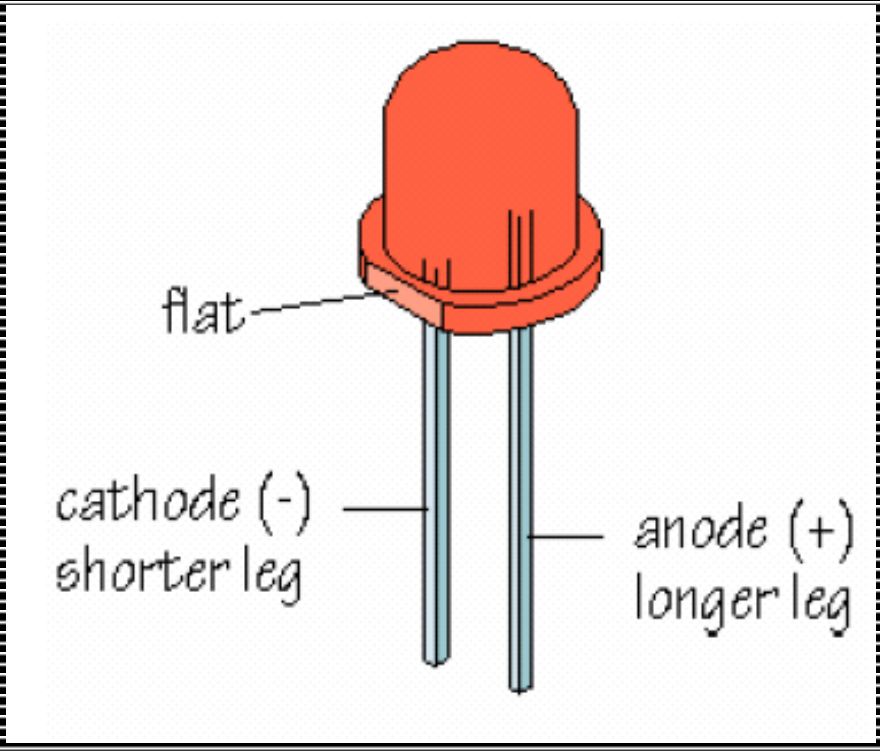
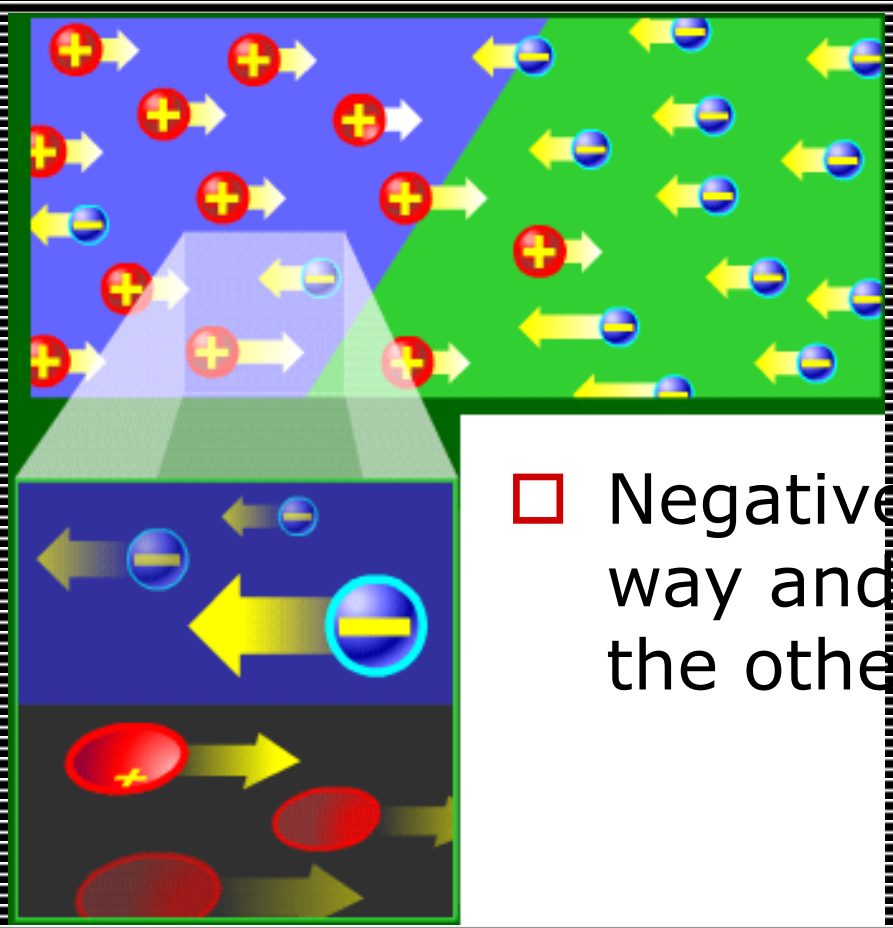
Light Emitting Diode: LED

