

# 4<sup>th</sup> Grade

## Electrical Circuits

### NYS Standard 4 (Science): Physical Setting

- ✓ **Key Idea 4: Energy exists in many forms, and when these forms change energy is conserved.**
- ✓ **Key Idea 5: Energy and matter interact through forces that result in changes in motion.**

Major Understandings	Learning Experience/Objectives	Supporting Terms
<p><b>4.1.a Energy exists in various forms: heat, electric, chemical, light, mechanical and sound</b></p> <p><b>4.1.e Electricity travels in a closed circuit.</b></p>	<p><b>Getting Started:</b> Students will discuss their background knowledge of electricity.</p> <p><b>Simple Circuits with Bulbs, Batteries and Wires:</b> Students will examine pictures of simple circuits and predict whether the various simple circuits pictured would light and then test their predictions using bulbs, batteries, and wires.</p> <p><b>Schematic Diagrams:</b> Students will draw electric circuits using symbols and construct circuits from electrical symbols.</p> <p><b>Switches:</b> Students will construct a switch and describe how it functions.</p> <p><b>Hidden Circuits Card:</b> Students will use a circuit tester to identify hidden circuit paths.</p>	<p>strategy, observe, circuit, connect, energy, interaction, prediction, copper, system, terminal, path, short circuit, positive, negative, fuse, schematic, symbols, open circuit, closed circuit, contact, switch</p>
<p>Series circuits have only one path for a current to flow; parallel circuits have multiple paths for current to flow.</p>	<p><b>Series Circuit:</b> Students will create a series circuit and explain how the brightness of the bulbs and current flow are affected by its construction.</p> <p><b>Parallel Circuit:</b> Students will create a parallel circuit and explain how the brightness of the bulbs and current flow are affected by its construction.</p> <p><b>Batteries Wired in Series and Parallel:</b> Students will observe and explain the differences between circuits when the batteries are connected in parallel and in series.</p>	<p>series circuit, system, parallel circuit, voltage</p>
<p><b>4.1.d Energy and matter interact: lighting a bulb by electrical current</b></p> <p><b>4.2.b Humans utilize interactions between matter and energy</b></p> <ul style="list-style-type: none"> <li>• chemical to electrical, light and heat (battery and bulb)</li> </ul>	<p><b>Brightness Meter:</b> Students will construct a brightness meter and measure the bulb's brightness using this device.</p> <p><b>What's Polarity:</b> Students will identify the terminals of a battery and explain how batteries are to be connected in a series circuit.</p> <p><b>The Bulb as Part of the Circuit:</b> Students will identify the parts of a bulb and the differences between various kinds of bulbs.</p> <p><b>Comparing Filaments:</b> Student will compare bulb filaments and their effect on the flow of electricity.</p>	<p>meter, voltage, filament, support wire, glass bead, terminal, insulator, function, watts, resistance, polarity, battery, brightness, bulb, function, watts</p>
<p><b>4.1.c Some materials transfer energy better than others</b></p>	<p><b>Conductors and Insulators:</b> Students will predict, test and determine if an object is a conductor or non-conductor.</p> <p><b>Liquid Conductors and Non-conductors:</b> Students will predict, test, and determine if various liquids are conductors or non-conductors.</p> <p><b>Resistance – Thick Wire, Thin Wire, Long Wire, Short Wire:</b> Students will predict and observe the effects of wire composition, length, and diameter on the flow of electricity in a circuit.</p>	<p>conductor, non-conductor, property, insulator, insulated, liquid, solution, diameter, length, variable, rheostat, nichrome, composition</p>
<p><b>4.2.b Humans utilize interactions between matter and energy</b></p> <ul style="list-style-type: none"> <li>• electrical to sound (doorbell or buzzer)</li> </ul>	<p><b>Buzzers:</b> Students will demonstrate and explain how electrical energy can be changed to sound energy.</p>	<p>energy, buzzer</p>
<p><b>5.1.e Magnetism is a force that may attract or repel certain materials.</b></p>	<p><b>Magnetism and Electricity:</b> Students will observe and identify the properties of magnetism.</p>	<p>compass, material, magnetic field, poles, current, electrons</p>