Armstrong

School Program 2023-2024

Lesson 6

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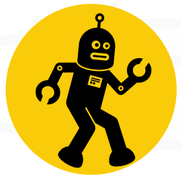
Lesson Content

Revising motor movement

Turning the robot

Functions



Moving the robot

Remember

Setting PWM on mblock

PWM pins 3, 5, 6, 9, 10, 11.

number between 0 and 255

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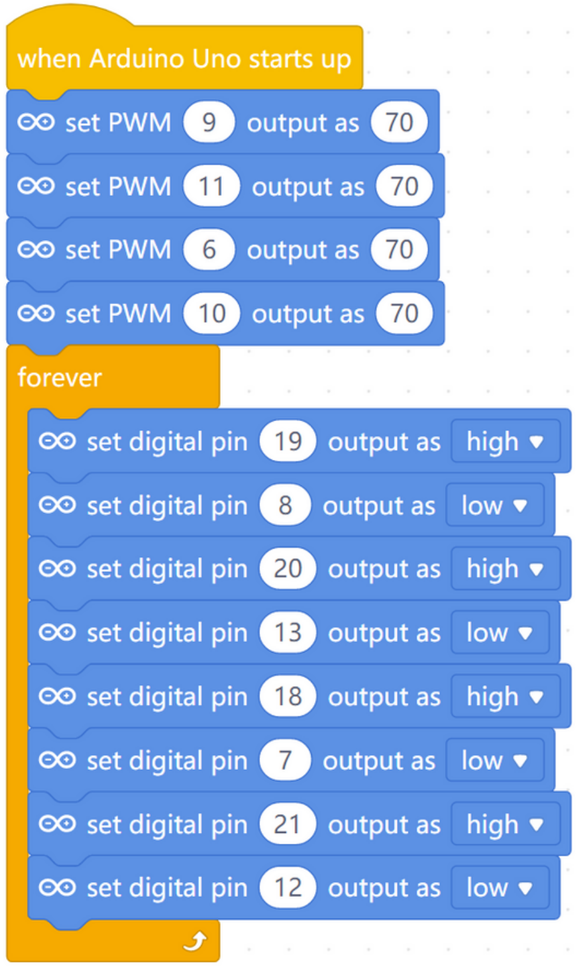
Remember

Code to move robot forward with speed



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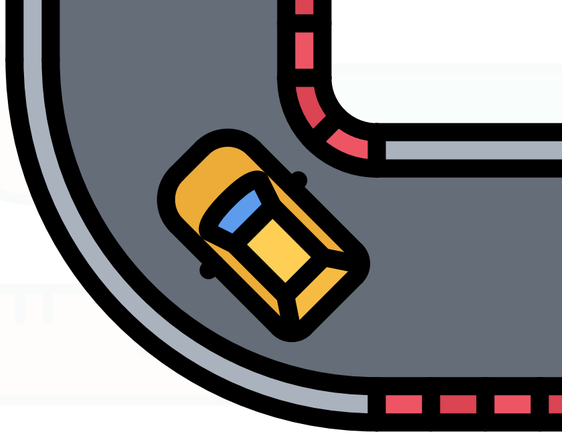
Rotation



What is rotation?

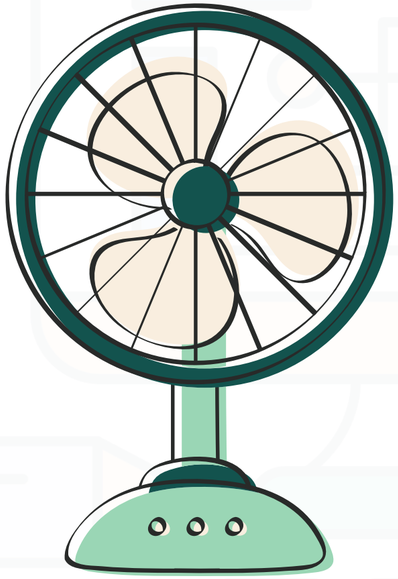
It is a circular motion about an axis or center and this center is called axis of rotation.

How do we rotate?

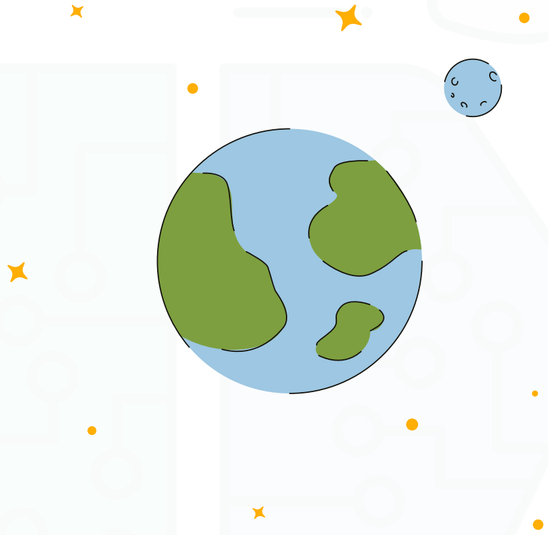
Depending on the axis of rotation a force is applied to the moving body.

Axis of Rotation

Object's Center

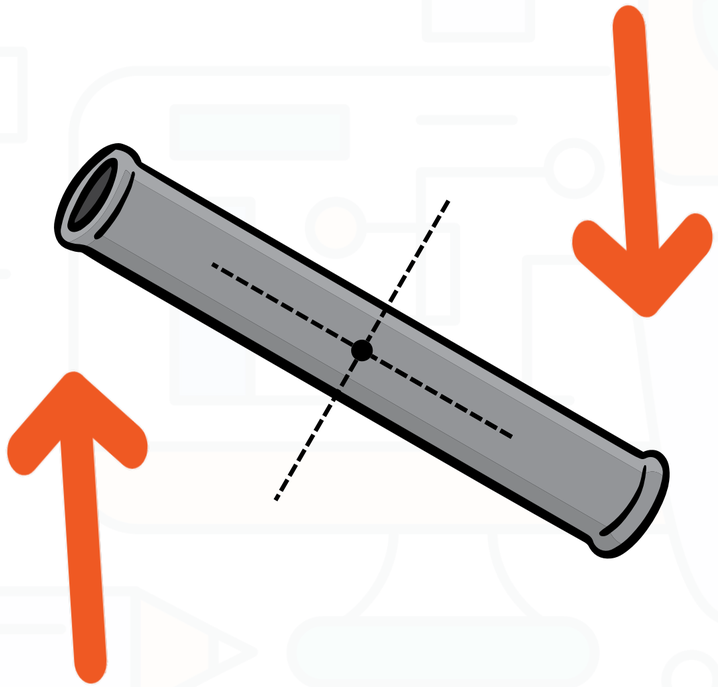


Point Outside The Objects Body

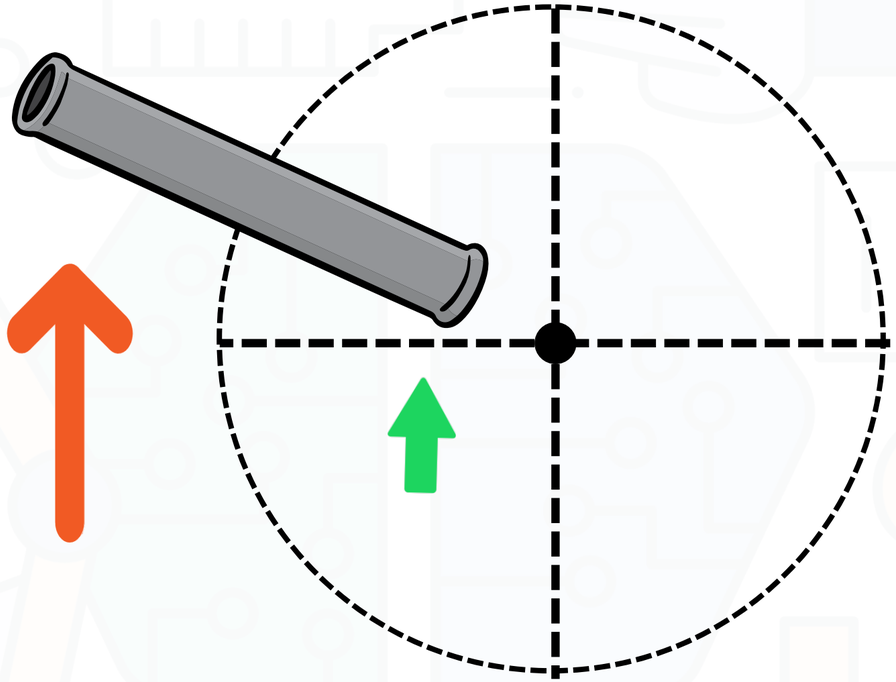


Axis of Rotation

Object's Center



Point Outside The Objects Body



Think

How can we make the robot rotate about its center?

