Armstrong

School Program 2023-2024

Orientation Session

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Lesson Content

Variables

Control speed

Light dimmer

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Think

What is a constant?

Think

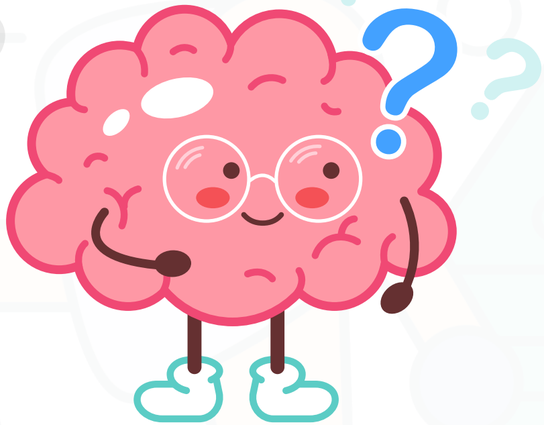
What is a constant?

A constant is a word or a symbol that represents a fixed value that does not change.

For example, the number 10 is a constant, because it always means the same thing.

Think

What is a variable?



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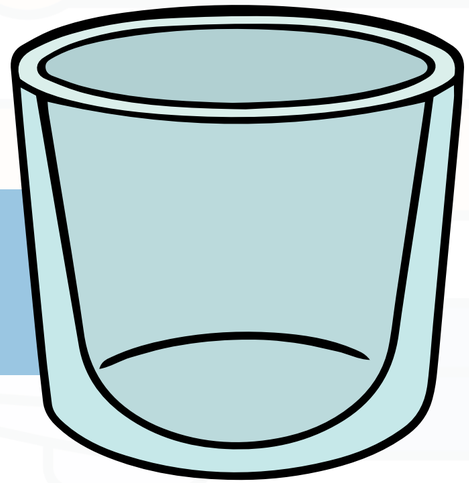
Think

What is a variable?

Constants are different from variables, which are words or symbols that can change their values depending on the situation.
For example, the word age is a variable, because it can mean different things for different people. The letter x is also a variable, because it can represent different numbers in different equations.

Analogy ≈

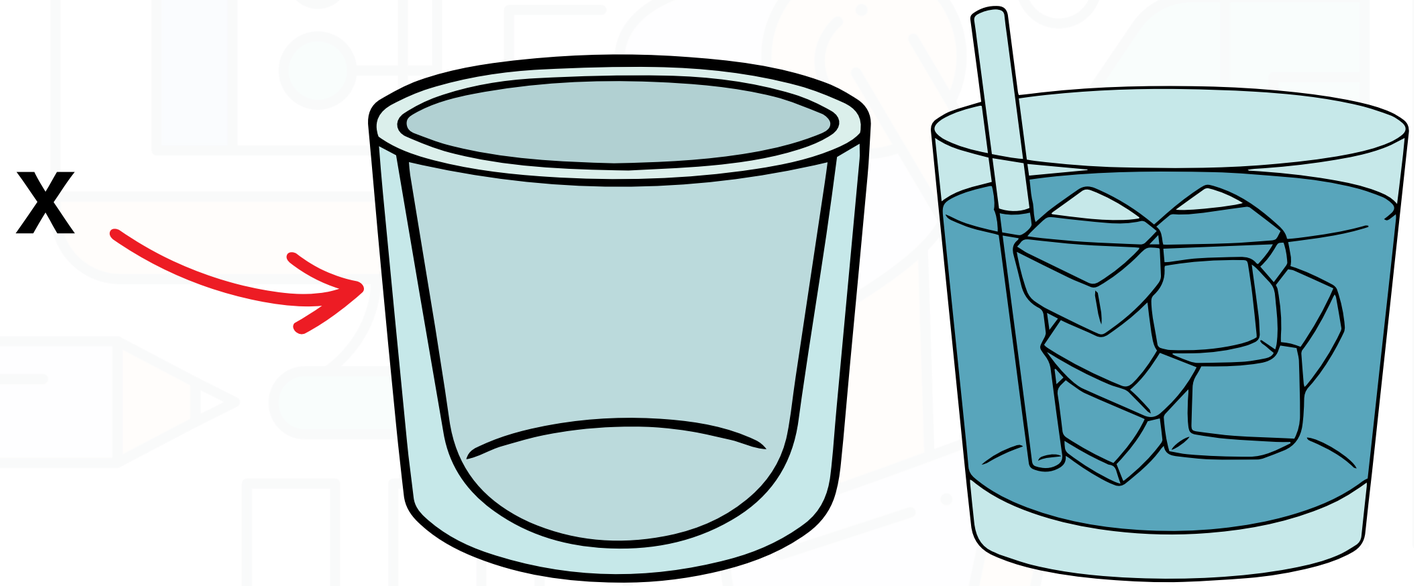
Imagine you have an empty cup.



