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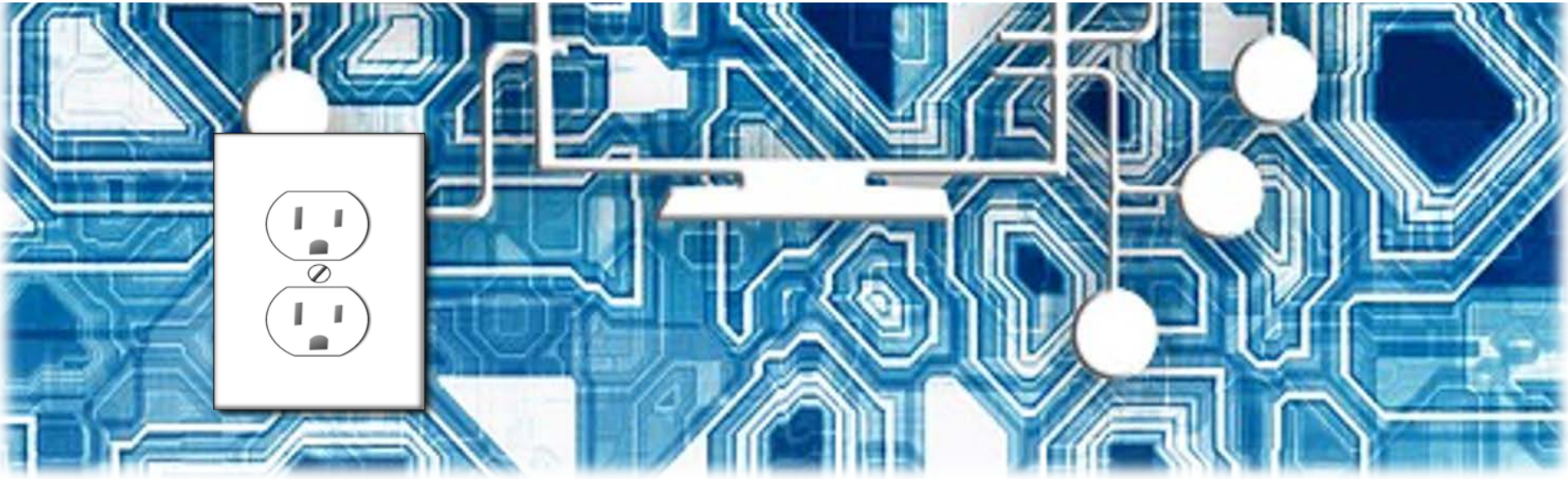
ELECTRICITY & CIRCUITS:
A Current Runs Through it!

Explore the world of electricity through children's natural curiosity. Test electrical circuits and discover how they affect the brightness of a light bulb in a simple circuit.

Dr. Theresa Vadala



Applying New Knowledge:
Learning & Transfer

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Electricity & Circuits: A Current Runs through it!

Theresa Vadala, Ed. D

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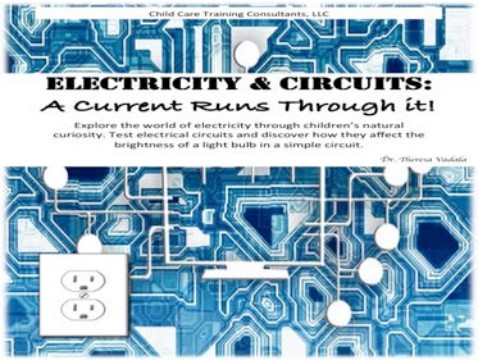

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PRESCHOOL Module 2 **CDA Subject Area 1: Children's Physical and Intellectual Development** **Title: Electricity & Circuits: A Current Runs through it!**	**1 Hour**	**0.1 CEU**

THE NEVADA REGISTRY TRAINING APPROVED

Dr. Theresa Vadala
(Instructor & Curriculum Designer)

AUTHORIZED IACET PROVIDER

Thank you for choosing
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for your CDA Training Needs!

Learning Assessment

Read the material provided, take the 5-10 quiz questions and

complete the training evaluation at the end of the course.

Participants must receive 100% on individual courses to obtain a certificate of completion.

Questions?
We are happy to help.

