



Laneview STEM Day

Presented by Students Advancing STEM and the Laneview PTA

Let's Make A Battery-Powered Skateboard!

2/3

Let's Make a Battery-Powered Skateboard (K-1)

- Welcome and Introductions
 - SAS Ambassadors (high school students) are representatives of our organization
- Students Advancing STEM (SAS)
 - High school and middle school students (SAS Ambassadors) interested in science, technology, engineering, mathematics
 - Putting together and presenting programs for elementary school students
 - SAS clubs at both Morrill and Sierramont Middle Schools and Piedmont Hills High School



Today's activity

Everyone will make a toy skateboard move by using batteries!

- What is a battery-powered skateboard?:
 - A toy skateboard that is attached to a battery and electrical circuit
 - The electrical circuit is connected to provide power, and move the skateboard forward
 - Here is a video that tells you about batteries and energy:
https://www.youtube.com/watch?v=edo7_mz6K34&t=10s



What is a Circuit?

- Path for moving electric current and electricity
- Allows electricity to be used and provides power to lights, appliances, computers, and many other devices just like this skateboard!



Parts of a Circuit:

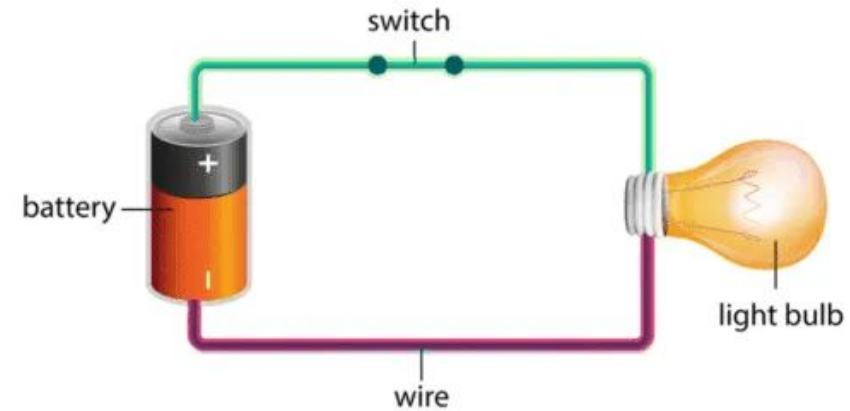
Power Source

- ex. flashlights → battery
- ex. homes or schools → public power plant
- in our skateboard, we are using a battery

Wires

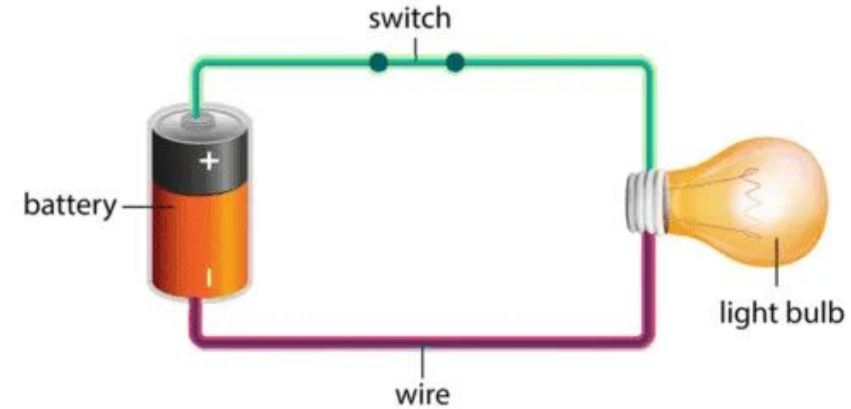
- made of metal, covered in plastic to contain the current
- connect the battery to the motor and propeller
- must be connected properly in order for the current to flow

Simple Electrical Circuit



You will be given **very specific** instructions on how to connect the wires as we build the skateboard!