Think about cups as containers that can hold different things, such as liquids, candies, or coins.

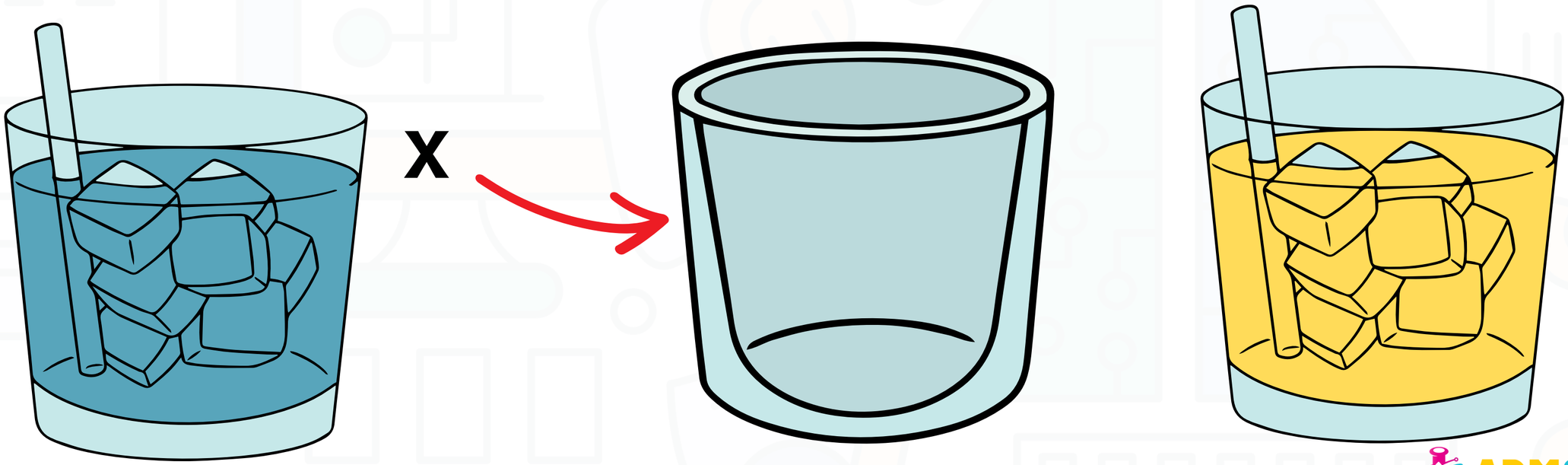
Analogy ≈

For example, you can have a cup named x and fill it with water. Then you can say that x is a variable that has the value of water.



