

Start by building the example, then turn it into your own unique design.

For use with TeacherGeek Electromagnet Activity, or Maker Cart. Find documents and activity materials at teachergeek.com.









Get Supplies

You will need these TeacherGeek components:

Below is the list of "ingredients" you'll need to build an Electromagnet. It includes some extra components to allow you to create your own unique design.



1 - Wire Roll colors vary <u>SKU: 1821-43</u>



1 - Battery Holder w/ Switch & Leads <u>SKU: 1821-63</u>



1 - Block <u>SKU: 1821-34</u>



1 – 50mm Screw #10 (2in) <u>SKU: 1821-27</u>

You will need these tools, they can be shared:

Tools available at teachergeek.com





Screwdriver



Pliers (optional) SKU 1823-86

You will need these non-TeacherGeek supplies:



Masking Tape



2 AA Batteries



Small Paper Clips and Other Materials

Erasers, Washers, Staples, Candy, Pennies, etc. for magnetic testing.



Electromagnet Crane Magnet Build



Make the Magnet









Do not keep your electromagnet turned on. It will get hot and drain your battery.

Congratulations!

Your electromagnet is finished. It's time to turn it into a crane on the next page.





Get Supplies

You will need these TeacherGeek components for the Crane:

Below is the list of "ingredients" you'll need to build an Electromagnet. It includes some extra components to allow you to create your own unique design.



Magnetic Materials Erasers, Washers, Stapes, Dimes Candy, Pennies, etc.

Tape





Use a **25mm screw** to attach a **connector strip** to the **block**. This will become the crane arm.

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Use a **25mm screw** and **nut** to attach your **electromagnet** to the arm.







Finish your example Electromagnet Crane by attaching the **battery holder** and taping loose **wires**.



On the next pages...



The Challenge: Redesign your crane to pick up as many paper clips as possible, in two minutes.

Difficulty: Easy







The Challenge: Redesign your crane to hang as many paper clips as possible, in two minutes.

Difficulty: Medium

This is not a good crane design (it's the example). Can you redesign it so it can pick up things near and far away, without moving the crane base?

Optional: Make the challenge more difficult by requiring that the crane base stay in one place.

> Prepare for the challenge by creating a "tree" or structure to hang paper clips on. The tree branches are opened paper clips.

Other documents and activity components at teachergeek.com.



The Challenge: Design an Electromagnet Crane to sort as many materials in 2 minutes as possible.

Difficulty: Medium





Single Player Arena







Engineering Challenge

Scoring Points:



2 Add 2 points for every **magnetic material** properly sorted.

Add 1 point for every **non-magnetic material** properly sorted.

Subtract 2 points for every material in the **wrong recycling** area.







Two Player Arena





Engineering Challenge

Design and build an electromagnetic minutes as possible. Compete against another crane for the most points.

TEAM #2

Criteria (rules):

 Only the crane arm may enter the sorting area during the challenge. Crane base must stay inside this rectangle. It may not be lifted up. Crane may not use sharp points to pick up materials. e.

Urane may not use snarp points to pick up materials.
Magnetic materials may only be moved by electromagnet

All materials must start in the center circle.
Only TeacherGeek, recycled, and approved mate

Only TeacherGeek, recycled, and approved materials may be used.

The example electromagnet crane arm will not reach all of the sorting areas. You need to redesign the arm so that it will

scoring Points:

Add 2 points for every magnetic
Add 1 point for every non-magnetic
material properly sorted.





Glue or tape side team #2 sheet here.



Class:

Set: _____

Points Scored

Group Names	Design #1	Design #2	Design #3	Design #4	Design #5	Design #6	Design #7	Design #8	Design #9	Design #10