Parts of a Circuit (cont.):

On-Off Switches

- allows you to control the flow of electricity through the circuit
- when a switch is connected, it completes the circuit and electricity flows (when a switch is disconnected, electricity stops and the circuit is broken)
- Your skateboard on-off switch is called an Alligator Clip
 - when you connect the Alligator Clip to the black battery wire, the propeller moves (disconnect = propeller stops)

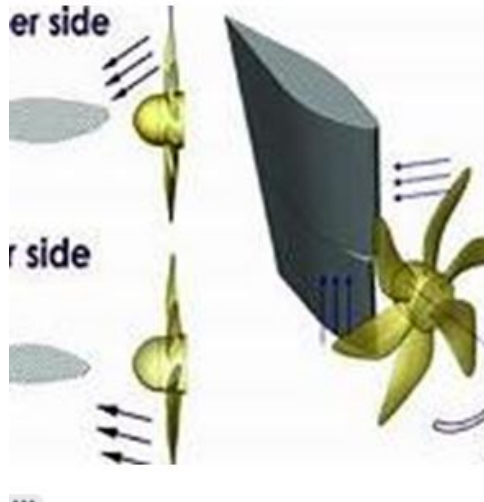


<https://www.youtube.com/watch?v=zSSkZ9F7Bng>



What is Thrust?

- Thrust means to punch or drive with force
- Force happens all around us all the time!
- Propellers rotate and create force that moves your skateboard forward
- In order for a propeller blade to spin, it needs the help of an engine or motor



Newton's Third Law of Motion

- Isaac Newton lived 400 years ago
- He created 3 “Laws” that are very important to science
- The third law says: “Every action has an equal and opposite reaction”
- When the circuit on your skateboard is connected, the propeller operates and produces force (an action) which pushes the skateboard forward (equal and opposite reaction)



<https://www.youtube.com/watch?v=6XNJDJTvenY>



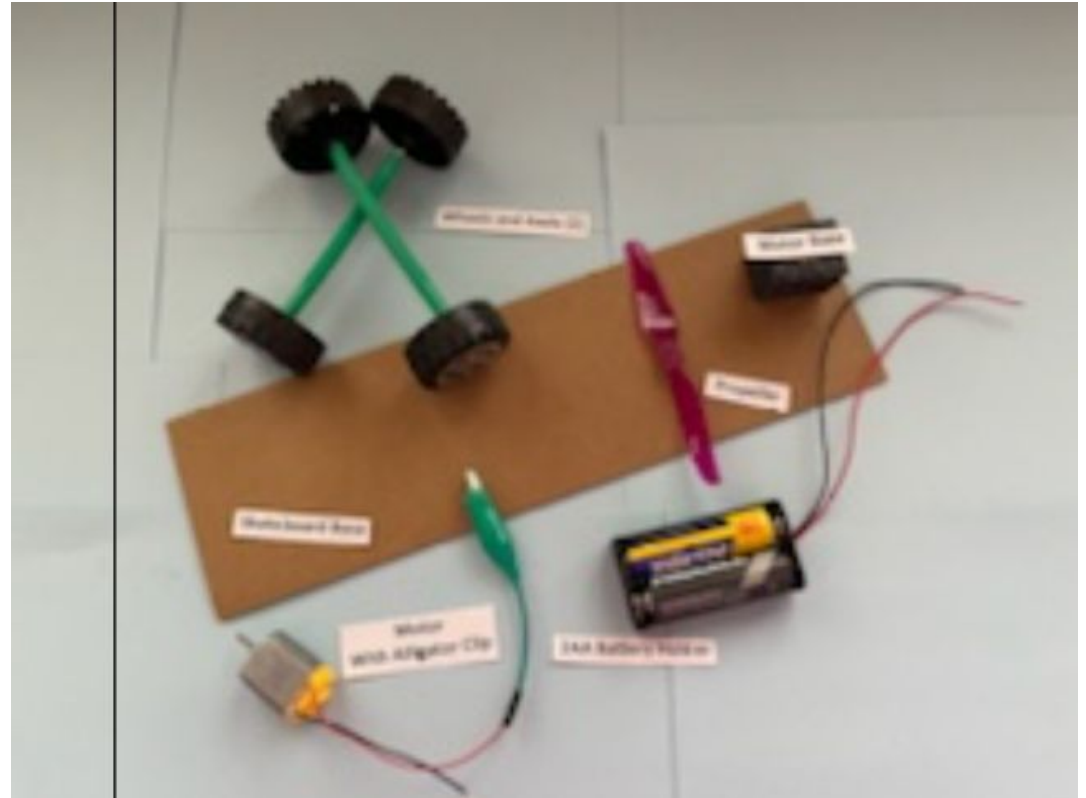
NOW, LET'S BUILD YOUR SKATEBOARD!!



