



San Diego Unified School District  
Science Department

**Grade 4 – Magnetism and Electricity**  
Physical Science  
**Unit of Study**



**ENERGY EFFICIENCY  
EDUCATION PROGRAM**  
SDCOE + SDUSD

**Table of Contents**

<b>Page</b>	
2	Module Overview/Conceptual Flow
3	California Science Standards
4	Pacing the Unit as a Whole
5	Investigation 1: The Force
10	Investigation 2: Making Connections
13	Investigation 3: Advanced Connections
16	Investigation 4: Current Attractions
19	Investigation 5: Click It
22	Energy Efficiency Education Program (E3) Enrichment Curriculum: “SOCKET” to Me
25	Recommended Body of Evidence
27	Module Materials and Equipment

**Science Vision for  
San Diego Unified School District**  
Science is an integral part of the intellectual development of a child. Interest in science begins with attitudes and values established in the earliest years through daily experiences. Students graduating from high school must have a foundation in scientific knowledge and evidence based reasoning.

Updated versions of this unit of study can be found online at [www.sandi.net/science](http://www.sandi.net/science).



**Grade 4 – Magnetism and Electricity**  
**Module Overview**



**Overview of the Unit**

The Magnetism and Electricity Module consists of five sequential investigations, each designed to introduce or reinforce concepts in physical science. Students experience magnetism and electricity as related effects and learn useful applications of magnetism and electricity in everyday life.

**Grade 4 Physical Science Conceptual Flow**

<b>Concept #1</b>				
Electricity and magnetism are related effects that have many useful applications in everyday life.				
<b>Subconcepts Investigation #1: The Force</b>	<b>Subconcepts Investigation # 2: Making Connections</b>	<b>Subconcepts Investigation # 3: Advanced Connections</b>	<b>Subconcepts Investigation # 4: Current Attractions</b>	<b>Subconcepts Investigation # 5: Click It</b>
Only iron sticks to a magnet.	A circuit is a pathway on which electric current flows.	A circuit with only one pathway for current flow is a series circuit. Components “share” the electric energy.	A core of iron or steel becomes an electromagnet when electricity flows through a coil of insulated wire surrounding the core.	A telegraph is an electronic communication device that uses an electromagnet.
Magnetism can be induced in iron.	Lightbulbs convert electric energy into heat and light energy.	A circuit with two or more pathways for current flow is a parallel circuit.	There are many ways to change the strength of an electromagnet, including changing the number of winds of wire around the core.	A code is a symbolic system used for communication.
Magnets have two poles. Like poles repel; opposite poles attract.	Motors convert electric energy into motion energy when placed in a closed circuit.			A telegraph converts electric energy into motion and sound energy.
Magnets display forces of attraction and repulsion that decrease with distance.	Conductors complete circuits and allow the flow electric current; insulators do not			
A compass is a magnet used to detect magnetic fields, including Earth’s.				

## 4<sup>th</sup> Grade Science Content Standards Addressed in this Module

### Physical Sciences

- PS1 Electricity and magnetism are related effects that have many useful applications in everyday life. As a basis for understanding this concept:
- PS1a Students know how to design and build simple series and parallel circuits by using components such as wires, batteries, and bulbs.
  - PS1b Students know how to build a simple compass and use it to detect magnetic effects, including Earth's magnetic field.
  - PS1c Students know electric currents produce magnetic fields and know how to build a simple electromagnet.
  - PS1d Students know the role of electromagnets in the construction of electric motors, electric generators, and simple devices, such as a doorbells and earphones.
  - PS1e Students know electrically charged objects attract or repel each other.
  - PS1f Students know that magnets have two poles (north and south) and that like poles repel each other while unlike poles attract each other.
  - PS1g Students know electrical energy can be converted to heat, light, and motion.

### Investigation and Experimentation

- I&E4 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
- I&E4a Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
  - I&E4b Measure and estimate the weight, length, or volume of objects.
  - I&E4c Formulate and justify predictions based on cause-and-effect relationships.
  - I&E4d Conduct multiple trials to test a prediction and draw conclusions about the relationships between predictions and results.
  - I&E4e Construct and interpret graphs from measurements.
  - I&E4f Follow a set of written instructions for a scientific investigation.

## Pacing the Unit as a Whole

Pre-Test (Optional)				
<b>Day 1</b> Start Inv. 1 Part 1 A	<b>Day 2</b> W	<b>Day 3</b> R	<b>Day 4</b> Start Inv. 1 Part 2 A/W	<b>Day 5</b> R
<b>Day 6</b> Start Inv. 1 Part 3 A	<b>Day 7</b> W	<b>Day 8</b> Start Inv. 1 Part 4 A	<b>Day 9</b> A/W	<b>Day 10</b> R
<b>Day 11</b> I-Check 1	<b>Day 12</b> Review	<b>Day 13</b> Start Inv. 2 Part 1 A/W	<b>Day 14</b> R	<b>Day 15</b> Start Inv. 2 Part 2 A
<b>Day 16</b> W	<b>Day 17</b> R	<b>Day 18</b> Start Inv. 2 Part 3 A/W	<b>Day 19</b> Start Inv. 2 Part 4 A/W	<b>Day 20</b> Start Inv. 2 Part 5 A
<b>Day 21</b> I-Check 2	<b>Day 22</b> Review	<b>Day 23</b> Start Inv. 3 Part 1 A/W	<b>Day 24</b> Start Inv. 3. Part 2 A	<b>Day 25</b> A/W
<b>Day 26</b> R	<b>Day 27</b> Start Inv. 3. Part 3 A/W	<b>Day 28</b> I-Check 3	<b>Day 29</b> Review	<b>Day 30</b> Start Inv. 4 Part 1 A/W
<b>Day 31</b> R	<b>Day 32</b> Start Inv. 4 Part 2 A	<b>Day 33</b> A/W	<b>Day 34</b> R	<b>Day 35</b> Start Inv. 4 Part 3 A/W
<b>Day 36</b> I-Check 4	<b>Day 37</b> Review	<b>Day 38</b> Start Inv. 5. Part 1 A/W	<b>Day 39</b> R	<b>Day 40</b> Start Inv. 5. Part 2 A/W
<b>Day 41</b> R	<b>Day 42</b> Start Inv. 5. Part 3 A	<b>Day 43</b> Review	<b>Day 44</b> Benchmark Assessment	
<b>Enrichment</b> “SOCKET” to Me Day 1	<b>Enrichment</b> “SOCKET” to Me Day 2	<b>Enrichment</b> “SOCKET” to Me Day 3	<b>Enrichment</b> “SOCKET” to Me Day 4	<b>Enrichment</b> “SOCKET” to Me Day 5

