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Armstrong

School Program 2023-2024

Lesson 2

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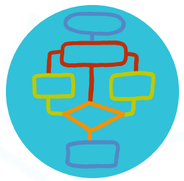
Lesson Content

Variables

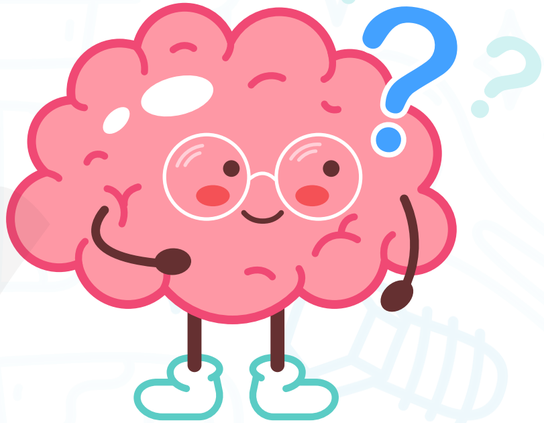
Pushbutton



if | else if | else

Think

What is a constant?



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Think 

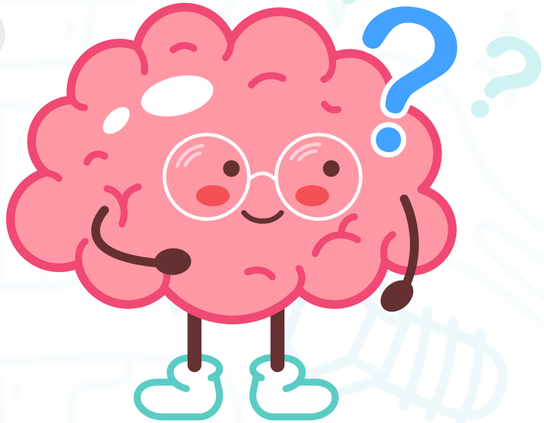
What is a constant?

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?



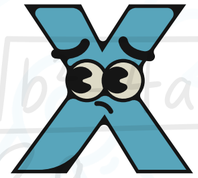
Think 

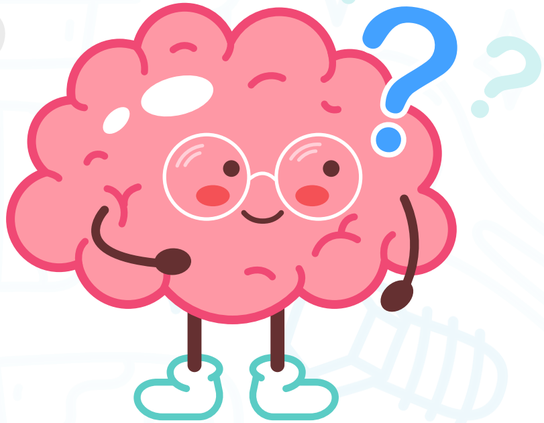
What is a variable? 

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.

Think

Why are variables important in coding?





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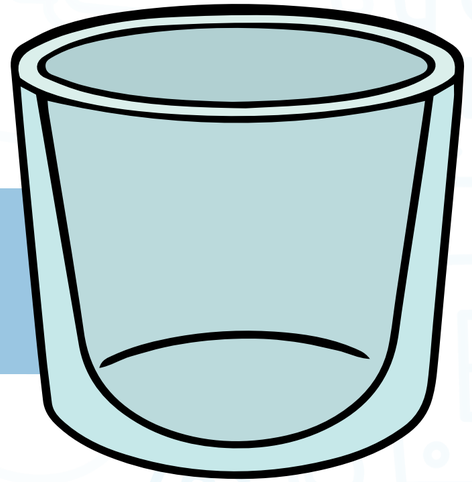
Think 

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.

Analogy ≈

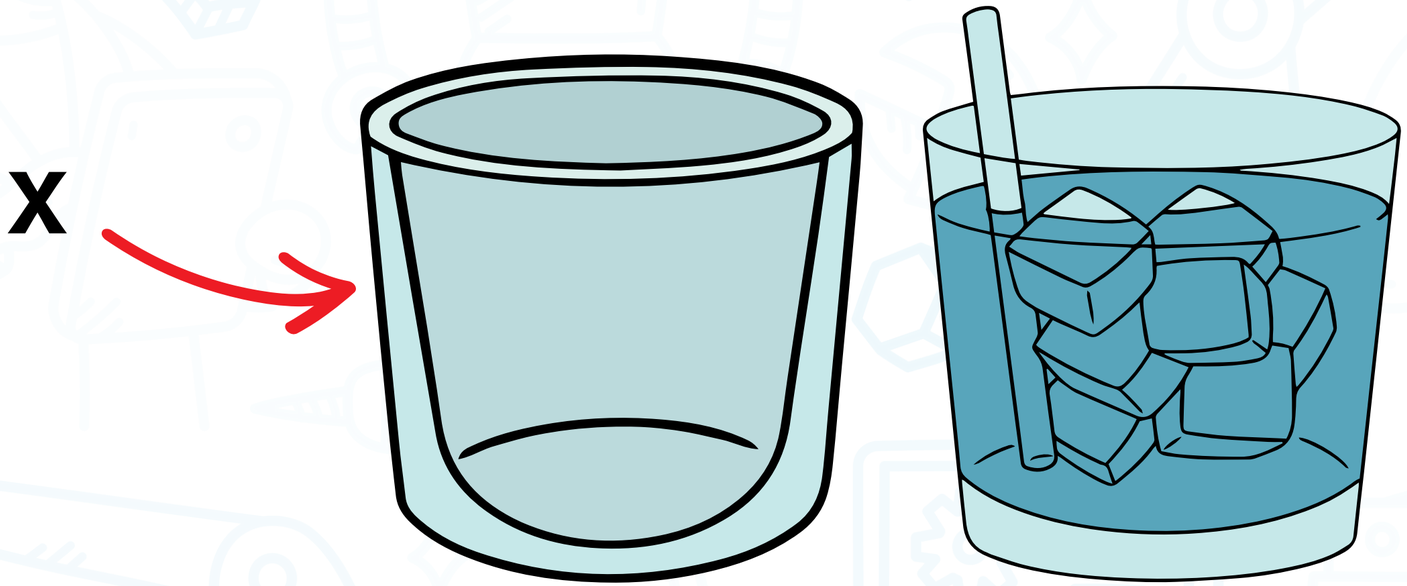
Imagine you have an empty cup.



