



# Armstrong

## School Program 2023-2024

Lesson 4



# Armstrong

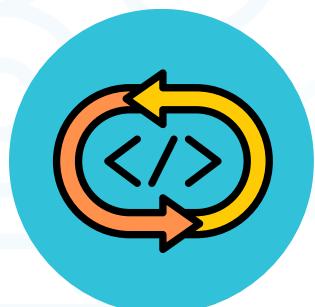
entertainment meets education



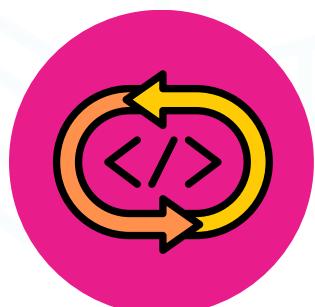
# Lesson Content



**Types of loops**



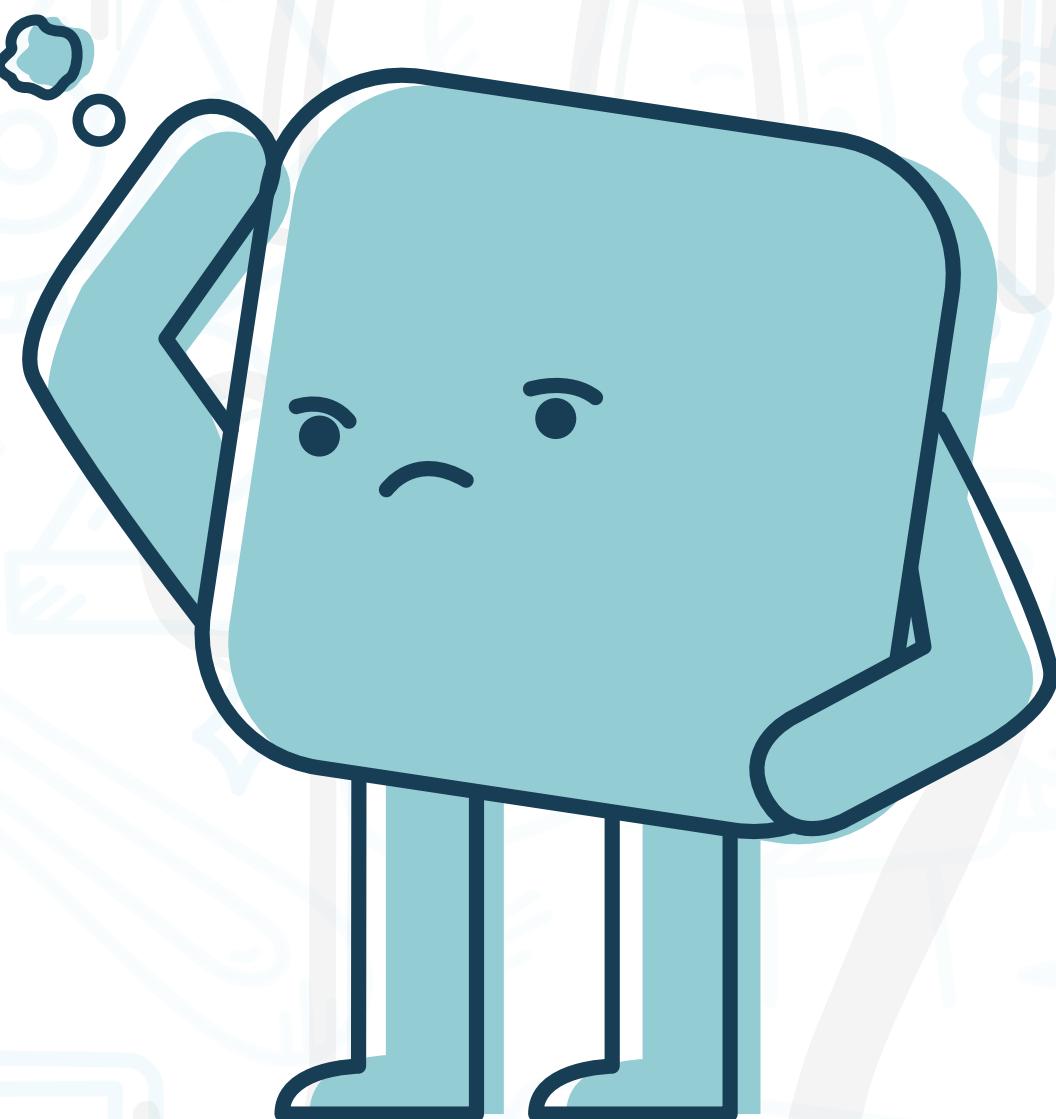
**Discover for loops**



**Discover while loops**

**Think**

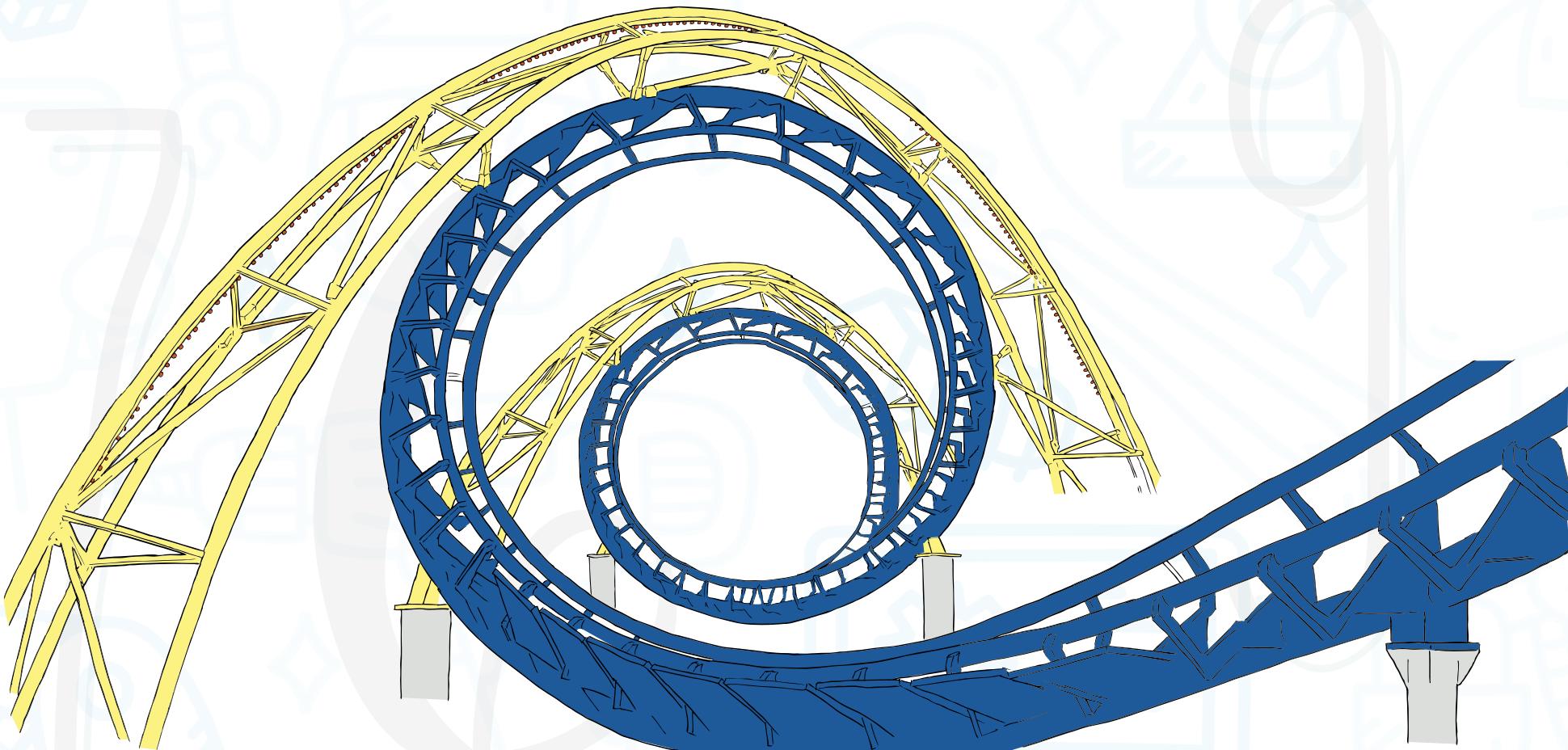