**A – Active Investigation** sessions include hands-on work with materials, active thinking about the concrete experiences, small-group discussion, writing in science notebooks, learning new vocabulary in context, and completing written embedded assessments to inform instruction. (Approximately 60 minutes)

**W – Wrap-up** sessions are teacher-directed vocabulary reinforcement and science content review. (Approximately 30 minutes)

**R – Reading** sessions (*Science Resources* book) include individual and interactive reading, answering review questions, and discussing the reading to ensure that students integrate the information. (Approximately 30 minutes)

**I-Checks** are short summative assessments. Students respond to written prompts. (Approximately 30 minutes)



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 1: The Force**



**Investigation Overview**

<p><b>Investigation 1: The Force</b>  <b>Concept: Electricity and magnetism are related effects that have many useful applications in everyday life.</b>          Students investigate the properties of magnets. They construct a simple compass and use it to detect magnetic effects. They investigate the strength of the force of attraction by graphing data to look for patterns of interaction.</p>	
<p><b>Part 1: Magnets and Materials</b></p>	<p><b>Part 2: More Magnetic Properties</b></p>
<p><u>Summary</u>          Students find that objects that contain iron stick to permanent magnets; other objects do not. They discover that two magnets will either attract or repel one another, depending on the orientation of the poles with respect to each other.</p>	<p><u>Summary</u>          Students observe that steel objects in contact with a magnet become temporary magnets. This induced magnetism disappears when the steel object separates from the magnet. Students find out that the magnetic force acts right through materials, with the exception of iron.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Only iron sticks to a magnet.</li> <li>▪ Two magnets attract or repel when they interact.</li> <li>▪ Magnets have two poles, called north and south. Two like poles repel; two opposite poles attract.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Magnetism can be induced in iron or steel.</li> <li>▪ The magnetic force acts through space and most materials.</li> <li>▪ The magnetic force of attraction between two magnets decreases with distance.</li> </ul>
<p><u>Time Allocation</u>          Active Investigation/Wrap-up: 2 days          Reading: 1 day</p>	<p><u>Time Allocation</u>          Active Investigation: 1 day          Reading: 1 day</p>
<p><u>CA Science Standards</u>          PS1f</p>	<p><u>CA Science Standards</u>          PS1f</p>

## Investigation Overview (continued)

### Investigation 1: The Force

**Concept: Electricity and magnetism are related effects that have many useful applications in everyday life.**

Students investigate the properties of magnets. They construct a simple compass and use it to detect magnetic effects. They investigate the strength of the force of attraction by graphing data to look for patterns of interaction.

Part 3: Breaking The Force	Part 4: Detecting Magnetic Fields
<p><u>Summary</u> Students use a balance and large washers to measure the force of attraction between two magnets. They systematically investigate what happens to the force of attraction as the distance between the two magnets increases. Students graph their results.</p>	<p><u>Summary</u> Students explore ways to detect the magnetic force. First they make a compass to detect Earth's magnetic field. They find several ways to detect magnetic fields and to make them visible, using things such as compasses and iron filings.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ The greater the distance between two magnets, the less the magnetic force.</li> <li>▪ Magnetic fields act right through plastic.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ A compass is a magnet used to detect Earth's magnetic field.</li> <li>▪ Compasses, iron filings, and iron objects can detect a magnetic field.</li> </ul>
<p><u>Time Allocation</u> Active Investigation/Wrap-up: 2 days</p>	<p><u>Time Allocation</u> Active Investigation/Wrap-up: 2 days Reading: 2 day Assessment/Review: 2 days</p>
<p><u>CA Science Standards</u> PS1f, I&amp;E6c, I&amp;E6d, I&amp;E6e, I&amp;E6f</p>	<p><u>CA Science Standards</u> PS1b, I&amp;E6c</p>



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 1: The Force**



**Pacing Guide – Investigation 1: The Force**

Day 1		Day 2		Day 3	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “Science Background” <i>TG p. 6 – 11</i> <input type="checkbox"/> Read “At a Glance” <i>TG p. 42-43</i> <input type="checkbox"/> Read “Background for the Teacher” <i>TG p. 44-47</i> <input type="checkbox"/> Read “Teaching Children About Magnetism” <i>TG p. 48-49</i> <input type="checkbox"/> Watch Video demo of Inv. 1, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 50-53</i> <input type="checkbox"/> Administer FOSS Grade 4 Physical Science Benchmark Pretest	Guiding the Investigation <input type="checkbox"/> “Part 1: Magnets and Materials” Steps 1-11 <i>TG p. 54-56</i>  <input type="checkbox"/> <b>Body of Evidence Prompt #1</b> <i>TG p.235 or 265</i>		Guiding the Investigation <input type="checkbox"/> “Part 1: Magnets and Materials; Wrapping up Part 1” Steps 12-26 <i>TG p. 56-61</i>	<input type="checkbox"/>	Reading in Science Resources <input type="checkbox"/> Steps 27-28 <i>TG p. 62</i>  Student Reading: Science Resources p. 3-8