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

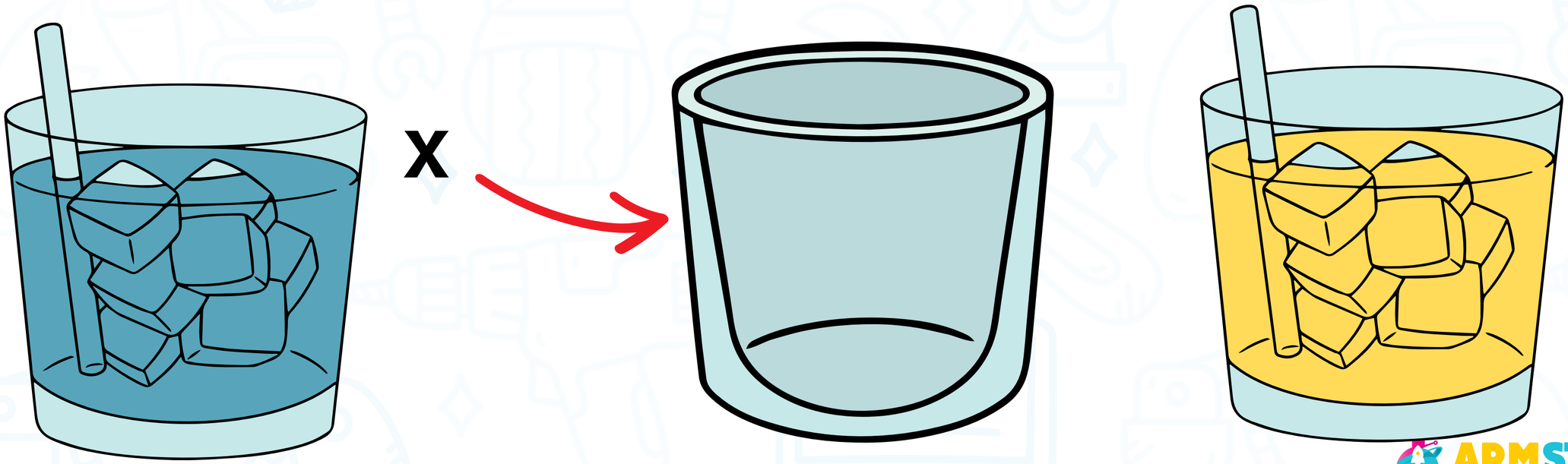
Analogy ≈

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.



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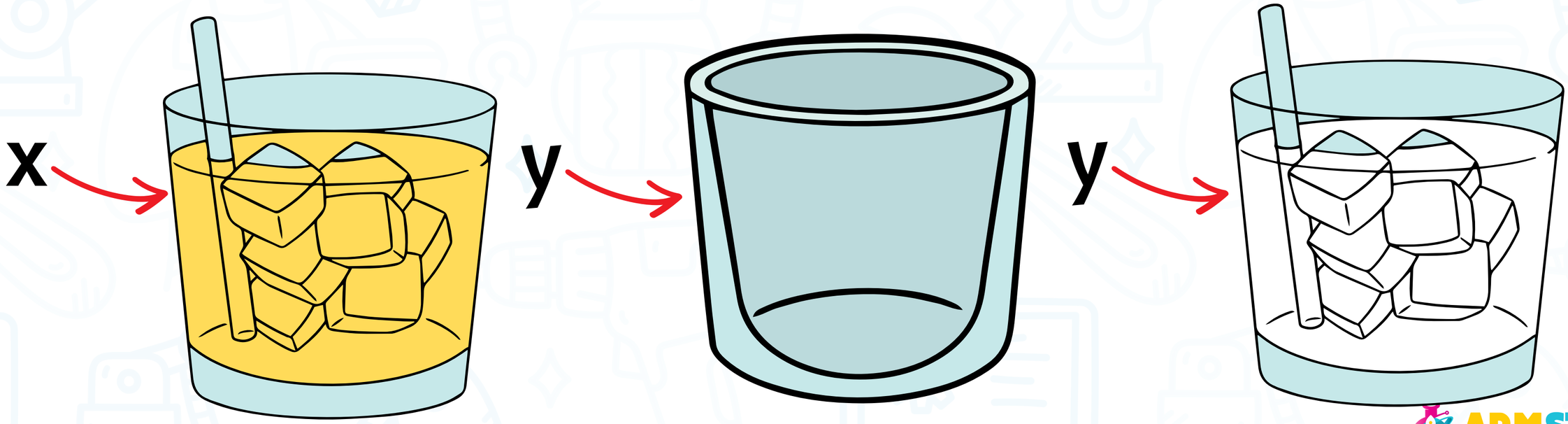
Analogy ≈

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.