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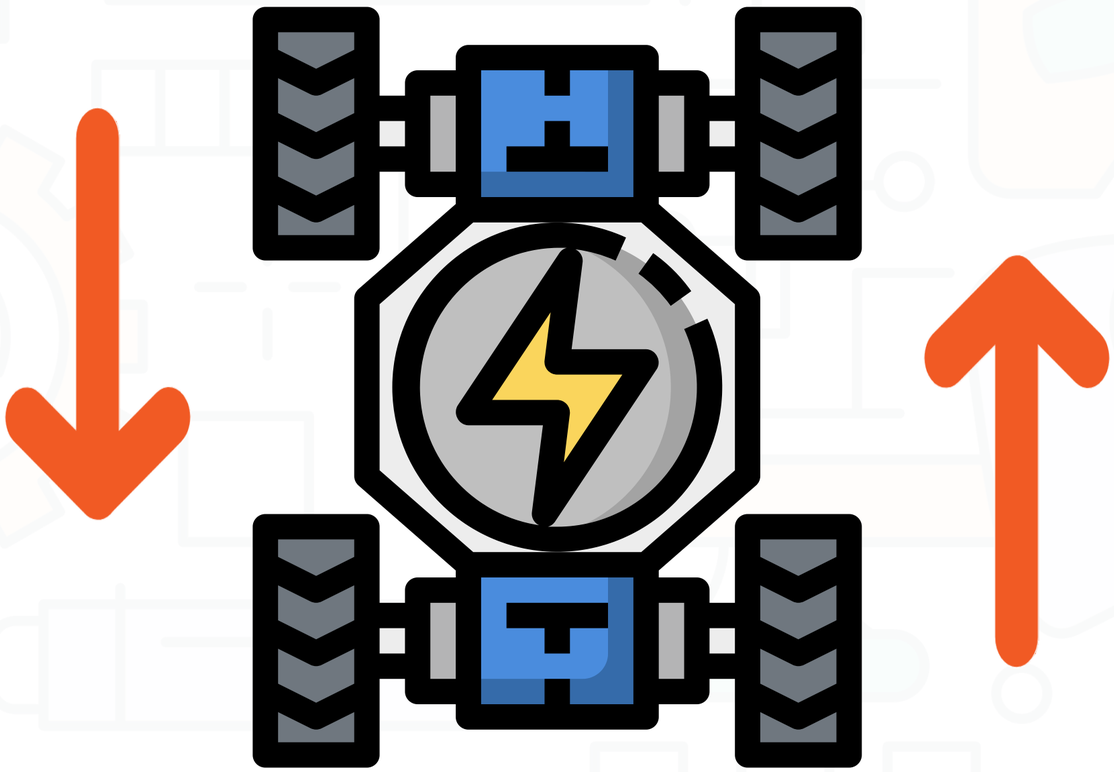
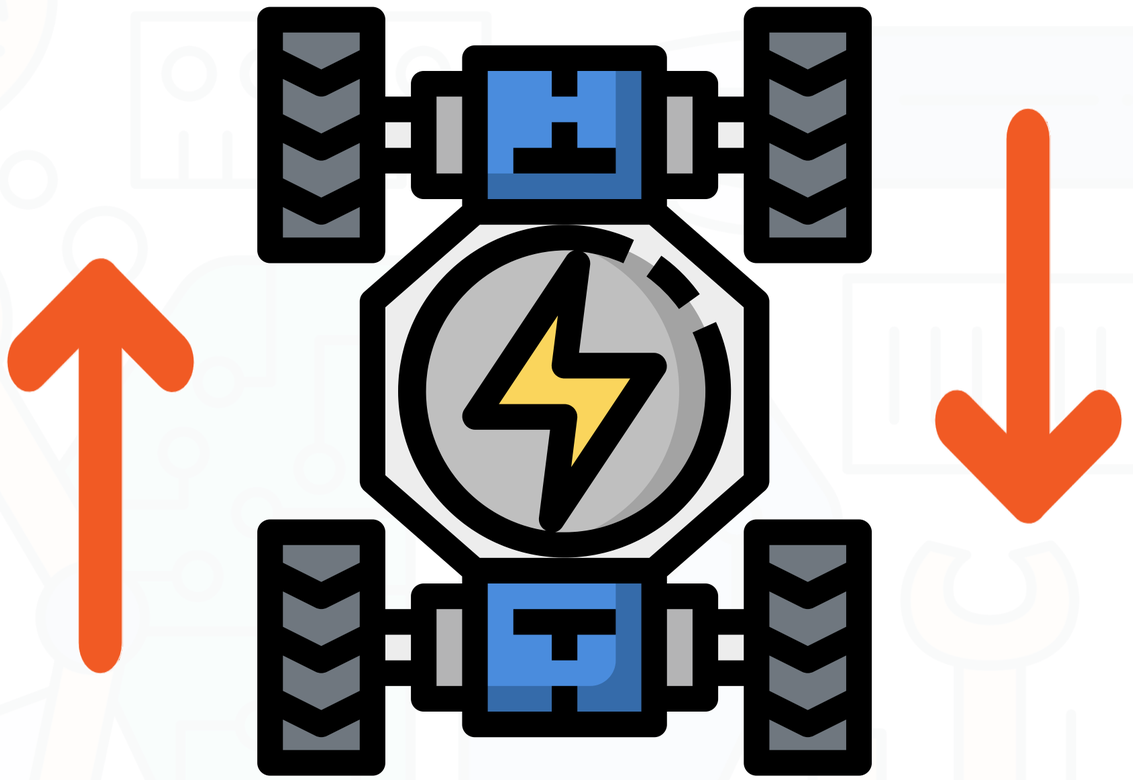
Rotate The Robot

Left Rotation



Right Rotation



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Let's try it on mBlock

Write a code to rotate the robot about its center.

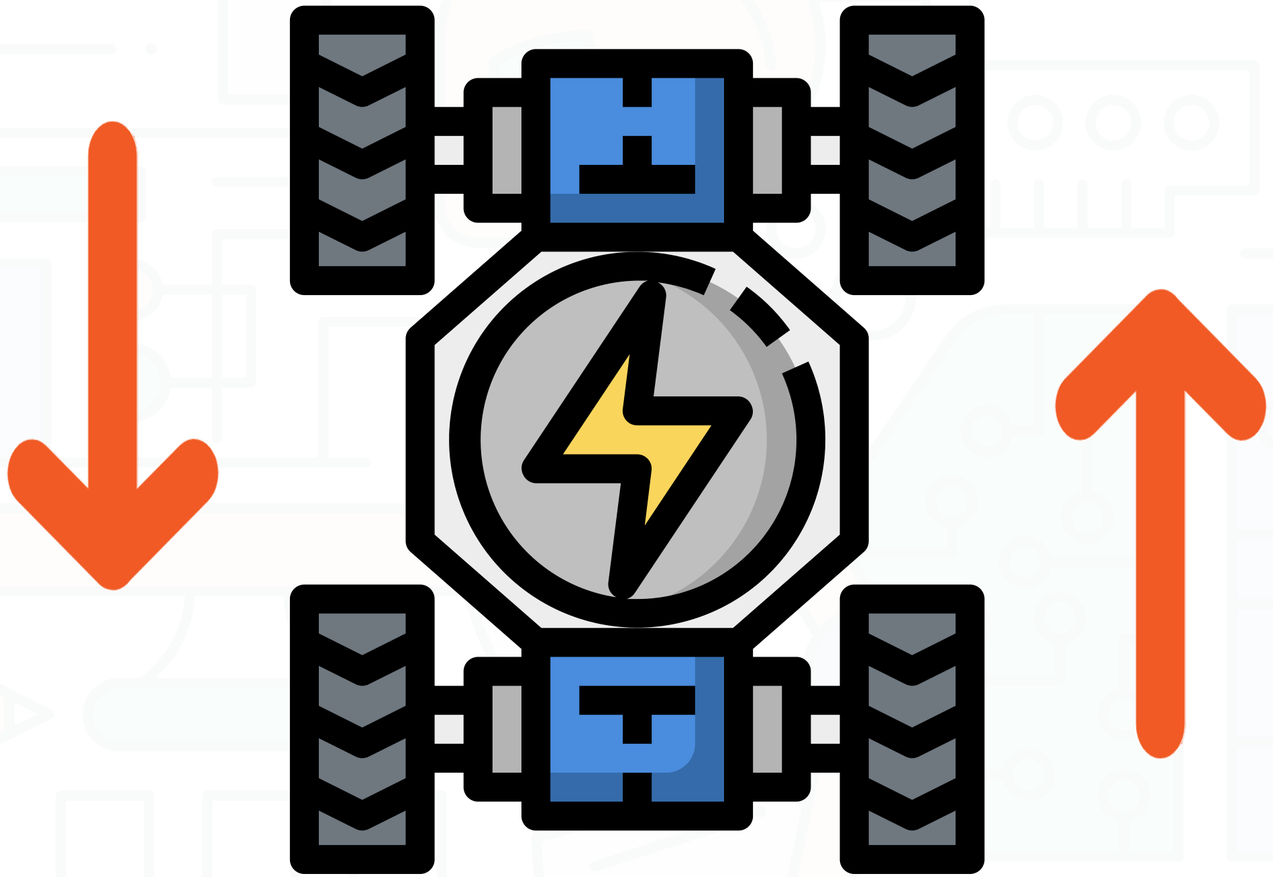
Try it by yourself

Hint: Remember forward and backward codes.