**Pacing Guide – Investigation 1: The Force (continued)**

Day 4		Day 5		Day 6	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Watch Video demo of Inv. 1, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 63-64</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: More Magnetic Properties; Wrapping up Part 2” Steps 1-13 <i>TG p. 65-67</i>		Reading in Science Resources <input type="checkbox"/> Steps 14-15 <i>TG p. 68</i>  Student Reading: Science Resources p. 9-11	<input type="checkbox"/> Watch Video demo of Inv. 1, Pt 3 Review “Materials” and “Getting Ready” <i>TG p. 70-71</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: Breaking The Force” Steps 1-7 <i>TG p. 72-73</i>
Day 7		Day 8		Day 9	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Guiding the Investigation <input type="checkbox"/> “Part 3: Breaking The Force” Wrapping up Part 3 Steps 8-20 <i>TG p. 74-77</i>	<input type="checkbox"/> Watch Video demo of Inv. 1, Pt 4 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 78-79</i>	Guiding the Investigation <input type="checkbox"/> “Part 4: Detecting Magnetic Fields” Steps 1-6 <i>TG p. 80-81</i>		Guiding the Investigation <input type="checkbox"/> “Part 4: Detecting Magnetic Fields” Wrapping up Part 4” Steps 7-18 <i>TG p. 81-84</i>
Day 10		Day 11		Day 12	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Reading in Science Resources <input type="checkbox"/> Steps 19-20 <i>TG p. 85</i>  Student Reading: Science Resources p. 12-15	Read “Benchmark Assessment” <i>TG p. 373-375</i>	Concluding Investigation 1 <input type="checkbox"/> Student Reading: Science Resources p. 16-19 <input type="checkbox"/> I-Check 1 Steps 21-23 <i>TG p. 86-87, 386-395, 419-424</i>		<input type="checkbox"/> Review <input type="checkbox"/> Interdisciplinary Extensions <i>TG p. 88-89</i>



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 2: Making Connections**



**Investigation Overview**

<b>Investigation 2: Making Connections</b>		
<p><b>Concept: Electricity and magnetism are related effects that have many useful applications in everyday life.</b> Students investigate current electricity and circuits, the pathways through which electricity flows. They observe electric energy being converted to heat, light, and motion. They work with electrically charged objects and observe their behavior.</p>		
<b>Part 1: Charge</b>	<b>Part 2: Lighting A Bulb</b>	<b>Part 3: Making A Motor Run</b>
<p><u>Summary</u> Students observe that balloons rubbed with wool or hair repel each other and that the wool attracts the balloons. Students learn that the behavior is due to static charge on the objects.</p>	<p><u>Summary</u> Students build circuits with a D-cell, a lightbulb, and one or two wires. They read about Thomas Edison’s development of a practical electric lightbulb.</p>	<p><u>Summary</u> Students make a circuit that includes a motor and observe that electric energy can be converted to energy of motion. They introduce a switch into the system to control the flow of current. Students learn to make schematic diagrams to represent their circuits.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Electrons are negatively charged atomic particles.</li> <li>▪ Objects with electron excess or deficit have electric charge.</li> <li>▪ Objects with similar charge repel; opposite charges attract.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ A circuit is a pathway on which electric current flows.</li> <li>▪ A D-cell is a source of electric energy.</li> <li>▪ Lightbulbs convert electric energy into heat and light energy.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Motors convert electric energy into motion energy when placed in a closed circuit.</li> <li>▪ A schematic diagram is a symbolic system that represents circuits.</li> </ul>
<p><u>Time Allocation</u> Active Investigation/Wrap-up: 1 day Reading: 1 day</p>	<p><u>Time Allocation</u> Active Investigation/Wrap-up: 2 days Reading: 1 day</p>	<p><u>Time Allocation</u> Active Investigation/Wrap-up: 1 day</p>
<p><u>CA Science Standards</u> PS1e</p>	<p><u>CA Science Standards</u> PS1a, PS1g</p>	<p><u>CA Science Standards</u> PS1a, PS1g</p>



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 2: Making Connections**

**Investigation Overview**

<p><b>Investigation 2: Making Connections (continued)</b>  <b>Concept: Electricity and magnetism are related effects that have many useful applications in everyday life.</b>          Students investigate current electricity and circuits, the pathways through which electricity flows. They observe electric energy being converted to heat, light, and motion. They work with electrically charged objects and observe their behavior.</p>		
<b>Part 4: Conductors and Insulators</b>	<b>Part 5: Mystery Boards</b>	
<p><u>Summary</u>          Students build an open circuit. They attempt to close the circuit with various objects to determine if they are conductors or insulators. They search the classroom for insulators and conductors.</p>	<p><u>Summary</u>          Students work with mystery boards to reinforce the concept of conductor and check their understanding of how electricity flows through a circuit.</p>	
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Conductors complete circuits and allow the flow of electric current; insulators do not.</li> <li>▪ All metals are conductors.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Conductors allow the flow of electric current in a circuit.</li> </ul>	
<p><u>Time Allocation</u>          Active Investigation/Wrap-up: 1 day</p>	<p><u>Time Allocation</u>          Active Investigation/Wrap-up/Reading: 1 day          Review: 1 day          Assessment: 2 days</p>	
<p><u>CA Science Standards</u>          PS1a, I&amp;E6c</p>	<p><u>CA Science Standards</u>          PS1a, I&amp;E6c</p>	