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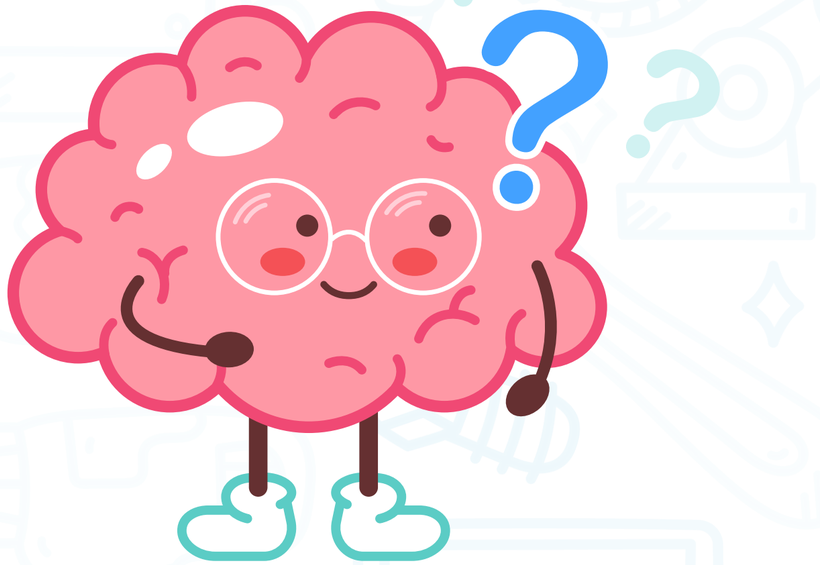
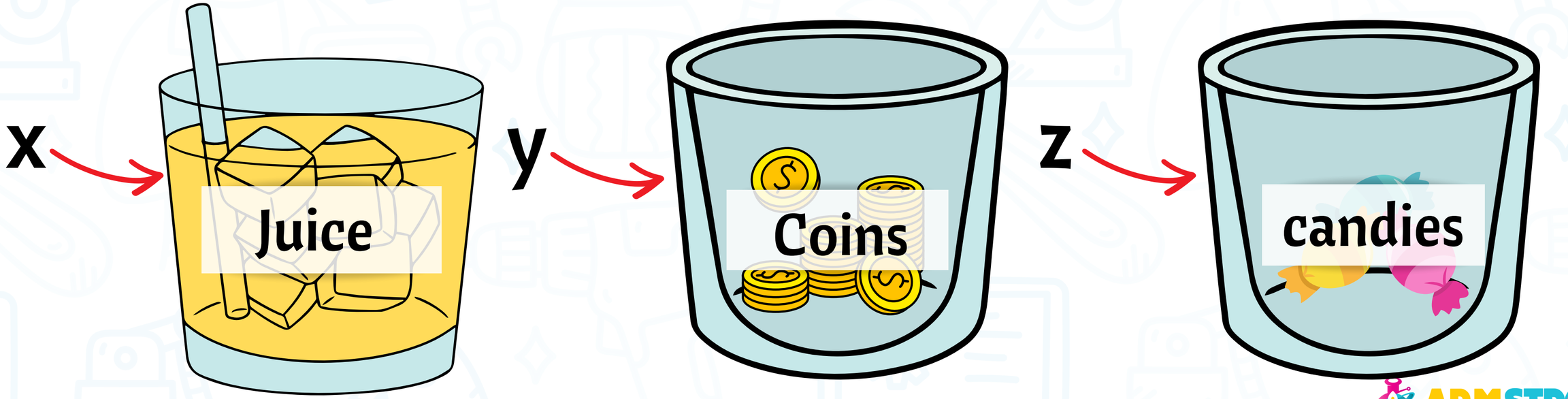
Think

How can we specify a cup for liquid, a cup for candies and a cup for coins ?



Analogy ≈

You can have a cup named X and fill it with juice.Another cup named Y and filled with coins.last cup Z filled with candies.(Label ≈ cup filling)



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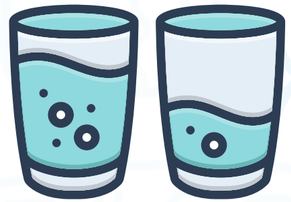
Analogy ≈

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.