Rotate The Robot

Left Rotation

- Enable -> D6
- Input 1 -> D11
- Input2 -> D12



- Enable -> D10
- Input 1 -> A1(D15)
- Input2 -> A2(D16)

- Enable -> D5
- Input 1 -> D7
- Input2 -> D8

- Enable -> D9
- Input 1 -> D13
- Input2 -> A0(D14)

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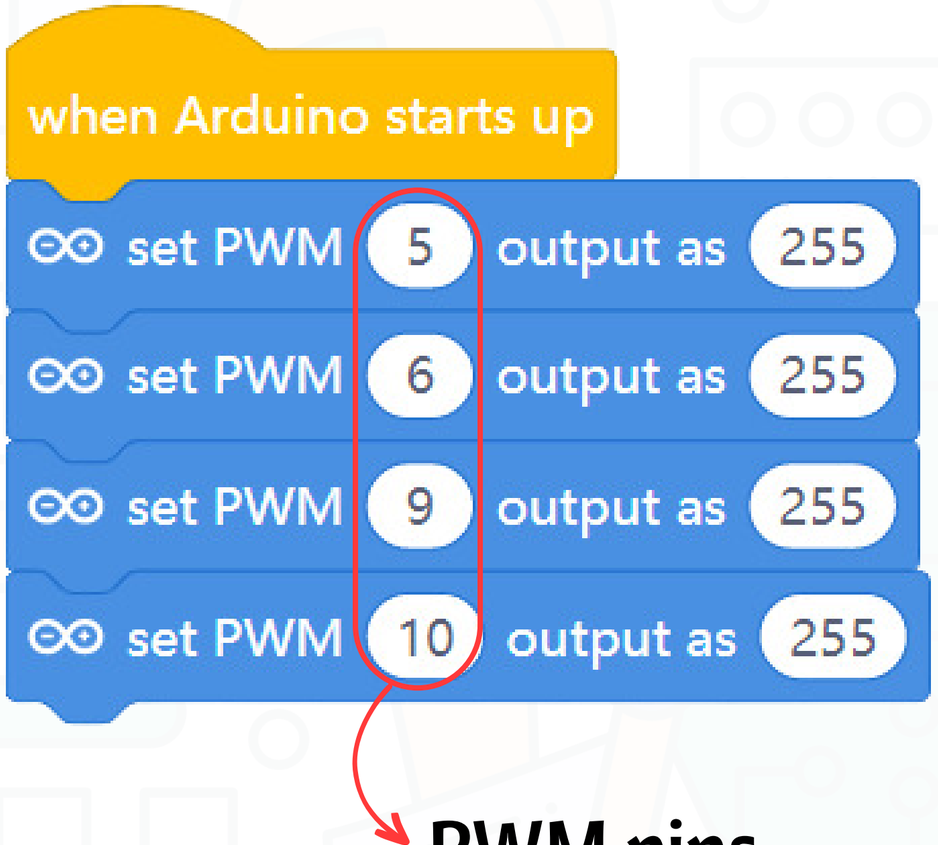
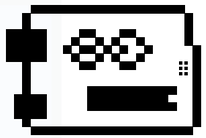
Let's rotate the robot

Step 1: Set motors' speed





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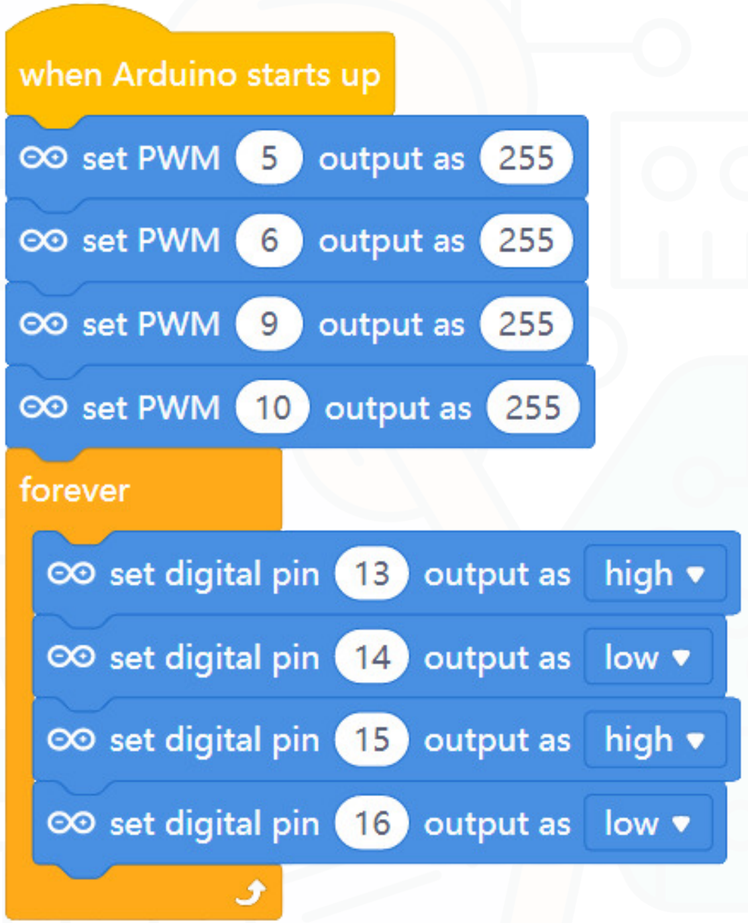
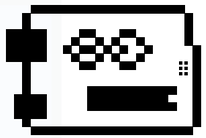
Let's rotate the robot

Step 2: Move the right wheels forward





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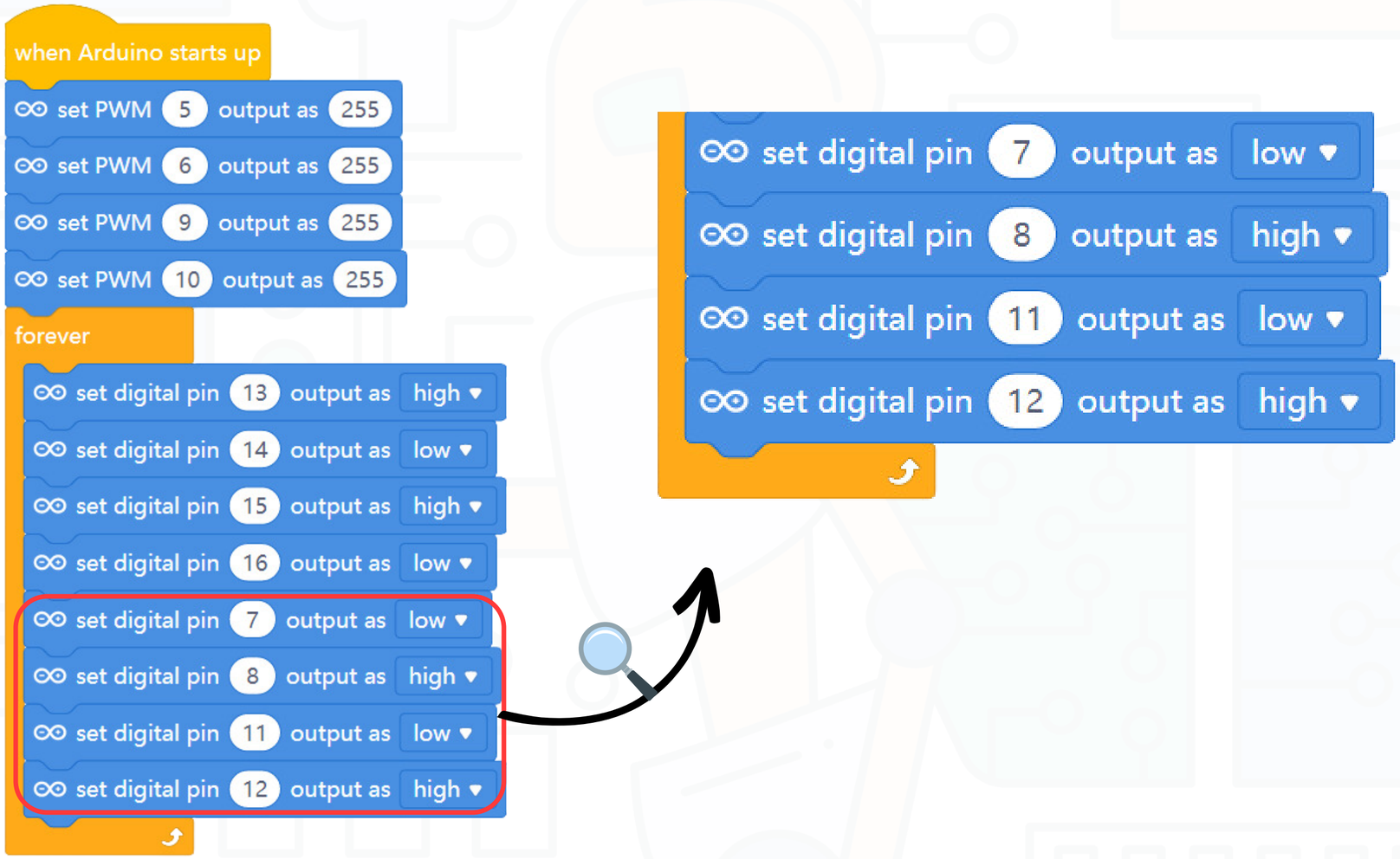
Let's rotate the robot