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 2: Making Connections**



**Pacing Guide – Investigation 2: Making Connections**

Day 13		Day 14		Day 15	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 92-93</i> <input type="checkbox"/> Read “Background for the Teacher” <i>TG p. 94-97</i> <input type="checkbox"/> Read “Teaching Children About Current Electricity” <i>TG p. 98-99</i> <input type="checkbox"/> Watch Video demo of Inv. 2, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 100-101</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Charge” Wrapping Up Part 1 Steps 1-11 <i>TG p. 102-105</i>  <input type="checkbox"/> <b>Body of Evidence Prompt #2</b> <i>TG p.238 or 268</i>		Reading in Science Resources <input type="checkbox"/> Steps 12-13 <i>TG p. 106</i>  Student Reading: Science Resources p. 20-21	<input type="checkbox"/> Watch Video demo of Inv. 2, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 107-108</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Lighting A Bulb” Steps 1-11 <i>TG p. 109-112</i>
Day 16		Day 17		Day 18	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Guiding the Investigation <input type="checkbox"/> “Part 2: Lighting A Bulb” Wrapping up Part 2 Steps 12-18 <i>TG p. 112-114</i>		Reading in Science Resources <input type="checkbox"/> Steps 19-20 <i>TG p. 115</i>  Student Reading: Science Resources p. 22-25	<input type="checkbox"/> Watch Video demo of Inv. 2, Pt 3 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 116-117</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: Making A Motor Run” Wrapping up Part 3” Steps 1-18 <i>TG p. 118-121</i> <input type="checkbox"/> <b>Body of Evidence Prompt #3</b> <i>TG p.241 or 271</i>

**Pacing Guide – Investigation 2: Making Connections (continued)**

Day 19		Day 20		Day 21	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Watch Video demo of Inv. 2, Pt 4 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 122-123</i>	Guiding the Investigation <input type="checkbox"/> “Part 4: Conductors and Insulators” Wrapping up Part 4 Steps 1-13 <i>TG p. 124-127</i>	<input type="checkbox"/> Watch Video demo of Inv. 2, Pt 5 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 128-130</i>	Guiding the Investigation <input type="checkbox"/> “Part 5: Mystery Boards” Steps 1-7 <i>TG p. 131-132</i>		Concluding Investigation 2 <input type="checkbox"/> Read Summary Steps 8-9 <i>TG p. 133</i> <input type="checkbox"/> I-Check 2 Step 10 <i>TG p. 133, 396-401, 425-427</i>  Student Reading: Science Resources p. 26-29
Day 22					
Prep	Instruction				
	<input type="checkbox"/> Review <input type="checkbox"/> Interdisciplinary Extensions <i>TG p. 134-136</i>				



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 3: Advanced Connections**

**Investigation Overview**

<b>Investigation 3: Advanced Connections</b>		
<p><b>Concept: Electricity and magnetism are related effects that have many useful applications in everyday life.</b> Students explore series and parallel circuits and compare the functioning of the components in each circuit. They formulate and justify their predications, based on their observations of electric energy being converted to light and motion.</p>		
<b>Part 1: Building Series Circuits</b>	<b>Part 2: Building Parallel Circuits</b>	<b>Part 3: The String-of-Lights Problem</b>
<p><u>Summary</u> Students find ways to operate more than one component in a circuit. They wire two bulbs in series with a D-cell and find that the bulbs glow dimly. When students put two D-cells in the series with two lightbulbs, they find that the bulbs shine brightly. Students draw schematic diagrams of their series circuits.</p>	<p><u>Summary</u> Students learn another way to operate two components. They construct a parallel circuit and find that many bulbs can operate on a single D-cell. There are six ways students can wire two bulbs in parallel. Students draw schematic diagrams of several of their parallel circuits.</p>	<p><u>Summary</u> Students simulate the research and development department of a decorative-light manufacturer. They put their knowledge of series and parallel circuits to work and solve customer complaints, making recommendations for manufacturing guidelines.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>Multiple components can be operated simultaneously by putting them in series with one another.</li> <li>Bulbs in series circuits are dim; they “share” the electric energy from the D-cell.</li> <li>D-cells in series provide more electric energy or no energy, depending on orientation.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>Multiple components can be operated simultaneously by putting them in series with one another.</li> <li>Bulbs in parallel circuits are bright; each component has its own pathway to the electric energy source.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>When one lightbulb in an array of bulbs in parallel goes out, the others in the array continue to burn.</li> <li>When one lightbulb in an array of bulbs in series goes out, the others in the array also go out.</li> </ul>
<p><u>Time Allocation</u> Active Investigation/Wrap-up: 1 day</p>	<p><u>Time Allocation</u> Active Investigation/Wrap-up: 2 days Reading: 1 day</p>	<p><u>Time Allocation</u> Active Investigation/Wrap-up/Reading: 1 day Assessment/Review: 2 days</p>
<p><u>CA Science Standards</u> PS1a, PS1g</p>	<p><u>CA Science Standards</u> PS1a, PS1g</p>	<p><u>CA Science Standards</u> PS1a, PS1g, I&amp;E6c</p>



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 3: Advanced Connections**



**Pacing Guide – Investigation 3: Advanced Connections**

Day 23		Day 24		Day 25	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 138-139</i> <input type="checkbox"/> Read “Background for teacher” <i>TG p. 140-144</i> <input type="checkbox"/> Read “Teaching Children About Electric Circuits” <i>TG p. 145</i> <input type="checkbox"/> Watch Video demo of Inv. 3, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 146-147</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Building Series Circuits” Wrapping up Part 1 Steps 1-17 <i>TG p. 148-152</i>  <input type="checkbox"/> <b>Body of Evidence Prompt #4</b> <i>TG p.245-275</i>	<input type="checkbox"/> Watch Video demo of Inv. 3, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 153-154</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Building Parallel Circuits” Steps 1-7 <i>TG p. 155-157</i>		Guiding the Investigation <input type="checkbox"/> “Part 2: Building Parallel Circuits; Wrapping up Pt 2” Steps 8-12 <i>TG p. 157-158</i>  <input type="checkbox"/> <b>Body of Evidence Prompt #5</b> <i>TG p.246 or 276</i>