Variable type

Integer

Float

Boolean

Char

String

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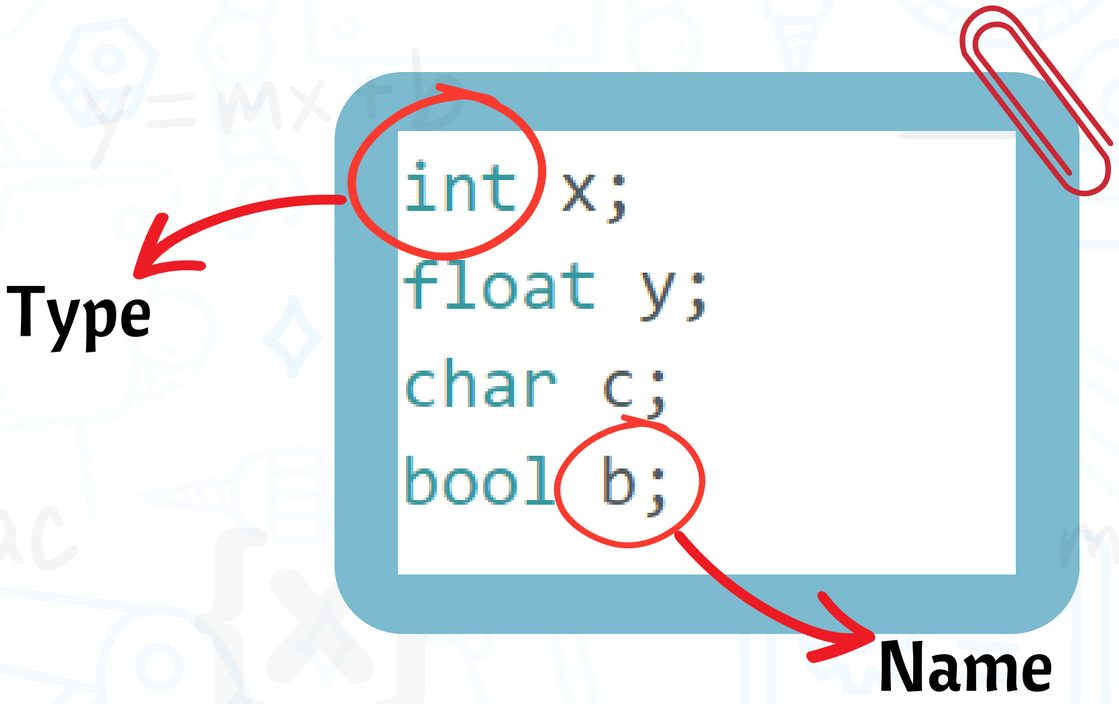
Let's try it on Arduino IDE

How to initialize different types of variables?

To define a variable, you need two things: type and name.



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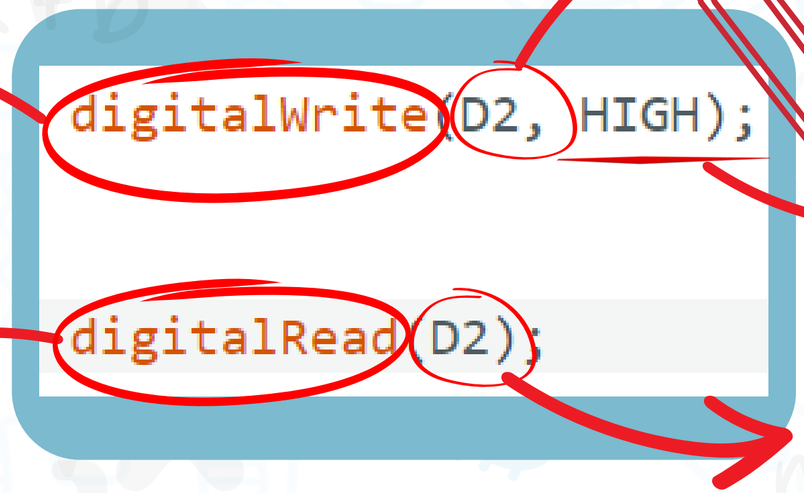
Let's try it on Arduino IDE

How to take or give info to the arduino ?

gives an order to the component

orders's pin number



Order

takes a reading from the component

pin number

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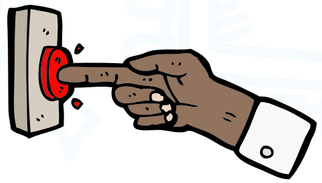
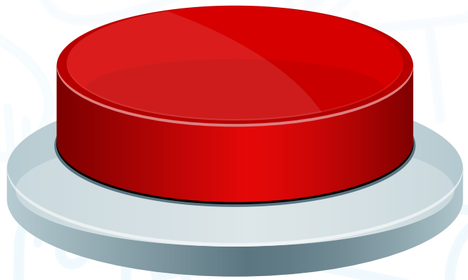
Intro to PushButton





Button Pressed :

High (1)

Button Released:

Low(0)

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Analogy ≈

Imagine you have a little swing

Think about a playground swing. As You know, when you're not sitting on the swing, it goes back to hanging down?

Analogy

Imagine you have a swing inside your toys. This tiny swing is always hanging down, just like when you're not on a swing. It's like a little sleepy friend who likes to stay down all the time.

Analogy

when you press a button or do something on your toy, it's like giving a little nudge to the swing. It wakes up for a moment and goes up, just like when you swing up high. But as soon as you stop, it goes back down, just like when you stop swinging.

