

Center for Research on Interface Structure and Phenomenon (CRISP)  
CRISP CLASSROOM KITS & DEMONSTRATIONS STANDARD ALIGNMENT

KIT TITLE: Electromagnets

GRADE LEVEL: 9-12

OBJECTIVES:

- Students will understand the relationship between current and magnetism.

**Next Generation Science Standards (NGSS)**

NGSS Performance Task	<b>HS – PS2-5.</b> <ul style="list-style-type: none"> <li>• Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.</li> </ul>
NGSS DCI Standards	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>• Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects. (HS-PS2-4)</li> <li>• Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> </ul> <b>PS3.A: Definitions of Energy</b> <ul style="list-style-type: none"> <li>• “Electrical energy” may mean energy stored in a battery or energy transmitted by electric currents.(secondary)</li> </ul>
NGSS CC Standards	<b>CC 3 - Cause and Effect</b> <ul style="list-style-type: none"> <li>• Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>
NGSS SEP Standards	<b>SEP 4 - Planning and Carrying out Investigations</b> <ul style="list-style-type: none"> <li>• Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>

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## Common Core Standards (CC)

CC-ELA Standards	<p><b>WHST.11-12.7</b> Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.</p> <p><b>WHST.11-12.8</b> Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.</p> <p><b>WHST.11-12.9</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>
CC-MATH Standards	<p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p><b>HSN.Q.A.2</b> Define appropriate quantities for the purpose of descriptive modeling.</p> <p><b>HSN.Q.A.3</b> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>