**Pacing Guide – Investigation 3: Advanced Connections (continued)**

Day 26		Day 27		Day 28	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Reading in Science Resources <input type="checkbox"/> Steps 13-15 <i>TG p. 159-160</i>  Student Reading: Science Resources p. 30-35	<input type="checkbox"/> Watch Video demo of Inv. 3, Pt 3 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 161-162</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: The String-of-Lights Problem” Wrapping up Part 3 Steps 1-11 <i>TG p. 163-165</i>		Concluding Investigation 3 <input type="checkbox"/> Read Summary Steps 12-13 <i>TG p. 166</i> <input type="checkbox"/> I Check 3 Step 14 <i>TG p. 166, 402-409, 428-432</i>  Student Reading: Science Resources p. 36-39
Day 29					
Prep	Instruction				
	<input type="checkbox"/> Review <input type="checkbox"/> Interdisciplinary Extensions <i>TG p. 167-168</i>				



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 4: Current Attractions**



**Investigation Overview**

<b>Investigation 4: Current Attractions</b>		
<p><b>Concept: Electricity and magnetism are related effects that have many useful applications in everyday life.</b> Students learn how to use electricity to make an electromagnet. They explore the variables that influence the strength of the magnetism produced by their electromagnets.</p>		
<b>Part 1: Building an Electromagnet</b>	<b>Part 2: Number of Winds</b>	<b>Part 3: More Electromagnets</b>
<p><u>Summary</u> Students discover that, when electric current flows through an insulated wire wound around a steel core, the steel core becomes a magnet. They learn that this happens because an electric current produces a magnetic field. They find out where to wind the wire on the core to produce the strongest magnet. Students read about Oersted’s landmark discovery that electric current produces magnetic fields.</p>	<p><u>Summary</u> Students experiment to find out how the number of winds of wire affects the strength of magnetism. After collecting data for a 20-wind, 30-wind, 40-wind electromagnet, students graph their results. They predict the strength of magnetism based on the graph. Students read a historical account of magician Robert-Houdin’s imaginative use of electromagnetism to prevent an armed conflict.</p>	<p><u>Summary</u> Students propose other ways to change the strength of the electromagnet. After listing a set of variables, students plan and conduct an experiment.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Current flowing through a wire produces a magnetic field.</li> <li>▪ A core of iron or steel becomes an electromagnet when electricity flows through a coil of insulated wire surrounding the core.</li> <li>▪ The magnetism produced by an electromagnet can be turned on and off.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ The greater the number of winds of wire around the iron core, the stronger the magnetism produced.</li> <li>▪ A graph can be used to make predictions.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ There are many ways to change the strength of an electromagnet, including tighter coils, number of D-cells, and different wire gauge</li> <li>▪ Wire used to make an electromagnet must be insulated.</li> <li>▪ All wire coils must be wound in the same direction.</li> </ul>
<p><u>Time Allocation</u> Active Investigation/Wrap-up: 1 day Reading: 1 day</p>	<p><u>Time Allocation</u> Active Investigation/Wrap-up: 2 days Reading: 1 day</p>	<p><u>Time Allocation</u> Active Investigation/Wrap-up/Reading: 1 day Assessment/Review: 1 day</p>
<p><u>CA Science Standards</u> PS1c, I&amp;E6a, I&amp;E6b</p>	<p><u>CA Science Standards</u> PS1c, I&amp;E6a, I&amp;E6c, I&amp;E6d, I&amp;E6e</p>	<p><u>CA Science Standards</u> PS1c, I&amp;E6c, I&amp;E6d, I&amp;E6f</p>



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 4: Current Attractions**



**Pacing Guide – Investigation 4: Current Attractions**

Day 30		Day 31		Day 32	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 172-173</i> <input type="checkbox"/> Read “Background for Teacher” <i>TG p. 174-176</i> <input type="checkbox"/> Read “Teaching Children About Electromagnetism” <i>TG p. 177</i> <input type="checkbox"/> Watch Video demo of Inv. 4, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 178-180</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Building An Electromagnet” Wrapping Up Part 1 Steps 1-15 <i>TG p. 181-184</i>		Reading in Science Resources <input type="checkbox"/> Steps 16-18 <i>TG p. 185</i>  Student Reading: Science Resources p. 40-42	<input type="checkbox"/> Watch Video demo of Inv. 4, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 186-187</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Number of Winds” Steps 1-6 <i>TG p. 188-189</i>  <input type="checkbox"/> <b>Body of Evidence Prompt #6</b> <i>TG p.252 or 282</i>

**Pacing Guide – Investigation 4: Current Attractions (continued)**

Day 33		Day 34		Day 35	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Guiding the Investigation <input type="checkbox"/> “Part 2: Number of Winds; Wrapping Up Part 2; Steps 7-11 <i>TG p. 189-190</i>		Reading in Science Resources <input type="checkbox"/> Steps 12-13 <i>TG p. 191</i>  Student Reading: Science Resources p. 43-45	<input type="checkbox"/> Watch Video demo of Inv. 4, Pt 3 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 192-193</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: More Electromagnets; Wrapping Up Part 3” Steps 1-9 <i>TG p. 194-196</i>
Day 36		Day 37			
Prep	Instruction	Prep	Instruction		
	Concluding Investigation 4 <input type="checkbox"/> Read Summary Steps 10-11 <i>TG p. 196</i> <input type="checkbox"/> I Check 4 Step 12 <i>TG p. 196, 410-413, 433-434</i>  Student Reading: Science Resources p. 46-49		<input type="checkbox"/> Review <input type="checkbox"/> Interdisciplinary Extensions <i>TG p. 197-198</i>		



