Other documents, including this activity without the lab, available at teachergeek.com/learn
You will need these TeacherGeek components:
Available in the TeacherGeek Electromagnetic Crane Activity, TeacherGeek Maker Cart, or at teachergeek.com
(activity packs include extra components for further tinkering and innovation).

1 - Wire Roll
colors vary
SKU: 1821-43

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

1 - Block
SKU: 1821-34

1 - 50mm Screw
#10 (2in)
SKU: 1821-27

You will need these tools, they can be shared:
Tools available at teachergeek.com

Wire Strippers
SKU 1823-95

Screwdriver
SKU 1823-90

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 Build Guide with Lab**

**Make the Magnet**

1. Turn a 5cm long screw into a block.

2. Uncoil a wire roll.

3. Measure 60cm from one end of the wire. Fold a piece of tape there, over the wire.

4. Wrap the wire, as shown below, 50 times around the screw.

**Quick Tip**
To keep wire from unwinding, wrap a few times in the slots.

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Adaptations for this activity at teachergeek.com  
Adult supervision required for children under 12.
5 Strip (remove) 1 cm of plastic insulation from the wire ends.

Yes... one wire should be longer than the other.

6 Twist the stripped wire from step 5 with the stripped battery holder wires.

7 Wrap the twisted wire ends with tape. This will keep them together, and keep them from touching.

Don’t Short Circuit
Keep the red and black wires from touching. The battery will heat up and die (nothing fun).
8 Put 2 AA batteries into the battery holder. Turn it on and try to pick up some paper clips.

Turn your magnet on and off with the metal lever.

Yes... You should have extra wire on one side.

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

Let's see how much your magnet can pick up.
Test The Magnet

9. How many small paper clips can your electromagnet pick up? _______________________________________

10. Add 50 more wire wraps around the screw, using the extra wire. How many wire wraps are now on the screw?
    _______________________________________

11. How many paper clips can it pick up?
    _______________________________________

12. Add another 50 wire wraps around the electromagnet. How many wire wraps are now on the screw?
    _______________________________________

13. How many paper clips can it pick up?
    _______________________________________
14 Make the wires the same length by wrapping the extra wire around the screw. 
Your electromagnet is done. Put it to work.

15 Magnetic materials will attract to your electromagnet. Test different materials to see if they are magnetic. Record the results below.

<table>
<thead>
<tr>
<th>Material</th>
<th>Predict: Will it be magnetic?</th>
<th>Test: Is it magnetic?</th>
<th>How many can it pick up?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper Clip</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber Eraser</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penny</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dime</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staple</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
16. What was similar about the materials that were magnetic?
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

17. What was different about the materials that were magnetic?
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

18. How could you make the magnet more powerful?
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Congratulations!

Your electromagnet is finished. It’s time to turn it into a crane.

Documents at teachergeek.com/learn