Conclusion

So, this sleepy swing friend helps your toys and gadgets know when you're doing something special. It's a clever way they understand what you want them to do! (this is the same role of the pull-down resistance)

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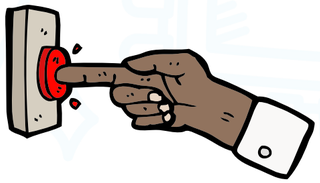
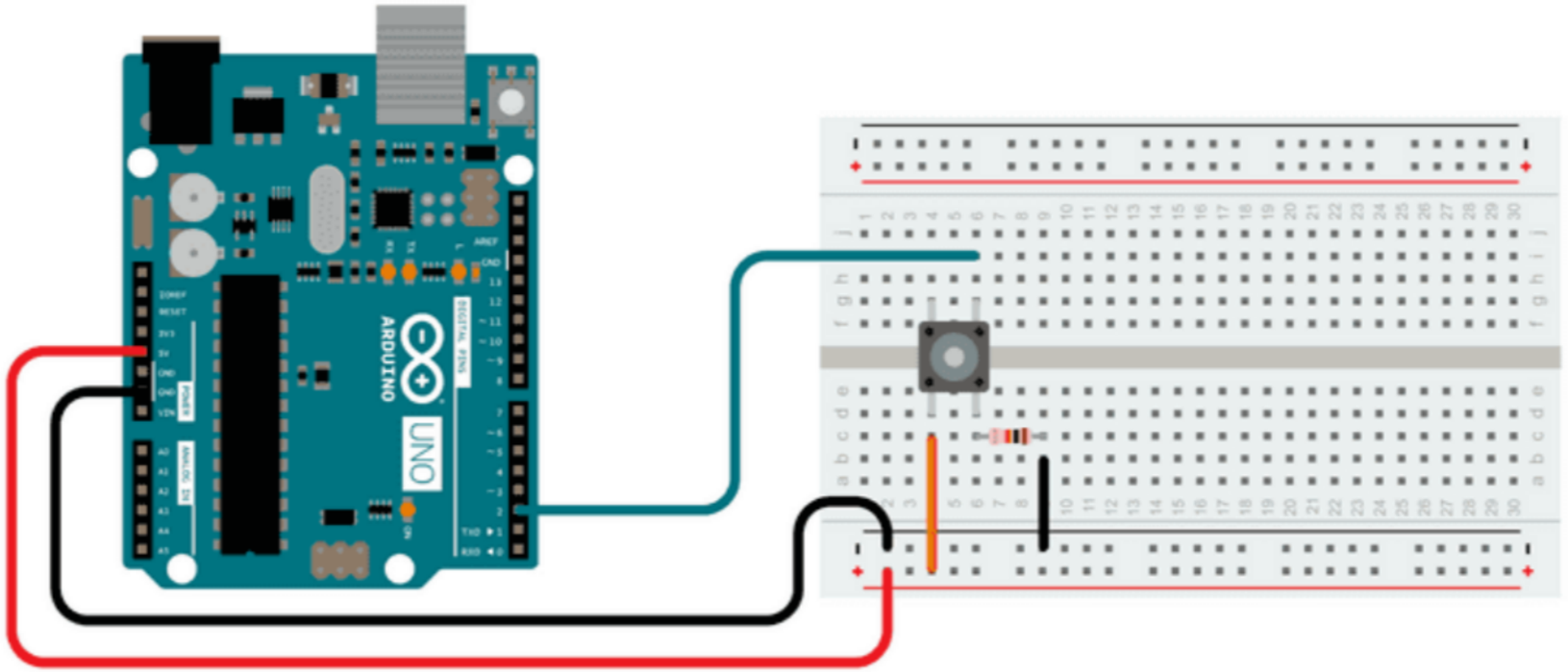
Intro to PushButton



pull-down Connection



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Think

What are conditions ?

If you are hungry

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Think

What are conditions ?

If you are hungry

Then you should eat

Think

What are conditions ?

If you are hungry

condition

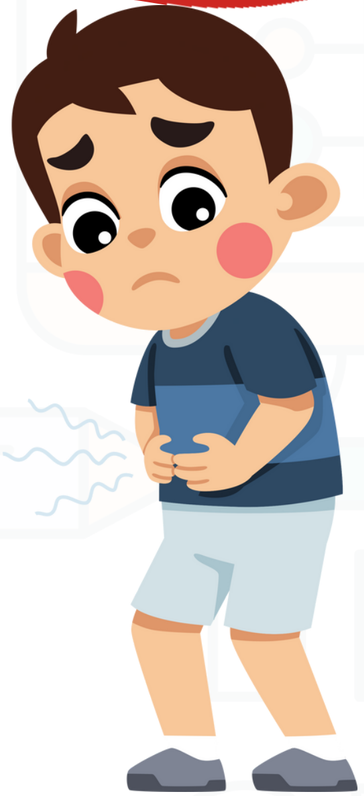
Then you should eat

Think

What are conditions ?

