

## Test Review & Recap

### Quick Recap

#### DIRECT CURRENT

A DIRECT CURRENT (DC) FLOWS IN ONE DIRECTION, EITHER STEADILY OR IN PULSES.

CURRENT (I)—THE QUANTITY OF ELECTRONS PASSING A GIVEN POINT. (UNIT: AMPERE)

VOLTAGE (V)—ELECTRICAL PRESSURE OR FORCE. (UNIT: VOLT)

RESISTANCE (R)—RESISTANCE TO THE FLOW OF A CURRENT. (UNIT: OHM)

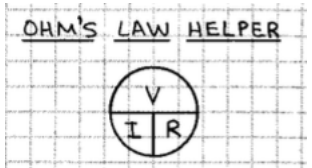
POWER (P)—THE WORK PERFORMED BY A CURRENT. (UNIT: WATT)

POTENTIAL DIFFERENCE—THE DIFFERENCE IN VOLTAGE BETWEEN THE TWO ENDS OF A CONDUCTOR THROUGH WHICH A CURRENT FLOWS. ALSO KNOWN AS VOLTAGE DROP.

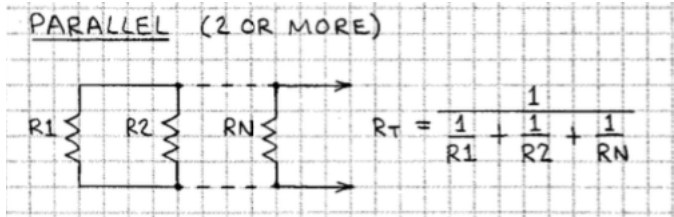
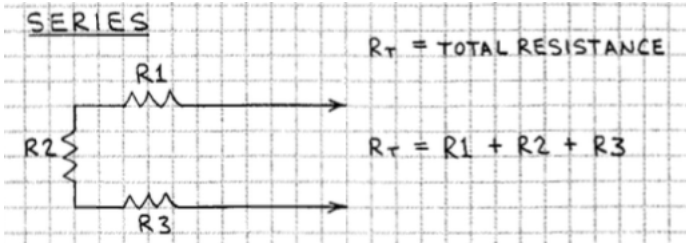
# Ohm's Law

**OHM'S LAW**  
A POTENTIAL DIFFERENCE OF 1 VOLT WILL FORCE A CURRENT OF 1 AMPERE THROUGH A RESISTANCE OF 1 OHM, OR:

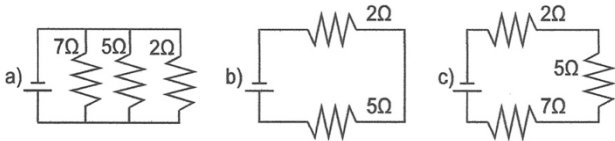
$$V = I \times R$$
$$I = \frac{V}{R}$$
$$R = \frac{V}{I}$$



