

Unit 09: Electricity

Unit #:	APSDO-00018792	Duration:	2.0 Week(s)	Date(s):	
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Team:
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Grades:
 8

Subjects:
 Science

Unit Focus

In this unit, students will apply ideas about electrical charges and forces to explain a variety of phenomena including ideas about why some materials attract each other while others repel. Students will also develop ideas that objects can exert force on other objects, even though the objects are not in contact, through fields. Students will also examine voltage, current, and resistance and their relevance to series and parallel electrical circuits. Students will build and study circuits with electrical components such as light bulbs, fuses, and circuit breakers. Summative assessments may include application problems, experimental designs, laboratory practices, data analyses, models, and position statements. These may be in the form of stand-alone tasks or as part of quizzes, tests, labs, or other assignments. Primary instructional materials may include the course textbook, supplemental print and online resources, and related laboratory equipment and materials.

Stage 1: Desired Results - Key Understandings

Established Goals	Transfer
<p>Next Generation Science Standards (DCI) <i>Science: 8</i></p> <ul style="list-style-type: none"> • Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. <i>PS2.6.B1</i> • Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through 	<p>T1 (T3) Collect, analyze, and evaluate the quality of evidence in relation to a question. T2 (T5) Communicate scientific information clearly, thoroughly, and accurately. T3 (T2) Design an investigation or model using appropriate scientific tools, resources, and methods. T4 (T4) Develop a valid scientific conclusion, assess its validity and limitations, and determine future course of actions to inspire further questions. T5 (T1) Integrate knowledge from a variety of disciplines and apply it to new situations to make sense of information, formulate insightful questions, and/or solve problems. T6 (T6) Use mathematics to represent physical variables and their relationships, to make quantitative predictions, and to solve problems.</p>
	Meaning

<p>space and can be mapped by their effect on a test object (a charged object, or a ball, respectively). <i>PS2.6.B3</i></p> <p><i>Science: 11</i></p> <ul style="list-style-type: none"> "Electrical energy" may mean energy stored in a battery or energy transmitted by electric currents. <i>PS3.9.A1</i> 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. <i>PS2.9.B3</i> 	Understandings	Essential Questions
	<p>U1 (U429) Electric and magnetic forces depend on properties of the material such as their position and orientation relative to one another and do not require that the objects are touching each other.</p> <p>U2 (U438) Electromagnetism and gravity are fundamental forces in our universe, which are represented by fields whose strength is determined by a variety of factors (e.g., distance, mass, charge).</p> <p>U3 (U454) Each form of energy can be converted into other forms of energy or into work (e.g., kinetic to potential, mechanical to electrical).</p> <p>U4 (U462) Energy that is stored in an electric, magnetic, or gravitational field is dependent upon the position of the objects in the field.</p> <p>U5 (U453) The current produced in an electrical circuit is dependent on the voltage applied, the resistance of the materials, and the manner in which the materials (e.g., wires) are connected together.</p> <p>U6 (U459) The availability of energy limits what can occur in any system.</p>	<p>Q1 (Q454) What factors influence the flow of electricity?</p> <p>Q2 (Q451) What does energy look and feel like?</p> <p>Q3 (Q453) How does energy convert to work or other forms of energy?</p> <p>Q4 (Q461) How can position of an object in a field affect the amount of energy it has stored?</p>
	Acquisition of Knowledge and Skill	
	Knowledge	Skills
	<p>S1</p> <p>Design series and parallel circuits and combination circuits</p> <p>S2</p> <p>Calculate either amperage, voltage or resistance using Ohm's Law (amps = volts/ohms)</p>	

		<p>S3 Build an electrochemical cell with varying voltage</p> <p>S4 Explain why and how electrical fields exert their forces over a distance</p> <p>S5 Explain the three ways a charge is produced</p>
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