**What are  
loops?**



# Think

## What are loops?

- Loops are things that repeat.
- They go round and round and round and round again.



# Analogy ≡

You have a pile of candy

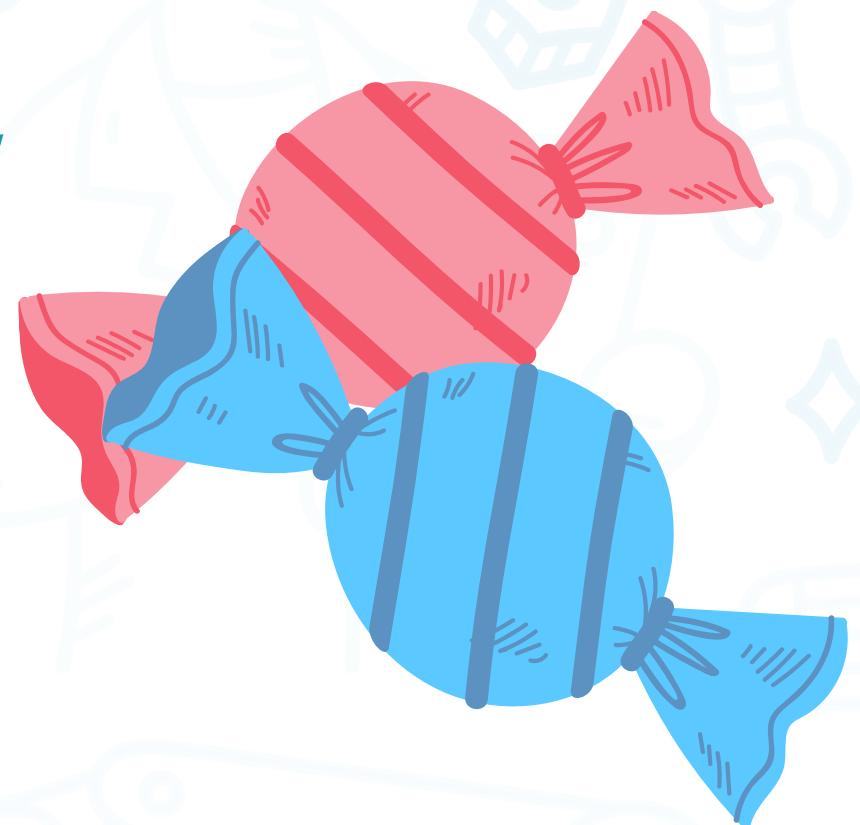
If you take one candy, and eat it, the pile will still be there