Support Services:

Please contact us 24/7 at

childcaretrainingconsultants1@gmail.com

Business # 702.837.2434

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Child Care Training Consultants LLC., Goal

The goal is to empower educators as they take Child Development Associate (CDA) courses to make a powerful difference in the lives of young children!

Mission Statement

"Child Care Training Consultants, LLC's is committed to provide research-based professional growth and development training courses primarily focused on the Child Development Associate. The CDA is the nation's premier credential that is transferable, valid, competency-based and nationally recognized in all 50 states, territories, the District of Columbia, community colleges and the United State Military.

Vision

Child Care Training Consultants, LLC's vision is to provide the early childhood community with courses based on CDA competency standards to obtain their CDA Credential and assist in reaching their goal as an exceptional early childhood educator to ultimately achieve higher child outcomes.

Why Teach Children About Electricity?

Young children enjoy solving problems and exploring the world through science, technology, engineering, and math (STEM). STEM learning can support children's early math development and many other important skills. Students STEM learning also promotes critical thinking, curiosity, persistence, decision-making, leadership, entrepreneurship, acceptance of failure and more. Regardless of your child's career aspirations, these skill sets will go a long way in preparing them for their future. The activities provided can be incorporated into daily teaching practices!

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Learning Objectives

Learners will be able to…

1) Explain how static electricity works,

2) Identify activities to determine what makes a complete circuit,

3) Describe how conductors and insulators make a complete circuit, to use in daily teaching practices.

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Learning Outcomes

Learners will be able to…

1) Identify 2 facts on how static electricity works.

2) Identify 2 activities to determine what makes a complete circuit.

3) Describe how conductors and insulators make a complete circuit.

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Electricity & Circuits: A Current Runs Through it!

Agenda

Part 1: Introduction to Electricity

Part 2: What is a Circuit?

Part 3: Conductors & Insulators

Introduction

Children are exposed to electricity even before they can realize what electricity is. They turn the lights off and on, watch TV, they play with electric toys, and they play games on computers and smart devices. They may realize that tablets or phones or electric toys need to be charged before they can work again. adapt the explanation to the child's age.

Explain to children that electricity can be dangerous. Keep it short and simple for preschoolers. Remind them to stay away from exposed wires or downed power lines, and to avoid using electrical devices near water, including tubs, sinks, puddles or toilets.

Identify how an electricity works by experimenting with basic circuits and design a circuit game board for your students to experiment with! Students will learn to question why things happen and want to share their observations about science. Promote using scientific methods when students are examining, discovering and exploring new objects and materials!

Introduction

Electricity is the flow of tiny particles called electrons and protons. It can also mean the energy you get when electrons flow from place to place. Electricity is the most versatile energy source that we have; it is also one of the newest: homes and businesses have been using it for not much more than a hundred years. Electricity has played a vital part of our past. But it could play a different role in our future, with many more buildings generating their own renewable electric power using solar cells and wind turbines. Let's take a closer look at electricity and find out how it works!

What is electricity?

Electricity is a type of energy that can build up in one place or flow from one place to another. When electricity gathers in one place it is known as **static electricity** (the word static means something that does not move); electricity that moves from one place to another is called **current electricity.**

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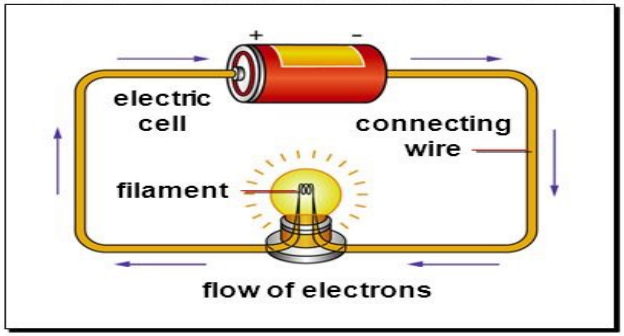
What is an Electric Current?

What is an Electric Current???



Definition:

An electric current is the rate of flow of electric charges in a circuit.