If you are hungry

condition



Then you should eat

action

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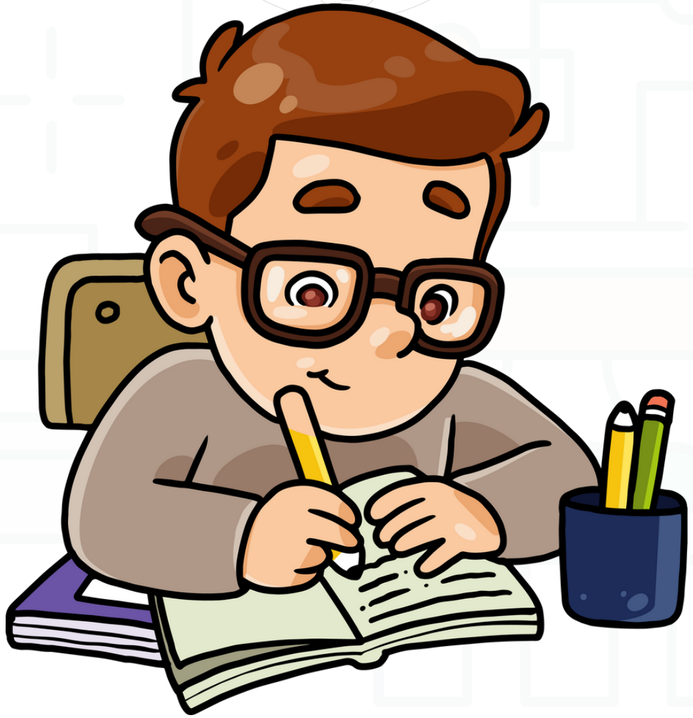
Think

What are conditions ?

If you finish your homework



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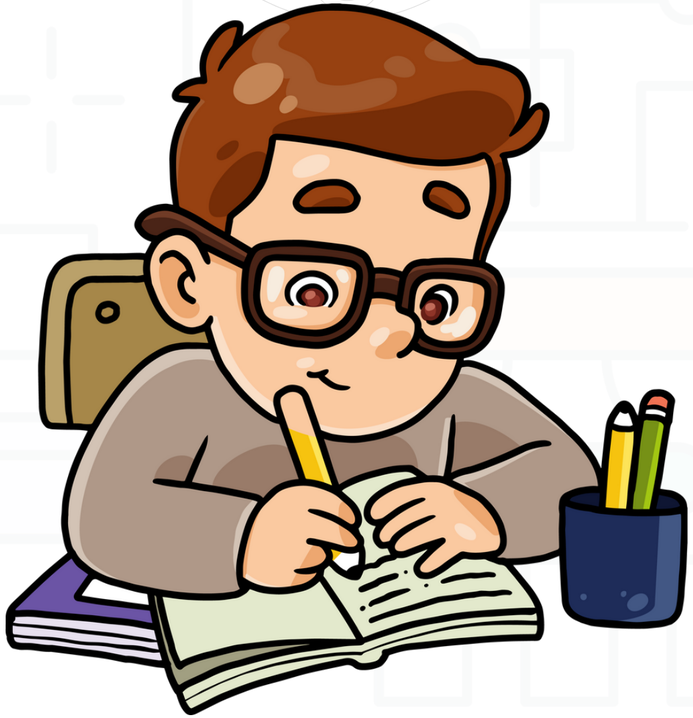
Think

What are conditions ?

If you finish your homework



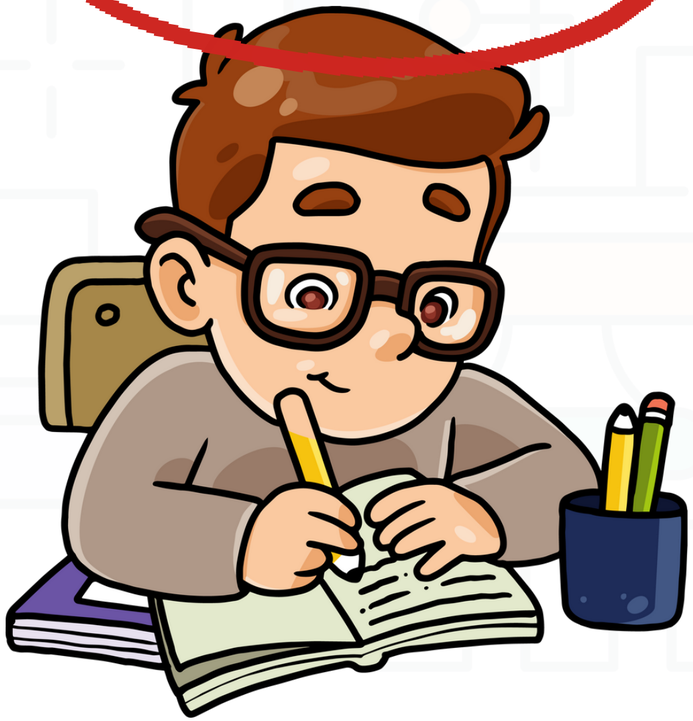
Then you could watch TV

Think

What are conditions ?

If you finish your homework

condition



Then you could watch TV

action

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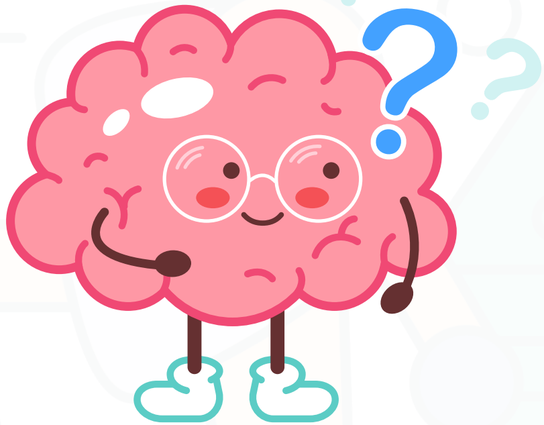
Think

What if the condition didn't happen? ⚠



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Think

What if the condition didn't happen?