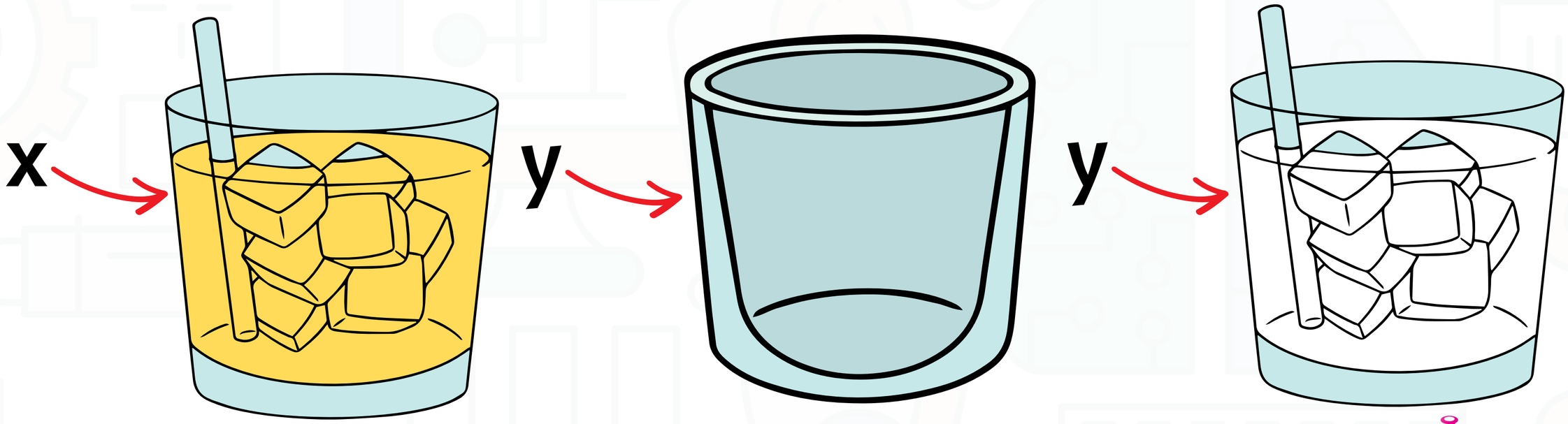
Analogy ≈

You can also change the value of x by emptying the cup and filling it with juice. Then you can say that x is still a variable, but now it has a different value of juice.



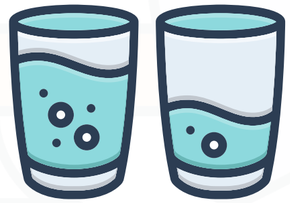
Analogy ≈

You can also have another cup named y and fill it with milk. Then you can say that y is another variable that has the value of milk.



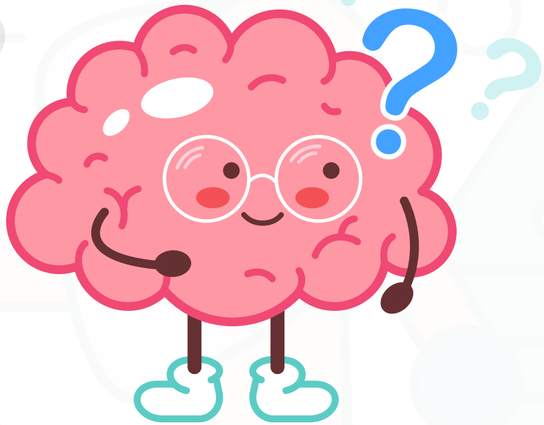
Analogy ≈

You can also compare the values of x and y by looking at the cups and seeing which one has more or less liquid. You can also add or subtract the values of x and y by pouring the liquids from one cup to another.



Think

Why are variables important in coding?



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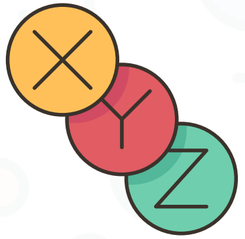
Think 

Why are variables important in coding? 

Variables are useful in coding because they can help us store and manipulate data that can vary based on the program's requirements.

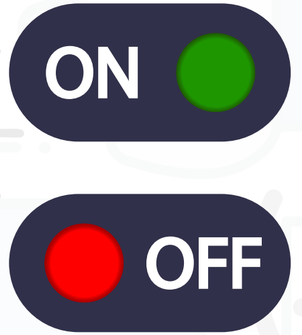
Variables



Types of variables:

Numbers

Letters



Boolen

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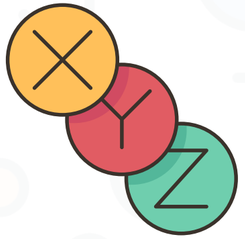
Variables