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 5: Click It**



**Investigation Overview**

<p><b>Investigation 5: Click It</b>  <b>Concept: Electricity and magnetism are related effects that have many useful applications in everyday life.</b>          Students use all the concepts they have learned to build a simple telegraph system. The last part of the investigation asks students to use their inquiry skills to design, conduct, and report their own investigations.</p>		
<b>Part 1: Reinventing the Telegraph</b>	<b>Part 2: Long-Distance Messages</b>	<b>Part 3: Investigation and Experimentation</b>
<p><u>Summary</u>          Students apply their knowledge of circuitry and electromagnetism to build a telegraph. They invent a code and use their telegraphs to send messages to each other. Students read about Samuel Morse, the inventor of the telegraph, and the role the telegraph played in the development of long-distance communication worldwide.</p>	<p><u>Summary</u>          Students hook up two telegraphs so they can send messages back and forth with another group. In meeting the challenge, students have to solve a number of problems, including circuit design, resistance imposed by the long lines, and long-distance procedural signals. Students read about electromagnets and the many different places they are found, including motors, generators, doorbells, and earphones.</p>	<p><u>Summary</u>          Students engage in a performance assessment to show what they have learned about planning and conducting a scientific investigation. They do an investigation to find out more about how the core of an electromagnet affects the strength of the magnet.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ People learn about the natural world through scientific practices and use that knowledge to meet human needs (such as communication).</li> <li>▪ A telegraph is an electronic communication device that uses an electromagnet.</li> <li>▪ A code is a symbolic system used for communication.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ A telegraph converts electric energy into motion and sound energy.</li> <li>▪ A generator converts motion energy into electric energy.</li> <li>▪ A motor converts electric energy into motion energy.</li> </ul>	
<p><u>Time Allocation</u>          Active Investigation/Wrap-up: 1 day          Reading: 1 day</p>	<p><u>Time Allocation</u>          Active Investigation/Wrap-up: 1 day          Reading: 1 day</p>	<p><u>Time Allocation</u>          Assessment/Review: 3 days</p>
<p><u>CA Science Standards</u>          PS1c, PS1d, PS1g</p>	<p><u>CA Science Standards</u>          PS1c, PS1d, PS1g, I&amp;E6c</p>	<p><u>CA Science Standards</u>          I&amp;E6c, I&amp;E6d</p>



**Grade 4 – Magnetism and Electricity**  
**Pacing Guide – Investigation 5: Click It**



**Pacing Guide – Investigation 5: Click It**

Day 38		Day 39		Day 40	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 200-201</i> <input type="checkbox"/> Read “Background For Teacher” <i>TG p. 202-207</i> <input type="checkbox"/> Read “Teaching Children About Electromagnet Applications” <i>TG p. 208</i> <input type="checkbox"/> Watch Video demo of Inv. 5, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 209-210</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Reinventing the Telegraph” Wrapping Up Part 1 Steps 1-13 <i>TG p. 211-215</i>		Reading in Science Resources <input type="checkbox"/> Steps 14-15 <i>TG p. 216</i>  Student Reading: Science Resources p. 50-54	<input type="checkbox"/> Watch Video demo of Inv. 5, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 217-218</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Long Distance Messages” Wrapping Up Part 2 Steps 1-12 <i>TG p. 219-222</i>  <input type="checkbox"/> <b>Body of Evidence Prompt #7</b> <i>TG p.258 or 288</i>
Day 41		Day 42		Day 43	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Reading in Science Resources <input type="checkbox"/> Steps 13-14 <i>TG p. 223</i>  Student Reading: Science Resources p. 55-63	<input type="checkbox"/> Watch Video demo of Inv. 5, Pt 3 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 224-226</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: Investigation and Experimentation” Steps 1-4 <i>TG p. 227</i>		<input type="checkbox"/> Review Reading in Science Resources Step 5 <i>TG p. 228</i> Student Reading: Science Resources p. 64-70 <input type="checkbox"/> Interdisciplinary Extensions <i>TG p. 229-230</i>

**Pacing Guide – Investigation 5: Click It (continued)**

Day 44	
Prep	Instruction
	<input type="checkbox"/> Administer Grade 4 DISTRICT Physical Science Benchmark Assessment



**Grade 4 – “SOCKET” to Me**  
**Pacing Guide – Enrichment Materials**



Please refer to the Energy Efficiency Education Program (E3) website at <http://www.k12e3.org> for more information about this program and professional development opportunities.

**Investigation Overview**

<p><b>Investigation: “SOCKET” to Me</b>  <b>Concept: Energy can be transformed from one form to another; in all energy transformations, some heat is produced. Some technologies use energy more efficiently than others, producing less waste heat. There are both renewable and non-renewable energy resources – these resources can be used to produce electricity. Human behavioral change and alternate technologies can conserve energy.</b></p>		
<p><b>Lesson 1: Light Bulb Challenge</b></p>	<p><b>Lesson 2: Electricity for Our Homes</b></p>	<p><b>Lesson 3: Renewable and Non-renewable Energy Resources</b></p>
<p><u>Summary</u>            Students explore the idea of energy efficiency by comparing incandescent and compact fluorescent light (CFL) bulbs. They measure heat production and compare costs. They survey bulbs in their own homes, and evaluate possibilities for energy savings.</p>	<p><u>Summary</u>            Students use a hand generator to produce an electric current, converting mechanical energy into electrical energy. They learn that generators inside power plants produce the electric current we use, providing electrical energy to power devices. They determine the distribution pathway from the power plant to homes.</p>	<p><u>Summary</u>            Students learn about the energy resources used to generate electric current in power plants. They learn some of the pros and cons of different resources, both renewable and non-renewable. They learn the mix of resources used to produce electricity in San Diego.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ An electric bulb produces both light and heat; CFL bulbs require less energy than incandescent bulbs to produce the same amount of light.</li> <li>▪ A complete circuit is needed for the bulbs to light.</li> <li>▪ A CFL bulb is more energy efficient, and can save you money in the long run.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Generators use electromagnetism to convert mechanical energy into electrical energy; in power plants generators use mechanical energy (from turbines) to produce an electric current.</li> <li>▪ Electric current is transmitted from the power plant to our homes via wires and transformers.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ The electricity we use is generated using the energy in a variety of resources.</li> <li>▪ Some resources, e.g. fossil fuels, are non-renewable – they are not replenished, and what we have now is all we will have.</li> <li>▪ Other resources, e.g. sun, wind, biomass, geothermal, and hydropower, are renewable – they are constantly being replenished.</li> <li>▪ There are pros and cons associated with every type of energy resource.</li> </ul>
<p><u>Time Allocation</u>            45 minutes</p>	<p><u>Time Allocation</u>            45 minutes</p>	<p><u>Time Allocation</u>            45 minutes</p>
<p><u>CA Science Standards</u>            PS1a, PS1e, I&amp;E6d, I&amp;E6e, I&amp;E6f</p>	<p><u>CA Science Standards</u>            PS1d, PS1e</p>	<p><u>CA Science Standards</u>            PS1d, PS1e</p>