Parts you need for your project

- One (1) Cardboard for skateboard base
 - Two (2) Wheels and axels
 - Two (2) AA batteries and battery holder
 - One (1) DC motor with Alligator Clip attached
 - One (1) Mount for motor/propeller
 - One (1) Propeller
- Markers will be on the tables

If you have any questions, ask the mentors!



Step One

- 1) Write your name near the top of one of the ends of the cardboard
- 2) Draw a half-circle on each end
- 3) Trim at the arc to get a skateboard shape



Step Two

Decorate your skateboard!

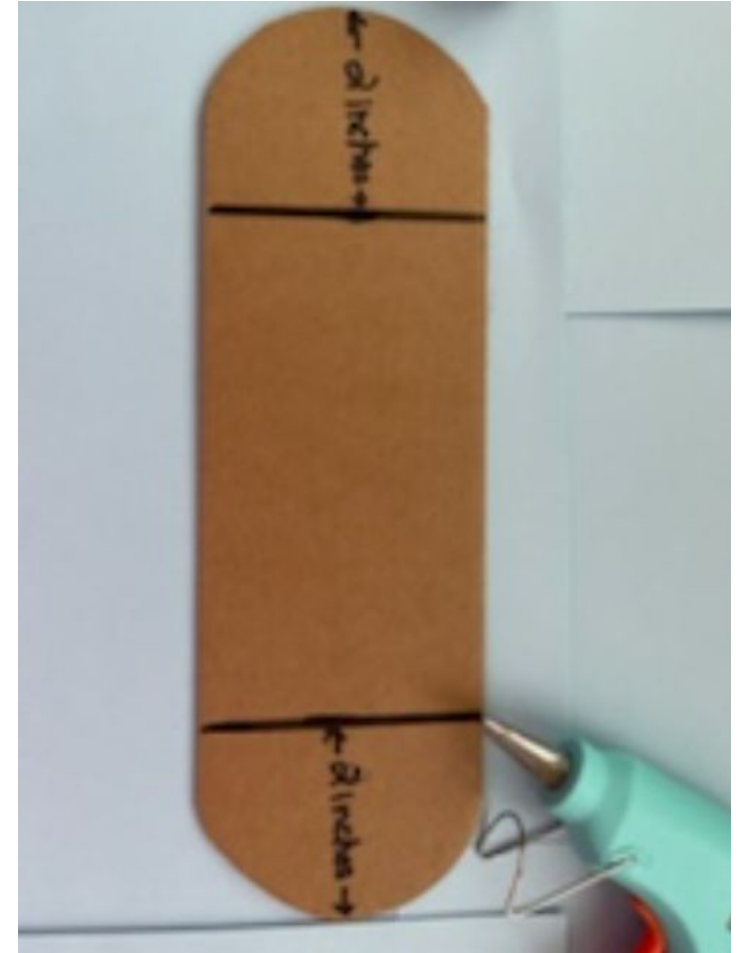
- 1) DO NOT decorate on the side where you wrote your name
- 2) Use the markers provided and personalize your skateboard!
- 3) You may decorate your skateboard in any (appropriate) way!



