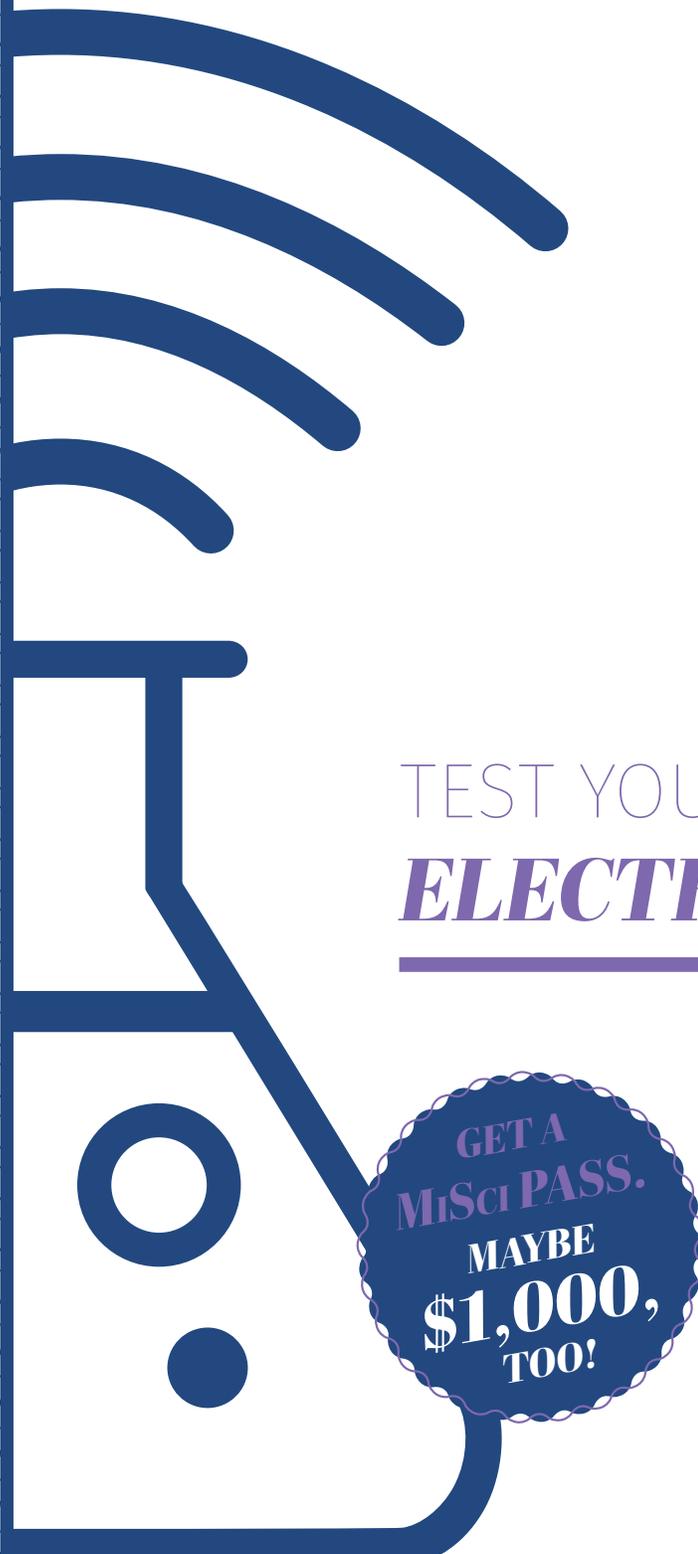


DTE Energy Sparks Theater



SHARE THE FUN ON INSTA

Post a pic of your kiddo enjoying Virtual Camp on Instagram using the hashtag **#MPCamp**. Six lucky kids will score a **\$25 Amazon gift card** – and get featured in our Friday emails!



TEST YOUR SMARTS ***ELECTRICITY QUIZ TIME***

GET A
MiSci PASS.
MAYBE
\$1,000,
TOO!

Don't chew that No. 2! This quick quiz is just **five questions** about what kids learned after trying the experiment and using this guide to learn more – done in a few clicks.

Just for completing it, each kid gets **one free general admission pass** to the Michigan Science Center **AND** a pass to its all-new Toyota Engineering 4D Theater, good Sept. 15-Dec. 31, 2017. Plus, one lucky kid wins \$1,000 for college!

So put on that thinking cap.

READY TO TAKE THE QUIZ? [Click here!](#)