Step 3: Move the left wheels backward



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Think

How can we make the robot rotate around an object?

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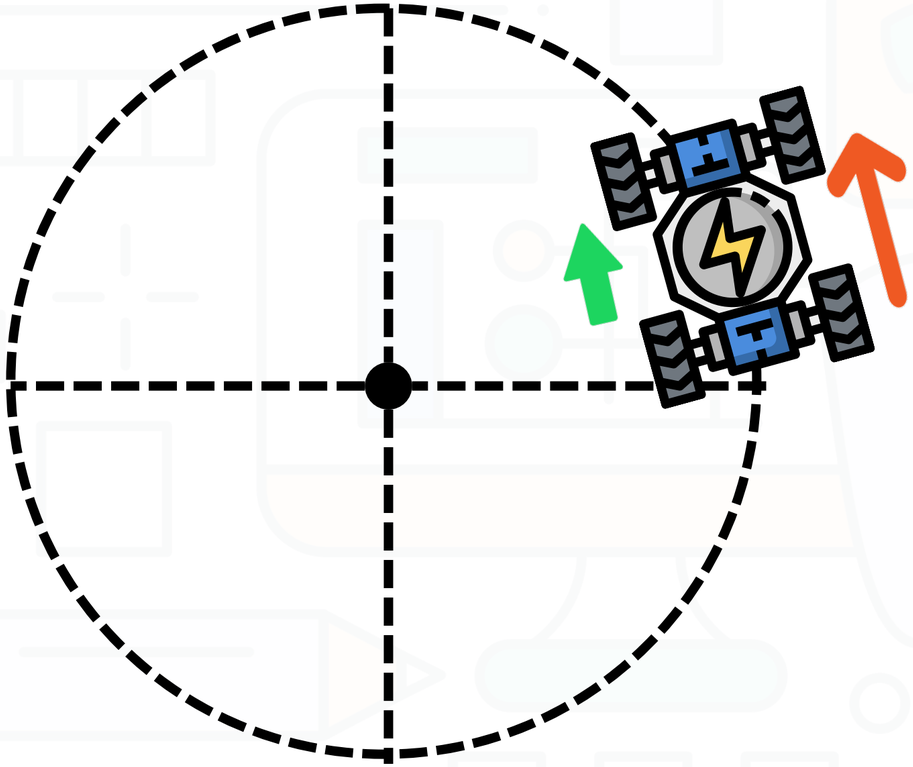
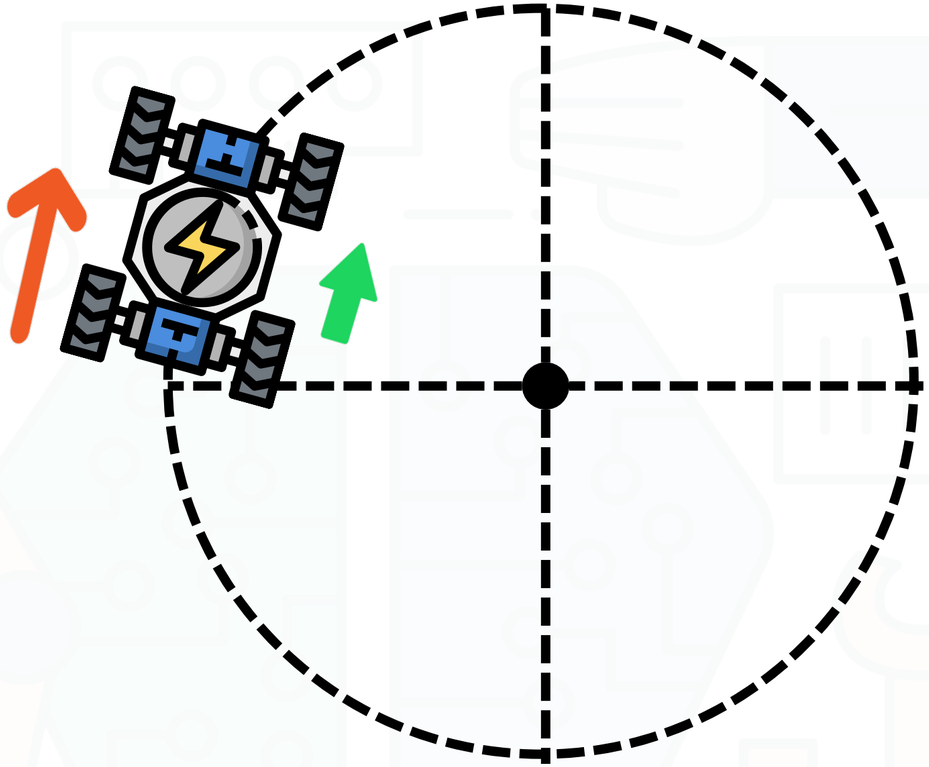
Rotate The Robot

