

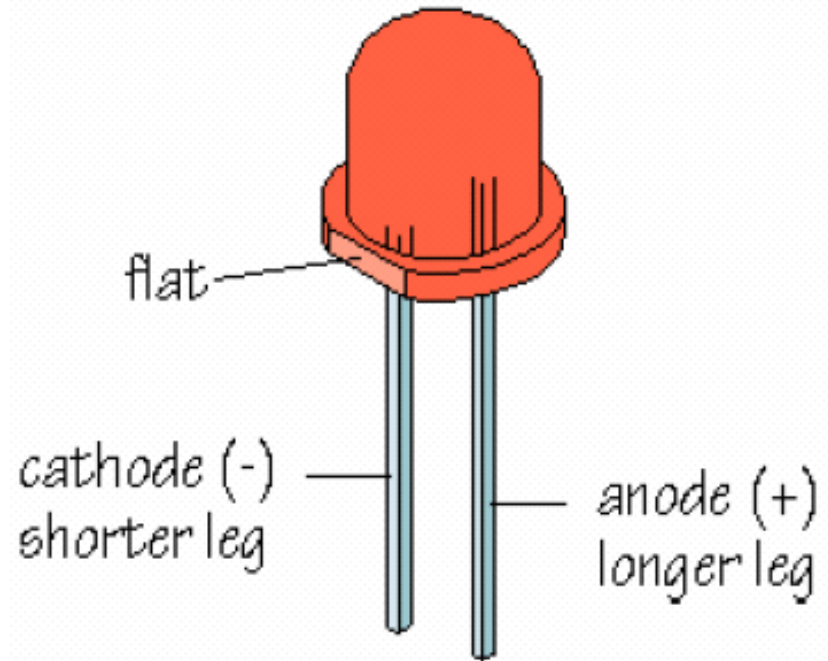
# **Light Emitting Diode: LED**

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# What is an LED?

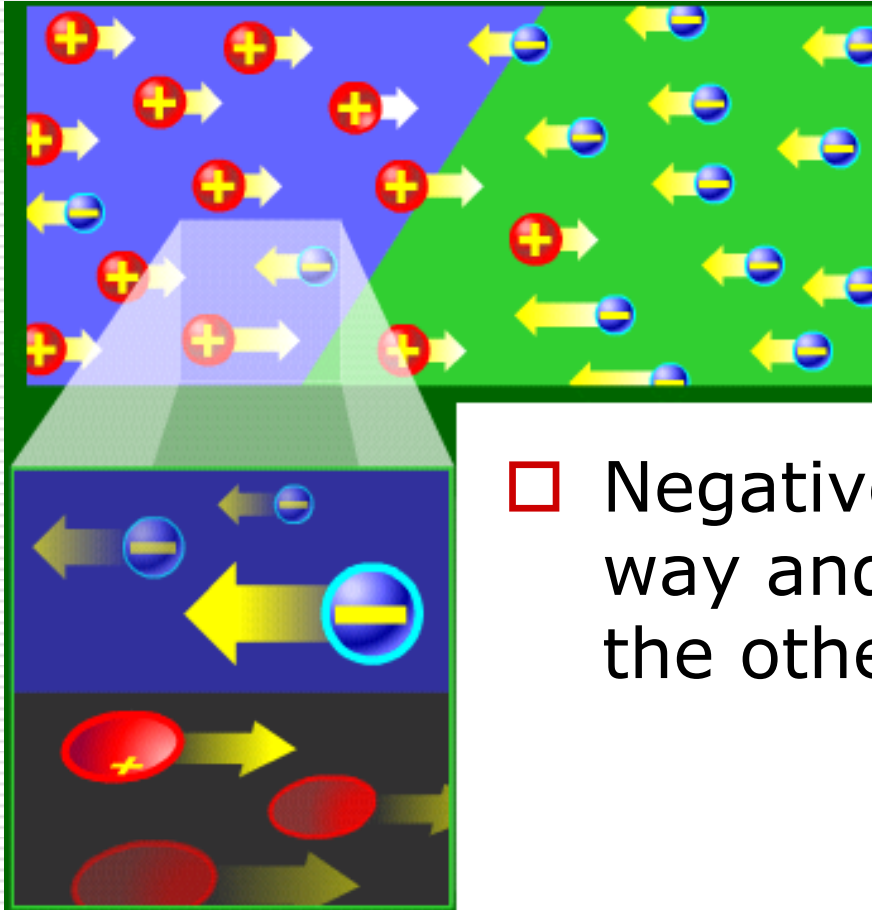
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- ❑ Light-emitting diode
- ❑ Semiconductor
- ❑ Has polarity



