Electricity and Magnetism

Big Idea Electricity is a result of tiny particles in matter interacting and producing a static charge. This charge can be stored and moved through circuits. Some materials conduct electricity better than others.

Taken from: Our On-line Science Textbook

Electricity & Magnetism

Standard S5P3a. Investigate static electricity. (workbook p.62)

Electric charges- can be positive or negative

Static Electricity - happens when electric charges build up in one place.
examples: balloon to the hair (rubbing), clothing our of a dryer, sheets on a bed, sock stuck to a shirt, rubbing a balloon with wool

Electrical field - is the space around an electric charge where electric forces act.

Video: https://vimeo.com/57637498

Static Electricity Lab

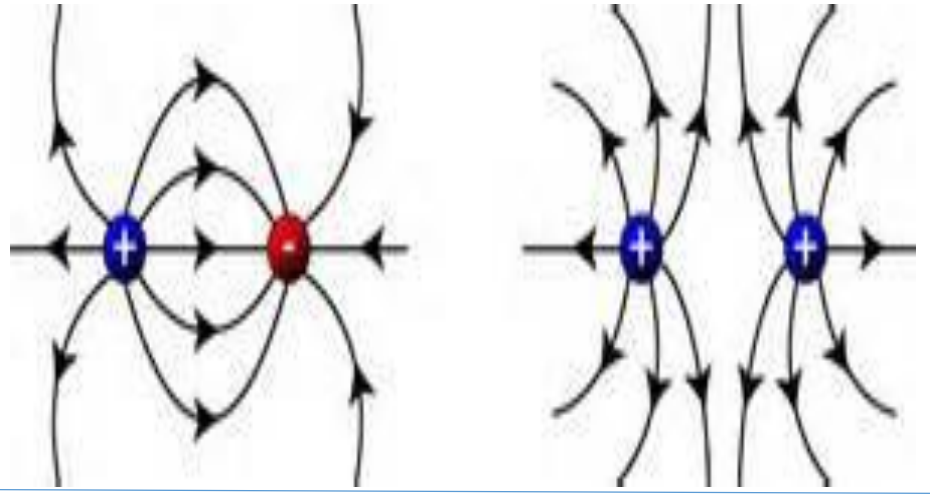
EQ What is static electricity?
How does static electricity affect hair or clothing? Defend your answer.

Electricity & Magnetism

Standard | S5P3a. Investigate static electricity. (workbook p.62)

Like charges are similar.
Unlike charges are different.

Unlike Charges (attract) Like charges (repel or push away)



Electricity & Magnetism

Standard (workbook p.62) S5P3a. Investigate static electricity.

Static Electricity –SEPARATING CHARGES- Clothes in a dryer rub together. Rubbing pulls the negative particles off of one thing and puts them on another..

So… negative charges move from piece of clothes to another. Only negative charges move like this. P.66

Video

EQ What is static electricity?

How does static electricity affect hair or clothing? Defend your answer.

Electricity & Magnetism

Standard **S5P3b. Determine the necessary components for completing an electric circuit.**

Electricity Flow of electrons

Video

Electric circuit is a closed path the electric current flows.

INVESTIGATION

Electric Circuit Lab In our electric circuit, the bulb changes energy (from the battery) to light and heat.

Electric current is a flow of electric charges.

Current electricity is more useful to people than static electricity.

EQ How can you make a circuit that will light up a light bulb?

Be ready to defend!

Electricity & Magnetism

Standard	I will understand the needed components for completing an electric circuit.
Series Circuits	has only one path for its current to flow (p. 73) If you break the circuit, all bulbs (or devices) will stop working. "Each time you add a bulb to a series circuit, all of the bulbs grow dimmer. In parallel circuits, adding more bulbs does not change how bright the bulbs are." (p. 75)
Parallel Circuits	has more than one path for the current to flow. P. 75
Essential Task:	How are series and a parallel circuits different?

Electricity & Magnetism

Standard S5P3b. Determine the necessary components for completing an electric circuit.

Series Circuits Draw the diagram on page 192. Click Here.