Else We can do something else

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Think

What if the condition didn't happen?

If you are sick

Then you should stay at home

Else you should go to school

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Think

What if the condition didn't happen?

If you are sick

Then you should stay at home

Else you should go to school

Two actions

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How to create if condition on arduino IDE

1

```
if (someCondition)
{
// do stuff if the condition is true
}
```

2

```
if (someCondition)
{
// do stuff if the condition is true
}
else
{
// do stuff if the condition is false
}
```

3

```
if (someCondition) {
// do stuff if the condition is true
}
else if (anotherCondition)
{
// do stuff only if the first condition is false
// and the second condition is true
}
else
{
  // do stuff only if all the if conditions above aren't achieved first
}
```

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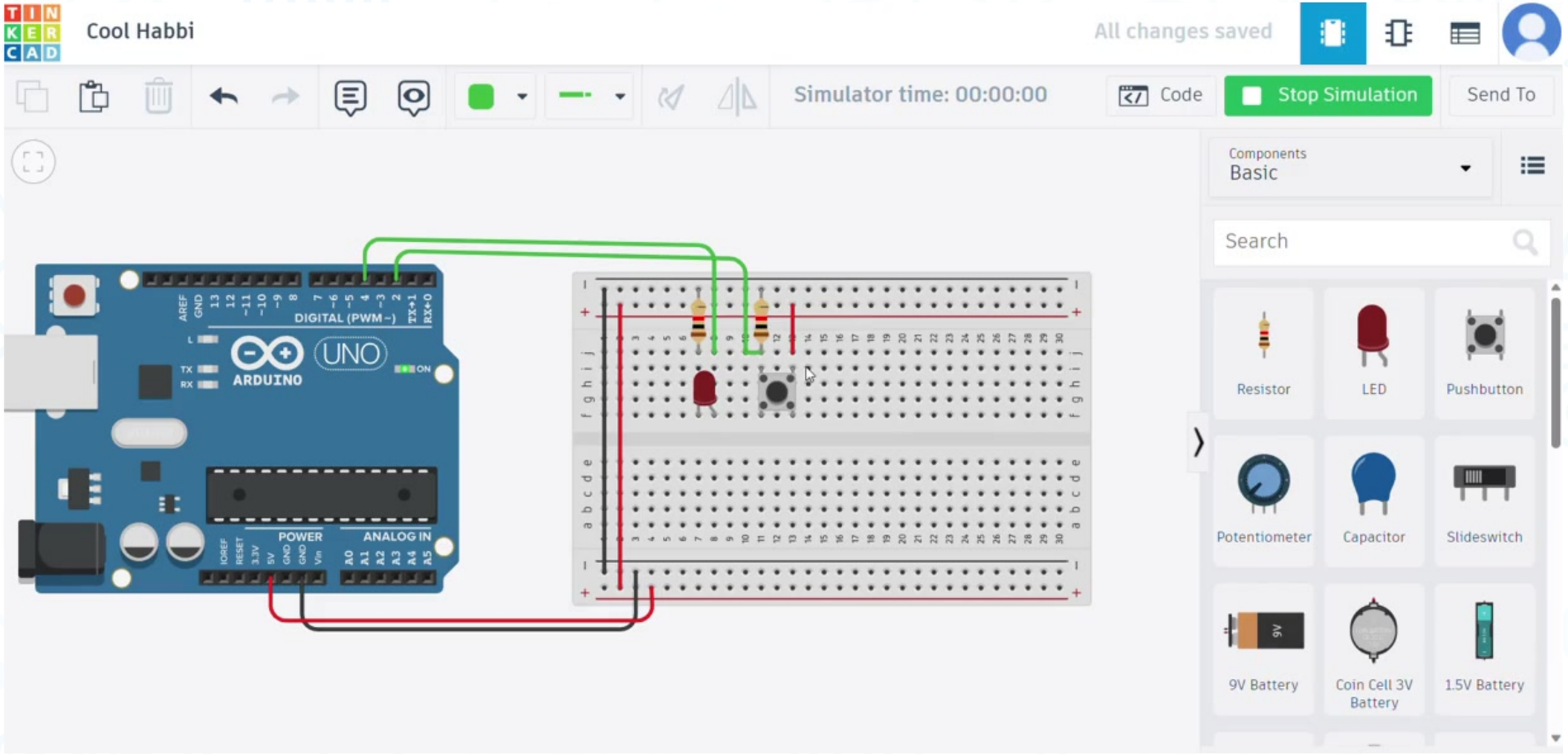
Example(LEDs and Pushbutton)



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Example(LEDs and Pushbutton)

digitalRead()

```
if (someCondition)
{
// do stuff if the condition is true
}
else
{
// do stuff if the condition is false
}
```

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Example(LEDs and Pushbutton)

