

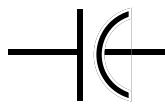

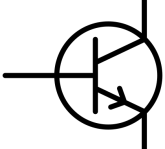


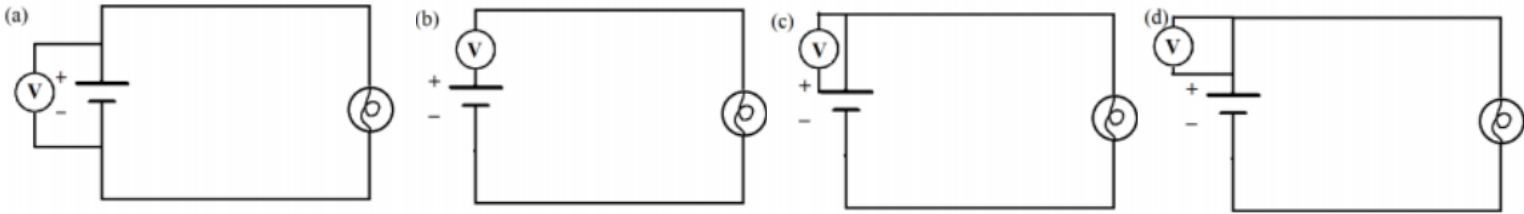
Name \_\_\_\_\_

**Instructions:** For each of the following circuit symbols, write the name of the corresponding circuit component and match it to the appropriate description

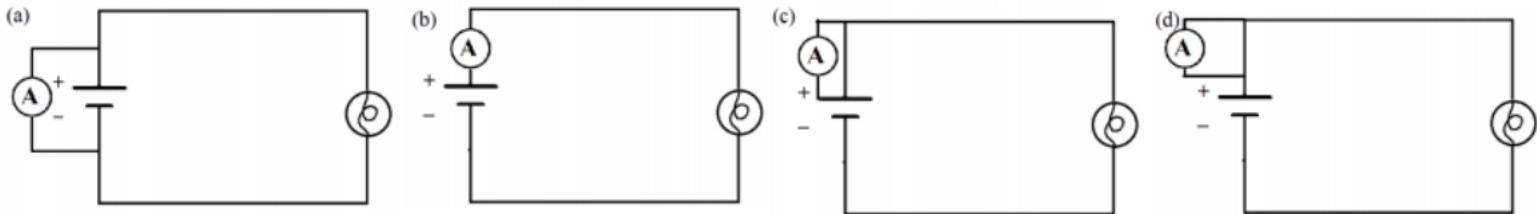
- |    |   |                  |               |
|----|---|------------------|---------------|
| 1. |    | _____            | _____         |
|    |   | (component name) | (description) |
| 2. |    | _____            | _____         |
|    |   | (component name) | (description) |
| 3. |    | _____            | _____         |
|    |   | (component name) | (description) |
| 4. |  | _____            | _____         |
|    |   | (component name) | (description) |
| 5. |  | _____            | _____         |
|    |   | (component name) | (description) |

- A. Component that controls the flow of electricity. Can be on or off
  - B. Component that allows current to flow in one direction, but not the other
  - C. Component that stores electrical charge until it is released
  - D. Component that limits the current that passes through the circuit
  - E. Component that can be used as a switch or an amplifier

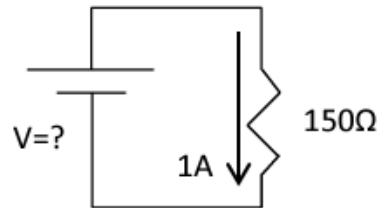
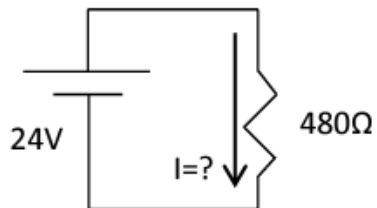
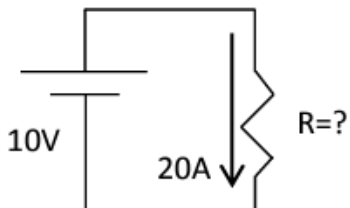
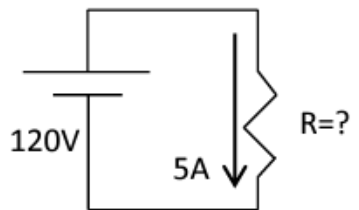
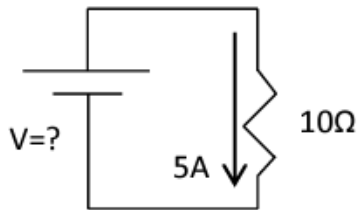
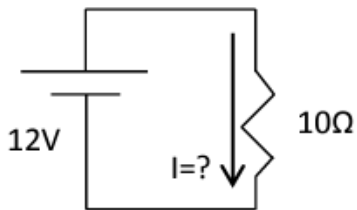
6. Which of the following shows the proper way to measure the voltage across a battery?