Numbers 1 2 3

Whole number

Integer

Decimal

Float

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Variables

Letters

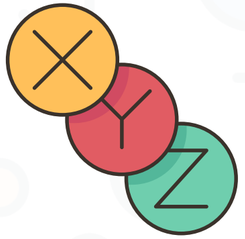
Letters

Characters

Words

String

Variables

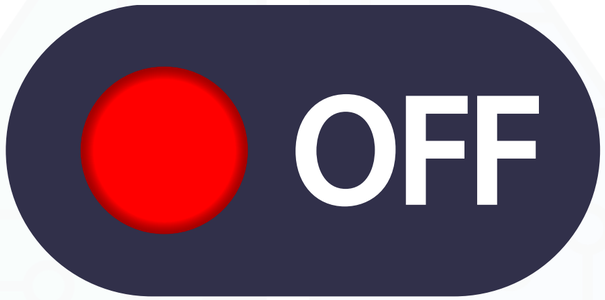


Boolen:

1

HIGH

0



LOW

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How to create variables

Step 1: Choose the type of Variable.

```
int myInteger = 42;
```

```
float pi = 3.14159;
```

```
bool isTrue = true;
```

```
char firstLetter = 'A';
```

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How to create variables

Step 2: Name the Variable.

```
int myInteger = 42;
```

```
float pi = 3.14159;
```

```
bool isTrue = true;
```

```
char firstLetter = 'A';
```

ARDUINO

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How to create variables

Step 3: Giving Value to the Variable.

```
int myInteger = 42;
```

```
float pi = 3.14159;
```

```
bool isTrue = true;
```

```
char firstLetter = 'A';
```

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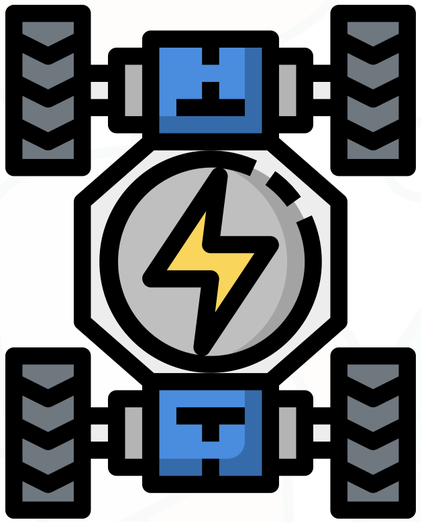
Let's try it on our robot

Write code to increase speed gradually

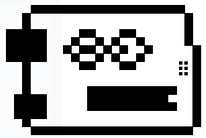
Enable -> 6
Input 1 ->11
Input2 -> 12



Enable -> 10
Input 1 -> 15
Input2 -> 16

Enable -> 5
Input 1 -> 7
Input2 -> 8

Enable -> 9
Input 1 -> 13
Input2 -> 14



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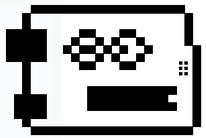
Increase speed gradually

Step 1: Create variable called speed

```
1   int speed = ;
```



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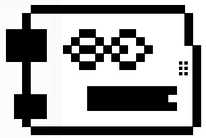
Increase speed gradually

Step 2: Import forward code



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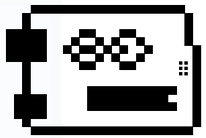
Increase speed gradually

Step 2: Import forward code



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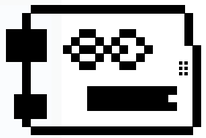
Increase speed gradually

Step 3: Set speed with 70



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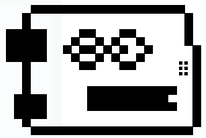
Increase speed gradually

Step 4: Set PWM pins to speed



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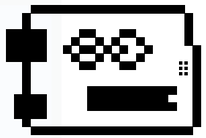
Increase speed gradually

Step 5: Increase speed by 10 every 3 seconds



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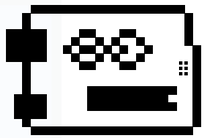
Increase speed gradually

Step 6: Repeat this 5 times



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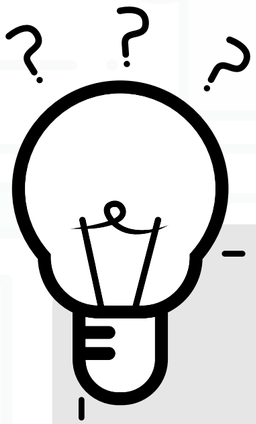
Increase speed gradually