This assigns the value of the right side to the variable in the left side

This compares the value of the right side to the variable in the left side

Let's try it on Arduino IDE

Experiment: Pushbutton and LED

Try it by yourself

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Example(LEDs and Pushbutton)

```
void setup()
{
pinMode(D7,OUTPUT);
pinMode(D8,INPUT);
}
void loop()
if (digitalRead(D8)== HIGH)
{
  digitalWrite(D7, HIGH);
}
else
{
  digitalWrite(D7,LOW);
}
```

If the button is pressed

To compare

Turn on the LED

Turn off the LED

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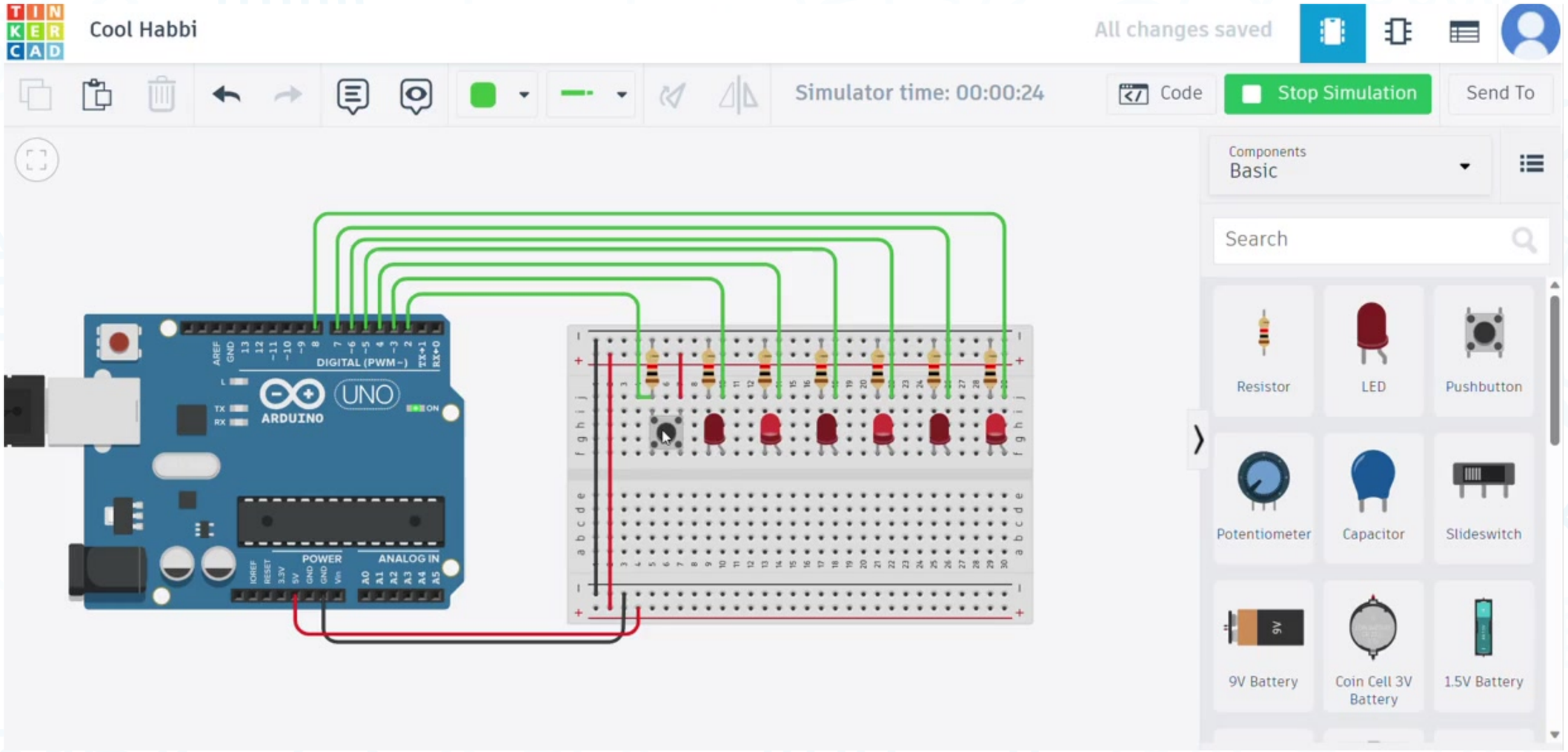
Example(LEDs and Pushbutton)



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Remember

Hint to use

`digitalRead()`

```
if (someCondition)
{
// do stuff if the condition is true
}
else
{
// do stuff if the condition is false
}
```

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Remember

Hint to use

This assigns the value of the right side to the variable in the left side

This compares the value of the right side to the variable in the left side

Let's try it on Arduino IDE

Experiment: Pushbutton and LED

Try it by yourself

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Example(LEDs and Pushbutton)

```
void loop()
if (digitalRead(D8)==HIGH)
{
  digitalWrite(D3, HIGH);
  digitalWrite(D5, HIGH);
  digitalWrite(D7, HIGH);
  digitalWrite(D4, LOW);
  digitalWrite(D6, LOW);
  digitalWrite(D0, LOW);
}
else
{
  digitalWrite(D3, LOW);
  digitalWrite(D5, LOW);
  digitalWrite(D7, LOW);
  digitalWrite(D4, HIGH);
  digitalWrite(D6, HIGH);
  digitalWrite(D0, HIGH);
}
```

If the button is pressed

Turn off the LED

Turn on the LED

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