# LED: How It Works

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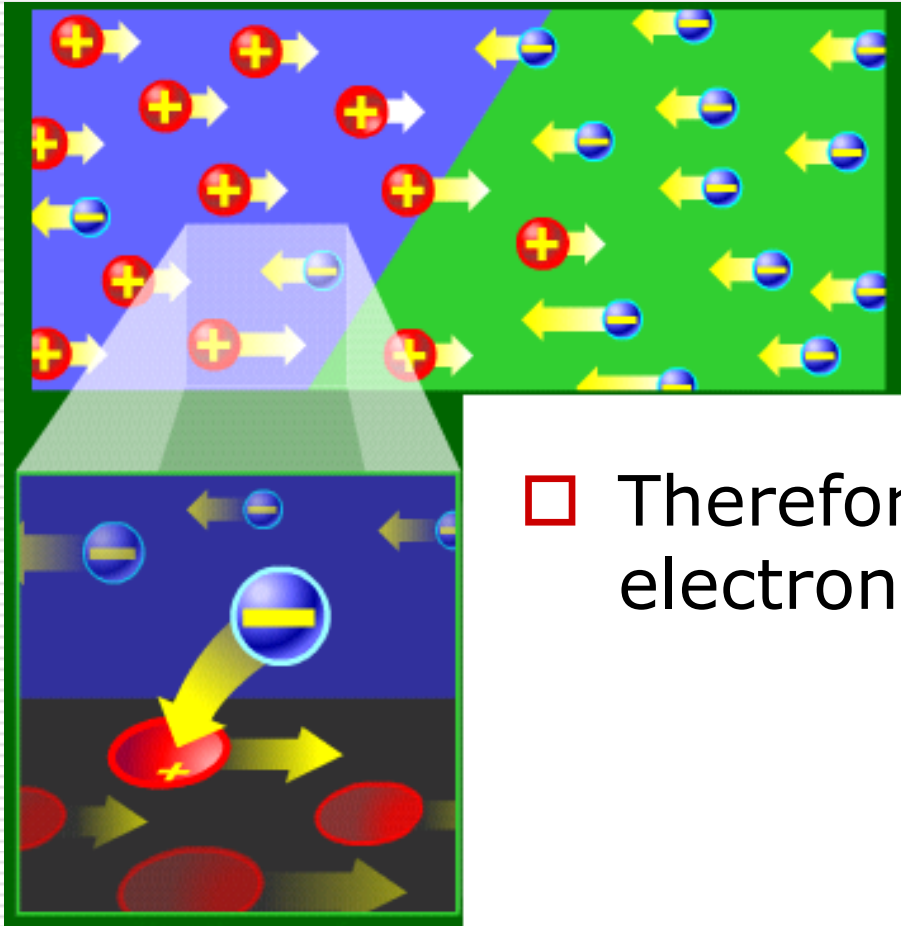