# Analogy ≡

You have a pile of candy

You have to repeat so you can finish your candy



# Analogy ≡

You have a pile of candy

All done



# Types of Loops

For loop

While loop

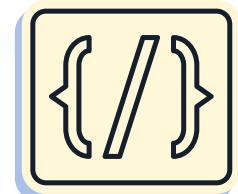
# For loops

For loops repeat a chunk of code a specified number of times.



# For loops

## Syntax



```
for(iterator initialization; stop condition; increment instruction){  
    //Do something  
}
```

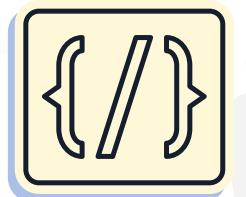
# While loops

While loops repeat a chunk  
of code while some  
condition is true, stopping  
when the condition is no  
longer true.



# while loops

Syntax



```
while(condition){
```

```
    //Do something
```

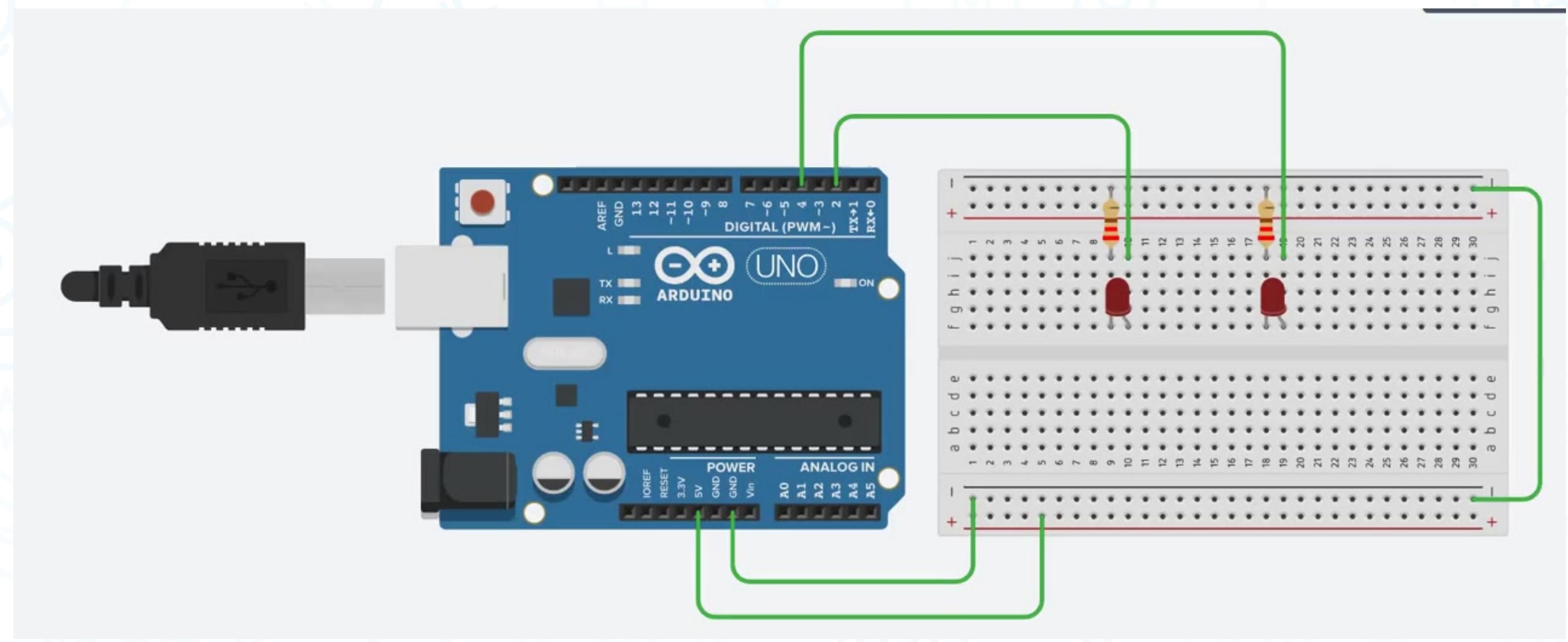
```
}
```

**Let's start our first  
example**

**START**

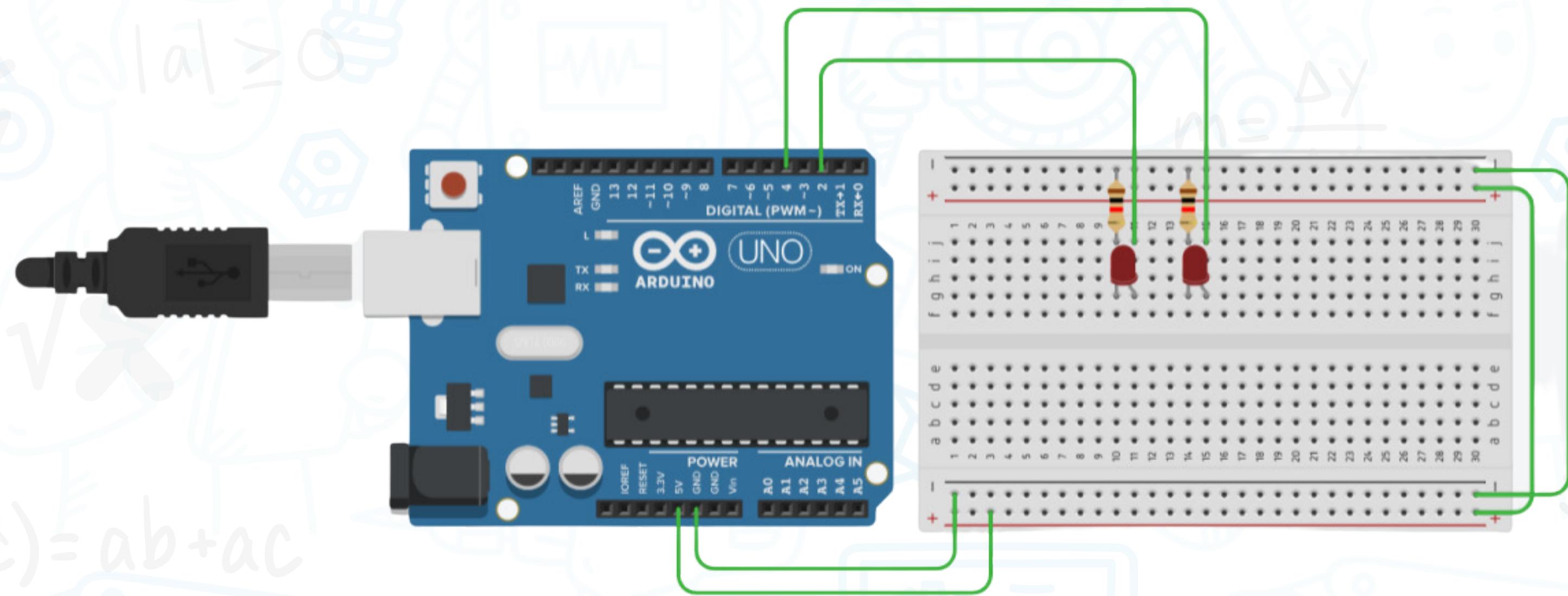
# Let's start tinkering

Flashing first 5 times and then second led 5 times



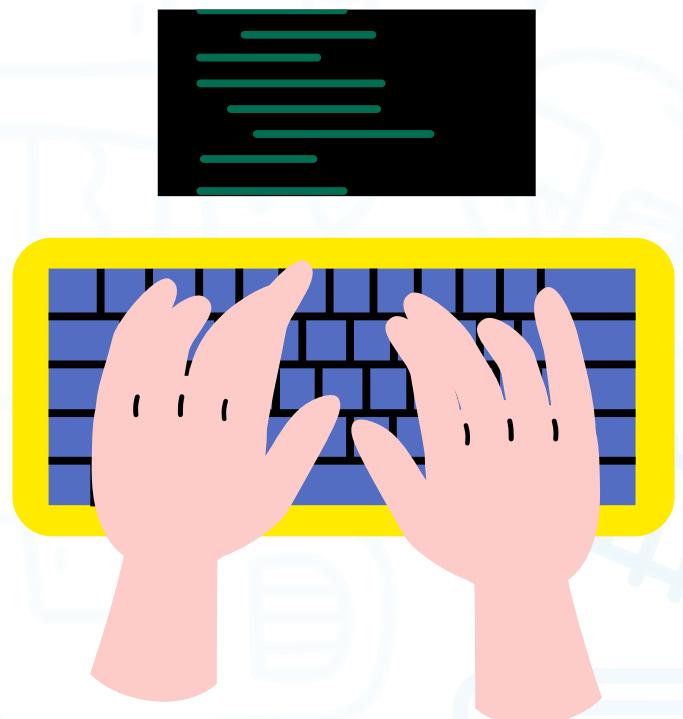
# Let's try it on Arduino IDE

## Step1: Assembly



# Flashing LEDs code

Try it by yourself



# Code explanation

Write the code for the first LED to flash once



Makes the first  
LED flashes

```
digitalWrite(D0, HIGH);  
delay(500);  
digitalWrite(D0, LOW);  
delay(500);
```