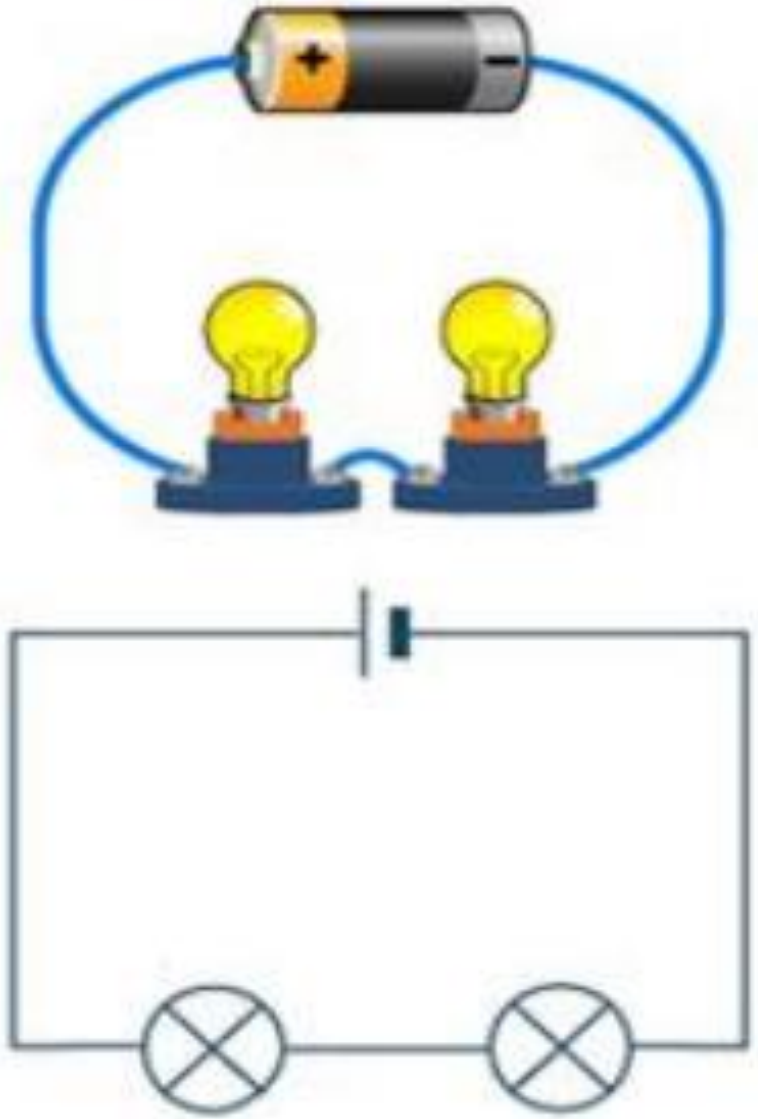
"In a series circuit, the same current goes through all the bulbs. Adding bulbs to a series circuit causes each bulb to be less bright."

Parallel Circuits Draw the diagram on page 194. Click Here.