□ When current flows across a diode

□ Negative electrons move one way and positive holes move the other way

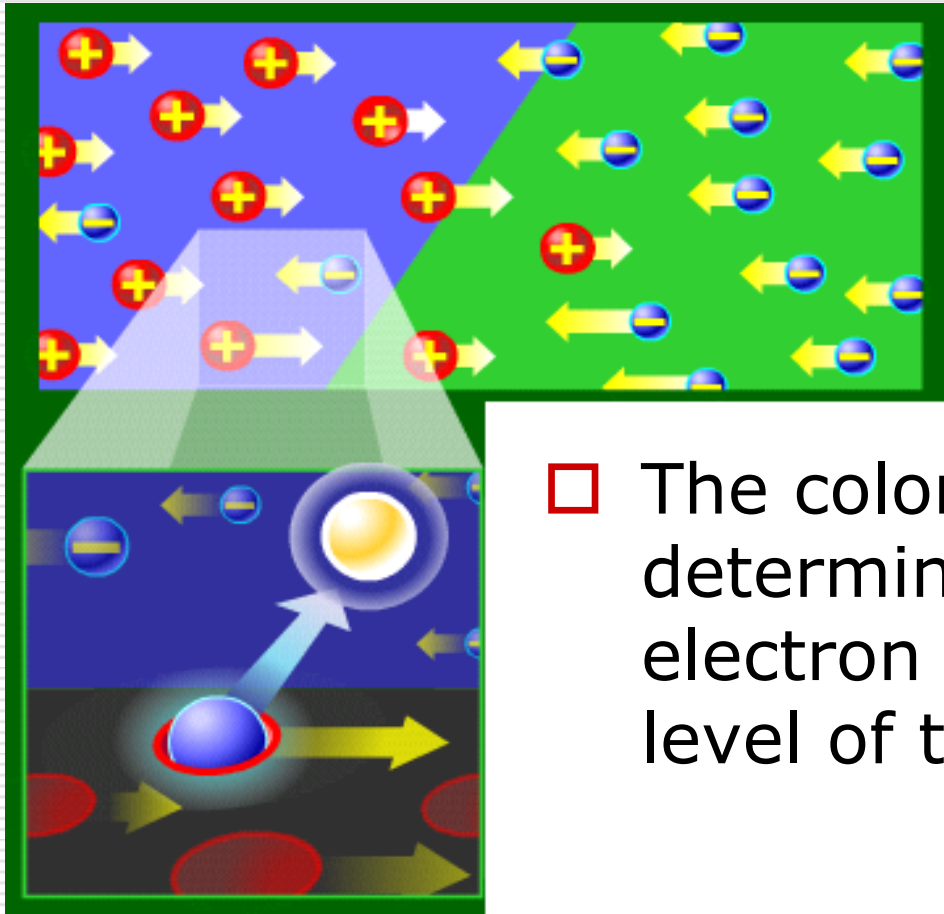
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# LED: How It Works



- The holes exist at a lower energy level than the free electrons
- Therefore when a free electrons falls it losses energy

