

Learn about electricity and magnetism by designing and building your very own Electromagnet!



You Are Here

Choose how you would like to complete this activity.

Download documents & videos at teachergeek.com/electromagnet

Go Guide

Start here! Build your Crane, evolve your design, and begin the In-The-Bucket Challenge!

Optional Lab

-Magnetic Materials Lab (Ages 8+)

Optional Challenges

-Clip-Hanger Challenge*
-Stack-It Challenge*
-Washer-Hanger Challenge*

*See Page 5

Supplies

MAGNET PARTS

Name	Qty	Picture
Washers #10 SKU 1821-24	10	
Screw 50 mm (2 in) SKU 1821-27	1	
Battery Holder Single AA SKU 1821-62	1	
Block SKU 1821-34	1	
Wire Roll 5 m (16.4 ft) SKU 1823-47	1	

MATERIALS YOU SUPPLY

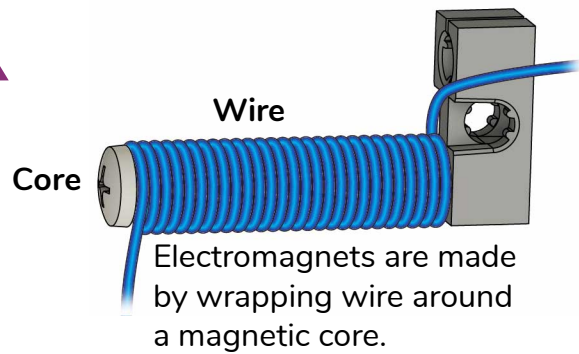
- AA Battery
- Paperclips
- Tape
- Cup

Optional - recommended for Clip Hanger Challenge on Page 5

Maker Cart Users: We recommend using Aluminum Wire for this activity (not included with Maker Carts until summer 2021).

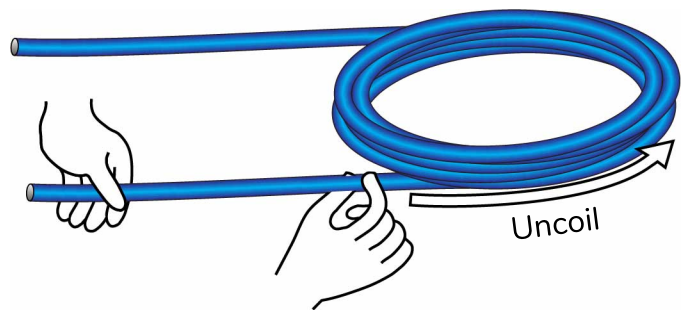
Prepare the Parts

Get your wire and core ready – they'll become your magnet.

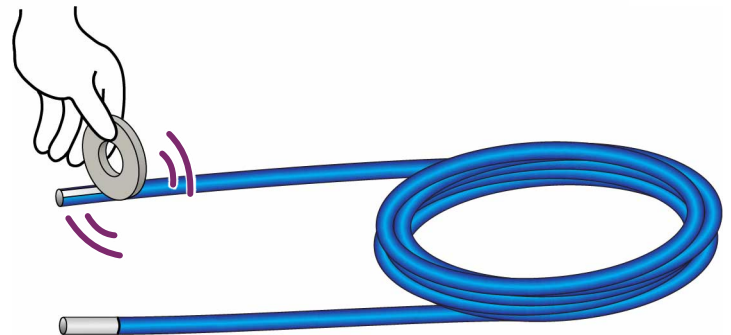
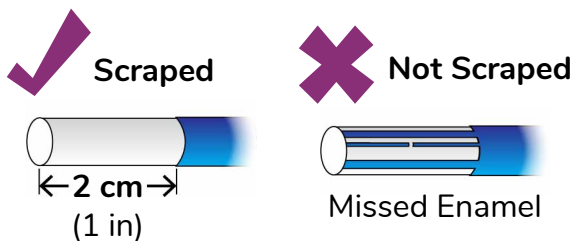


