Before we get started...

Circuits

– Voltage
– Current
– Resistance
Before we get started...

\[ R_{\text{total}} = R_1 + R_2 + R_3 \]

\[ G_{\text{total}} = G_1 + G_2 + G_3 \]

\[ G_{\text{total}} = \frac{1}{\frac{1}{G_1} + \frac{1}{G_2} + \frac{1}{G_3}} \]

\[ R_{\text{total}} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}} \]
Resistor Color Code Chart

<table>
<thead>
<tr>
<th>1st digit</th>
<th>2nd digit</th>
<th>Multiplier</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>x 1</td>
<td>±1%</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>x 10</td>
<td>±2%</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>x 100</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>x 1K</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>x 10K</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>x 100K</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>x 1M</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>x 0.1</td>
<td>±5%</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>x 0.01</td>
<td>±10%</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td></td>
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</tr>
</tbody>
</table>
Breadboards

Layout
Microcontrollers (Arduino Uno)

What it is:

• “A TOOL for making computers that can sense and control more of the physical world than your desktop.”
• Open-source
• Interactive
Arduino Hardware Overview

Digital Pins
Arduino Hardware Overview

Analog Pins
Arduino Hardware Overview

Power Outputs
Arduino Hardware Overview

Power Sources
Integrated Development Environment (IDE)

Please open your computers
Blink.ino
Fade.ino
DigitalReadSerial.ino
AnalogReadSerial.ino
Combine!

• Turn LED on and off using push button
• Fade LED based on potentiometer