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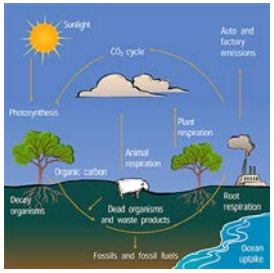
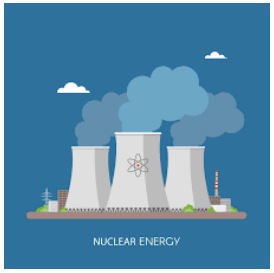
Major Types of Energy

Three major categories of energy for electricity generation:



- **Fossil fuels**
  (**coal**, **natural gas**, and **petroleum**)

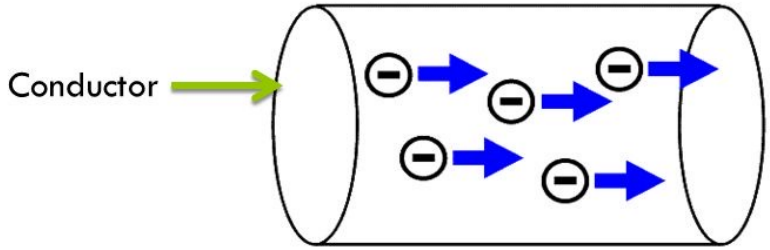


- **Nuclear energy**

- **Renewable energy sources**
  (Hydropower, Wind, Solar).

What is Current Electricity?

- The movement or flow of electrons in a closed path (circuit)
- Conductors are used for current electricity, because they allow electrons to travel freely through an object



When electrons move, they carry electrical energy from one place to another. This is called **current electricity** or an **electric current**. A lightning bolt is one example of an electric current, although it does not last very long. Electric currents are also involved in powering all the electrical appliances that you use, from washing machines to flashlights and from telephones to MP3 players.

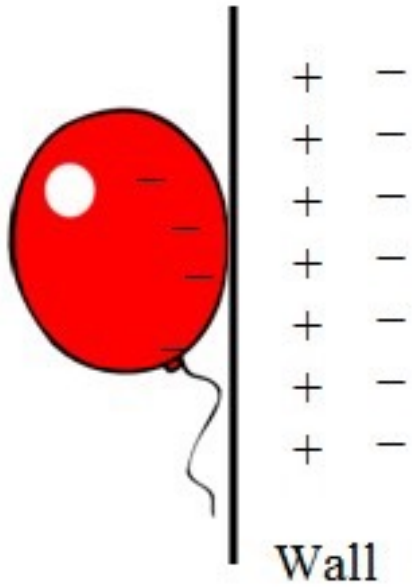
Static Electricity

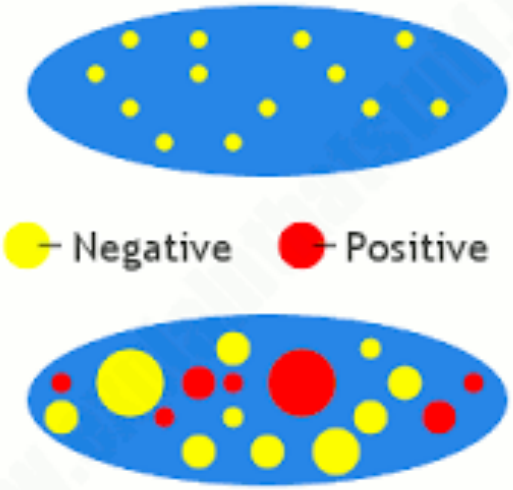
A **static** charge happens when two surfaces touch each other and the electrons move from one object to another.

A **static** charge happens when two surfaces touch each other, and the electrons move from one object to another. One of the objects will have a positive charge and the other a negative charge. If you rub an object quickly, like a balloon, or your feet on the carpet, these will build-up a rather large charge. Static electricity often happens when you rub things together. If you rub a balloon against your pullover 20 or 30 times, you'll find the balloon sticks to you. This happens because rubbing the balloon gives it an **electric charge** (a small amount of electricity).

How does Static Electricity Work?

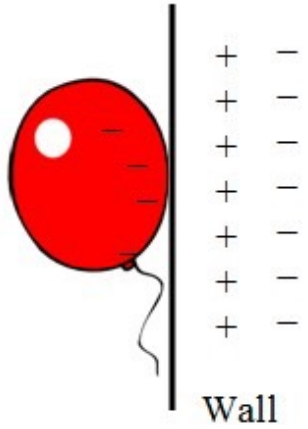
Electricity is caused by electrons, the tiny particles that "orbit" around the edges of atoms, from which everything is made.