Step Three

Add wheel lines and glue on wheels

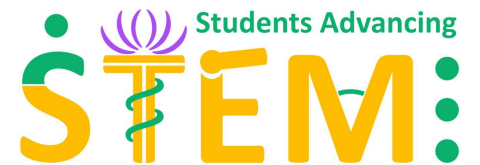
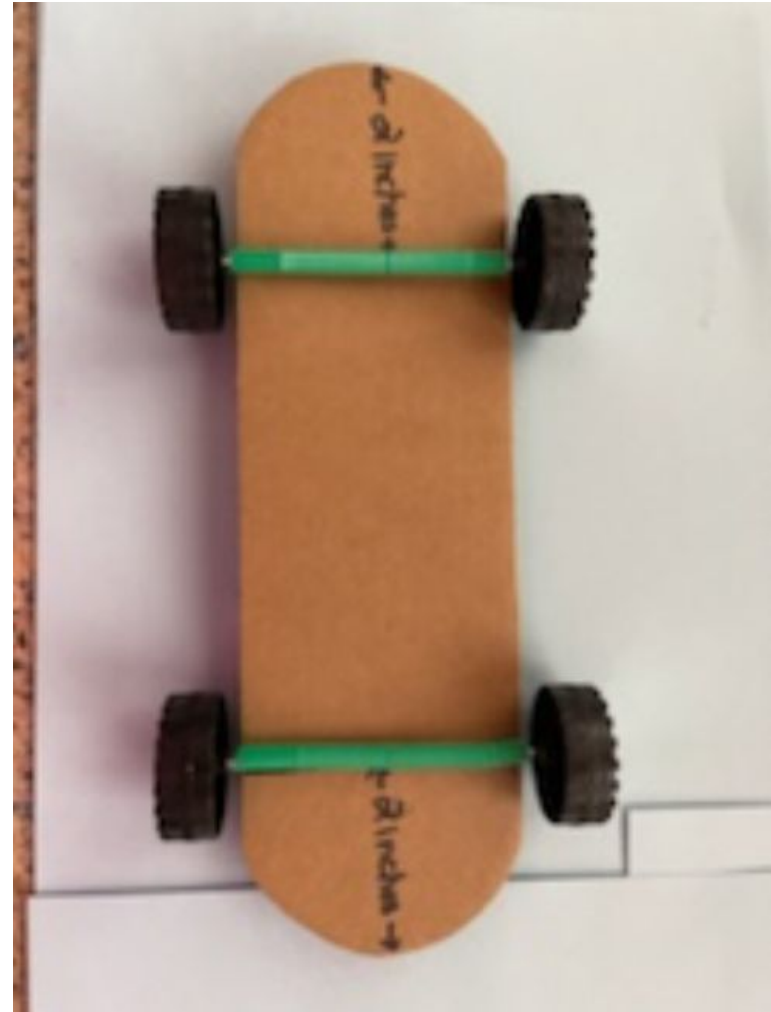
- 1) Take a ruler and measure about 2 inches from each end
- 2) Make a straight line that is parallel with the edges
 - you will glue your axels to this line
 - the lines MUST be about 2 inches from the end, otherwise the weight of the skateboard will not be even



Step Four

Glue the axels/straws to the skateboard

- 1) Put a line of glue on the lines on the bottom of the skateboard with the hot glue gun
- 2) Place the axel onto the glue, hold it gently until dry (~3 min)
 - make sure not to set them down during this time, hold onto them!
- 3) Make sure the axels are parallel (ask for help if you need it!)

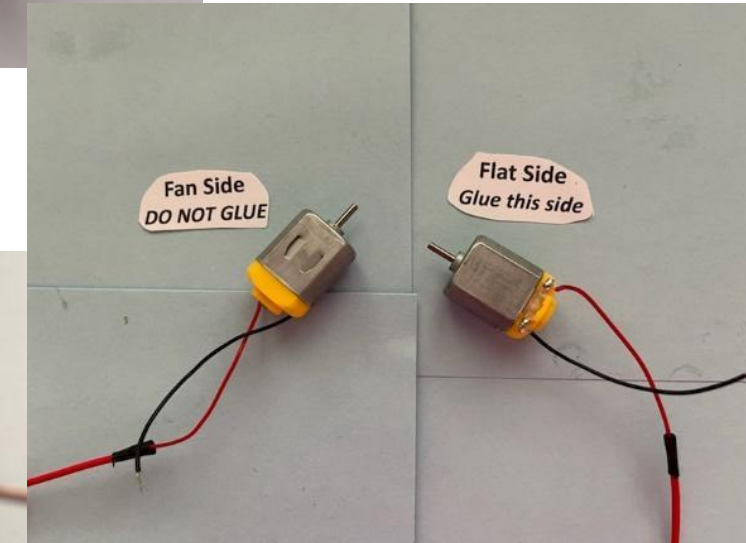
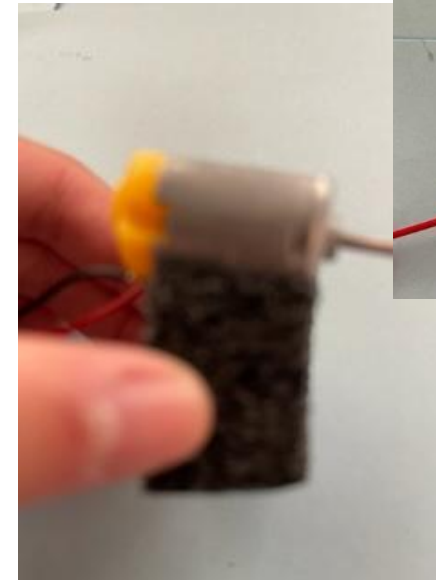
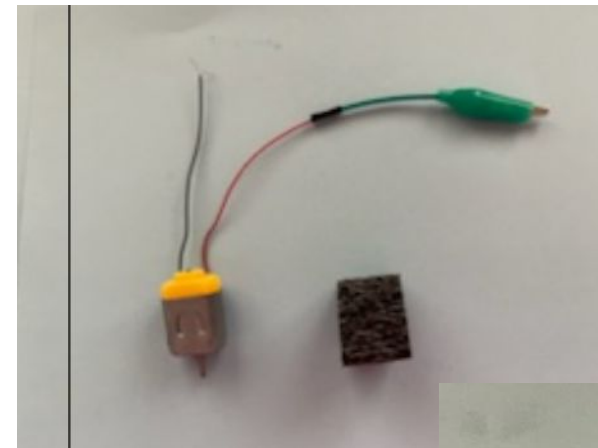