# LED: How It Works

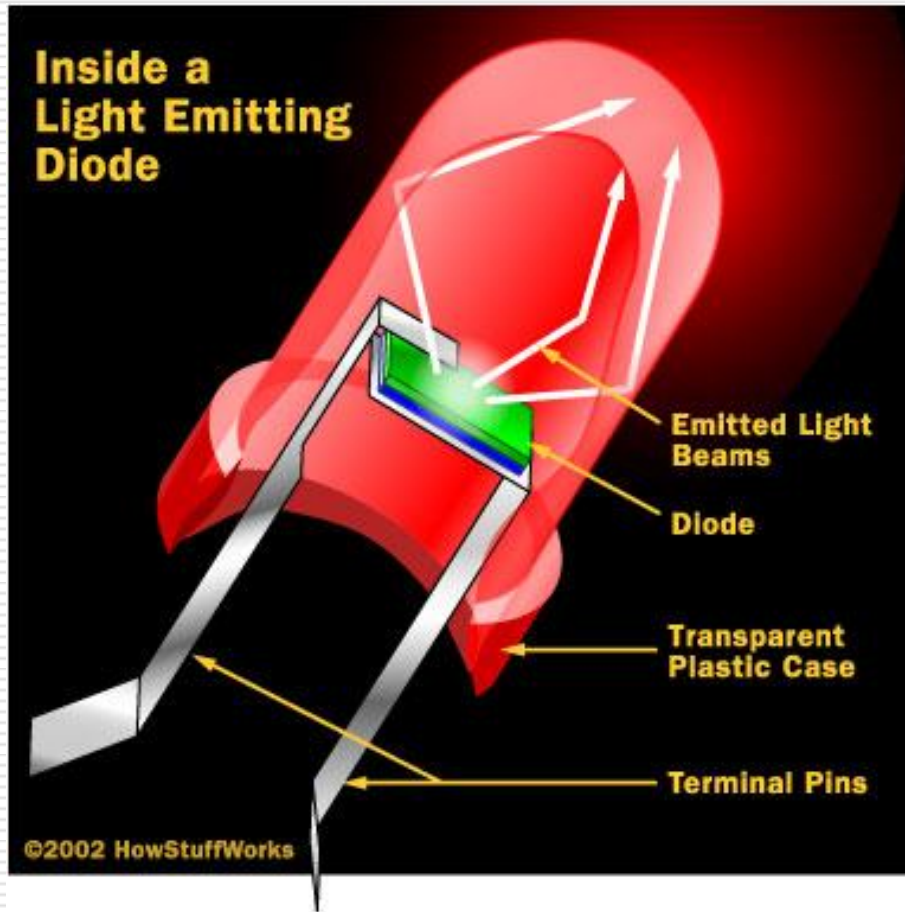


□ This energy is emitted in a form of a photon, which causes light

□ The color of the light is determined by the fall of the electron and hence energy level of the photon