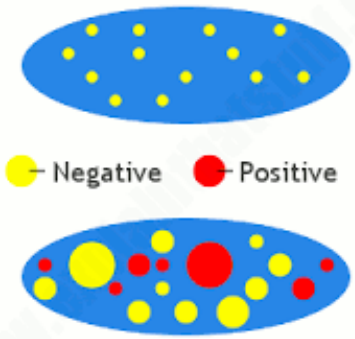




How does Static Electricity Work?

Electricity is caused by electrons, the tiny particles that "orbit" around the edges of atoms, from which everything is made. Each electron has a small negative charge. An atom normally has an equal number of electrons and protons (positively charged particles in its nucleus or center), so atoms have no overall electrical charge. A piece of rubber is made from large collections of atoms called molecules. Since the atoms have no electrical charge, the molecules have no charge either—and nor does the rubber.





Electromagnet

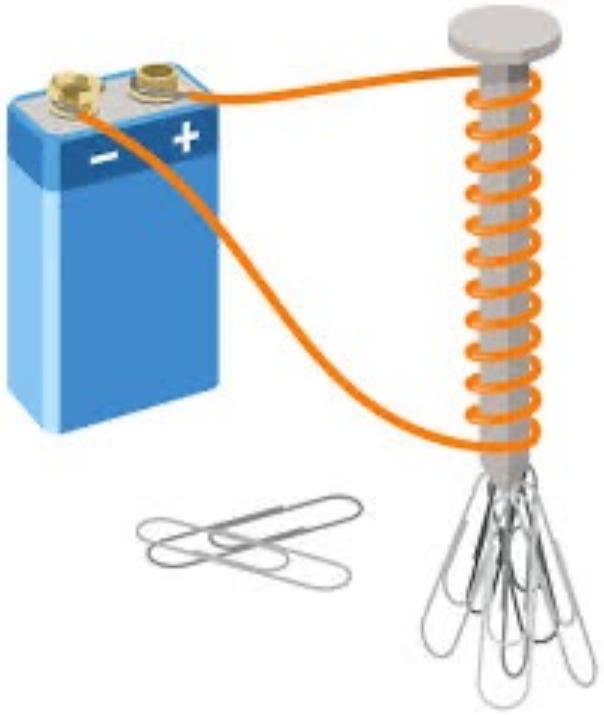
Electricity and magnetism are closely related. You might have seen giant steel electromagnets working in a scrapyard. An **electromagnet** is a magnet that can be switched on and off with electricity. When the current flows, it works like a magnet; when the current stops, it goes back to being an ordinary, unmagnetized piece of steel. Scrapyard cranes pick up bits of metal junk by switching the magnet on. To release the metal junk, they switch the electromagnet off again. Electromagnets show that electricity can make magnetism, but how do they work? When electricity flows through a wire, it creates an invisible pattern of magnetism all around it. If you put a compass needle near an electric cable, and switch the electricity on or off, you can see the needle move because of the magnetism the cable generates. The magnetism is caused by the changing electricity when you switch the current on or off.

This is how an **electric motor** works. An electric motor is a machine that turns electricity into mechanical energy. In other words, electric power makes the motor spin around—and the motor can drive machinery.

Electromagnet Activity

An **electromagnet** is a magnet that can be switched on and off with electricity.

When the current flows, it works like a magnet; when the current stops, it goes back to being an ordinary, unmagnetized piece of steel.



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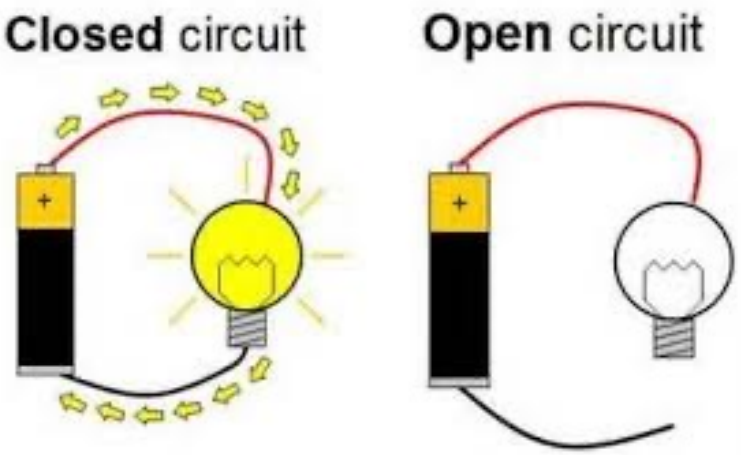
Potato & Lemon Clock