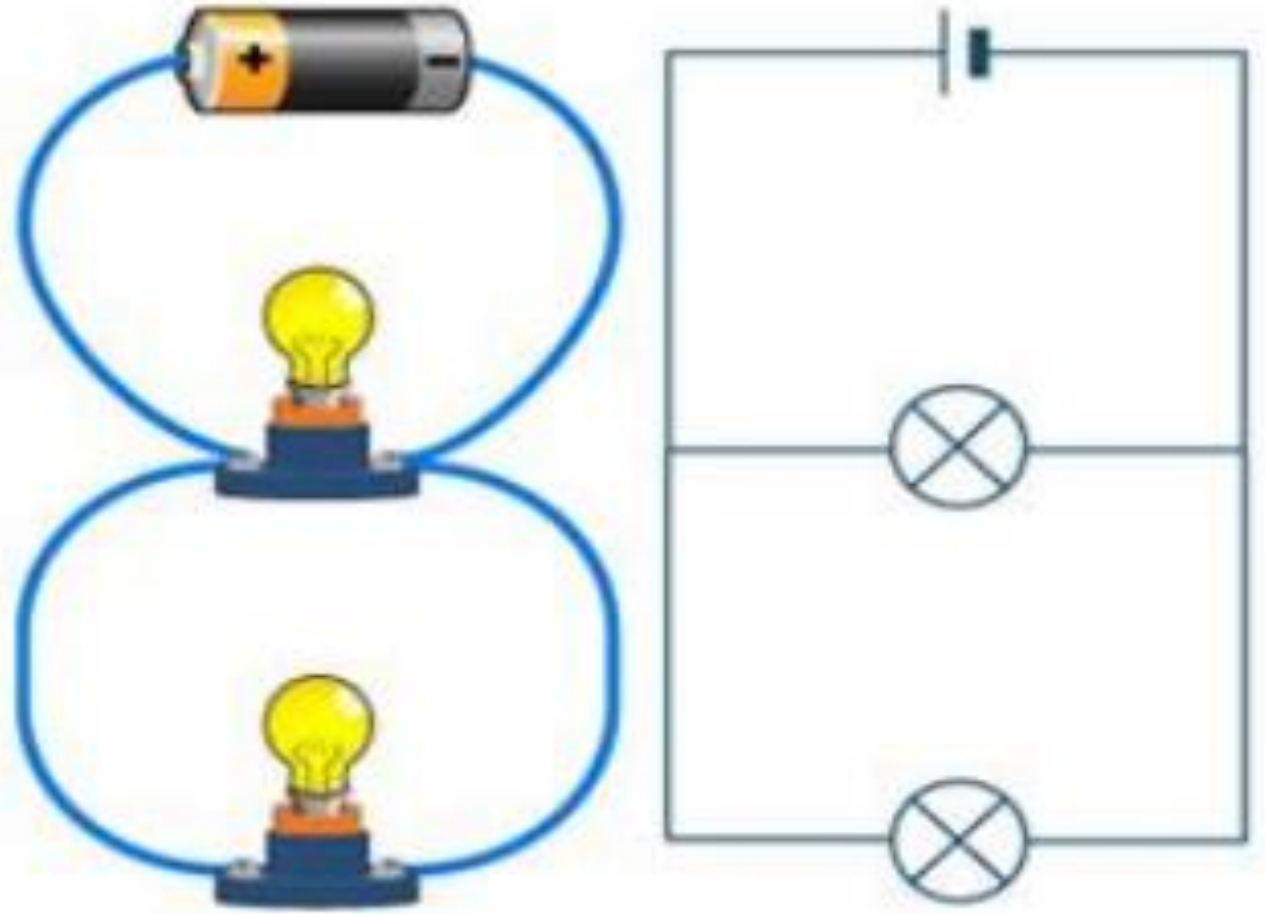
"In a parallel circuit, the current splits between the different paths. Adding bulbs to a parallel circuit doesn't change the brightness of each bulb."

Essential Task: How are series and a parallel circuits different?

Standard I will understand the needed components for completing an electric circuit.



Series Circuit



Parallel Circuit

How are series and a parallel circuits different?

Series Circuit

Electricity & Magnetism

Standard	S5P3b. Determine the necessary components for completing an electric circuit.
Resistance	“Resistance is how much a material opposes the flow of current.” P. 196
Short Circuit	“In a short circuit, current flows where it isn’t wanted. Short circuits prevent the rest of the circuit from working properly. They have low resistance and high current, so they also produce a lot of heat.” P. 196

Electricity & Magnetism

Standard	S5P3b. Determine the necessary components for completing an electric circuit.
Conductors	A conductor is a type of material through which negative charges can move easily.
	Electricity passes through the copper wire, paper clip, and foil. These are all metals. Metals are good conductors of electricity because negative charges move through them easily.
	In a circuit, a battery uses energy to push negative charges into one end of a wire. Those charges repel, or push, others in the wire. Negative charges come out the other end of the wire and go back into the battery.
	Online Textbook p. 206
EQ	Why are metals good conductors of electricity?

Electricity & Magnetism

Standard	S5P3b. Determine the necessary components for completing an electric circuit.
Insulator	Insulators are materials that resists the flow of electricity. In our experiment, you found that electricity didn't pass through the cardboard, foam, rubber band, or plastic. These are all nonmetals. In fact, most nonmetals are good insulators. Negative charges don't move easily through them. For example, the parts of a lamp cord you touch are rubber or plastic. Plastic cover plates are placed over sockets to keep people from touching the exposed wires. If insulation on a cord or plug is cracked or broken, you can get a shock. Online Textbook p. 208
EQ	Why are plastics not good conductors of electricity?