Step 7: After 5 times make robot stop



To make robot stop:

1. set all motor PWM pins to 0
2. set all motor pins to low

Increase speed gradually

Step 7: After 5 times make robot stop

Light dimmer simulation

Light dimmer simulation

Step 1: Connect LED to pin 3

Try it by yourself

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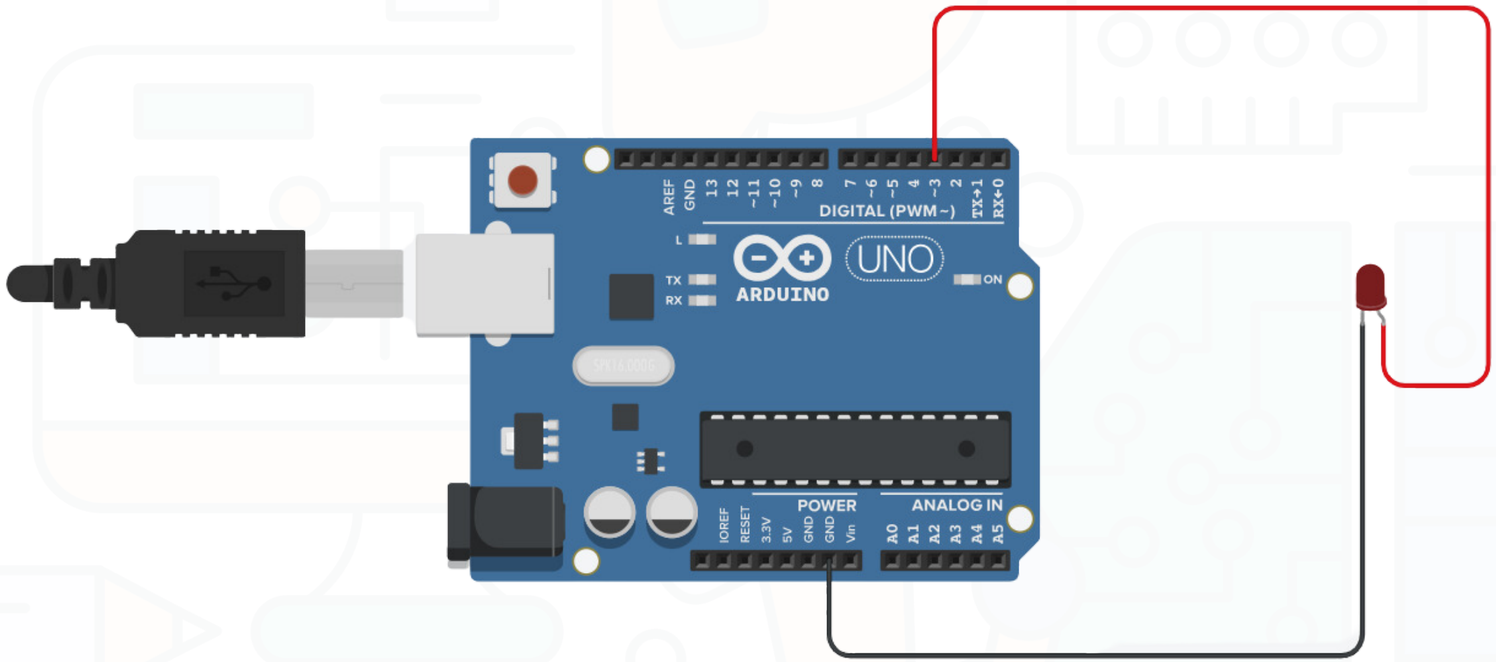
Light dimmer simulation

Step 1: Connect LED to pin 3



Light dimmer simulation

Step 2: Write code to control LED's brightness

Think in steps

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Light dimmer simulation

Step 2: Write code to control LED's brightness

Think in steps

1. I want to start with a turned-off LED

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Light dimmer simulation

Step 2: Write code to control LED's brightness

Think in steps

1. I want to start with a turned-off LED
2. Increase it brightness by 10 every 0.5 sec

Light dimmer simulation

Step 2: Write code to control LED's brightness

Think

How can we control brightness?