# Code explanation

To repeat the flashing:



you will write it as  
follows

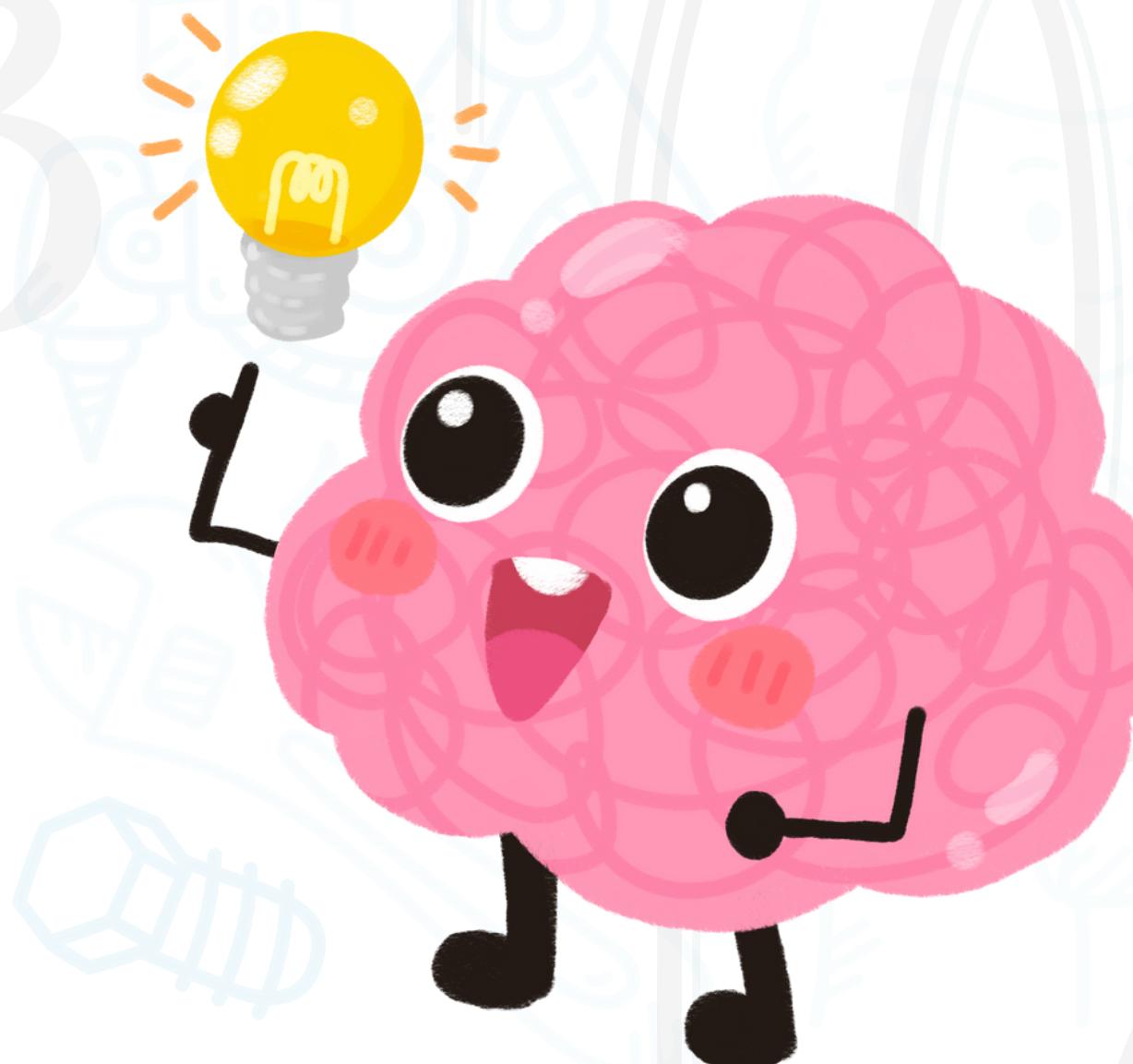


```
digitalWrite(D0, HIGH);  
delay(500);  
digitalWrite(D0, LOW);  
delay(500);  
digitalWrite(D0, HIGH);  
delay(500);  
digitalWrite(D0, LOW);  
delay(500);
```