Step Five

Glue the motor to the motor mount

- 1) Take the motor base and the motor
- 2) Secure the motor to one of the flat sides of the motor mount.
- 3) The propeller needs to be able to clear the mount

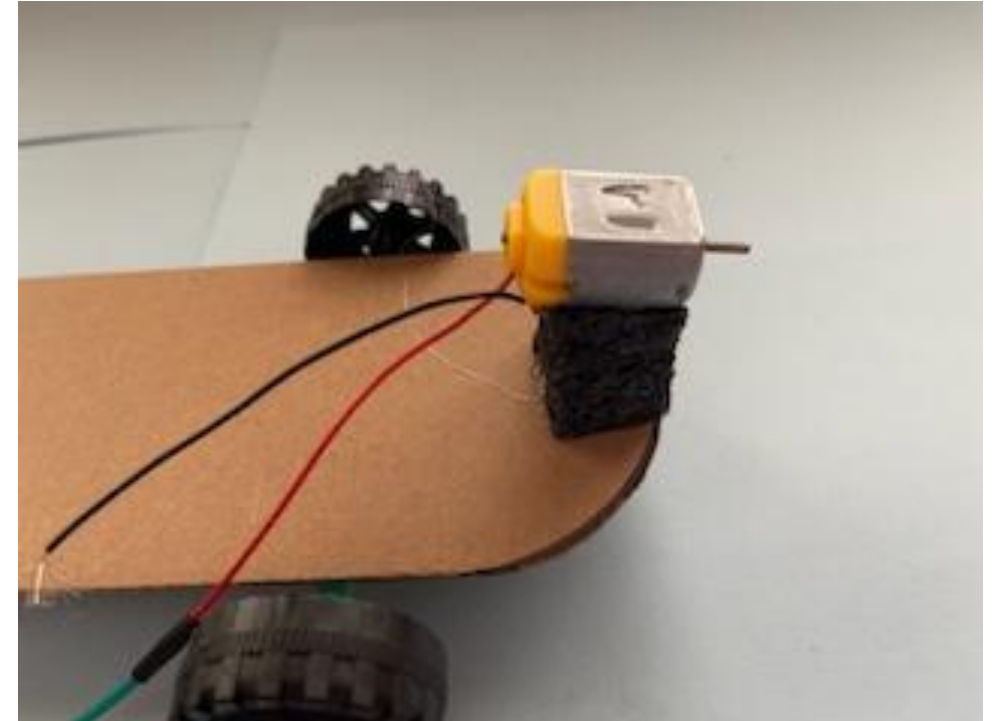
NOTE: apply glue to the flat side of the motor– not the fan side.