## Investigation Overview (continued)

**Investigation: “SOCKET” to Me**  
**Concept: Energy can be transformed from one form to another; in all energy transformations, some heat is produced. Some technologies use energy more efficiently than others, producing less waste heat. There are both renewable and non-renewable energy resources – these resources can be used to produce electricity. Human behavioral change and alternate technologies can conserve energy.**

Lesson 4: Solar Water Heaters	Lesson 4: Converting Energy	
<p><u>Summary</u>            Students learn that water heaters are among the biggest users of energy in a home. They conduct an experiment and collect data on the solar heating of water in covered and uncovered containers, and relate their results to the preheating of water for solar water heaters to save energy.</p>	<p><u>Summary</u>            Students survey energy use in a room at school and note any ways that energy could be saved by making simple, small changes. This demonstrates that if everyone saves a little energy, it can add u t big savings. Students conduct a similar survey at home. They create a poster or brochure to share with other students or with their families that shows simple ways to save energy.</p>	
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ Energy from the sun can be used to heat water for use in our homes.</li> <li>▪ Water in a covered container is heated more than water in an open one.</li> <li>▪ Preheating water for our water heaters can save energy and save money.</li> </ul>	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> <li>▪ There are many ways to conserve energy in our daily lives.</li> <li>▪ Small, simple changes can have a large effect when many people do them.</li> </ul>	
<p><u>Time Allocation</u>            45 minutes</p>	<p><u>Time Allocation</u>            45 minutes</p>	
<p><u>CA Science Standards</u>            I&amp;E6d, I&amp;E6f, Foundation for Gr. 5 ES4b</p>	<p><u>CA Science Standards</u></p>	



**Grade 4 – “SOCKET” to Me**  
**Pacing Guide – Enrichment Materials**



**Pacing Guide – “SOCKET” to Me**

Day 1		Day 2		Day 3	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “For the Teacher – About Energy”, <i>TG p. ii-iii</i> <input type="checkbox"/> Read “Overview”, “Background for the Teacher”, and “Getting Ready” <i>TG p. 1-3</i> <input type="checkbox"/> Review “Materials” <i>TG p. 1</i> and “Vocabulary” <i>TG p. 2</i> <input type="checkbox"/> Review and check answers for “Science Notebook, Lesson 1” <i>TG p.10-11</i>	<input type="checkbox"/> Guiding the Activity <i>TG p. 4-9</i>	<input type="checkbox"/> Read “Overview”, “Background for the Teacher”, and “Getting Ready” <i>TG p. 12-15</i> <input type="checkbox"/> Review “Materials” <i>TG p. 12</i> <input type="checkbox"/> Review and check answers for “Science Notebook, Lesson 2” <i>TG p.19</i>	<input type="checkbox"/> Guiding the Activity <i>TG p. 15-18</i>	<input type="checkbox"/> Read “Overview” and “Background for the Teacher”, <i>TG p. 20-21</i> <input type="checkbox"/> Review “Materials” <i>TG p. 20</i> <input type="checkbox"/> Review and check answers for “Science Notebook, Lesson 3” <i>TG p.24</i>	<input type="checkbox"/> Guiding the Activity <i>TG p.22-23</i>
Day 4		Day 5			
Prep	Instruction	Prep	Instruction		
<input type="checkbox"/> Read “Overview”, “Background for the Teacher”, and “Getting Ready” <i>TG p. 26</i> <input type="checkbox"/> Review “Materials”, <i>TG p. 25</i> <input type="checkbox"/> Review and check answers for “Science Notebook, Lesson 4” <i>TG p.32</i>	<input type="checkbox"/> Guiding the Activity <i>TG p. 26-31</i>	<input type="checkbox"/> Read “Overview”, “Background for the Teacher”, and “Getting Ready” <i>TG p. 33-34</i> <input type="checkbox"/> Review “Materials”, <i>TG p. 33</i> , and “Schoolroom Energy Audit” <i>TG p.36</i>	<input type="checkbox"/> Guiding the Activity <i>TG p. 34-35</i>		



## Grade 4 – Magnetism and Electricity Recommended Body of Evidence



### Overview

This guide is intended to support the collection of a Body of Evidence. A student's Body of Evidence should, at a minimum, include work from the listed prompts and in-class investigations that demonstrate a student's level of proficiency. The FOSS pre-assessment given at the beginning of the unit, the I-checks given after each investigation, and Grade 4 DISTRICT Physical Science Benchmark Assessment given at the end of the unit (post-assessment) may also be included in the body of evidence.