A **potato clock** is powered by acid within the potato reacting with a positive and a negative electrode. When the reaction occurs, electrons flow between the materials, generating an electric current. The negative electrode, or anode, in a **potato battery** is often made from zinc in the form of a galvanized nail.

Lemon-powered **clocks work** by using the process of electrolysis. The **lemon** juice is an acidic electrolyte, which is then connected in a circuit through a metal electrode. There must be two different metals present to produce an electric charge; zinc and copper are common.

Part 2: What is a Circuit?

How Circuits Work



A circuit is a closed loop containing a source of electrical energy (like a battery) and a load (like a light bulb). Every circuit must have a load of some sort, All the electrical energy in a circuit must get used by the load. The load will convert the electrical energy to some other form of energy.

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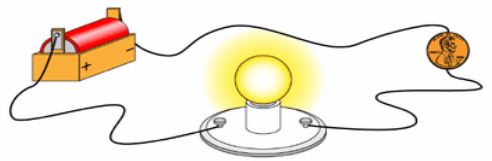
Conductors and Insulators

A **conductor** is a material that allows electricity to flow through it.
An **insulator** is a material that electricity cannot flow through.

To determine whether an object is a conductor or insulator, you can build a simple circuit with a battery, light bulb, and three pieces of wire.



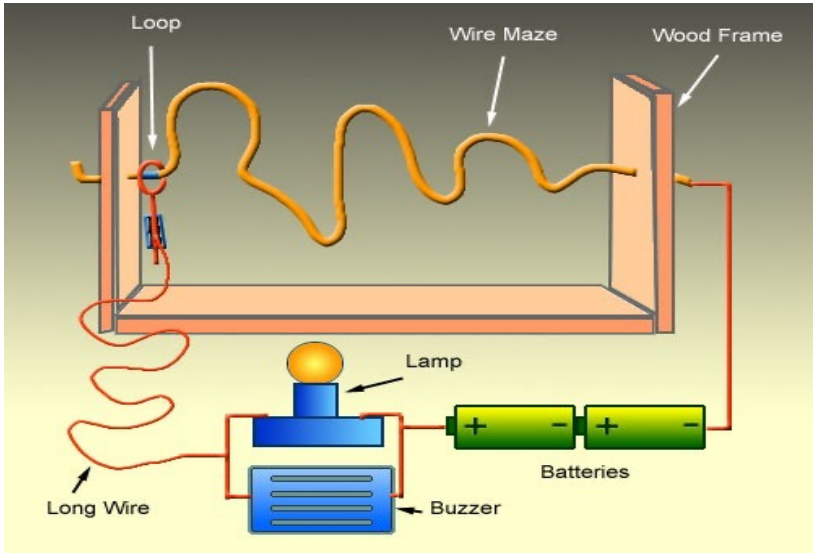
Touch the free ends of the wire to the object you are testing. If the light bulb lights up, the object is made from a conductor. if it does not, the object is made from an insulator.

Complete the table. Predict whether each item is made from a material that is a conductor or insulator. Then test each item to determine if it is made from a conductor or insulator.

Object	Prediction: Conductor or Insulator?	Result: Conductor or Insulator?
rubber band		
penny		
nickel		
toothpick		
key		
paper clip		
brass paper fastener		
glass microscope slide		
(your choice)		
(your choice)		

Steady Hand Circuit Game

A fun eye-hand coordination game, exploration into conductivity and introduction to electric circuits.