What is an LED?

- Light-emitting diode
- Semiconductor
- Has polarity

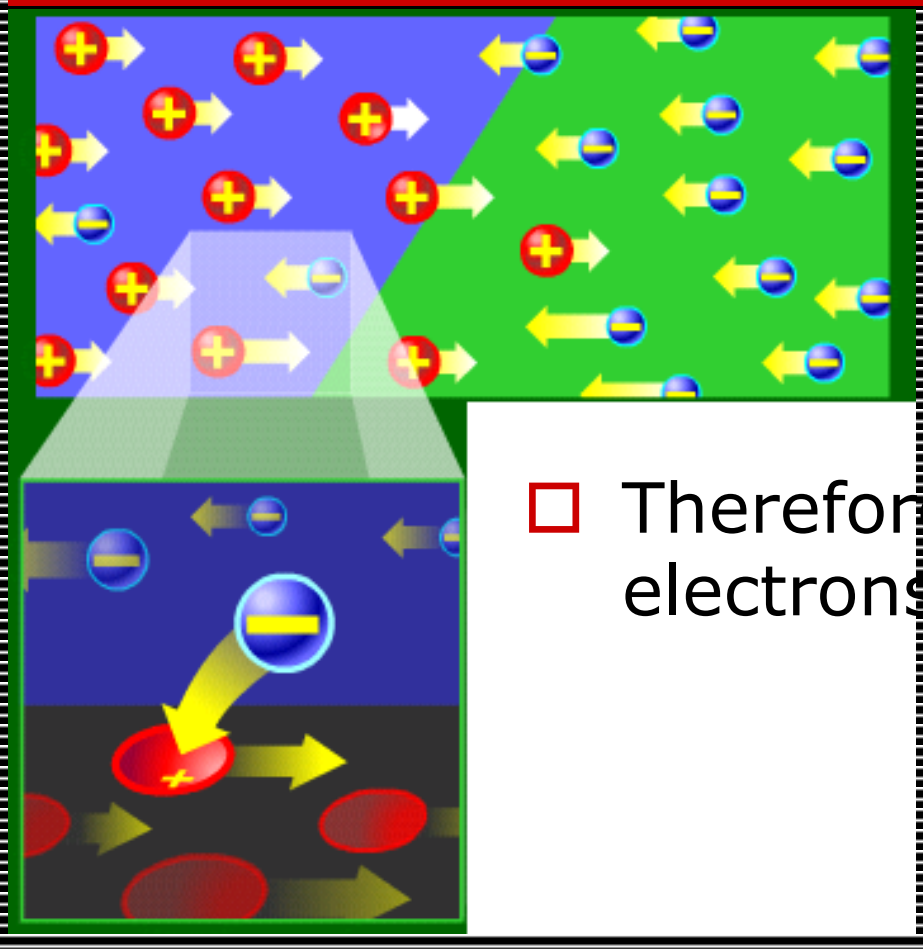


LED: How It Works



- When current flows across a diode
- Negative electrons move one way and positive holes move the other way