# Inside a Light Emitting Diode

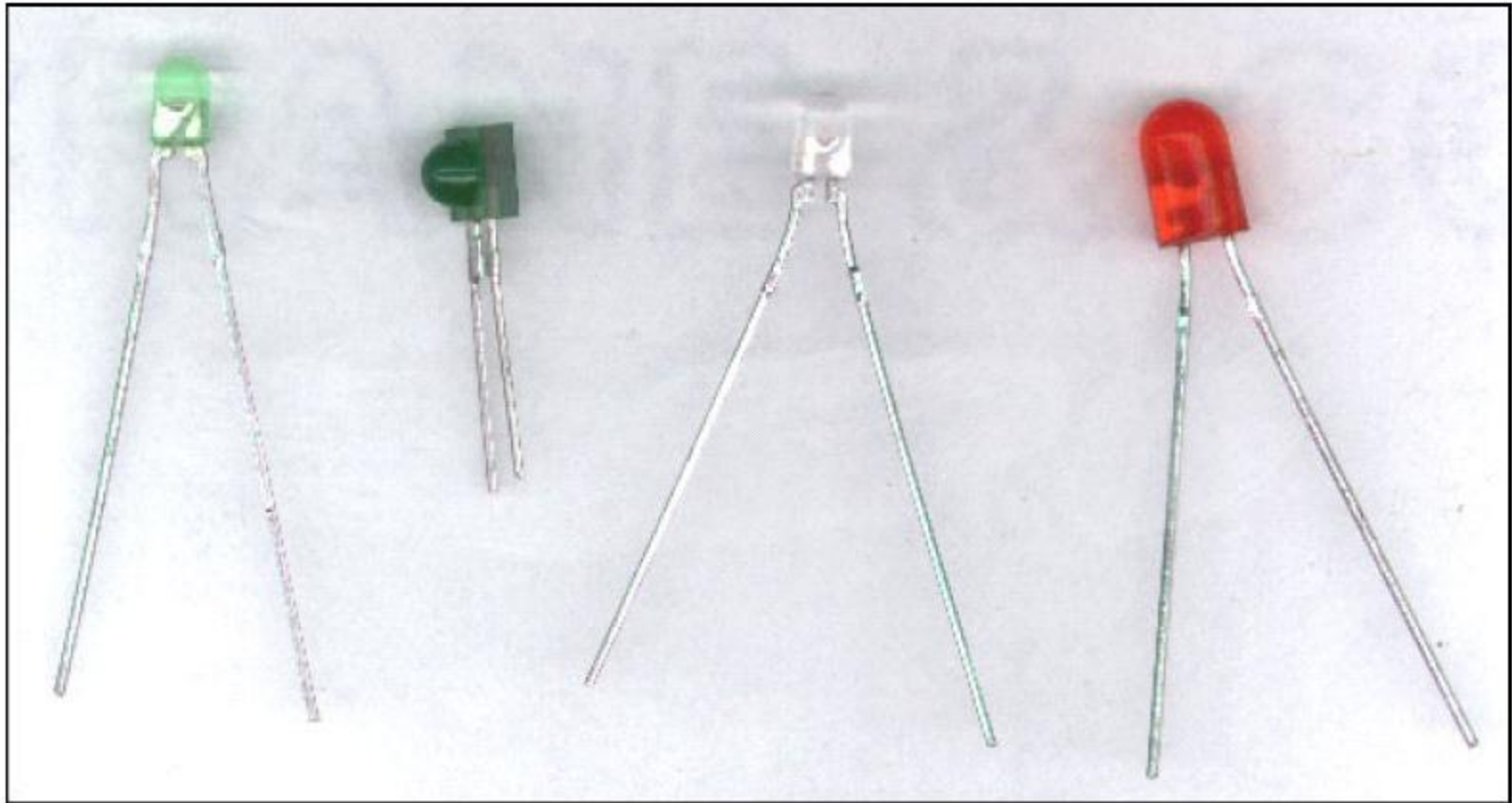
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1. Transparent Plastic Case
2. Terminal Pins
3. Diode