Left Curve Forward



Right Curve Forward



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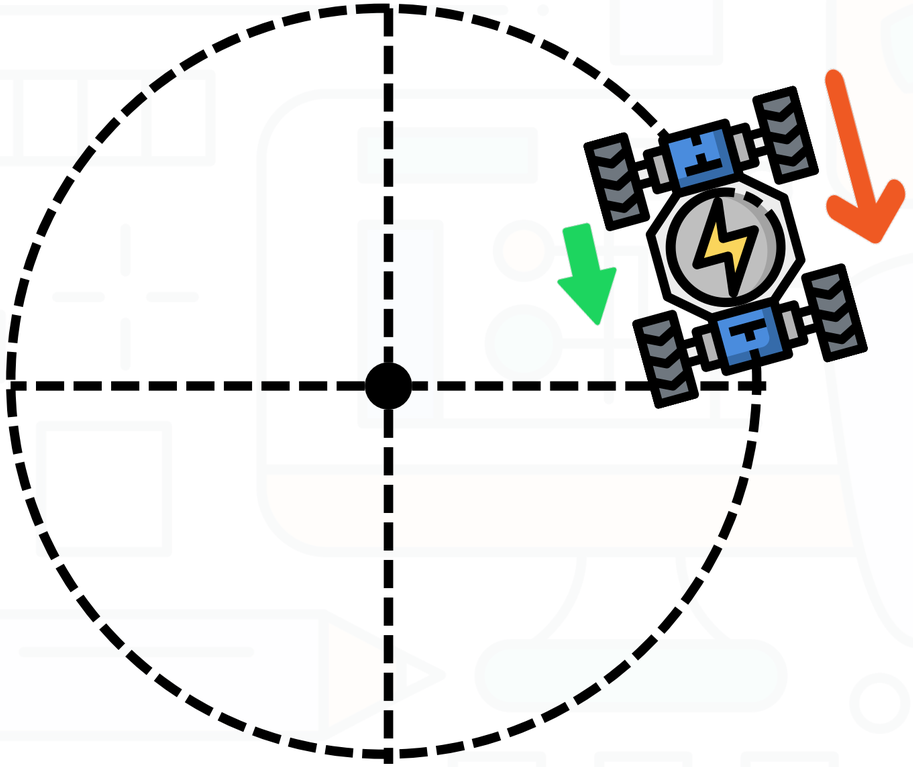
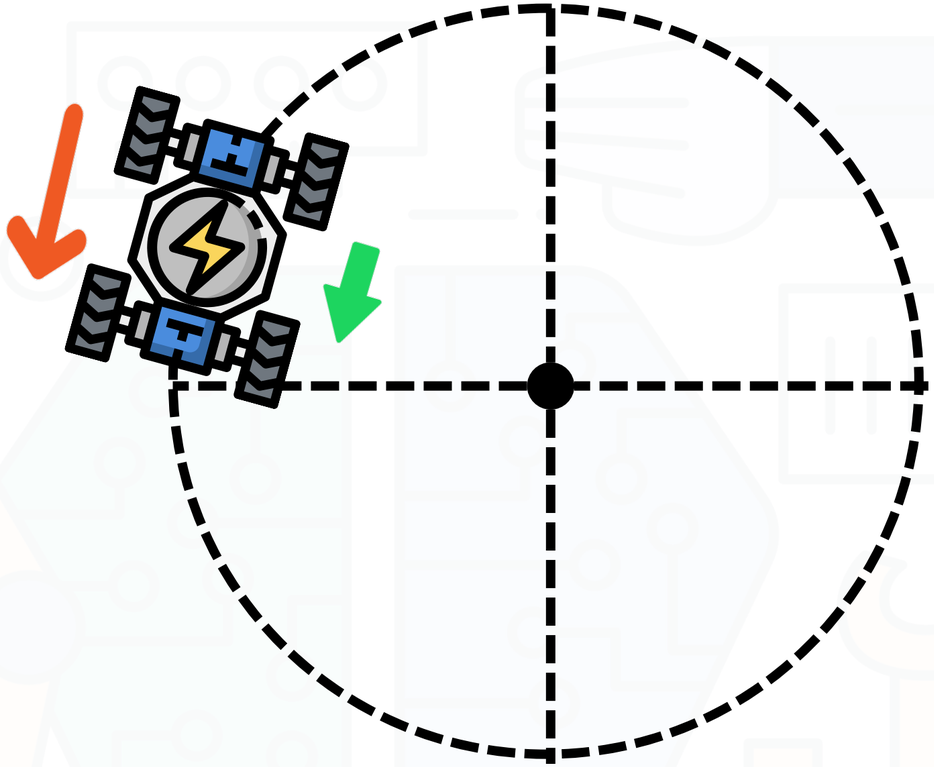
Rotate The Robot

Left Curve Backward



Right Curve Backward



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Let's try it on mBlock

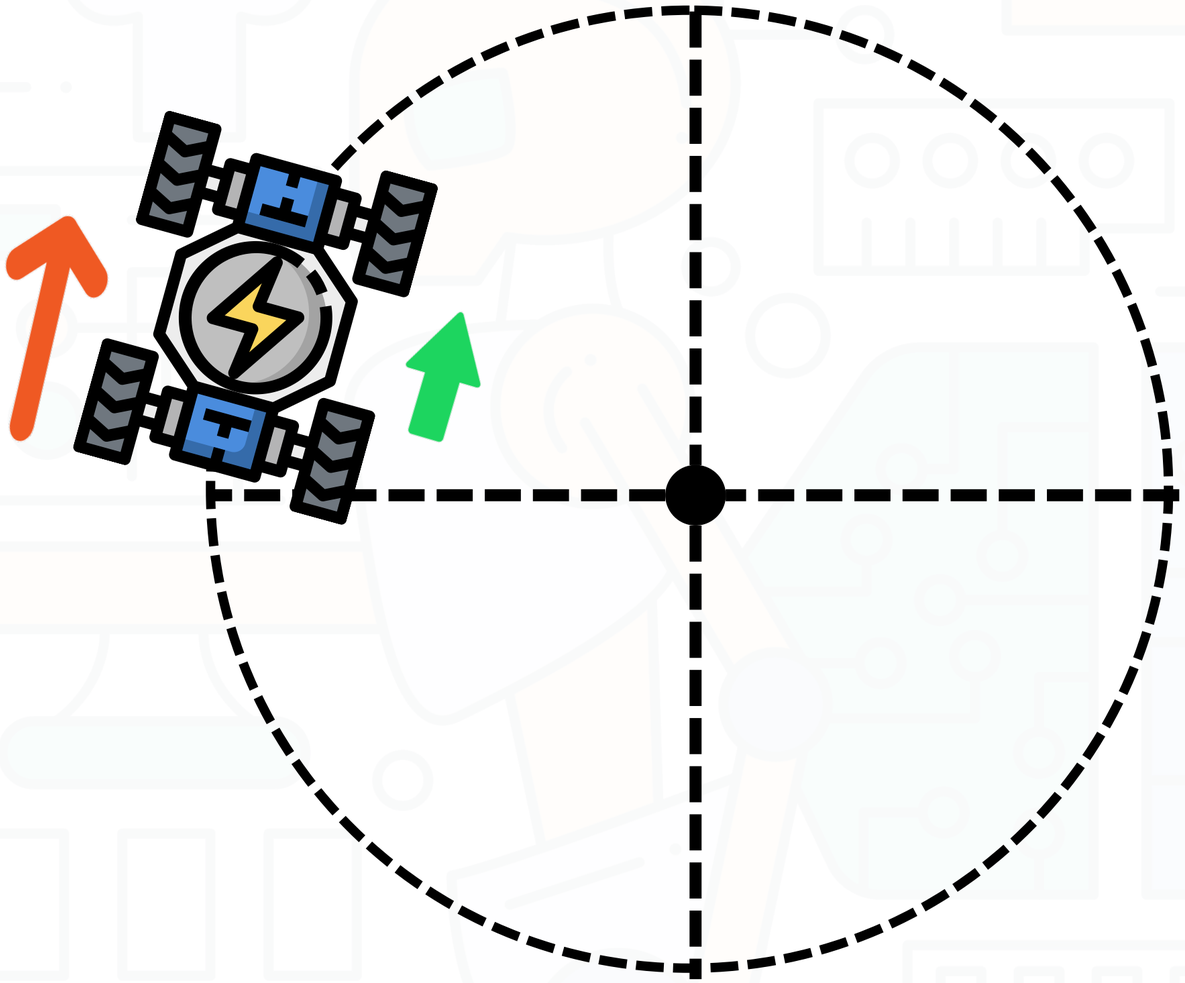
Write a code to rotate the robot about its center.

Try it by yourself

Hint: Use PWM to set speed.

Rotate The Robot

Right Rotation



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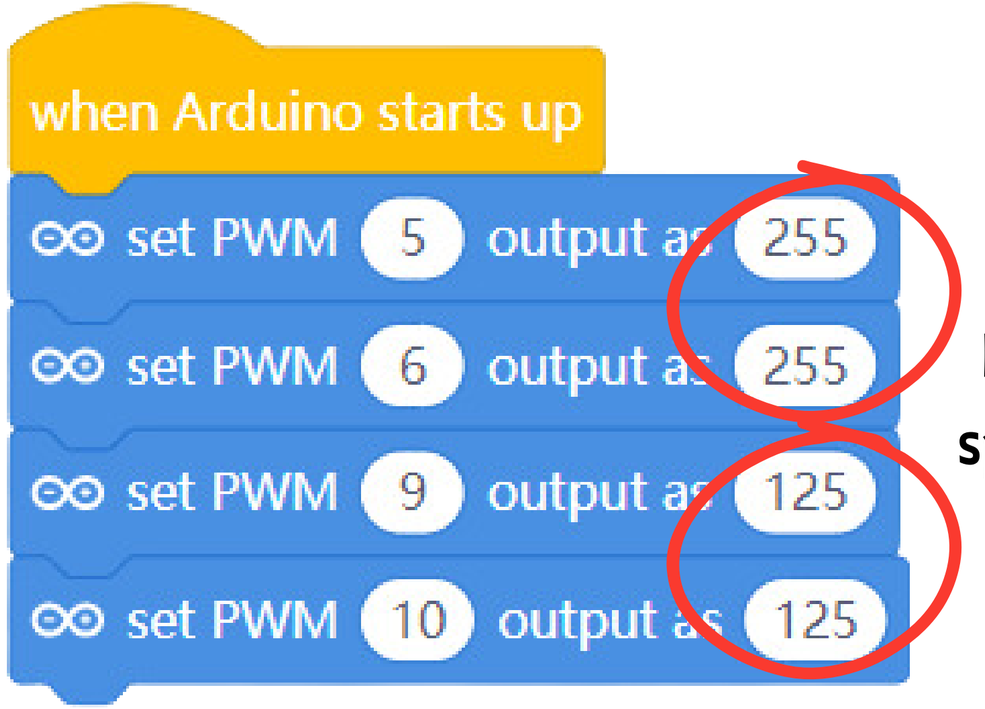
Let's rotate the robot