How to make a Steady Hand Circuit Game (5-minute, 57 seconds video)

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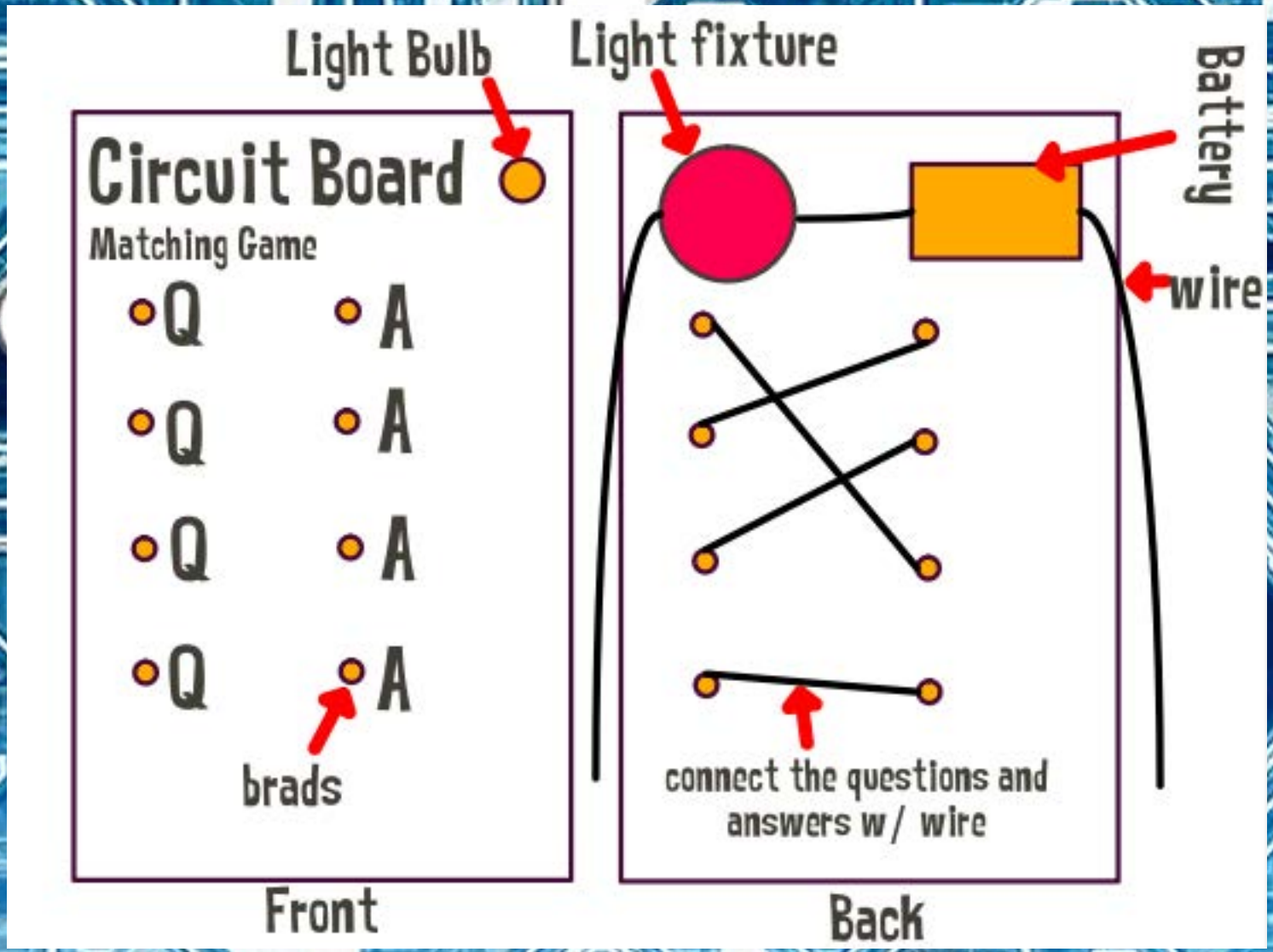
Electronic Match Circuit Board



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Insulators stop the transfer of energy. They slow down the energy and make it difficult for it to pass through the object.
Conductors help the transfer of energy. They allow energy to easily pas through the object.

Electrical Insulators	Electrical Conductors
	
What do all these insulators have in common?	What do all these conductors have in common?

Part 3:
Conductors & Insulators

In a **conductor**, electric current can flow freely, in an **insulator** it cannot. Metals such as copper typify **conductors**, while most non-metallic solids are said to be good **insulators**, having extremely high resistance to the flow of charge through them and stop the energy flow.