# Resistor Networks

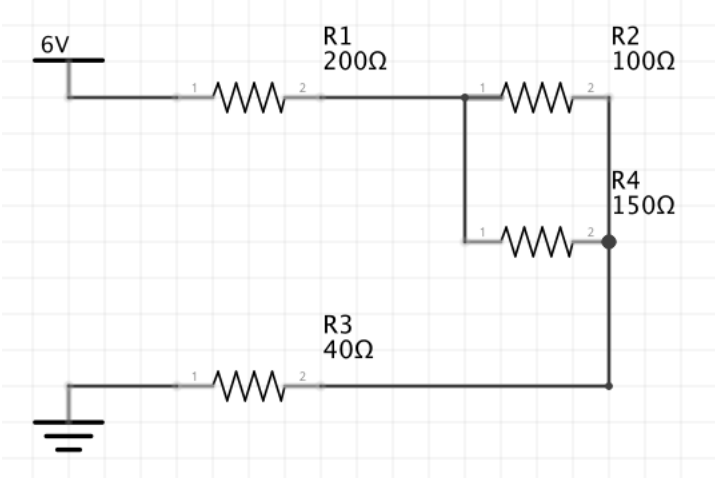


### Resistor Practice

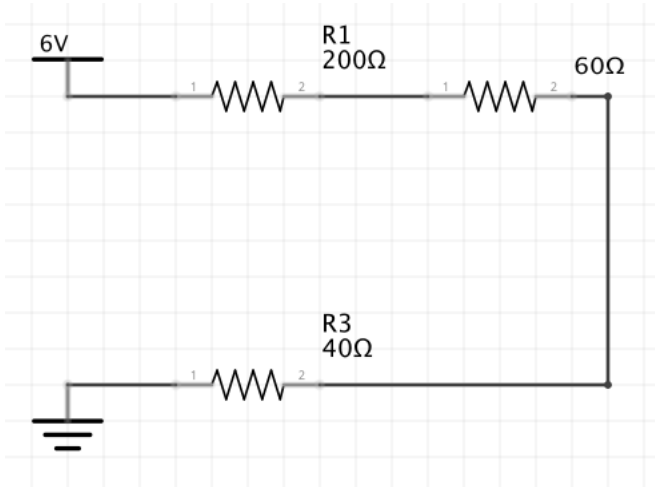


- a) ans: ~1.2ohm)
- b) Two in series (ans: 7ohm)
- c) Three in series (ans: 14ohm)

### Resistor Practice

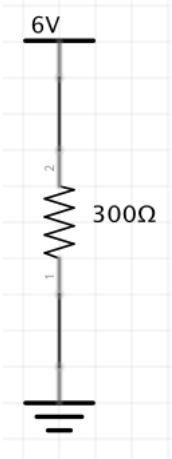


# Resistor Practice



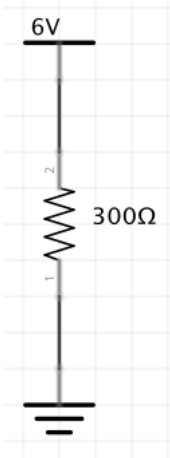
Use Parallel addition to reduce R2 and R4

# Resistor Practice



Use series addition to combine the remaining resistors

# Resistor Practice

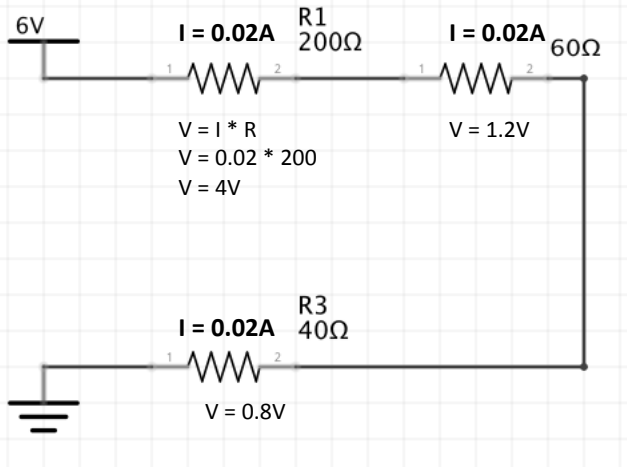


Calculate current

$$V = I * R$$

$$I = V / R$$
$$I = 6 / 300$$
$$I = 0.02 \text{ A}$$

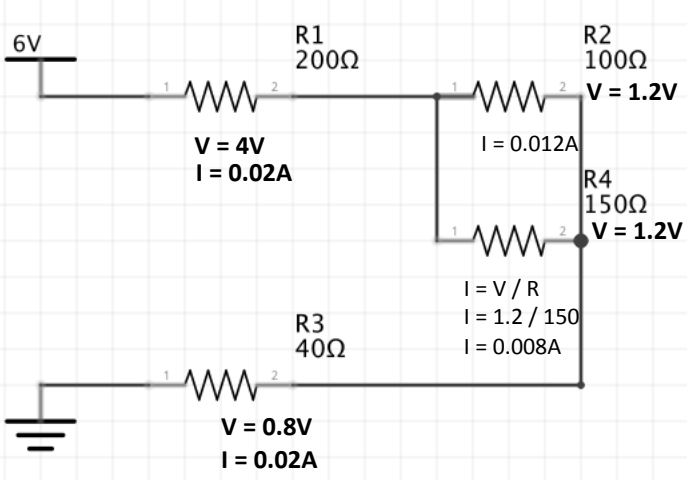
# Resistor Practice



Use the 0.02A current solved for to determine voltages across each resistor

Should add up to 6V !

