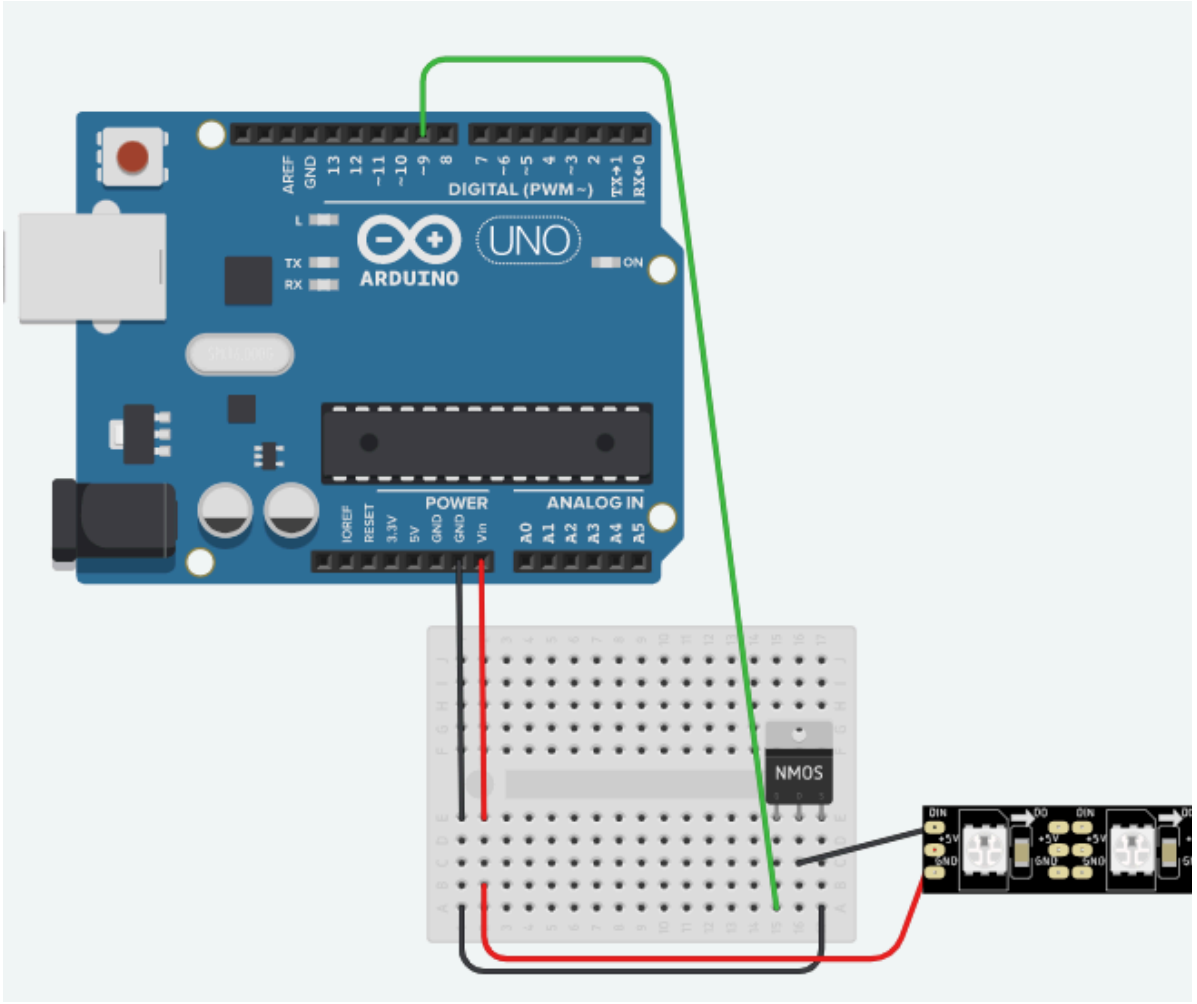
Create a stroboscope with Arduino (Part 1)

Step 1

Create the circuit shown in this figure:



Transform the Blink Source code in order to make the LED Strip to blink.

Blink Code:

```
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(9, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(9, HIGH);   // turn the LED on (HIGH is the voltage level)
  delay(1000);                       // wait for a second
  digitalWrite(9, LOW);    // turn the LED off by making the voltage LOW
  delay(1000);                       // wait for a second
}
```

Step 2

The bellow code Blinks the LED strip without using **delay()** function. Read the code carefully and try to understand what every line does.

```
// constants won't change. Used here to set a pin number:
const int ledPin =  9; // the number of the LED pin

// Generally, you should use "unsigned long" for variables that hold time
// The value will quickly become too large for an int to store
unsigned long previousMillis = 0;        // will store last time LED was updated

long freq = 2;

// constants won't change:
const long timeOn = 100;
const long timeOff = (1000/freq) - 100;

void setup() {
  // set the digital pin as output:
  pinMode(ledPin, OUTPUT);
}

void loop() {
  // here is where you'd put code that needs to be running all the time.

  // check to see if it's time to blink the LED; that is, if the difference
  // between the current time and last time you blinked the LED is bigger than
  // the interval at which you want to blink the LED.
  unsigned long currentMillis = millis();

  if (currentMillis - previousMillis >= timeOn + timeOff) {
    // save the last time you blinked the LED
    previousMillis = currentMillis;
    digitalWrite(ledPin, HIGH);
  }else if(currentMillis - previousMillis >= timeOn){
    digitalWrite(ledPin, LOW);
  }

}
```

Transform the above code in order to blink the LED strip with a specific frequency. The LED strip should be on for 100ms whatever the frequency is (Hint: use a new variable int freq).

What values should variables **timeOn** and **timeOff** should have if variable **freq** is 2 (Hz)?

Fill the table:

Frequency (Hz)	Period (ms)	timeOn (ms)	timeOff (ms)
2	1/2 s = 0,5 s = 500 ms	100	400
4	1/4 s = 0,25 s = 250 ms	100	150
5	200	100	100

10	100	100	0 ???
20	50	100	???

Is there any limit for the frequency that we can have?

Yes, if we want the LED strip to be on for 100ms then the maximum frequency is 10 Hz. (Actually if we have frequency exactly 10 Hz then the timeOff variable must be 0 which means that the LED strip will never be off and thus we will not have a periodic phenomenon.