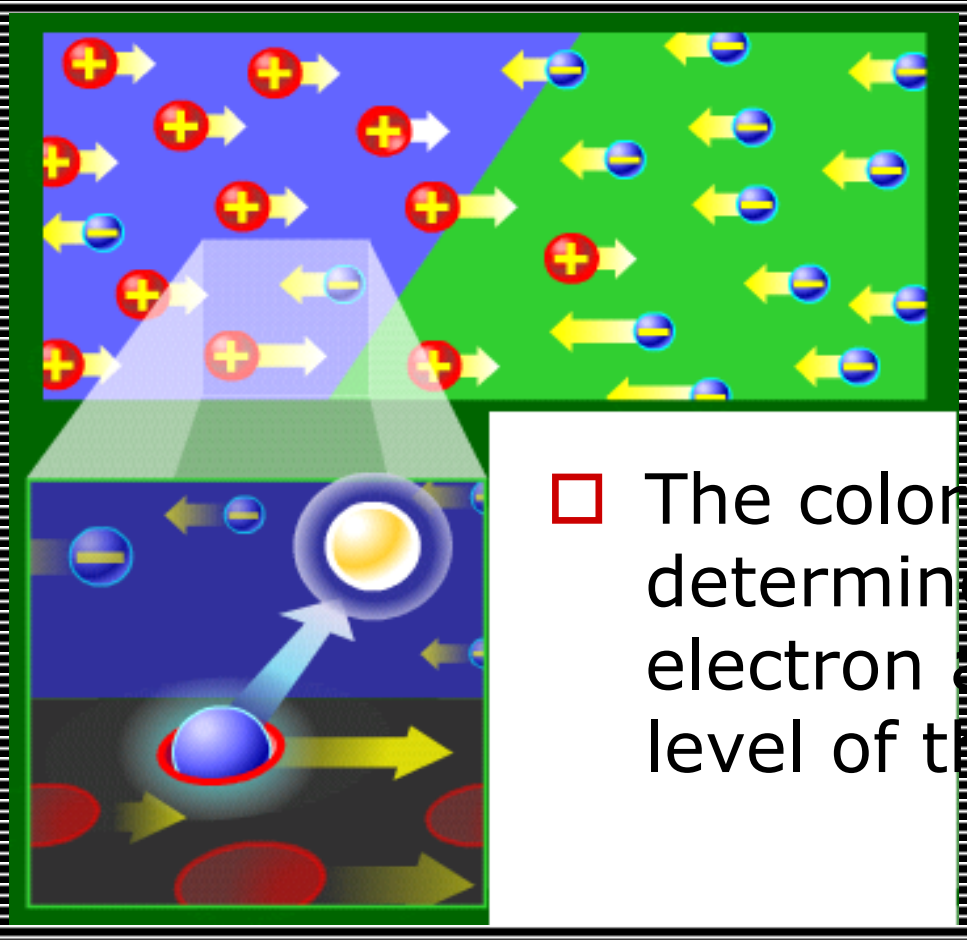
LED: How It Works



- The wholes exist at a lower energy level than the free electrons

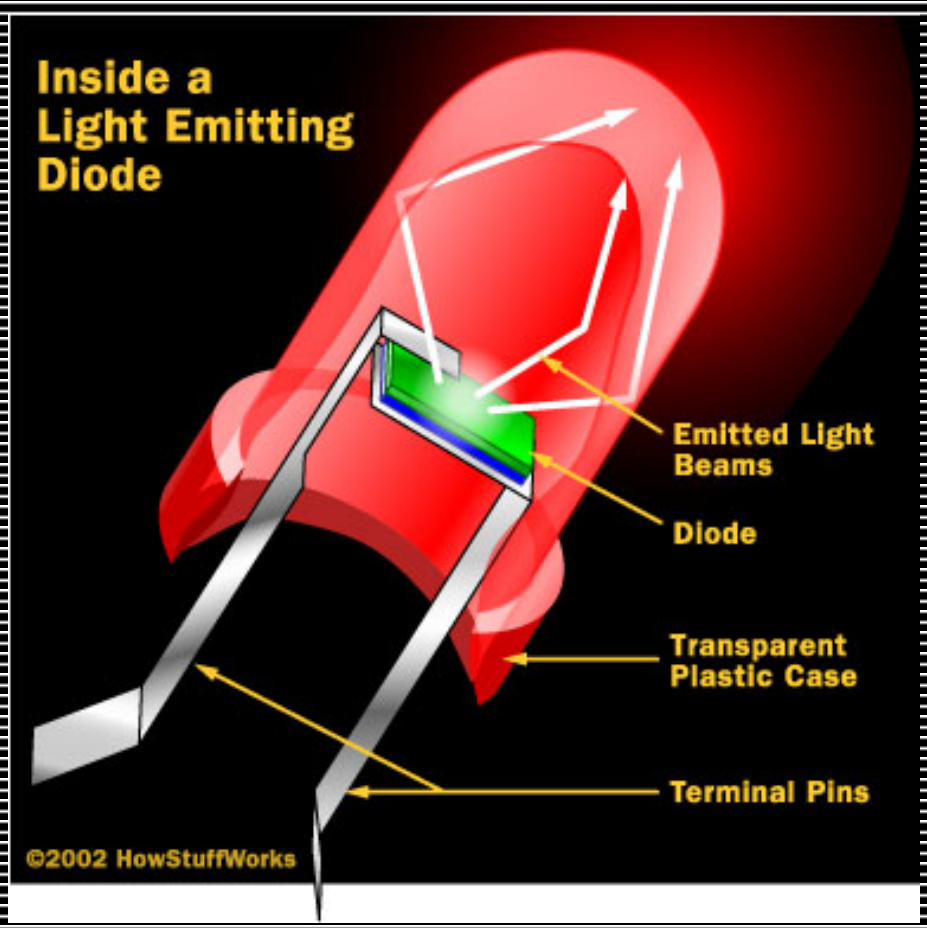
- Therefore when a free electrons falls it losses energy