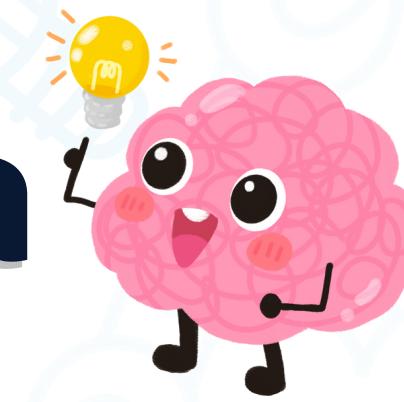
# Think

## TOOO LONG

let's try using  
loops



# Code explanation



```
for (int i=0; i<5; i++)
{
    digitalWrite(D0, HIGH);
    delay (500);
    digitalWrite(D0, LOW);
    delay(500);
}
```

# Code explanation

**for loop:** it makes the code much neater

without for loop

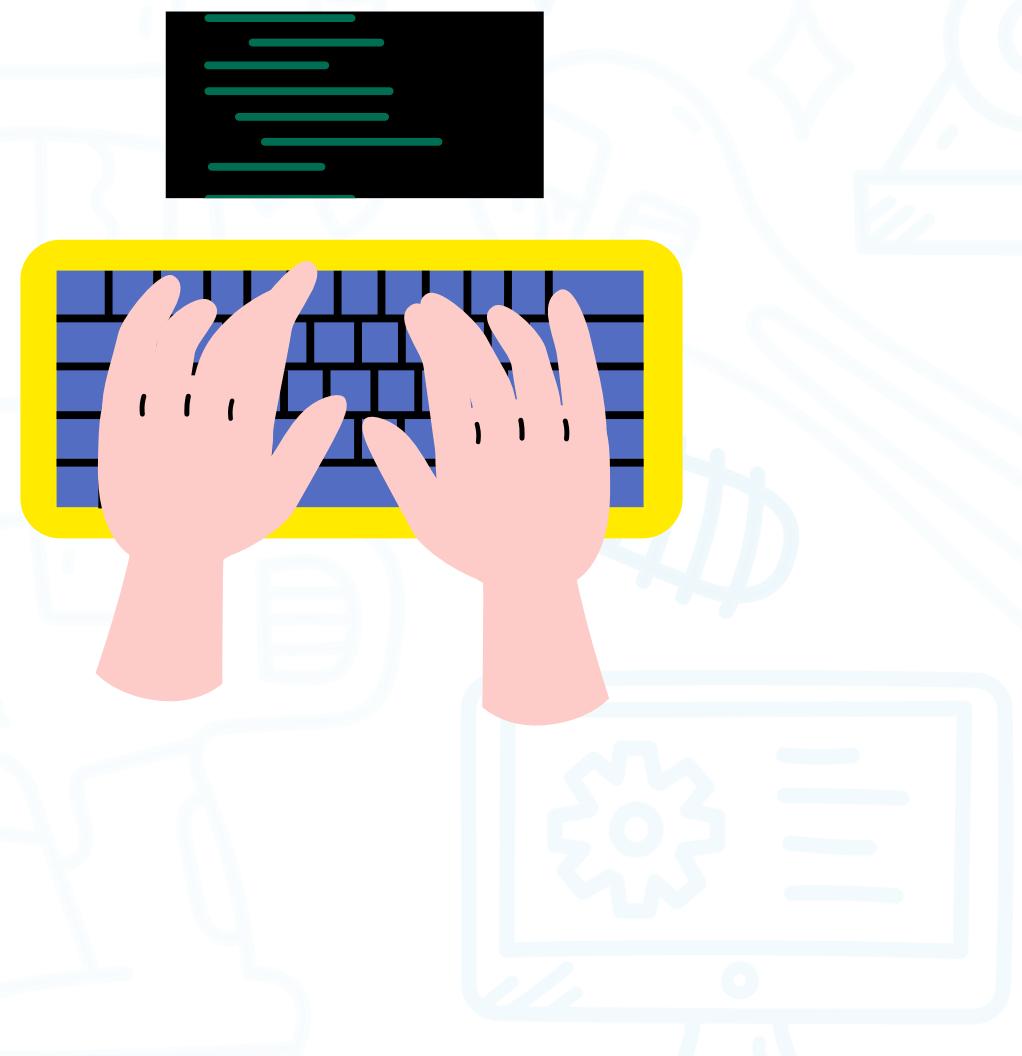
with for loop

```
for (int i=0;i<5;i++)
{
    digitalWrite(D0, HIGH);
    delay (500);
    digitalWrite(D0, LOW);
    delay(500);
}
```

```
digitalWrite(D0, HIGH);
delay (500);
digitalWrite(D0, LOW);
delay(500);
    digitalWrite(D0, HIGH);
delay (500);
digitalWrite(D0, LOW);
delay(500);
```

# Flashing LEDs

Write the code for the  
second LED by yourself



# Code explanation

Repeat the code for the second LED

Makes the second LED  
flashes

```
for (int i=0;i<5;i++)  
{  
    digitalWrite(D3, HIGH);  
    delay (500);  
    digitalWrite(D3, LOW);  
    delay (500);  
}
```