Step 1: Set motors' speed



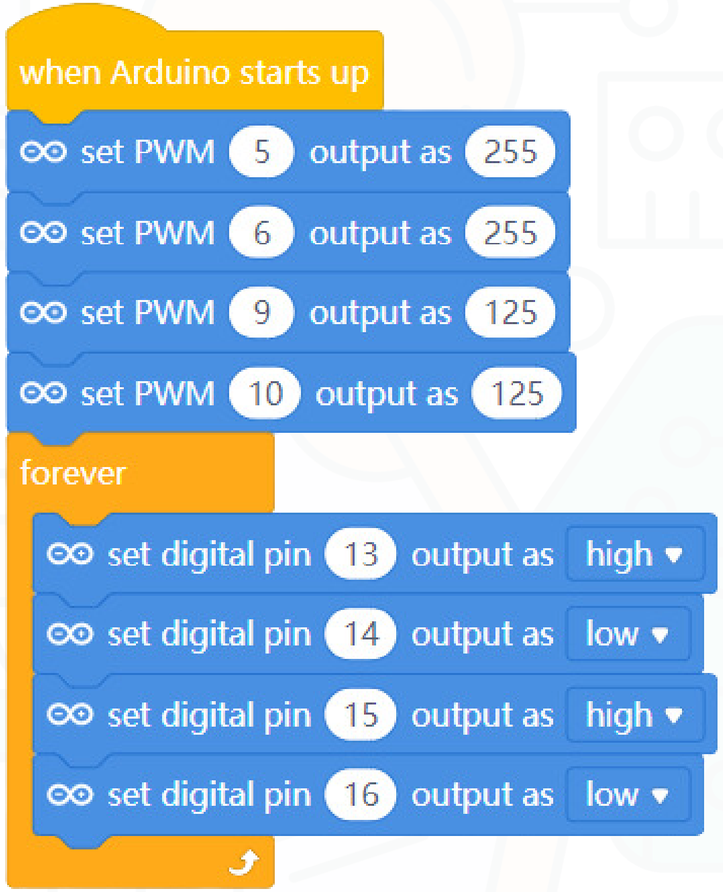
Left wheels PWM pins

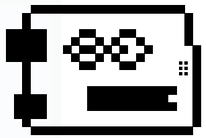
Right wheels PWM pins

Notice Left wheels have full speed while right wheel takes half the speed

Let's rotate the robot

Step 2: Moving the right wheels forward





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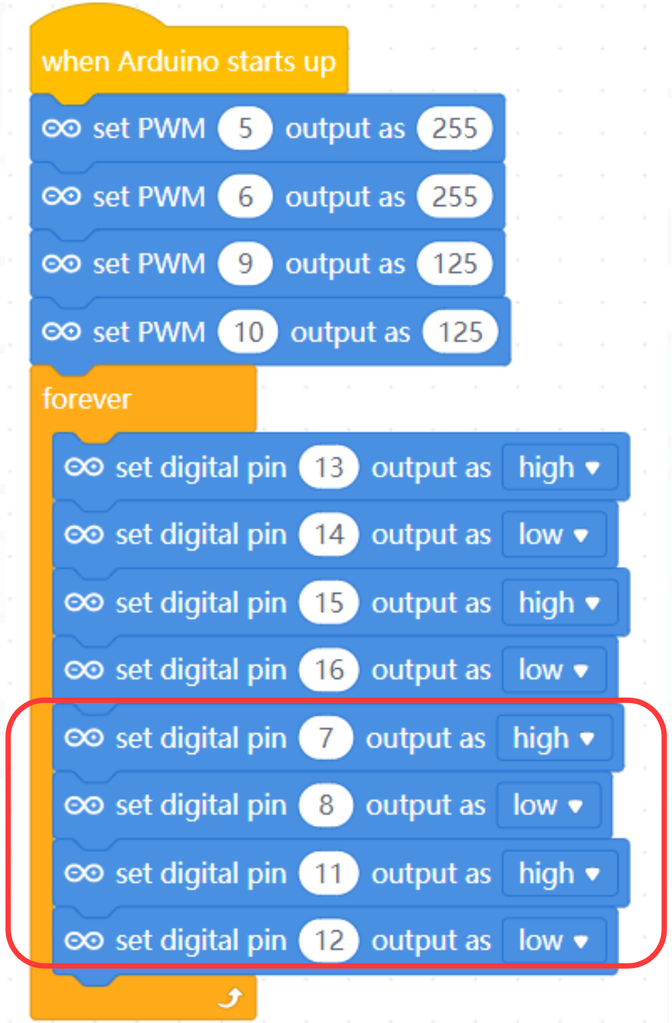
Let's rotate the robot

Step 3: Moving the left wheels forward



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Think

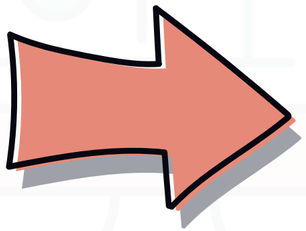
What are functions?

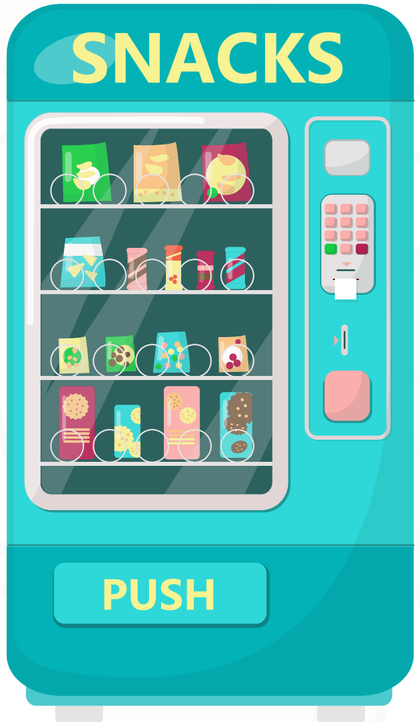
Functions

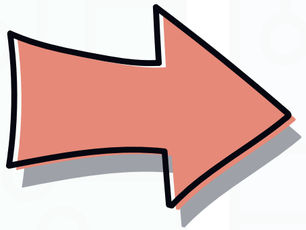
What is a function?

A group of actions that takes an input and produces an output

Input







Output

Analogy ≈

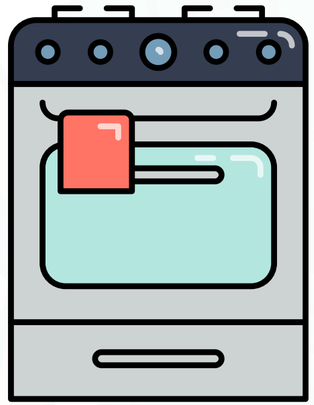
Imagine you have a cake recipe that mixes the ingredients and puts the mix in the oven.

What will be the output if we used eggs, flour, sugar and strawberries as the ingredients?

Input

Step 1

Step 2



Output

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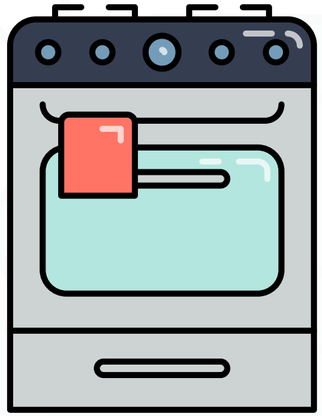
Analogy ≈

What will be the output if we used chocolate instead of strawberries?

Input

Step 1

Step 2



Output

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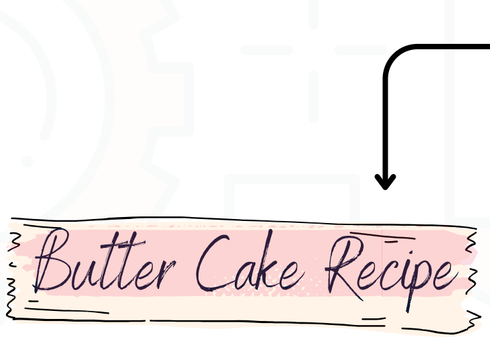
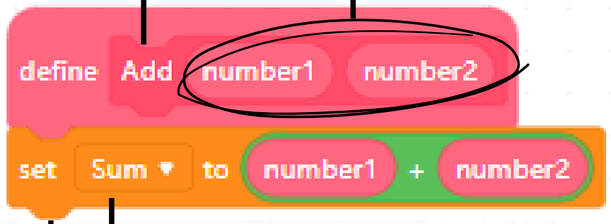
Think

How functions help us in coding?