LED: How It Works



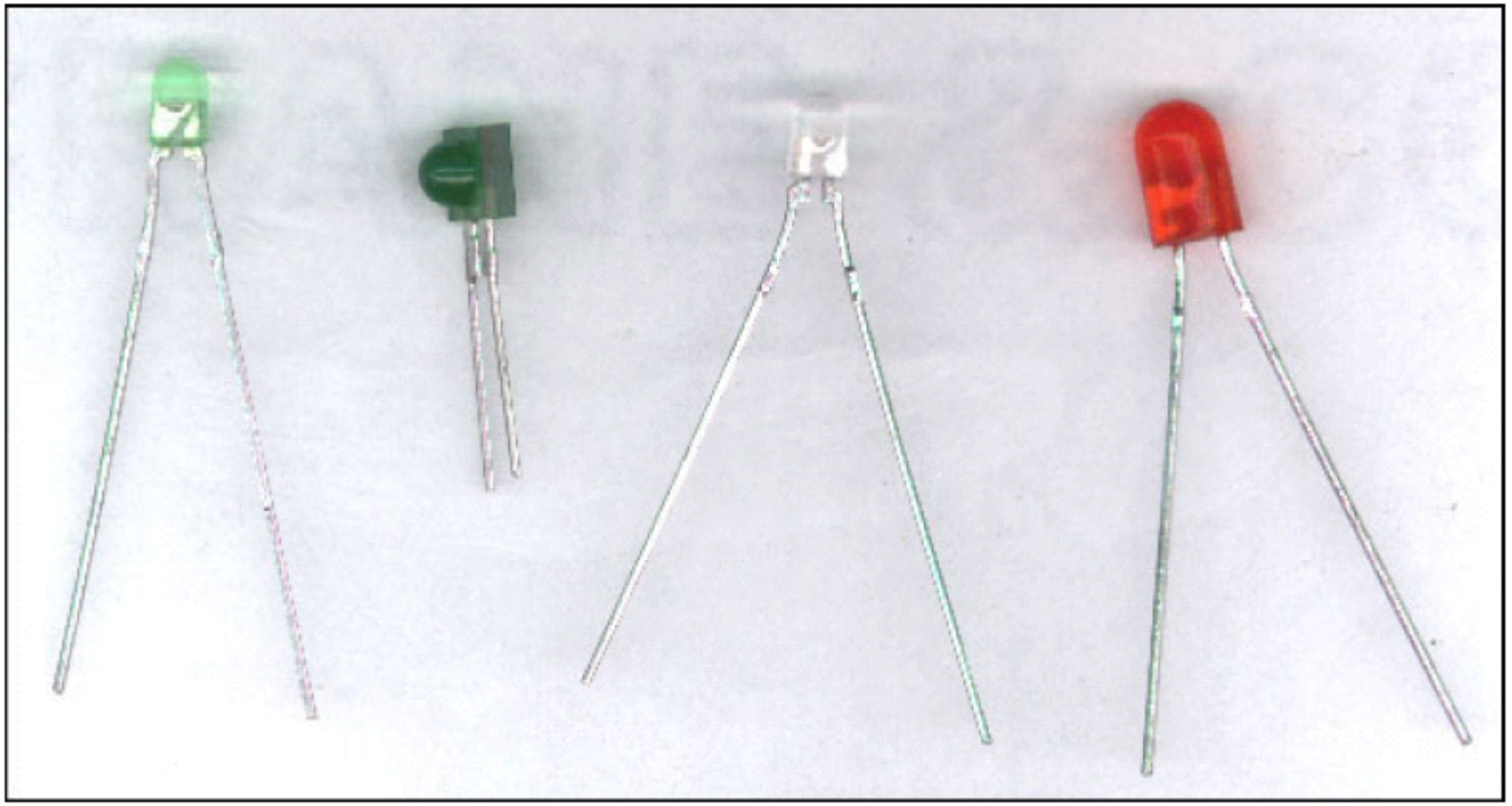
- This energy is emitted in a form of a photon, which causes light
- The color of the light is determined by the fall of the electron and hence energy level of the photon