# Flashing LEDs

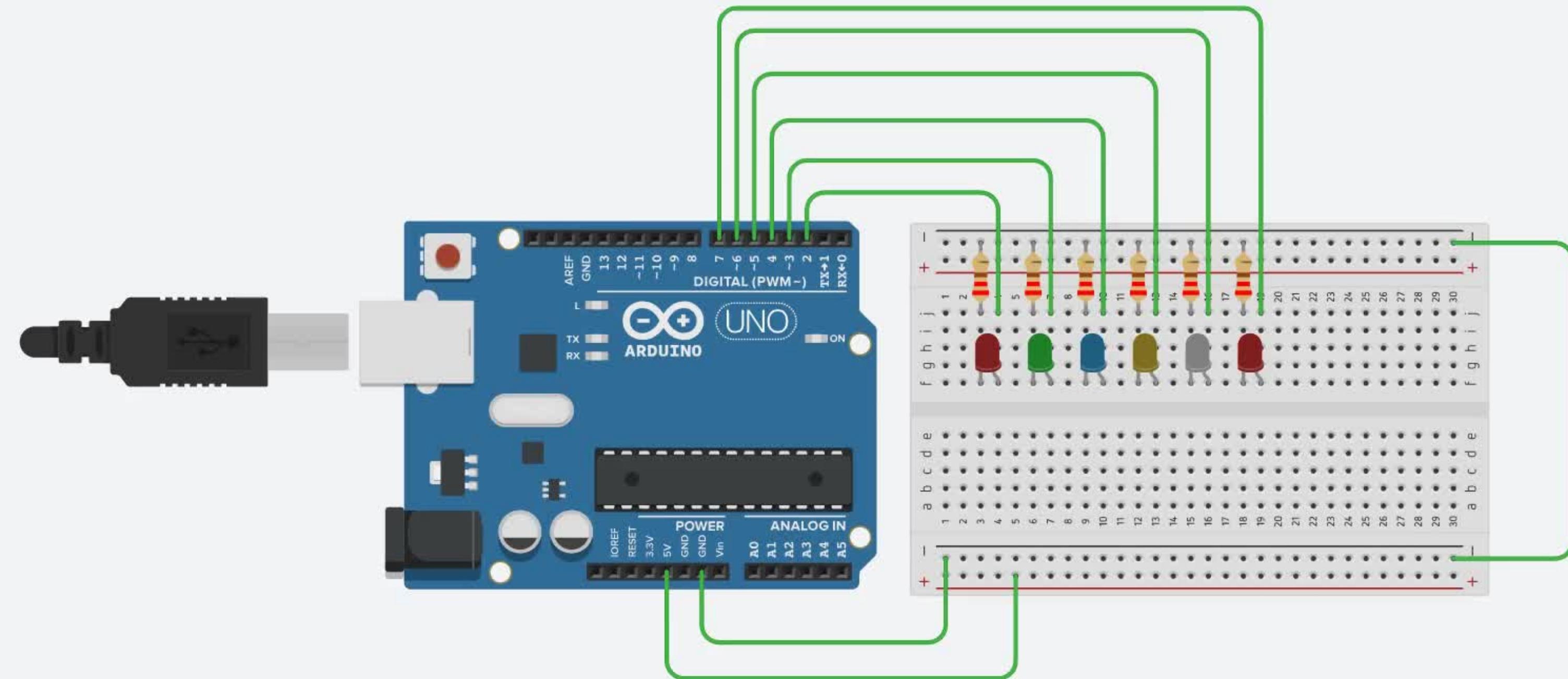
```
void setup()
{
pinMode (D0, OUTPUT);
pinMode (D3, OUTPUT);
}
void loop()
{
for (int i=0;i<5;i++)
{
  digitalWrite(D0, HIGH);
  delay (500);
  digitalWrite(D0, LOW);
  delay(500);
}
for (int i=0;i<5;i++)
{
  digitalWrite(D3, HIGH);
  delay (500);
  digitalWrite(D3, LOW);
  delay (500);
}
```