Step Six

Glue the motor and mount to the back of the skateboard

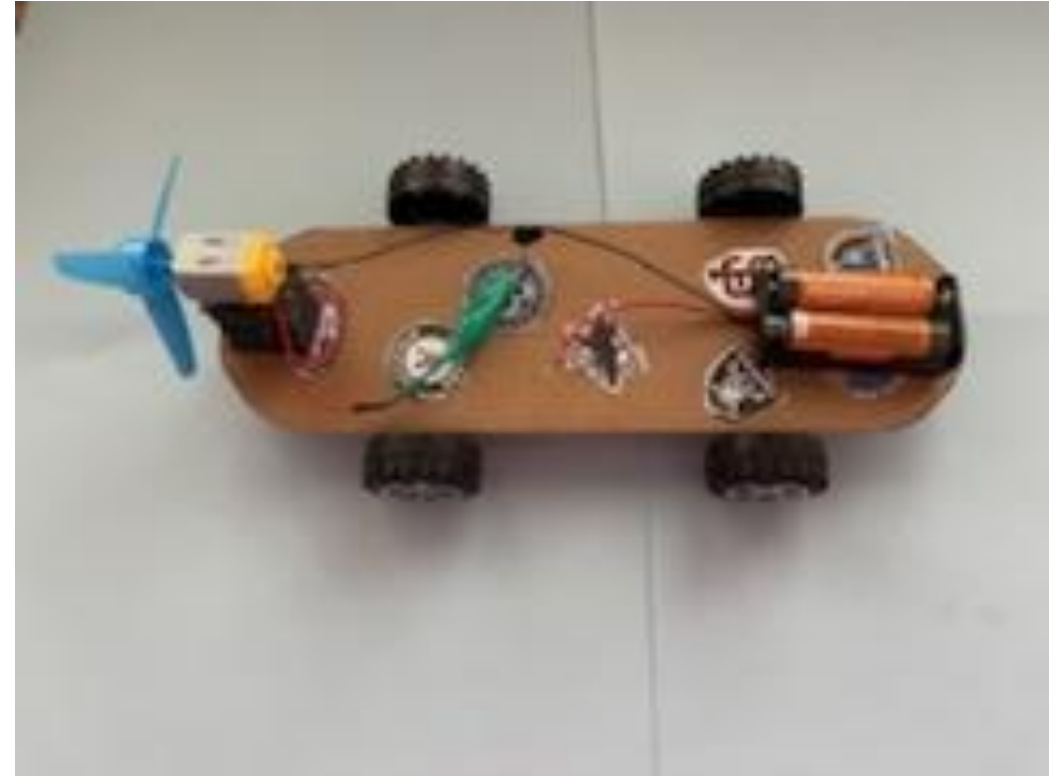
- 1) Make sure the mount is glued as closely as possible to the back of the skateboard
- 2) Remember, your propeller can not come in contact with the skateboard if you want it to work