Inside a Light Emitting Diode



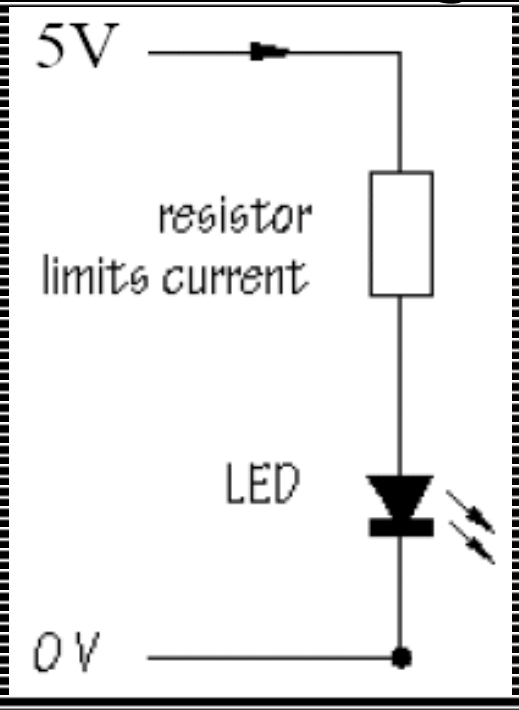
1. Transparent Plastic Case
2. Terminal Pins
3. Diode