Prepare Your Wire

1 Carefully uncoil both ends of the wire. Don't tangle it!

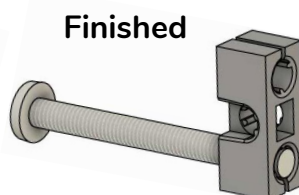
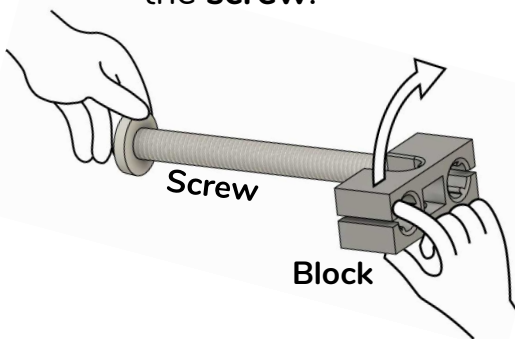


2 Scrape 2 cm (1 in) of enamel off both ends of the wire.

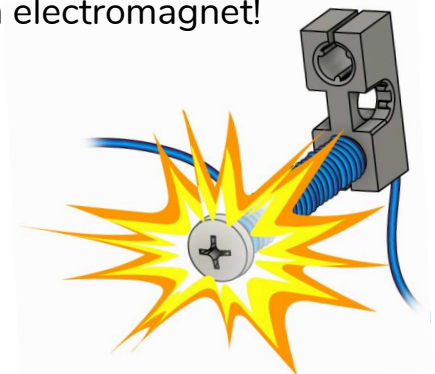


Make the Core

3 Turn the block onto the screw.



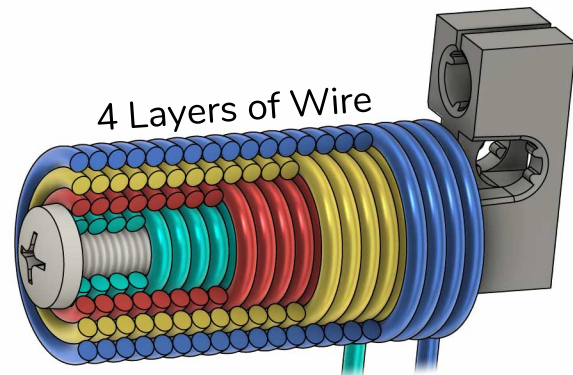
✓ **Your wire and core are ready!**
Next, you'll make them into an electromagnet!