# Now, Our second example

START

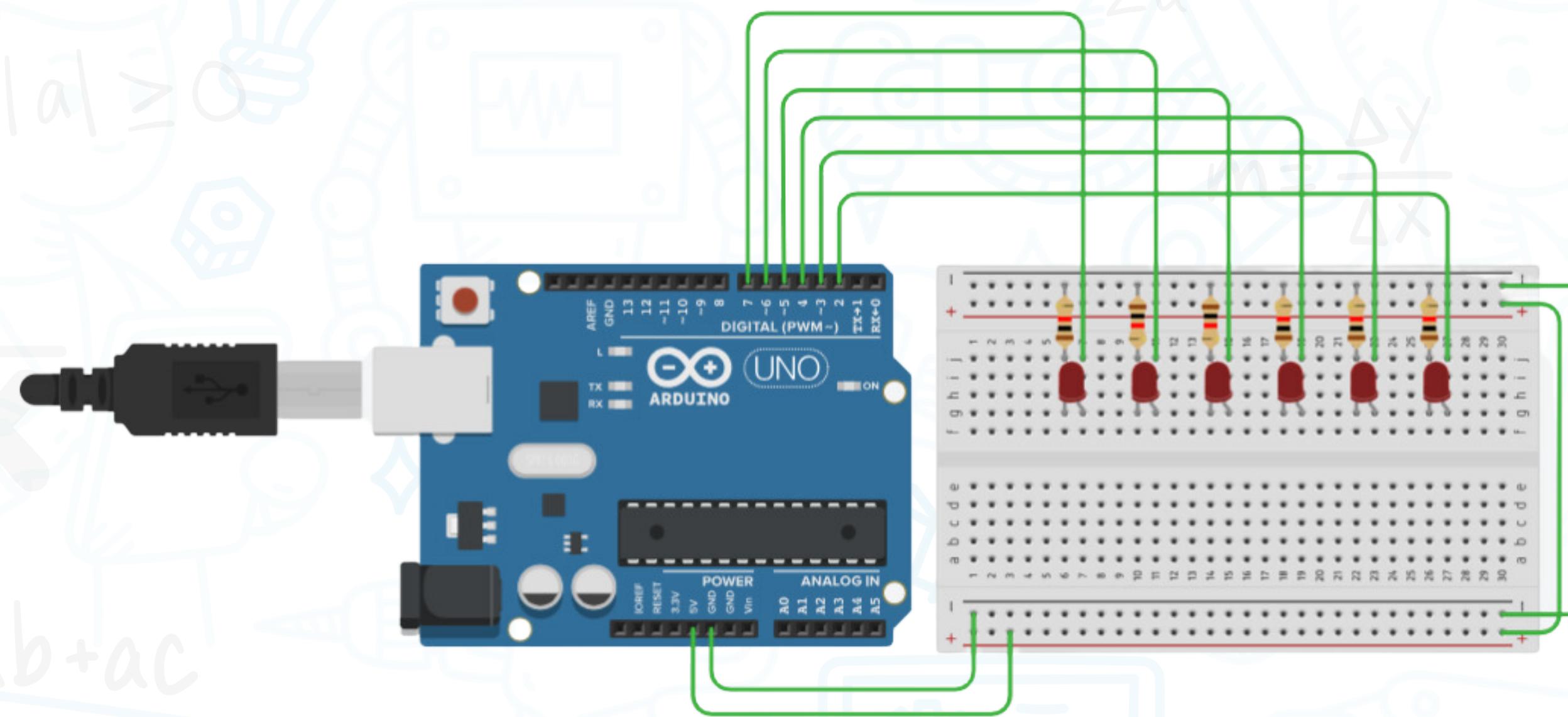
# Let's start tinkering

## flash multiple LEDs using while loop



# Let's try it on Arduino IDE

# Step1: Assembly



# LED sequence

Try it by yourself



# Code explanation

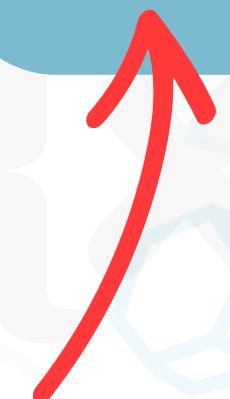
We can use array which arranges the pins' numbers one after another and a pin is accessed by its order

```
int pins[5]={D3,D4,D5,D6,D7};
```

# Code explanation

we specify the type of the elements in the array as int which means integer

```
int pins[5]={D3,D4,D5,D6,D7};
```



# Code explanation

we define the name of the array. Here we choose “pins”

```
int pins[5]={D3,D4,D5,D6,D7};
```



# Code explanation

we specify the number of elements in the array.

we will control 5 leds so we set the number to 5

```
int pins[5]={D3,D4,D5,D6,D7};
```



# Code explanation

we assign the values of  
the array's elements  
separated with commas  
and included between  
curly brackets

```
int pins[5]={D3,D4,D5,D6,D7};
```



# Code explanation

Note that:

`pins[0]=D3`

`pins[1]=D4`

`pins[2]=D5`

`pins[3]=D6`

`pins[4]=D7`

```
int pins[5]={D3,D4,D5,D6,D7};
```



# Code explanation

For loop can be used in setting up your code

```
void setup()
{
    for(int i=0;i<5;i++){
        pinMode(pins[i],OUTPUT);
    }
}
```

# Code explanation

In loop we write the blink code for each pin to blink the defined leds in pins array one after another

```
void loop()
{
    for(int i=0;i<5;i++){
        digitalWrite(pins[i], HIGH);
        delay (500);
        digitalWrite(pins[i], LOW);
        delay (500);
    }
}
```

# Code Explanation

While loop can also be used  
to do the same function.



# Code explanation

while loop can be used by  
adjusting the condition

repeat until the  
condition is false

```
void loop()
{
    int i=0;
    while(i<5){
        digitalWrite(pins[i], HIGH);
        delay (500);
        digitalWrite(pins[i],LOW);
        delay (500);
        i++;
    }
}
```

