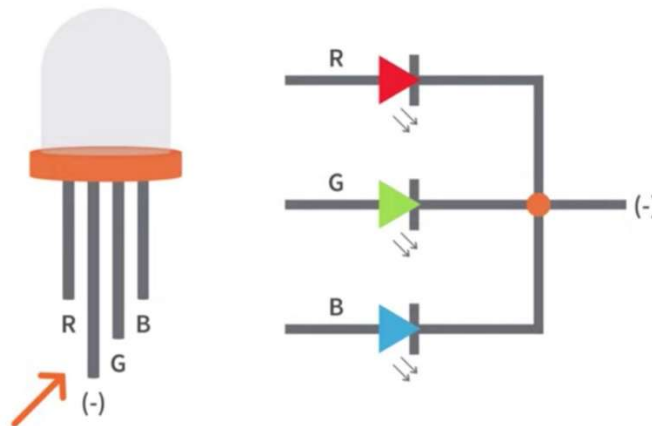


Micro-Python: Lesson 5

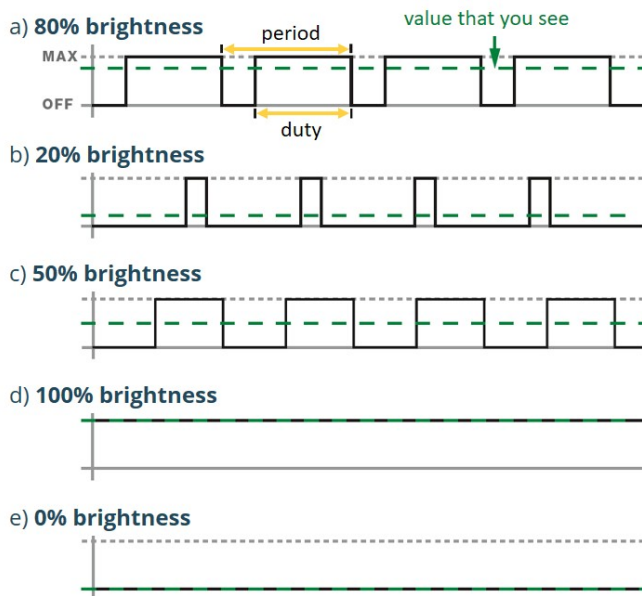
An RGB LED is really 3 LEDs in one. It can shine red, green, or blue, and it can create a wide range of colors by blending these three hues.

The RGB LED is a clear LED with 4 legs. The longest leg is the negative leg. The other legs are for the main colors, as shown here. **Each colored leg needs a 220Ω resistor!!



Pulse Width Modulation

The brightness of an LED can be controlled with Pulse Width Modulation (PWM). Pulse Width Modulation is a technique used in electronics to control the average power delivered to a device by rapidly switching a signal between high and low states, where the "on" time (pulse width) of the signal is varied to effectively create an analog-like output from a digital signal, allowing for precise control of power or voltage without needing a true analog signal source.