Step Seven

Glue the battery pack to the front of the skateboard

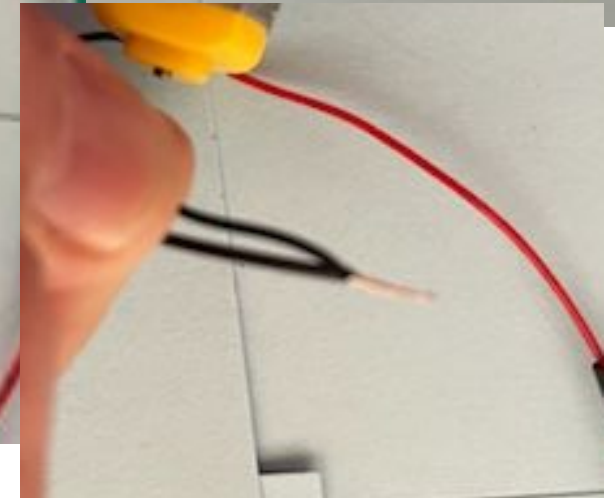
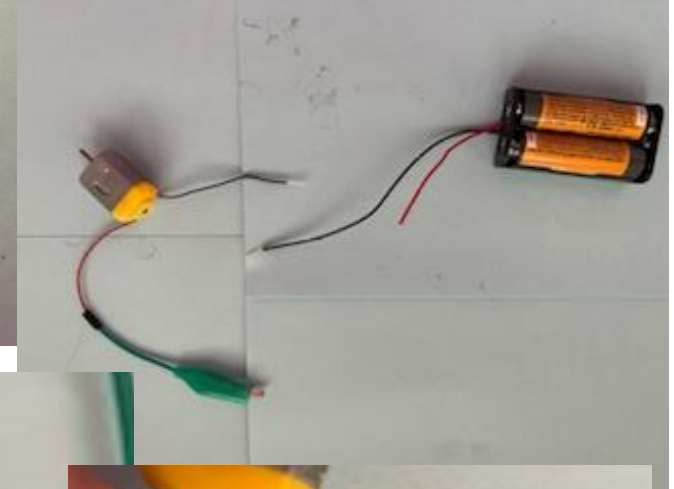
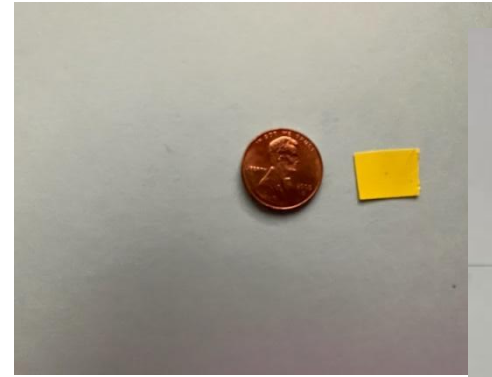
- 1) The battery pack (batteries facing up) must be at the front edge of the skateboard
- 2) The skateboard won't work properly if the battery back is not at the front



Step Eight

Connect the wires (ONLY the BLACK wires)

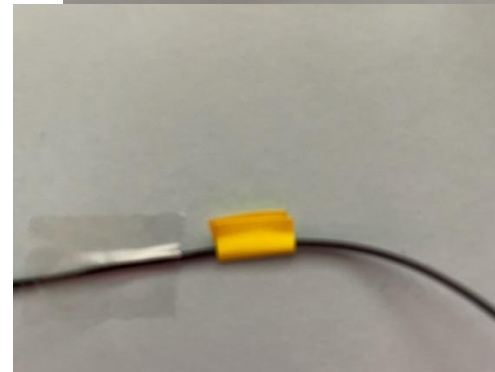
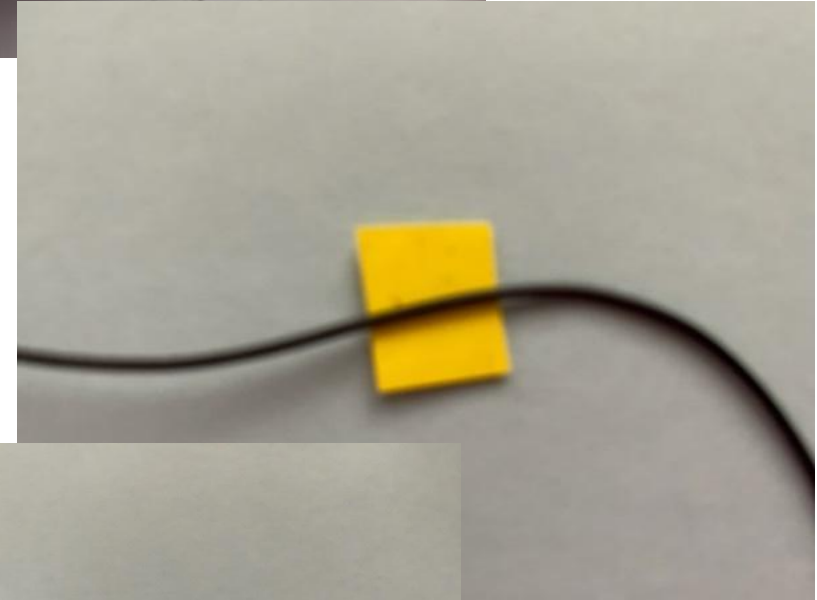
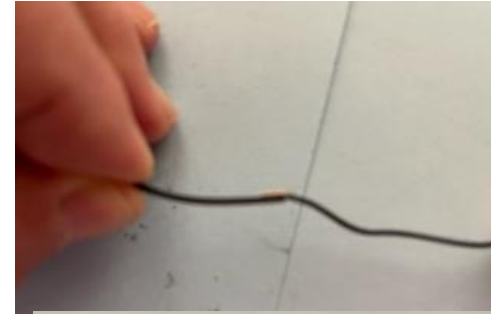
- 1) Cut a piece of tape about the size of a penny
- 2) Find the two black wires
- 3) Put the two black wires side by side
- 4) Twist the wires together



Step Eight cont.