Analogy ≈

A function in programming is like a recipe for a computer. Just like how a recipe tells you how to make a cake, a function tells the computer what to do. Both have:





Name **Input** **Steps** **Output**

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Let's try it on mBlock

Write a code to move forward and backward

Try it by yourself

Hint: Use begin function to Define pins.

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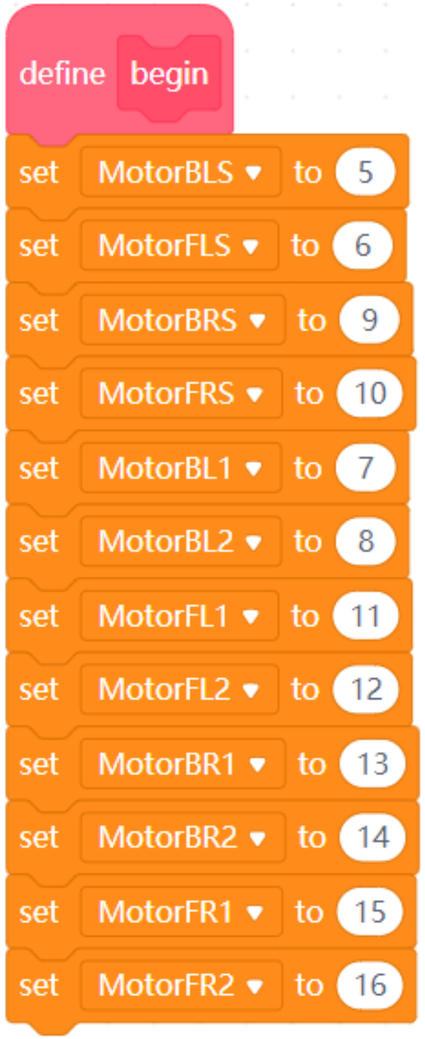
Let's try it on mBlock

Begin Function



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Let's try it on mBlock

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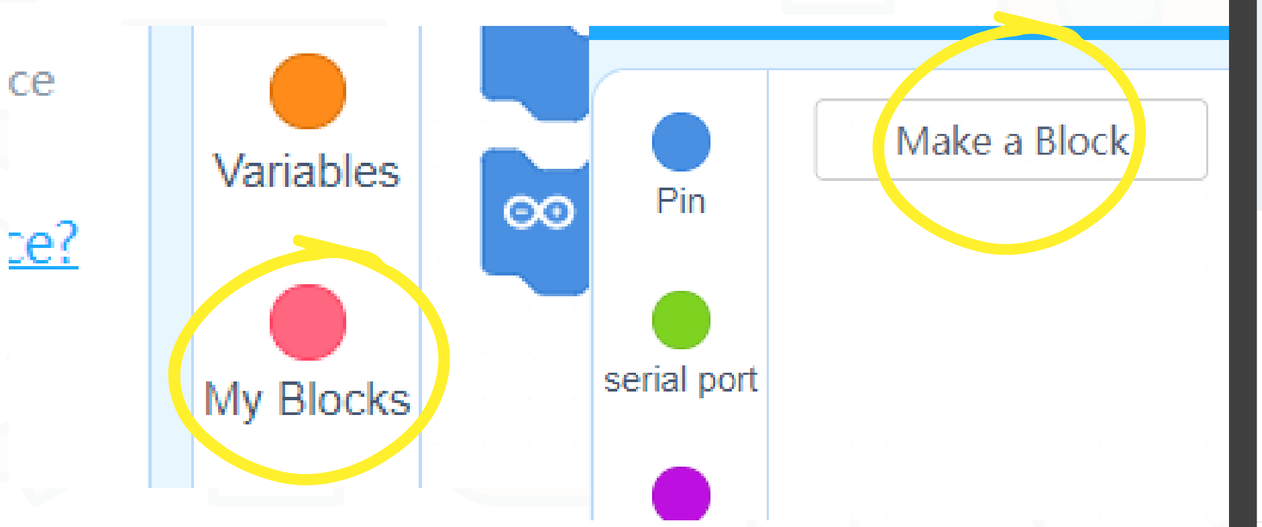
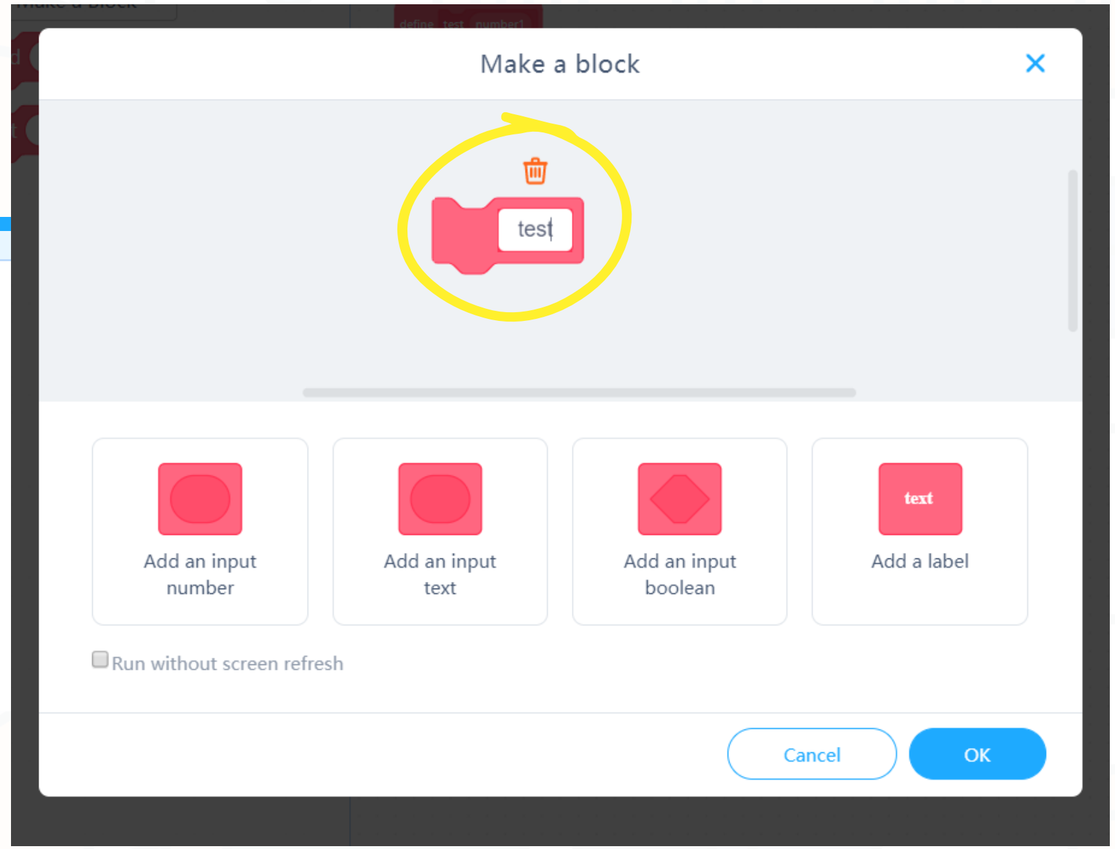
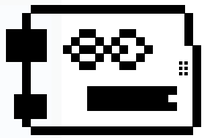
Let's make functions