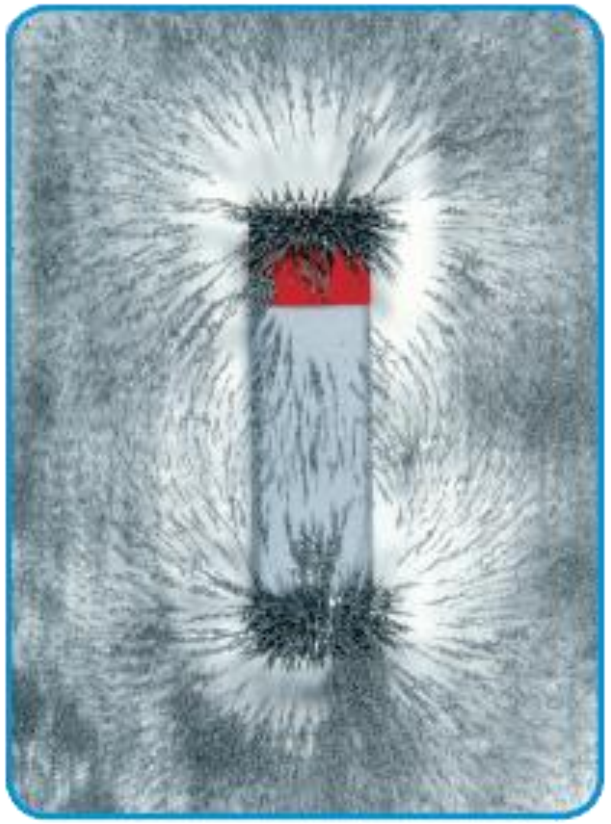
Electricity & Magnetism

Standard	S5P3.d Compare a bar magnet to an electromagnet
Electromagnet	A magnet made by coiling a wire around a piece of iron and running electric current through the wire.
	If you run a current in the wire, a magnetic field forms around the wire. The field around one wire is weak. The field gets much stronger if you wrap the wire into a tight coil.
	An electromagnet is a temporary magnet. It has a magnetic force only when an electric current passes through the wire coil. If you turn the electricity off, the electromagnet no longer works.
EQ	**How can electricity be used to make a magnet?**

Compare a bar magnet to an electromagnet

Electromagnet

Bar Magnet

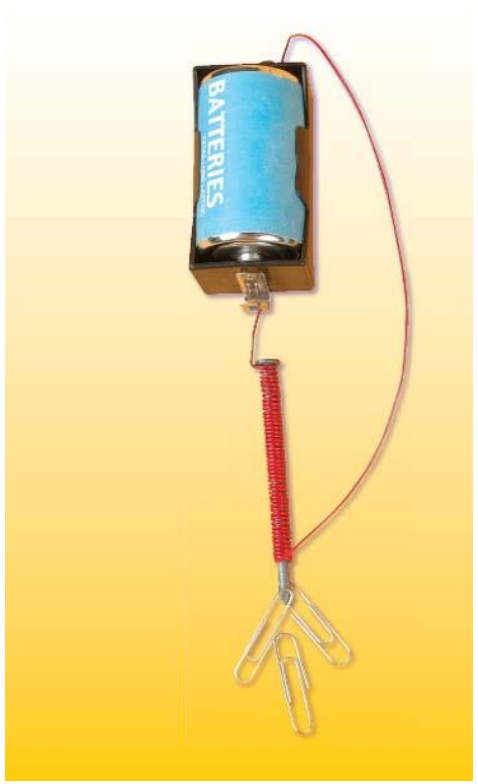


The magnetic field around a wire that carries current looks different from the field around a bar magnet. The lines of the field circle around the wire instead of looping out from the end. A compass needle placed near the wire points straight out, away from the wire. (FROM our Online Textbook 216-217)

EQ **How can electricity be used to make a magnet?**

Electromagnets

Compare a bar magnet to an electromagnet



The strength of an electromagnet depends on the number of coils of wire around the core. Count the paper clips and the coils.

This electromagnet is the same as the one to the left except that it has more coils. There are two layers of coils. Count the paper clips and coils. Remember to double the number of coils you see.

There are two ways to make an electromagnet stronger. In the Investigate, you observed one way. The more coils you use, the stronger the magnet becomes. The wire can be coiled in several layers. The second way to increase the strength of an electromagnet is to increase the electric current. For example, you could add one, two, or three batteries in a series.
In the Investigate, you saw another way to control an electromagnet. Switching the connections to the battery switches the direction of the magnetic field. The *N* pole of the electromagnet becomes the *S* pole. (page 218)

EQ **How can electricity be used to make a magnet?**