7. Which of the following shows the proper way to measure the current through a battery?

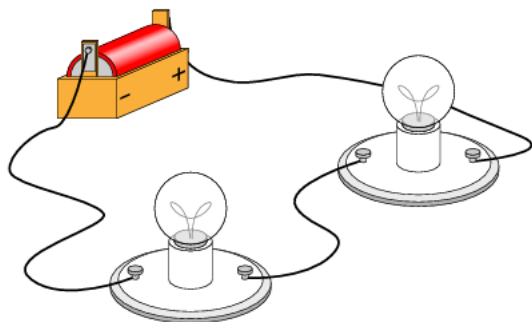


8. Solve for the unknown in each of these circuits



**Instructions:** For the following examples, circle whether or not the circuit will work (will it light up) and explain why.

9.



Will it light up?      Yes   /   No

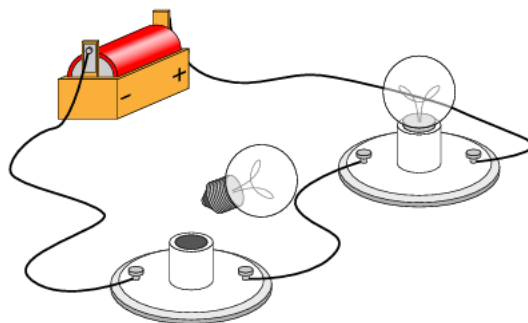
Why? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

10.



Will it light up?      Yes   /   No

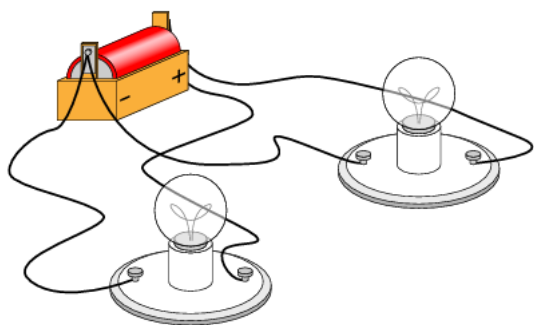
Why? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11.



Will it light up?      Yes   /   No

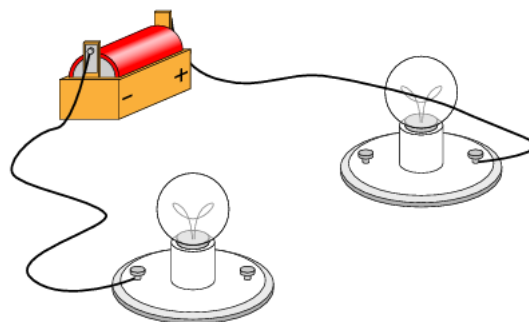
Why? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

12.



Will it light up?      Yes   /   No

Why? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Instructions:** Draw the following circuits

13. Draw a circuit with a voltage source and 3 resistors in series



14. Draw a circuit with a voltage source and 3 resistors in parallel



**Instructions:** For the following code snippets, write out what output you'd expect to see on the serial monitor. If there is no output, write "Nothing"

15.

```
for (int i=1; i<13; i+2){  
    Serial.print(i);  
}
```

Output:

16.

```
int j;  
for (int i=1; i<13; i++){  
    j=j+i;  
}  
Serial.print(j);
```

Output:

17.

```
char a[] = "qzoaaaitp";  
for (int i=1; i<9; i+3){  
    Serial.print(a[i]);  
}
```

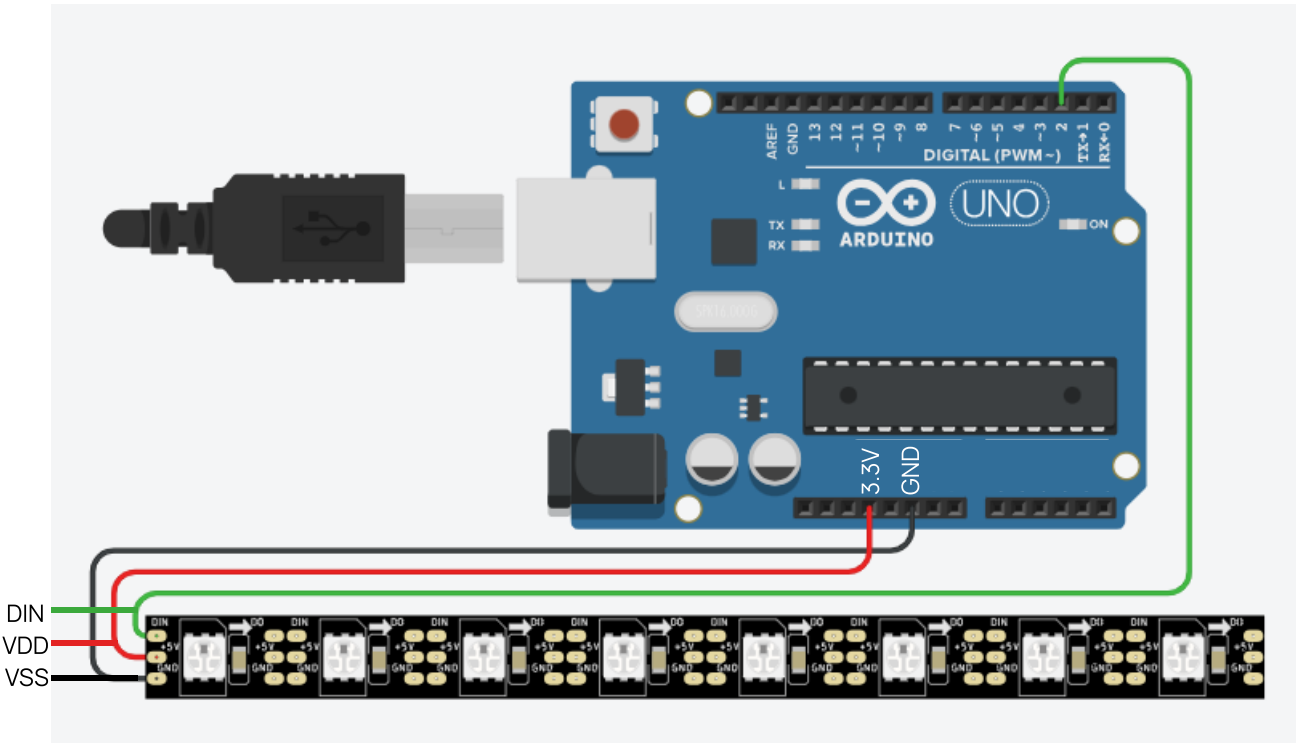
Output:

18.

```
bool b;  
int j;  
for (int i=0; i<10; i++){  
    j=j+1;  
}  
if ((j%2)== 1){  
    b=1;  
}  
if ((b) Serial.print(j);
```

Output:

**Instructions:** Carlos wired the following strip of NeoPixels to his Arduino Uno as shown below. However, he made a mistake somewhere in his wiring and the NeoPixels are not lighting up. Use the following information from the NeoPixel datasheet to help Carlos fix his circuit



19. The circuit is not working because

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20. To fix the circuit, we need to

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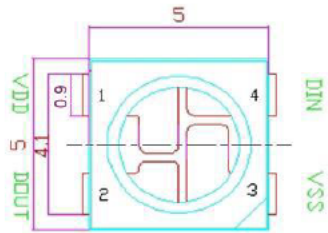
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PIN configuration



PIN function

NO.	Symbol	Function description
1	VDD	Power supply LED
2	DOUT	Control data signal output
3	VSS	Ground
4	DIN	Control data signal input

Absolute Maximum Ratings

Prameter	Symbol	Ratings	Unit
Power supply voltage	$V_{DD}$	+3.5~+5.3	V
Input voltage	$V_i$	-0.5~ $V_{DD}+0.5$	V
Operation junction temperature	$T_{opt}$	-25~+80	°C
Storage temperature range	$T_{stg}$	-40~+105	°C

Electrical Characteristics ( $T_A=-20\sim+70^{\circ}\text{C}$ ,  $V_{DD}=4.5\sim5.5\text{V}$ ,  $V_{SS}=0\text{V}$ , unless otherwise specified)

**Instructions:** This is the code that Carlos is using to light his NeoPixel strip. Use the information from the library below to answer the questions on the next page.

## Carlos's Code

```
#include <Adafruit_NeoPixel.h>

#define ledCount 8
#define pin 2

Adafruit_NeoPixel strip (ledCount, pin, NEO_GRB + NEO_KHZ800);

void setup() {
  strip.begin();
  strip.show();
  strip.setBrightness(100);
}

void loop() {
  //set the first pixel green
  strip.setPixelColor(0, 0, 255, 0); //change this line
  strip.show();
  delay(10);
}
```

## Library

```
215  class Adafruit_NeoPixel {
216
217  public:
218      // Constructor: number of LEDs, pin number, LED type
219      Adafruit_NeoPixel(uint16_t n, int16_t pin = 6,
220                      neoPixelType type = NEO_GRB + NEO_KHZ800);
221      Adafruit_NeoPixel(void);
222      ~Adafruit_NeoPixel();
223
224      void begin(void);
225      void show(void);
226      void setPin(int16_t p);
227      void setPixelColor(uint16_t n, uint8_t r, uint8_t g, uint8_t b);
228      void setPixelColor(uint16_t n, uint8_t r, uint8_t g, uint8_t b, uint8_t w);
229      void setPixelColor(uint16_t n, uint32_t c);
230      void fill(uint32_t c = 0, uint16_t first = 0, uint16_t count = 0);
231      void setBrightness(uint8_t);
232      void clear(void);
233      void updateLength(uint16_t n);
234      void updateType(neoPixelType t);
```

21. As it is written, the first pixel will light up green once the code is run. How would you edit the code so that:

a. The first pixel lights up red

b. The first pixel lights up white

c. The last pixel lights up blue

d. All of the pixels turn on green

22. Carlos wants to add 3 more NeoPixels to his strip. What should he add or change in the code in order to add more pixels to his strip?

23. Carlos wants the lights to dim to 50% after being on for 2 seconds. What line(s) should he add to his code in order to accomplish this?