# Kinds of LEDs

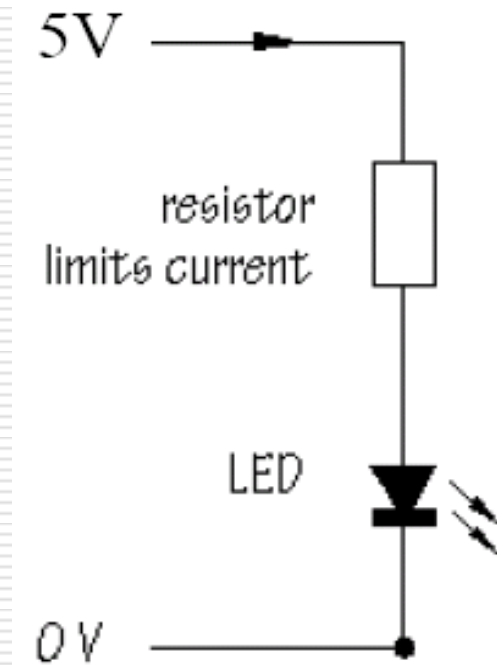
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# How to Connect a LED:

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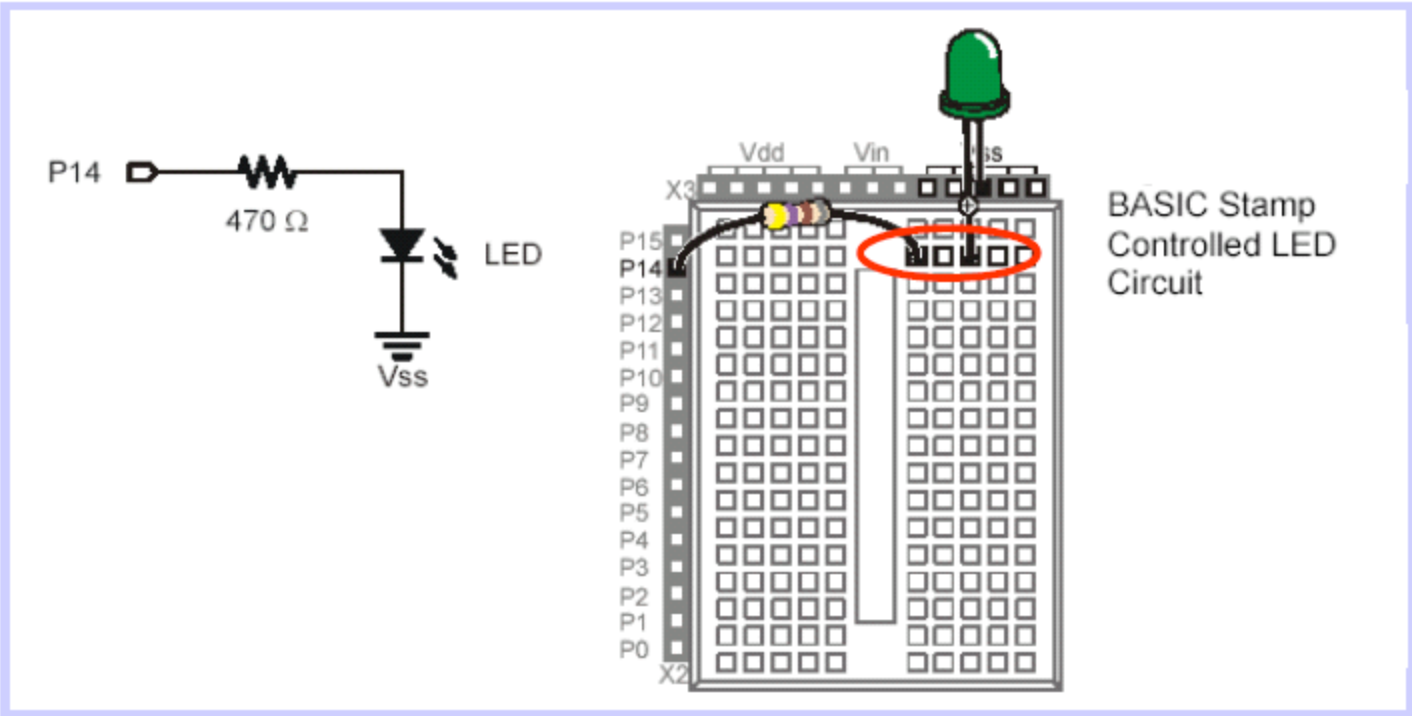
- ❑ Requires 1.5~2.5V and 10 mA
- ❑ To prevent overloading, use resistor 470  $\Omega$