Connect the wires (ONLY the BLACK wires)

- 1) Gently pull on both ends of the black wires and bend the wire so it lays on one of the wires
- 2) Place the bare wire in the middle of the piece of tape
- 3) Fold the tape over to make sure the wire is covered

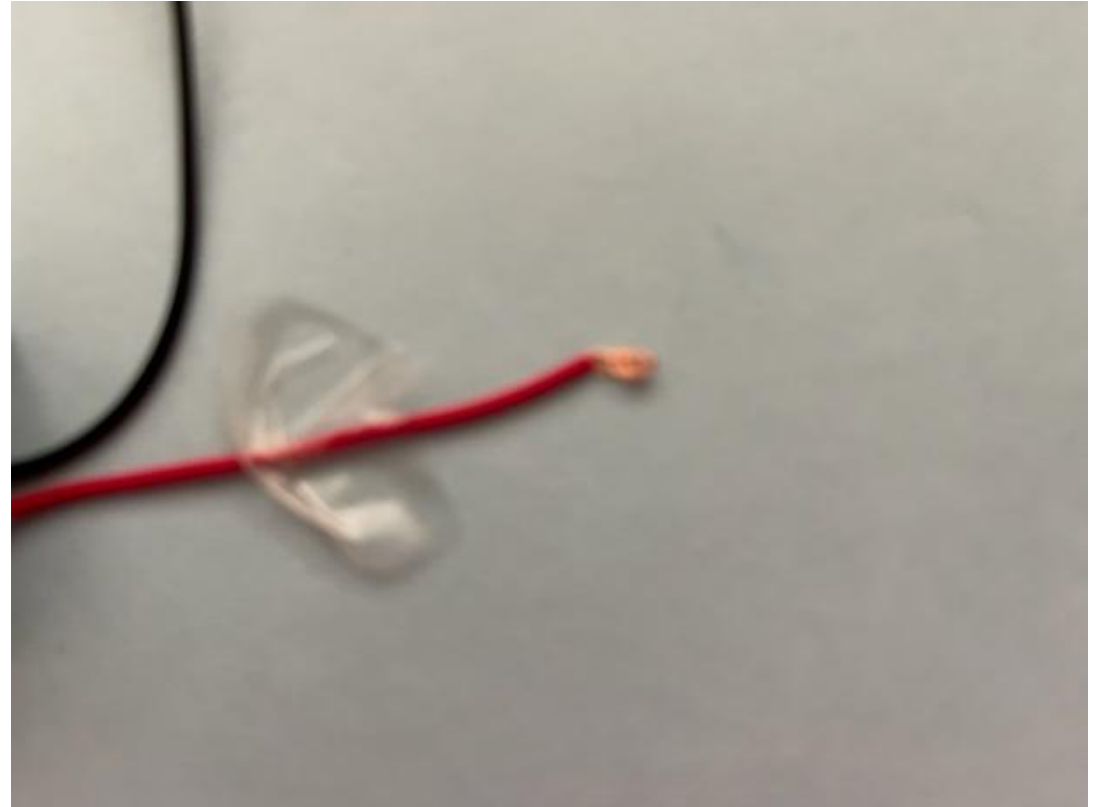


Step Eight cont.

Connect the wires (ONLY the BLACK wires)

- 1) Take the red wire from the battery and make a loop out of the exposed wire. This will be connected to the alligator clip

This is our **on/off switch!**



Operate your Skateboard!

Place your skateboard on the floor

Make sure you have a clear path!

**Connect the alligator clip to the wires
from the red battery wire**

Off it goes!



Done!

Today, you built a battery-powered skateboard.

You learned about circuits, thrust, and Newton's 3rd law.

We hope you enjoyed this activity and hope you enjoy science as much as we do!

Now have fun with your skateboard!

Remember to throw away trash, and give mentors any extra materials.