Kinds of LEDs

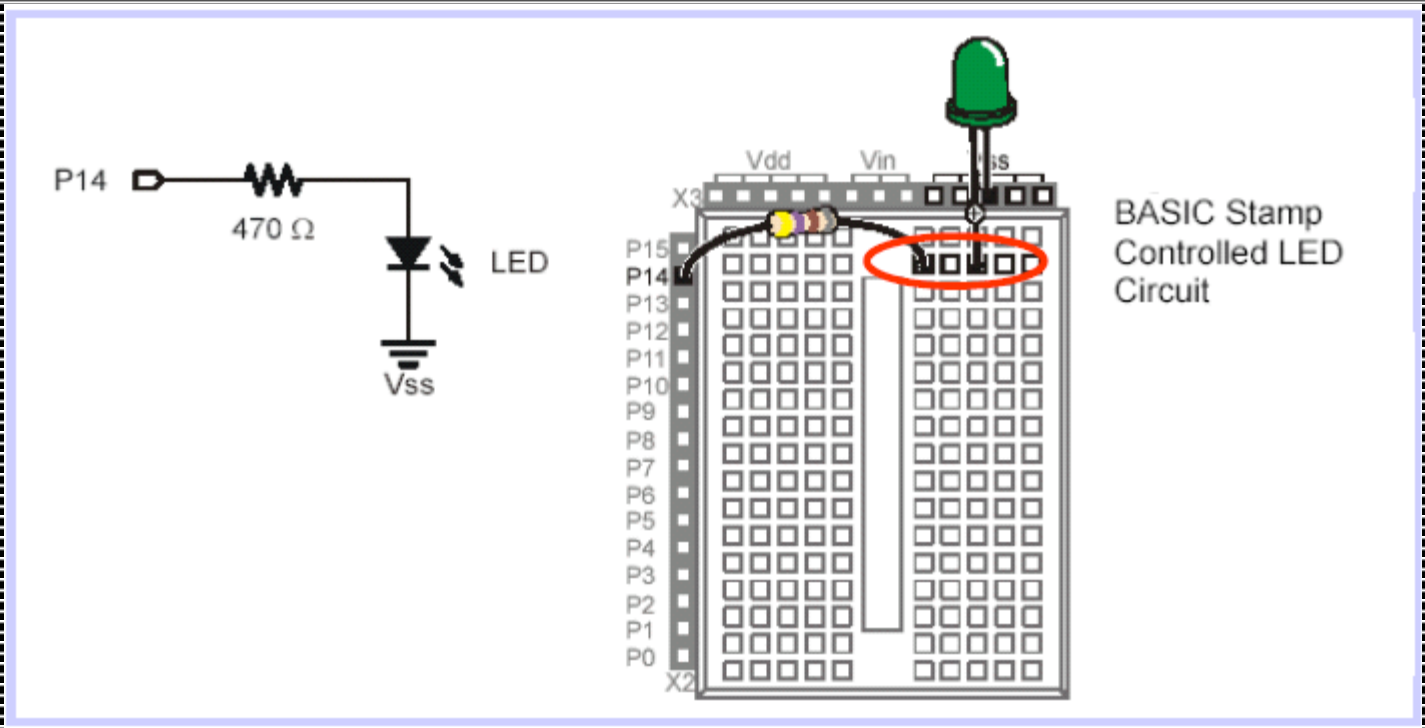


How to Connect a LED:

- Requires 1.5~2.5V and 10 mA
- To prevent overloading, use resistor 470 Ω

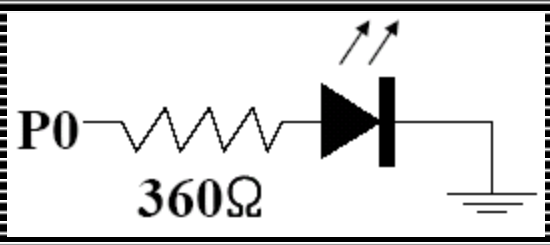


How to Connect a LED:

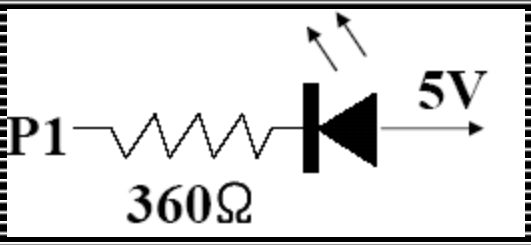


Connect LED to BS2

- LED is on when P0 is high



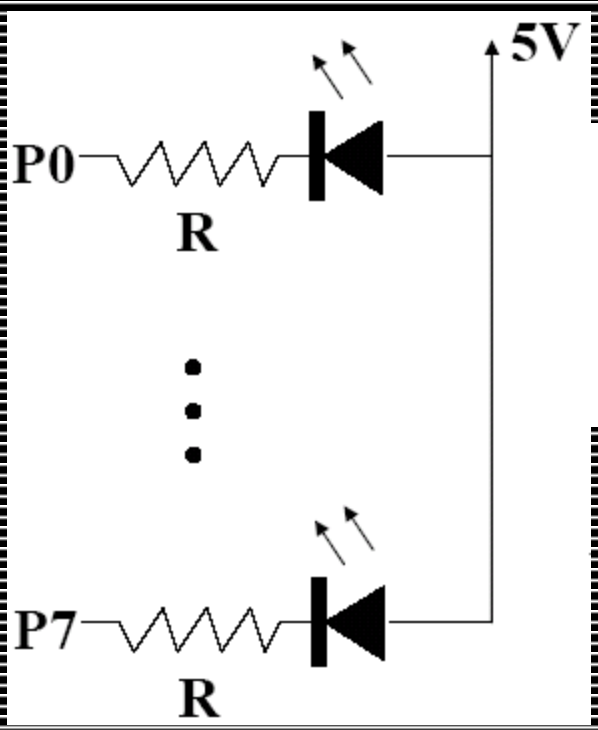
- LED is on when P1 is low



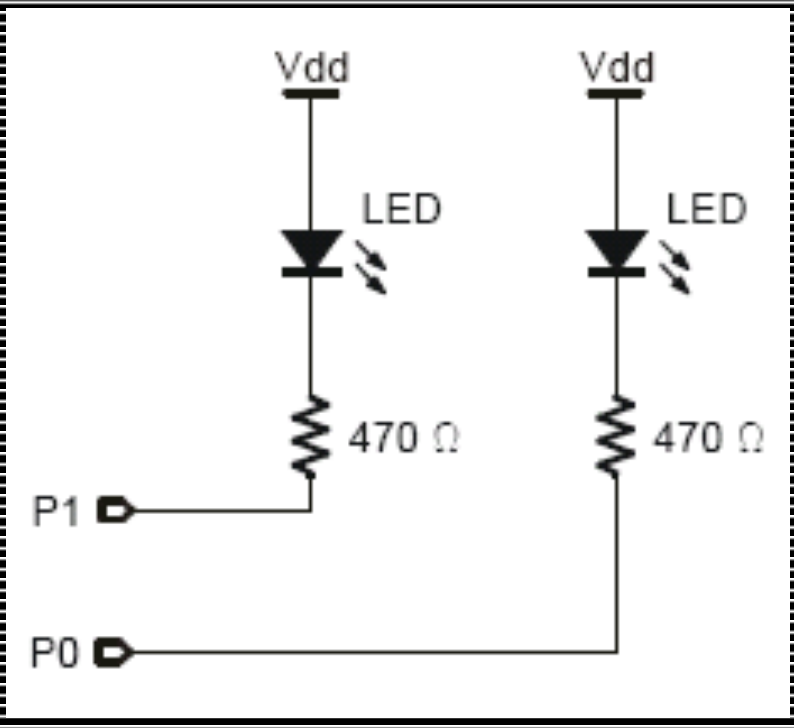
Connect Multiple LEDs to BS2

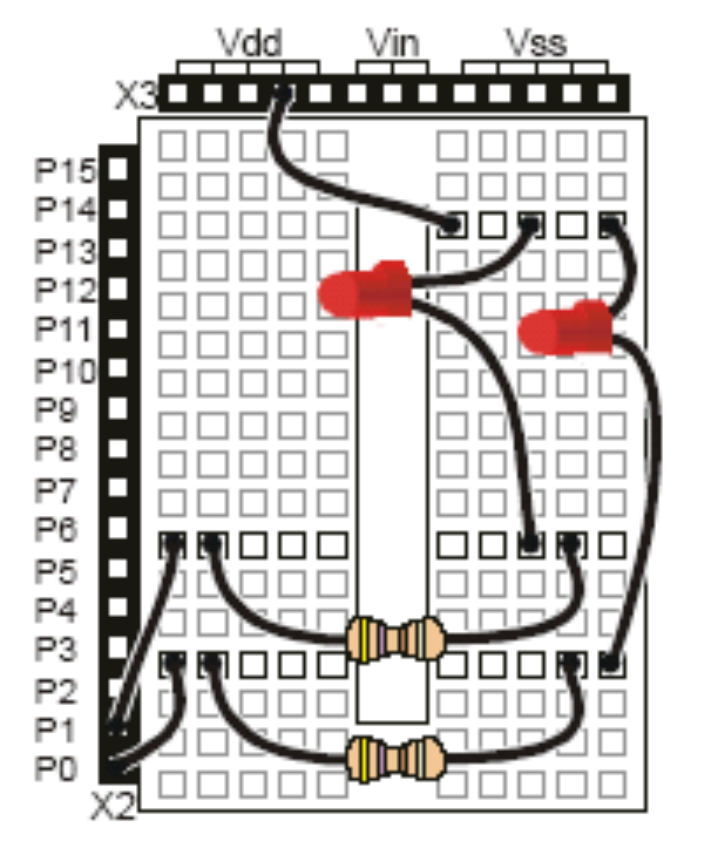
- 8 LEDs are connected to BS2 each I/O pin (P0~P7) is allowed to sink 6.25mA

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



Case Study: Blinking LED





Case Study: Blinking LED

- Pbasic program to make an LED blink

```
output 0          → Make pin0 an output

Main:             → Loop begins here
        low 0     → Turn LED on
        pause 1000 → Pause for 1 sec
        high 0    → Turn LED off
        pause 1000 → Pause for 1 sec
goto Main         → Go back to beginning of loop
```

Experiments

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