# How to Connect a LED:

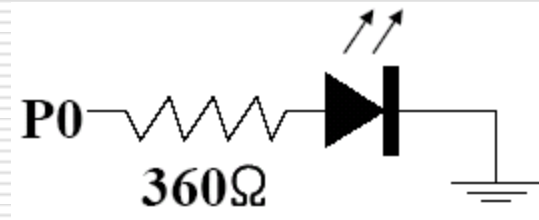
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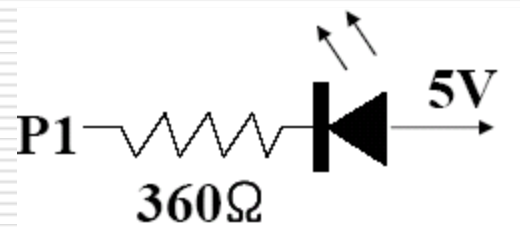
# Connect LED to BS2

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- LED is on when P0 is high



- LED is on when P1 is low

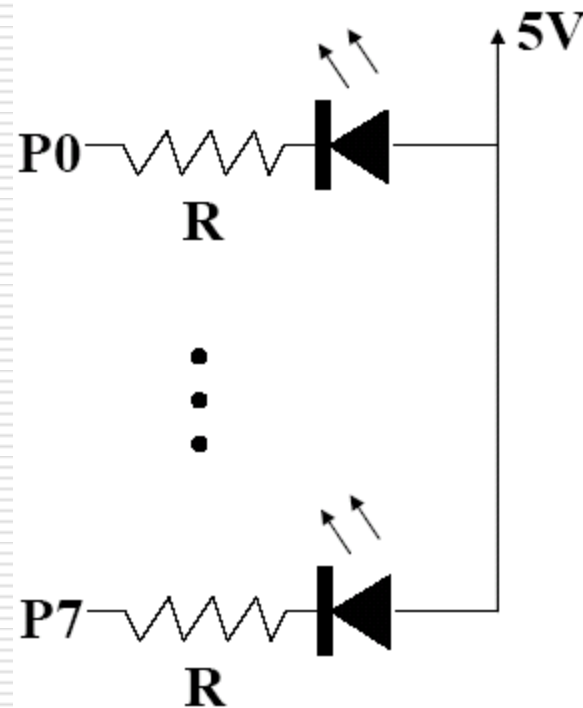


# Connect Multiple LEDs to BS2

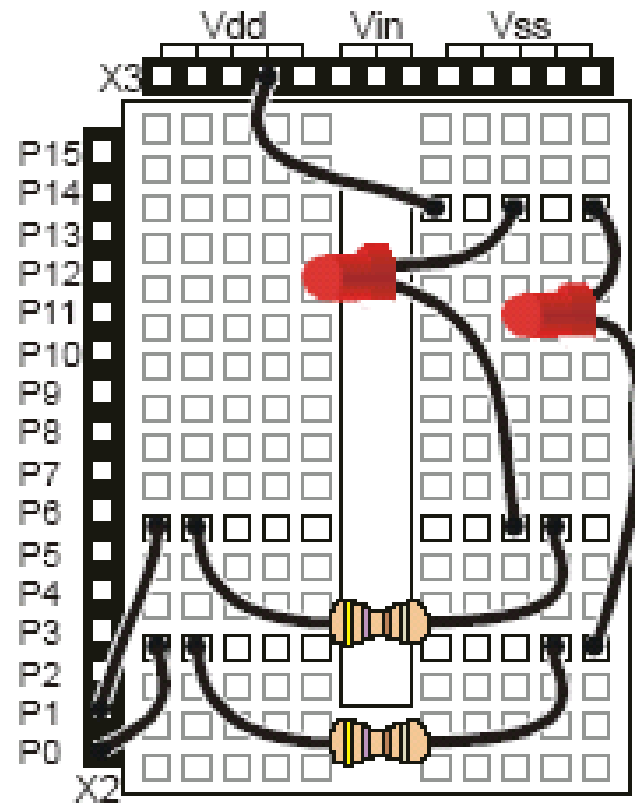
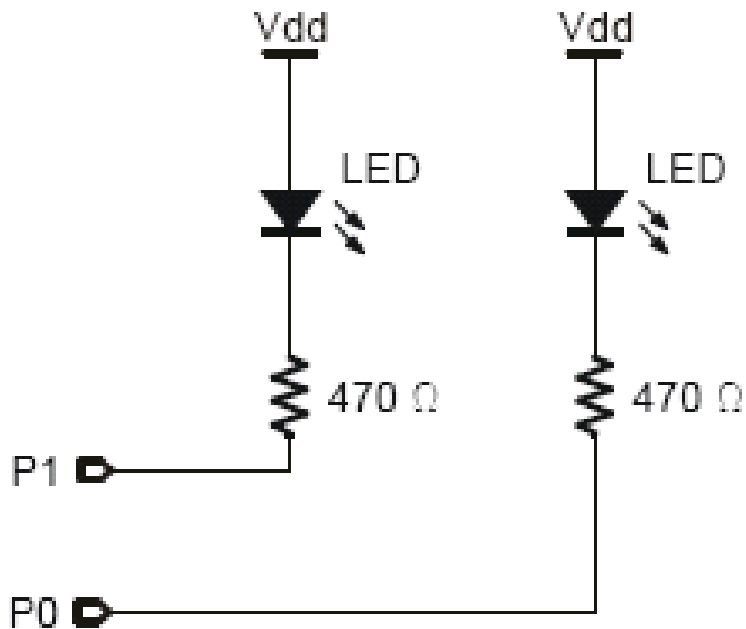
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- 8 LEDs are connected to BS2 each I/O pin (P0-P7) is allowed to sink 6.25mA

$$R = \frac{V}{I} = \frac{3.6}{6.25 \times 10^{-3}} = 576\Omega$$



# Case Study: Blinking LED



# Case Study: Blinking LED

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- Pbasic program to make an LED blink

<b>output 0</b>	→	<b>Make pin0 an output</b>
<b>Main:</b>	→	<b>Loop begins here</b>
<b>low 0</b>	→	<b>Turn LED on</b>
<b>pause 1000</b>	→	<b>Pause for 1 sec</b>
<b>high 0</b>	→	<b>Turn LED off</b>
<b>pause 1000</b>	→	<b>Pause for 1 sec</b>
<b>goto Main</b>	→	<b>Go back to beginning of loop</b>

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# Experiments

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- Flash an LED
    1. Single LED
    2. Multiple LEDs
  - Traffic Light by use of LEDs
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