Safety & Review

DON'T ever play with electricity!

Electricity is amazingly useful—but it can be really dangerous as well. When electricity zaps from power plants to your home, it's at thousands of times higher voltages and massively more dangerous than the electricity in your home. **If you are silly enough to touch or play near power equipment, you could die an extremely nasty and unpleasant death**—electricity doesn't just shock you, it burns you alive. Heed warnings like this one and stay well away.

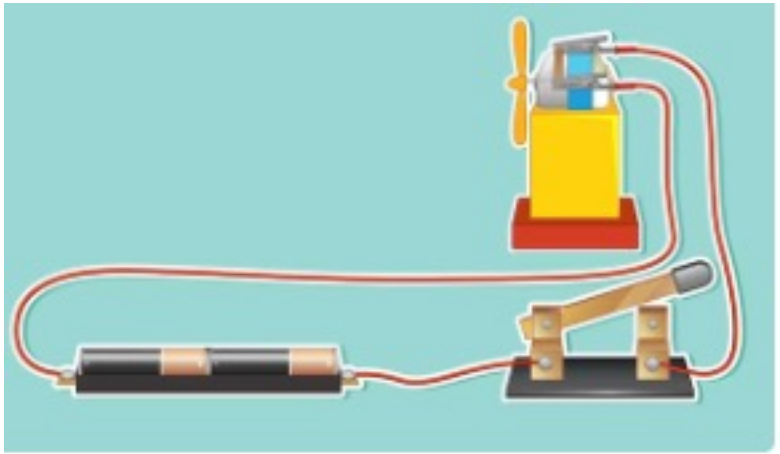
Electricity can also be dangerous in your home. Household electric power can kill you, so be sure to treat it with respect too. Don't play with household power sockets or push things into them. Don't take apart electrical appliances, because dangerous voltages can linger inside *for a long time* after they are switched off. If you want to know what something electrical looks like inside, search on the web—you'll find a safe answer that way.

It's generally okay to use small (1.5 volt) flashlight batteries for your experiments if you want to learn about electricity; they make small and safe voltages and electric currents that will do you no harm. Ask an adult for advice if you're not sure what's safe.

What Children Learn

STEM learning promotes:

- Critical thinking
- Curiosity
- Persistence
- Decision-making
- Leadership
- Entrepreneurship
- Acceptance of failure and more!



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Review

1. Explain how static electricity works,

2. Identify activities to determine what makes a complete circuit,
3. Describe how conductors and insulators make a complete circuit, to use in daily teaching practices.

References

Electricity (Science in a Flash) by Georgia Amson-Bradshaw. Hachette/Franklin Watts, 2017/2018. A clearly written 32-page guide for ages 7–9, with some basic hands-on activities and a helpful glossary.

Electricity for Young Makers: Fun and Easy Do-It-Yourself Projects by Marc de Vinck. Maker Media, 2017. A safe and friendly hands-on introduction in which you get to build a flashlight, a loudspeaker, and a couple of electric motors!

A Beginner's Guide to Electricity and Magnetism by Gill Arbuthnot. A&C Black/Bloomsbury, 2016. Another 64-page overview for ages 7–10.

Eyewitness: Electricity by Steve Parker. Dorling Kindersley, 2005. A classic glossy Eyewitness book that blends facts and history. Also worth investing in the same series: Eyewitness: Electronics by Roger Bridgman. Dorling Kindersley, 2007. This one takes a similar approach but covers electronics and electronic components.

Charged Up: The Story of Electricity by Jackie Bailey and Matthew Lilly. Picture Window Books/A & C Black, 2004. A humorous, cartoon-style tour through the history of electricity. (For some reason, it's also published under the title "Charging About.

Electricity: Make it Work by Wendy Baker, Alexandra Parsons, and Andrew Haslam. Two-Can, 2000. A mixture of hands-on activities interspersed with factual information about electricity.

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Transfer of Learning

How will you transfer learning into your work environment?

Think about strategies or activities that you found of interests.

How will you use them in the classroom?

How will you differentiate activities to meet students' needs?

If you were observed in the classroom, would your supervisor see the connection between the training content and your interactions with students?

Thank you for choosing
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