# Resistor Practice



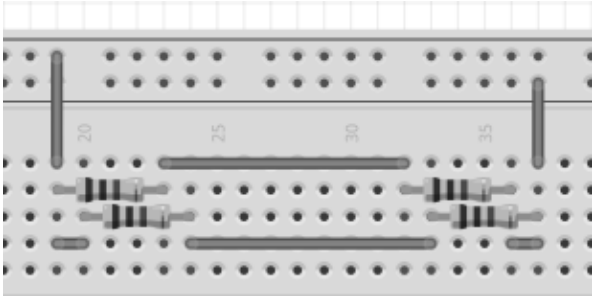
Continue expanding towards original

Find currents / voltages as necessary

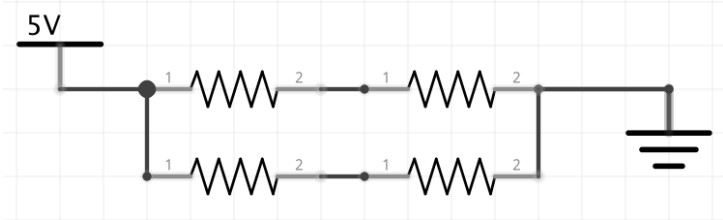
Remember: Voltage stays the same if expanding in parallel

# Breadboard to Circuit Diagram

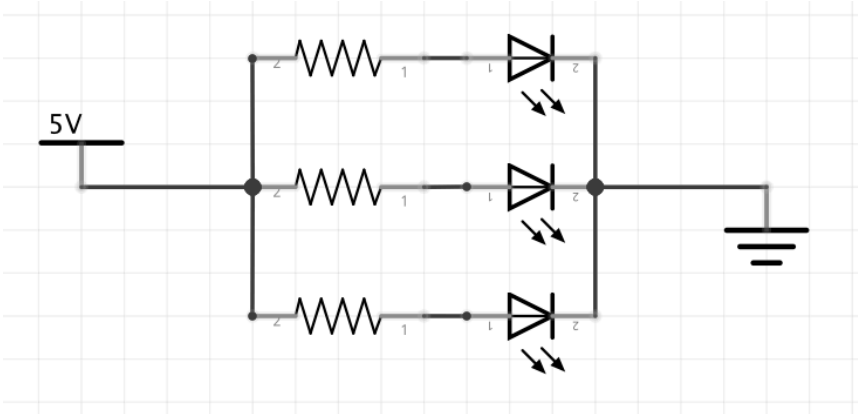
Assume 5V and GND on their proper rails



### Breadboard to Circuit Diagram

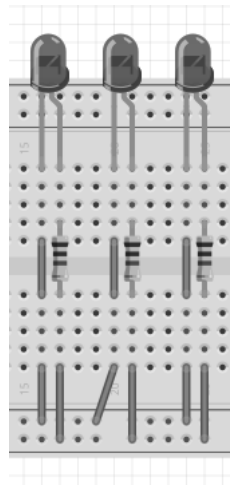


### Circuit Diagram to Breadboard



## Circuit Diagram to Breadboard

Assume 5V and GND on their proper rails



## Arduino Code

- Setup() runs once
  - Set all your PINS as inputs or outputs
  - Set any variables to their initial states
- Loop() runs continuously (over and over)
  - Try to avoid “delay”, better to use a timer
  - Try to separate reading in from sensors and acting on those readings



## Arduino Code

- Setup() functions
  - pinMode
    - Ex: pinMode(12,INPUT)
    - Ex: pinMode(12,INPUT\_PULLUP)
    - Ex: pinMode(8,OUTPUT)

## Arduino Code

- Loop() functions
  - digitalWrite()
    - Obtain a High / Low (1/0) value from a pin
    - Ex: result = digitalWrite(8)
  - digitalWrite()
    - Turn a pin High / Low (1/0)
    - Ex: digitalWrite(8,HIGH)
    - Ex: digitalWrite(9,variable)

Questions?