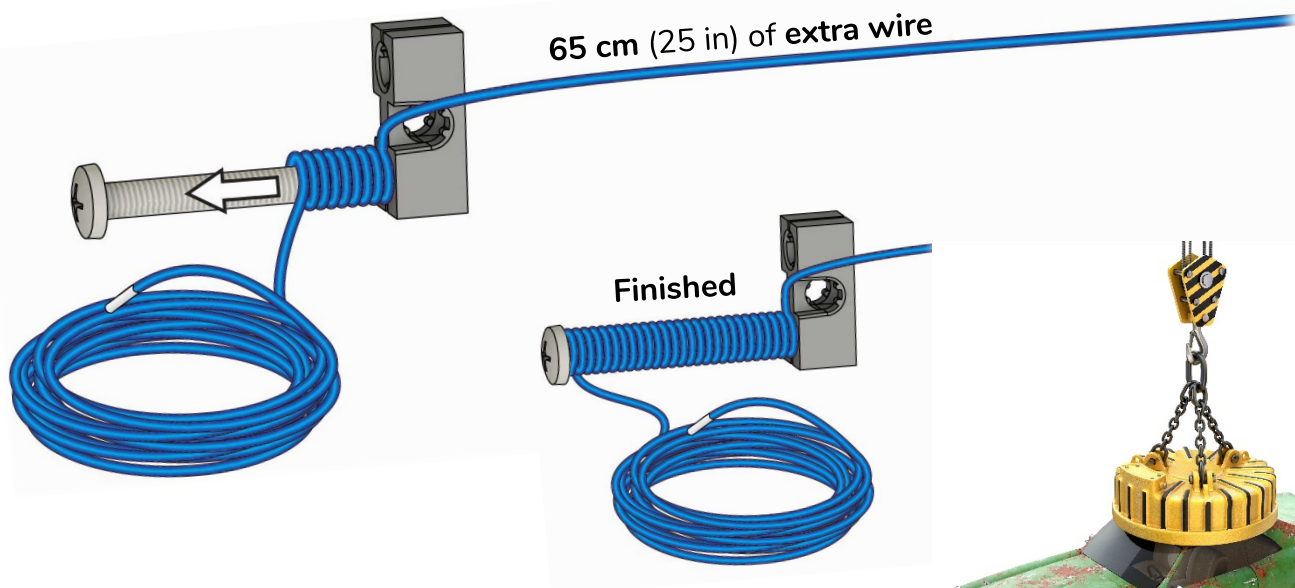
Wrap the First Layer

Your magnet will get four layers of wire wrapping. After you add each layer, you'll test your magnet.

Do you think more wraps will make your magnet stronger or weaker?

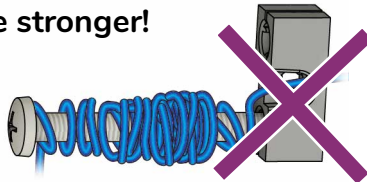


- 4** Wrap one layer of wire down the screw, leaving 50 cm (20 in) of extra wire at the base.



Neatness Counts!

Don't make your magnet like this...
Neat magnets are stronger!



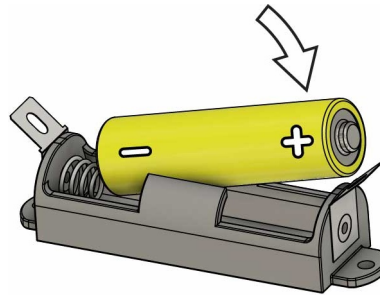
☒ Your magnet is ready!
Let's see how much it can pick up.



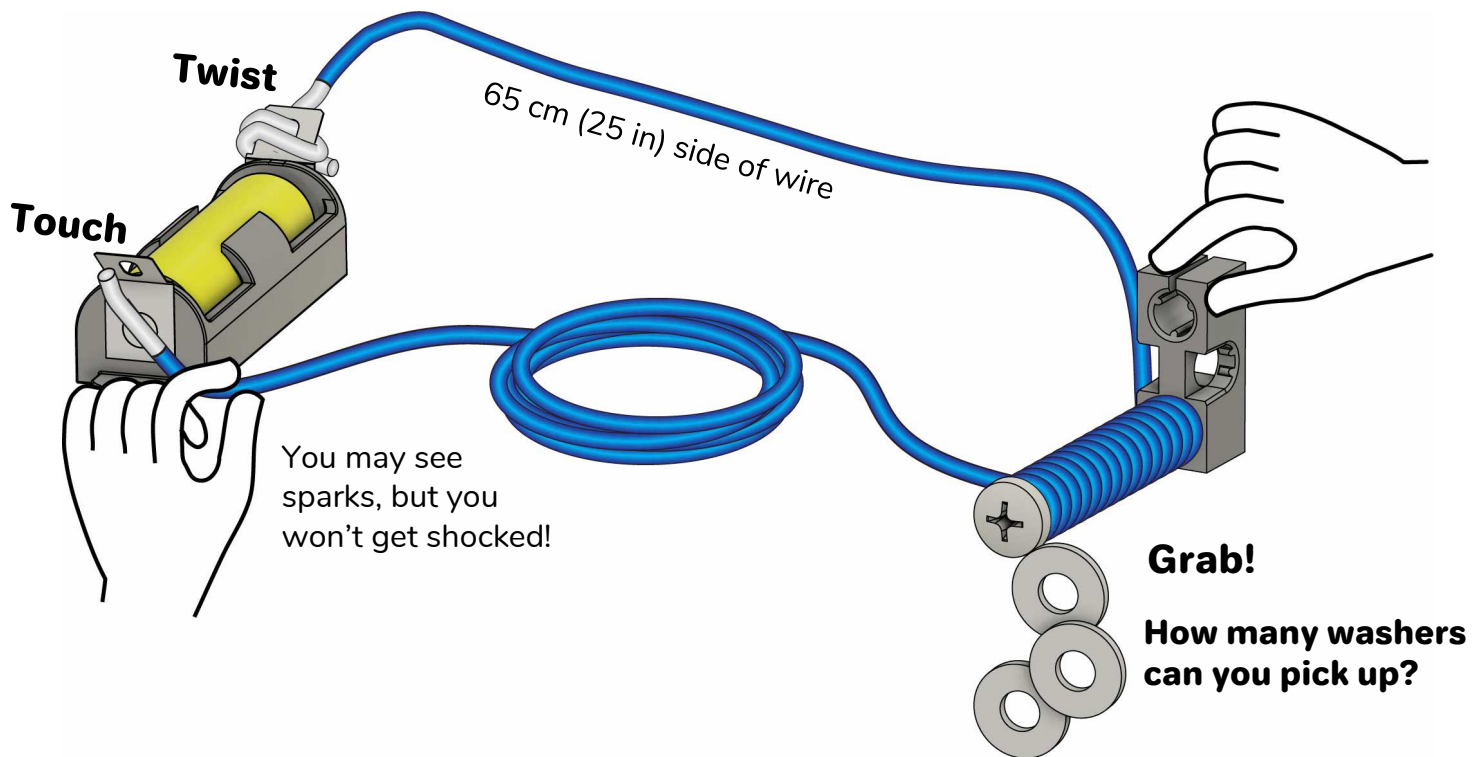
Test Your Magnet!