Light dimmer simulation

Step 2: Write code to control LED's brightness

Think

How can we control brightness?

Using a variable named brightness that can be increased or decreased over time.

Light dimmer simulation

Step 2.1: Create brightness varibale

```
int brightness = ;
```

Light dimmer simulation

Step 2.2: Set variable to 0

```
int brightness = 0;
```

Light dimmer simulation

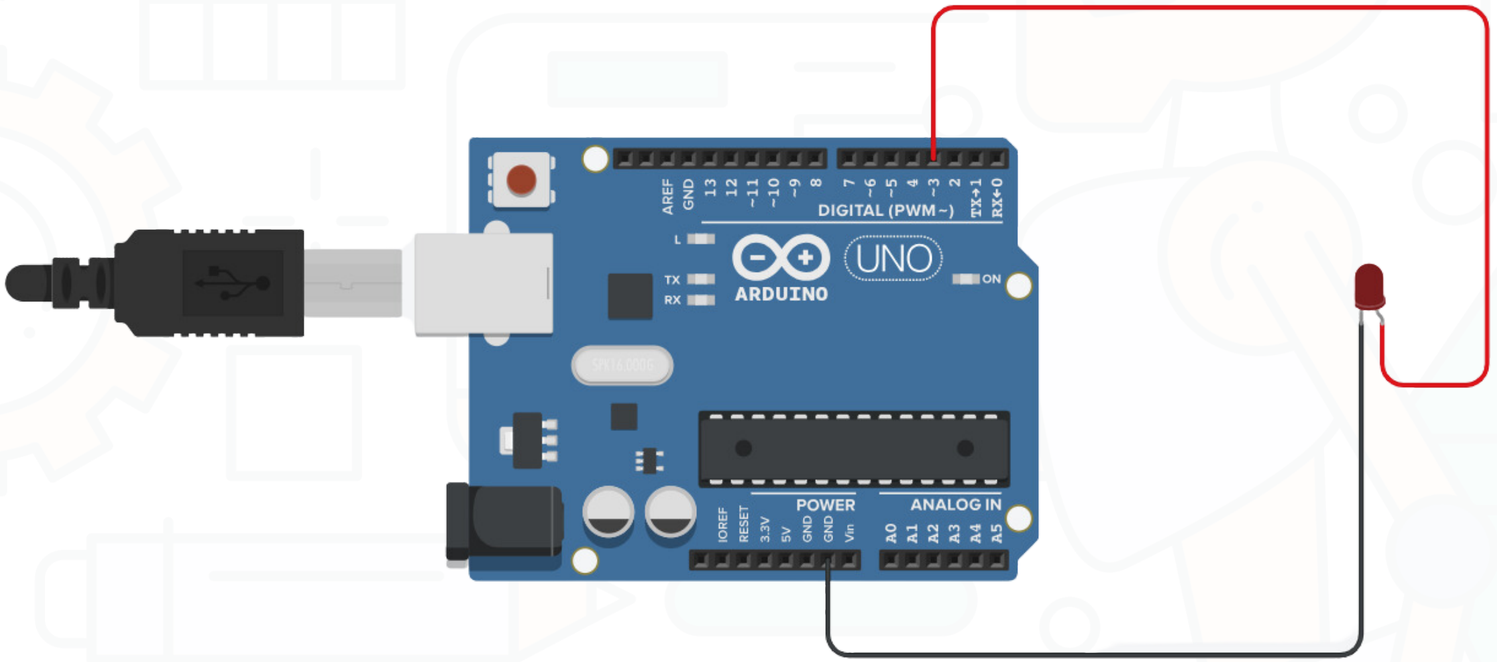
Step 2.3: Set pin 3 to Brightness

```
3   void setup() {
4   pinMode(3,OUTPUT);
5   }
```

```
void loop() {
analogWrite(3,brightness);
}
```

Light dimmer simulation

Step 2.4: Wait 0.5 sec and increase brightness by 10




```
void loop() {
  analogWrite(3, brightness);
  brightness += 10;

  if (brightness > 255) {
    brightness = 0;
  }

  delay(100);
}
```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