

Sample Lesson Plan using TechChains.org

Potential NGSS Standards: K-2-ETS1-3, 3-5-ETS1-1, 3-5-ETS1-2, 3-PS2-4, 4-PS3-4, MS-ETS1-4

<u>Question / Activity</u>	<u>Objectives / Next Steps</u>
<p>What kinds of materials are magnetic? Small Groups: Give students a wide variety of materials and a magnet. Which materials are magnetic?</p>	<ul style="list-style-type: none">• Only a subset of metals (iron/steel, nickel, cobalt) are magnetic. <p><i>How do magnets work?</i></p>
<p>How do magnets work? Whole Class: Show students a commercial or obfuscated electromagnet at work. (Don't show a working model of an electromagnet made using the same materials students will use.)</p>	<ul style="list-style-type: none">• Because electromagnets work only when connected to an energy source, magnetic objects must be reacting to energy. <p><i>How do you make an electromagnet?</i></p>
<p>How do you make an electromagnet? Small Groups: Give students materials with which to design their own electromagnets. These materials will include batteries, wire, and something to serve as a core (such as a bolt or nail). Some experimentation is welcome, or students can use TechChains.org to examine how the battery and electromagnet work together.</p>	<ul style="list-style-type: none">• An electromagnet works when a wire is coiled around a core and energy is applied.• As energy (electrons) move, they create an electrical field which can attract magnetic objects. <p><i>What changes electromagnet effectiveness?</i></p>
<p>What changes electromagnet effectiveness? Small Groups: Encourage students to experiment and see if they can improve the effectiveness of their electromagnet. Give students a challenge to design an electromagnet which can hold a specific number of paper clips.</p>	<ul style="list-style-type: none">• Some ways to adapt the efficiency of the electromagnet is to change the number of times the wire is wrapped around the core, change the neatness with which the wire is wrapped, and to change the amount of current which is moving through the wire. <p><i>How are large and small electromagnets used in the real world?...</i></p>