- 5** Put the **battery** into the **holder**.

Flat side of battery
against the spring.



- 6** Hook up your magnet and pick stuff up!

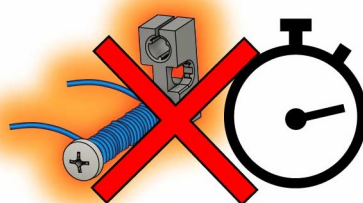


Don't Overheat!

Don't cut the wire!



Don't leave your magnet on!

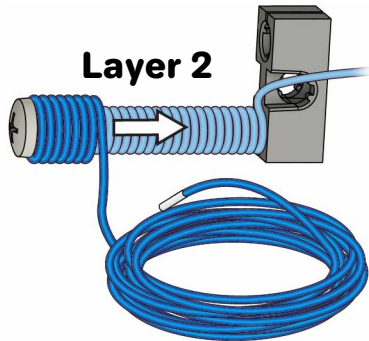


The wire, battery, and battery holder can get very hot.

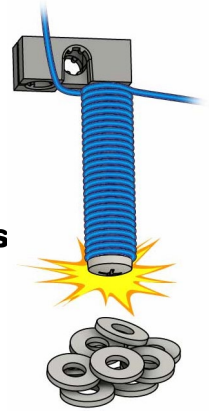
Do not permanently attach the magnet to the battery, run the magnet continuously, or cut the wire much shorter.

Wrap More Layers

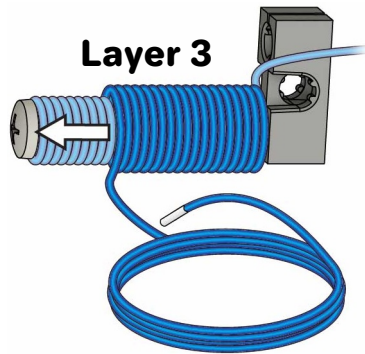
- 7** Wrap a **second layer**, then **test your magnet!**



How many washers can you grab now?



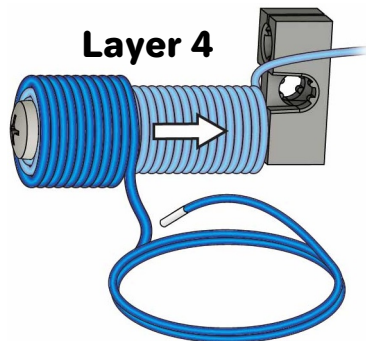
- 8** Wrap a **third layer**, then **test your magnet!**



How many washers can you grab now?