$$\text{Frequency} = \frac{1}{\text{period}}$$

Duty Cycle = percentage of the time on

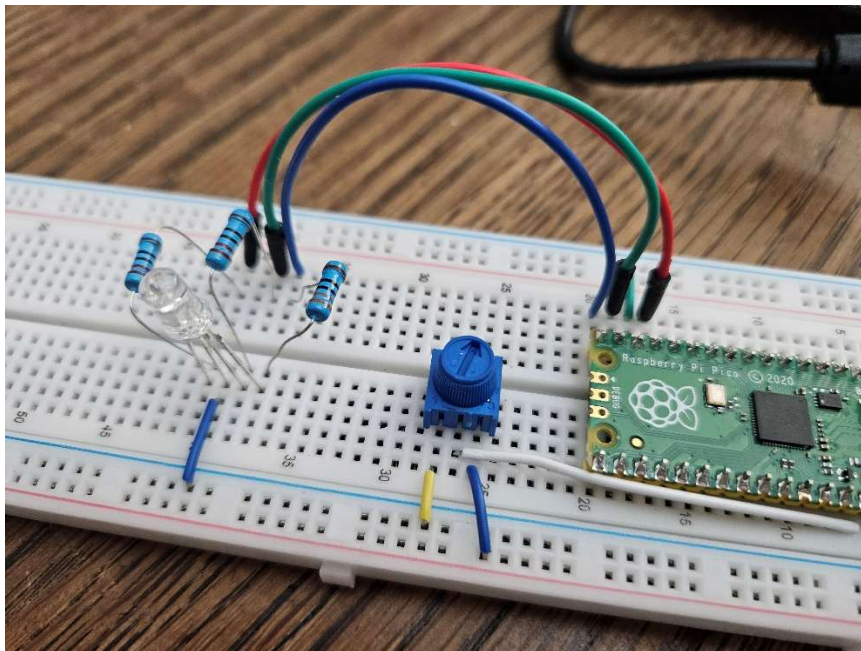
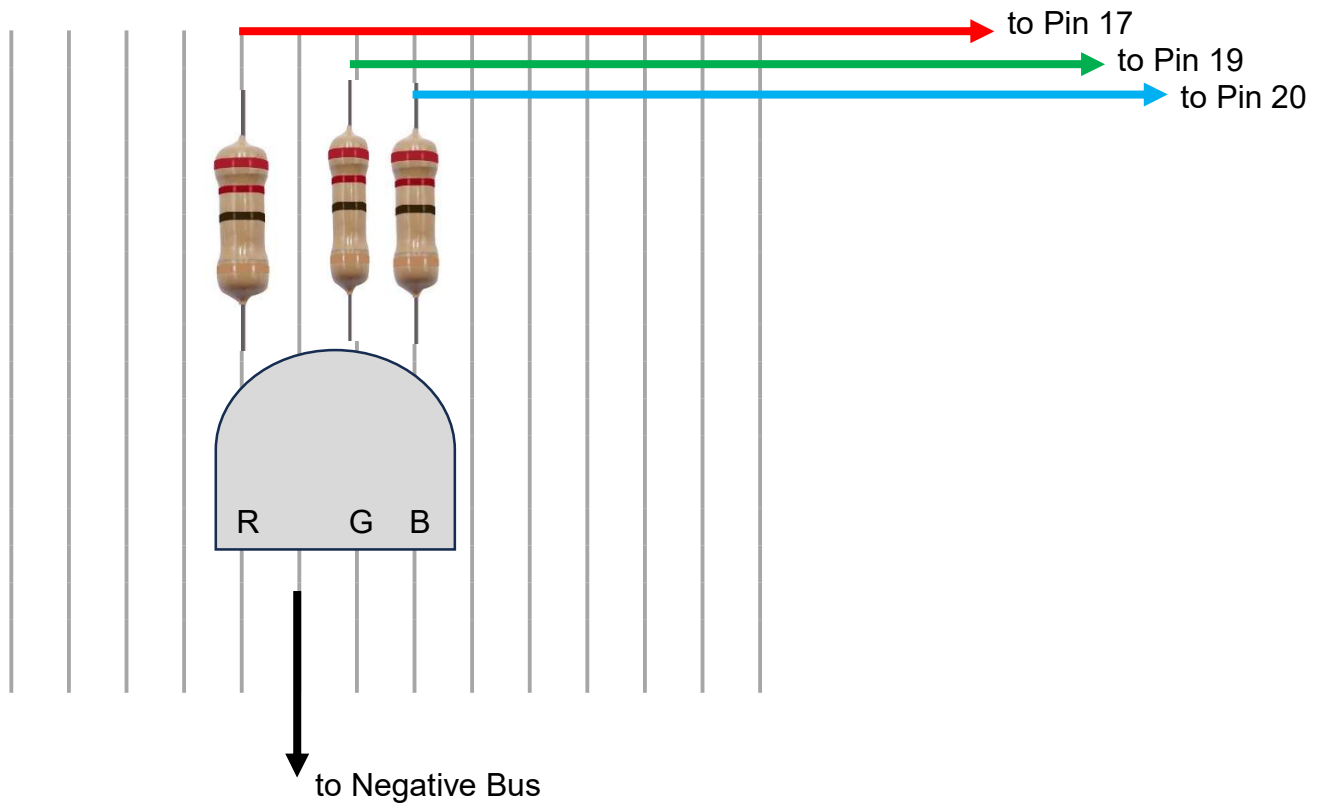
$$V_{\text{out}} = V_{\text{max}} * \text{Duty Cycle}$$

Example:

$$V_{\text{out}} = 3.3 \text{ V} * 0.5 = 1.65 \text{ V}$$

Build the circuit shown here:

Run a jumper from Pin 18 (GND) to the Negative Bus on the top side of the board.



Ignore the potentiometer. We aren't using that today.

Type this code into Thonny and run it.

from machine import Pin, PWM	
from time import sleep	
redPin=13	
greenPin=14	
bluePin=15	
redLED=PWM(Pin(redPin))	
greenLED=PWM(Pin(greenPin))	
blueLED=PWM(Pin(bluePin))	
redLED.freq(1000)	
redLED.duty_u16(0)	
greenLED.freq(1000)	
greenLED.duty_u16(0)	
blueLED.freq(1000)	
blueLED.duty_u16(0)	
while True:	
redBright=65550	
greenBright=0	
blueBright=0	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
sleep(.1)	

New Code: Keep all the code down to the While Loop. Erase what you had and type this:

while True:	
myColor=input('What color do you want? ')	
if myColor=='Red' :	
redBright=65550	
greenBright=0	
blueBright=0	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
if myColor=='Green' :	
redBright=0	
greenBright=65550	
blueBright=0	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
if myColor=='Blue' :	
redBright=0	
greenBright=0	
blueBright=65550	
redLED.duty_u16(redBright)	

greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
if myColor=='Cyan' :	
redBright=0	
greenBright=65550	
blueBright=65550	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
if myColor=='Magenta' :	
redBright=65550	
greenBright=0	
blueBright=65550	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
if myColor=='Yellow' :	
redBright=65550	
greenBright=35550	
blueBright=0	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
if myColor=='Orange' :	
redBright=65550	
greenBright=10000	
blueBright=0	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	
if myColor=='White' :	
redBright=65550	
greenBright=65550	
blueBright=65550	
redLED.duty_u16(redBright)	
greenLED.duty_u16(greenBright)	
blueLED.duty_u16(blueBright)	