Download samples of proficient work at <https://eteams.sandi.net/sites/sbrc>

### Recommended Body of Evidence – Grade 4 Physical Science

#### Concept #1

Electricity and magnetism are related effects that have many useful applications in everyday life. (PS1a, PS1b, PS1c, PS1d, PS1e, PS1f, PS1g)

#### **Prompt 1: FOSS: Magnetism and Electricity: Investigation 1: The Force Part 2: More Magnetic Properties**

**(TG p. 235 or 265 – Response Sheet – The Force – No.5 – Science Notebook)**

Sandy wrote in her science notebook: *Magnets only stick to other magnets. When a magnet touches an iron nail, the nail becomes a temporary magnet. That is why the magnet sticks.* 1. Do you agree with Sandy? Why or why not? 2. How could you prove that the nail had become a magnet?

#### **Prompt 2: FOSS: Magnetism and Electricity: Investigation 2: Making Connections Part 1: Charge**

**(TG p. 238 or 268 – Charge – No. 8 – Science Notebook)**

1. Rub a balloon on your hair. What do you predict will happen if you bring the charged balloon close to two hanging charged balloons? Why do you think so? 2. Rub a balloon on your hair. What do you predict will happen if you bring your other hand close to two hanging charged balloons? Why do you think so? 3. Conclusions. What is the general rule for how charged objects interact?

#### **Prompt 3: FOSS: Magnetism and Electricity: Investigation 2: Making Connections Part 3: Making A Motor Run**

**(TG p. 241 or 271 – Response Sheet – Making Connections - No. 11 – Science Notebook)**

1. Ahmed drew a picture of a motor circuit he built. Draw arrows on the picture to show how electricity flows through the circuit. Explain below why you drew the arrows the way that you did. 2. Look at the two bulb-and-battery circuits pictured below. Only one will light the bulb. Which one do you think will work and why?

#### **Prompt 4: FOSS: Magnetism and Electricity: Investigation 3: Advanced Connections Part 1: Building Series Circuits**

**(TG p. 245 or 275 Two Bulbs In Series – No. 15 – Science Notebook)**

1. Draw a diagram of a series circuit that will light two bulbs. 2. Why do you think the two lights are dim when they are in series? 3. Why do you think two lightbulbs are bright when two D-cells are used in series? 4. Draw and label a schematic diagram of your series circuit that made two lightbulbs glow brightly.

## Recommended Body of Evidence – Grade 4 Physical Science (continued)

### **Prompt 5: FOSS: Magnetism and Electricity: Investigation 3: Advanced Connections Part 2: Building Parallel Circuits**

***(TG p. 246 or 276 – Two Bulbs In Parallel – No. 16 – Science Notebook)***

1. Draw a schematic diagram of a parallel circuit that will light two bulbs. 2. Why do you think the two lights are bright when they are in parallel? 3. Draw and label a schematic diagram of another parallel circuit that made two lightbulbs shine brightly.

### **Prompt 6: FOSS: Magnetism and Electricity: Investigation 4: Current Attractions Part 2: Number of Winds**

***(TG p. 252 or 282 – Response Sheet – Current Attractions – No. 22 – Science Notebook)***

Sarena heard that if you wind a wire around a rivet and connect the wire to a D-cell, you can make a magnet. She got some wire, wound it around an aluminum rivet four times, and attached it to a D-cell. She tried to pick up some paper clips, but nothing happened. Below is a drawing she made to show what she had done. Help Sarena get her electromagnet to work. 1. Make a drawing to show how to make an electromagnet that works. 2. Explain to Sarena what she needs to change. 3. Explain to Sarena how an electromagnet works.

### **Prompt 7: FOSS: Magnetism and Electricity: Investigation 5: Click It Part 2: Long-Distance Messages**

***(TG p. 258 or 288 – Summary: Click It – No. 28 – Science Notebook)***

***ELECTROMAGNETS EVERYWHERE REVIEW*** 1. How does motor work? 2. How does a doorbell make a continuous ring? 3. How does a speaker work?

***SUMMARY QUESTIONS*** 1. What causes the core of an electromagnet to become a magnet? 2. Discuss how an electromagnet can act as an energy converter.



## Grade 4 – Magnetism and Electricity Module Materials and Equipment



### Materials Provided

The FOSS kit comes with most of the supplies that are needed to teach the unit. The kits will be delivered to the school site prior to the start of the 12-week unit of instruction. At the end of the 12-weeks, the kit will be returned to the Science Resource Center where it will be refurbished and prepared for its next use. Please review the refurbishment calendar for kit drop-off and return dates. Kits must be returned according to the refurbishment calendar to ensure that all kits are checked and restocked with consumable materials.

### Materials Supplied by the Teacher or School Site

Be aware that the classroom teacher or school site must supply a few items. These are indicated in the materials list for each part of the investigation with an asterisk (\*). Here is a summary of those items.

Investigation 1: The Force	Investigation 2: Making Connections	Investigation 3: Advanced Connection	Investigation 4: Current Attractions
<ul style="list-style-type: none"><li>▪ Flip Chart</li><li>▪ Assorted magnets (Optional)</li><li>▪ Marking Pen, permanent</li><li>▪ Masking tape</li><li>▪ Overhead projector (optional)</li><li>▪ Paper clips (large)</li><li>▪ Scratch Paper</li><li>▪ Additional test objects</li><li>▪ Transparency (optional)</li><li>▪ Transparent Tape</li></ul>	<ul style="list-style-type: none"><li>▪ Cardboard</li><li>▪ 8 Combs, hard rubber</li><li>▪ Masking tape</li><li>▪ Clear packing tape (optional)</li><li>▪ 8 paperback books</li><li>▪ 1 metric ruler or meter tape</li><li>▪ Plastic bottles</li><li>▪ 8 sneakers</li><li>▪ 8 wool synthetic sweaters</li></ul>	<ul style="list-style-type: none"><li>▪ Index Cards</li><li>▪ 1 Sheet of Chart Paper (optional)</li></ul>	<ul style="list-style-type: none"><li>▪ 8 Pieces of graph paper (optional)</li><li>▪ 1 overhead projector</li><li>▪ 1 Transparency (optional)</li><li>▪ wire of different gauges</li></ul>