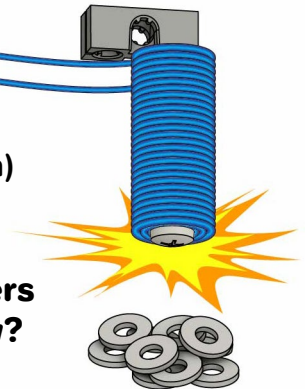


- 9** Wrap until both **wires** are the **same length**, then **test it!**



Both wires about 65 cm (25 in)

How many washers can you grab now?



☒ **Your magnet is done.**
Time for a lab or a challenge!



Want to learn more about magnets?

Download the [Magnetic Materials](https://www.teachergeek.com/electromagnet)
at [teachergeek.com/electromagnet](https://www.teachergeek.com/electromagnet)

Ages 8+

Clip-Hanger Challenge

Hang as many paperclips and washers as you can!

Criteria

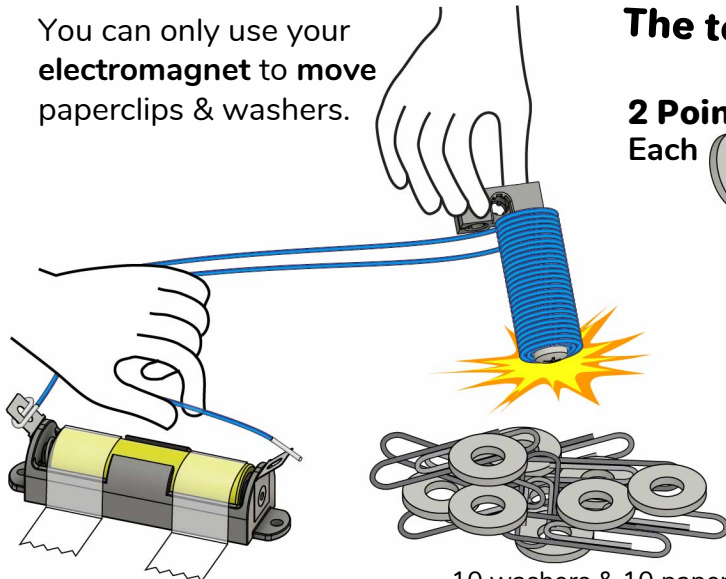
(what your design must do)



You have 1 minute to earn as many points as you can.

Washers and paperclips must be hung on **different hooks**, or they count as negative points.

You can only use your electromagnet to move paperclips & washers.



Tape battery to table to make it easier to turn magnet on and off.

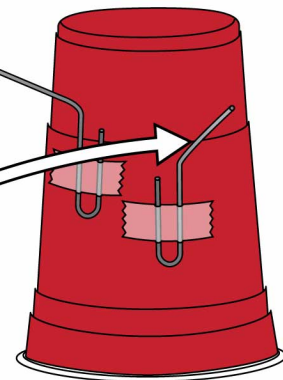
10 washers & 10 paperclips

The team with the most points wins!

2 Points Each



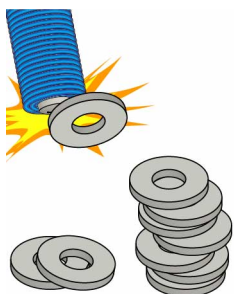
1 Point Each



Make hooks by bending paperclips and taping to a cup.

Additional Challenges

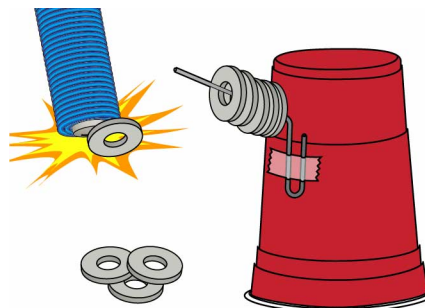
Stack-It Challenge



Using only your electromagnet, stack as many washers as you can! You have one minute. The team with the tallest stack wins.

If two teams tie for height, the faster team wins!

Washer-Hanger Challenge



Complete the same way as the challenge above, but with just washers. This challenge requires only one paperclip to use as a hook.