Step 1: Define the function







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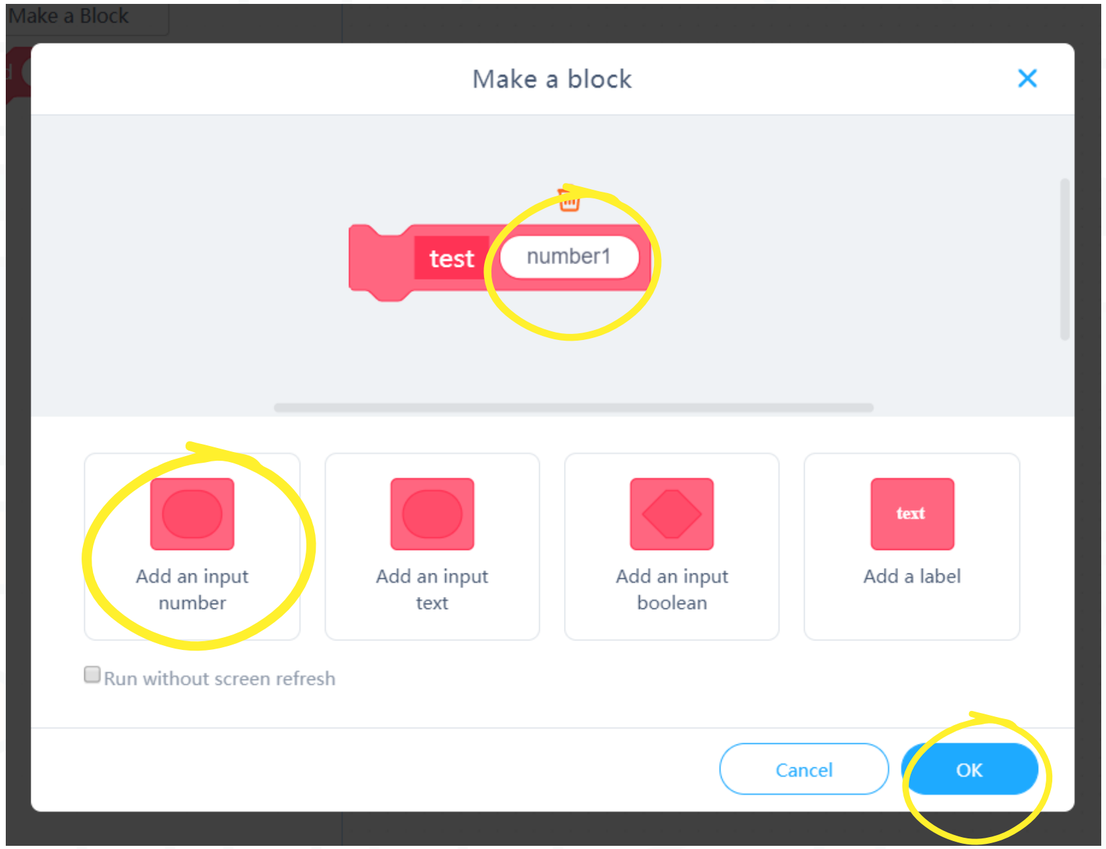
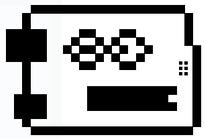
Let's make functions

Step 2: Define parameters





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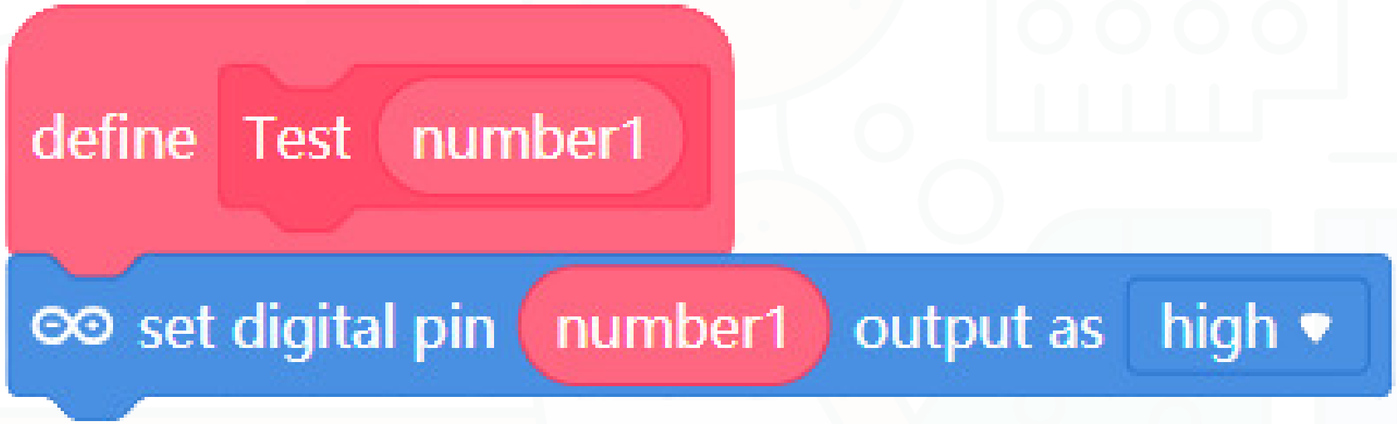
Let's make functions

Step 3: : Build function block



Let's try it on mBlock

Write a code to rotate as a function

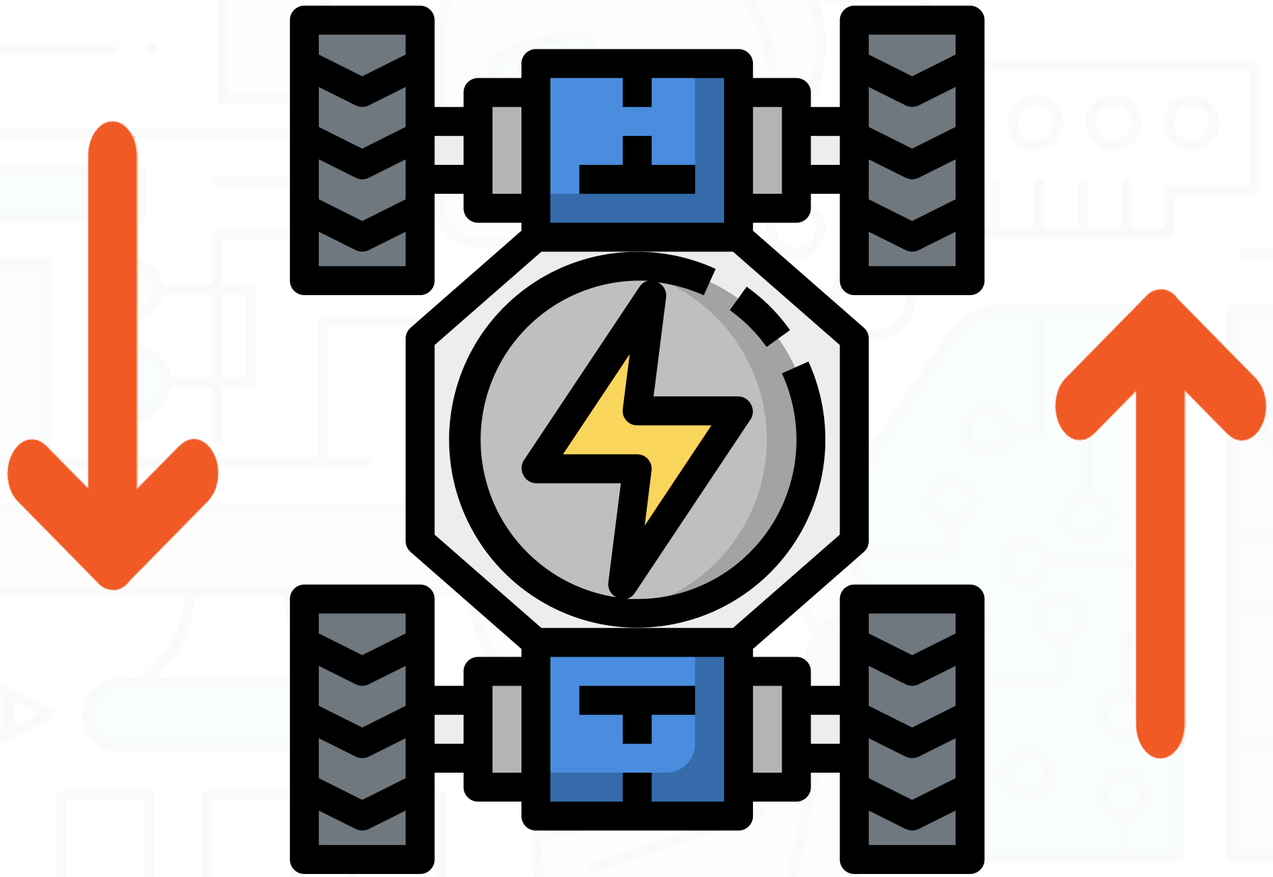
Try it by yourself

Hint: Use begin function to Define pins.

Rotate The Robot

Left Rotation

- Enable -> D6
- Input 1 -> D11
- Input2 -> D12



- Enable -> D10
- Input 1 -> A1(D15)
- Input2 -> A2(D16)

- Enable -> D5
- Input 1 -> D7
- Input2 -> D8

- Enable -> D9
- Input 1 -> D13
- Input2 -> A0(D14)

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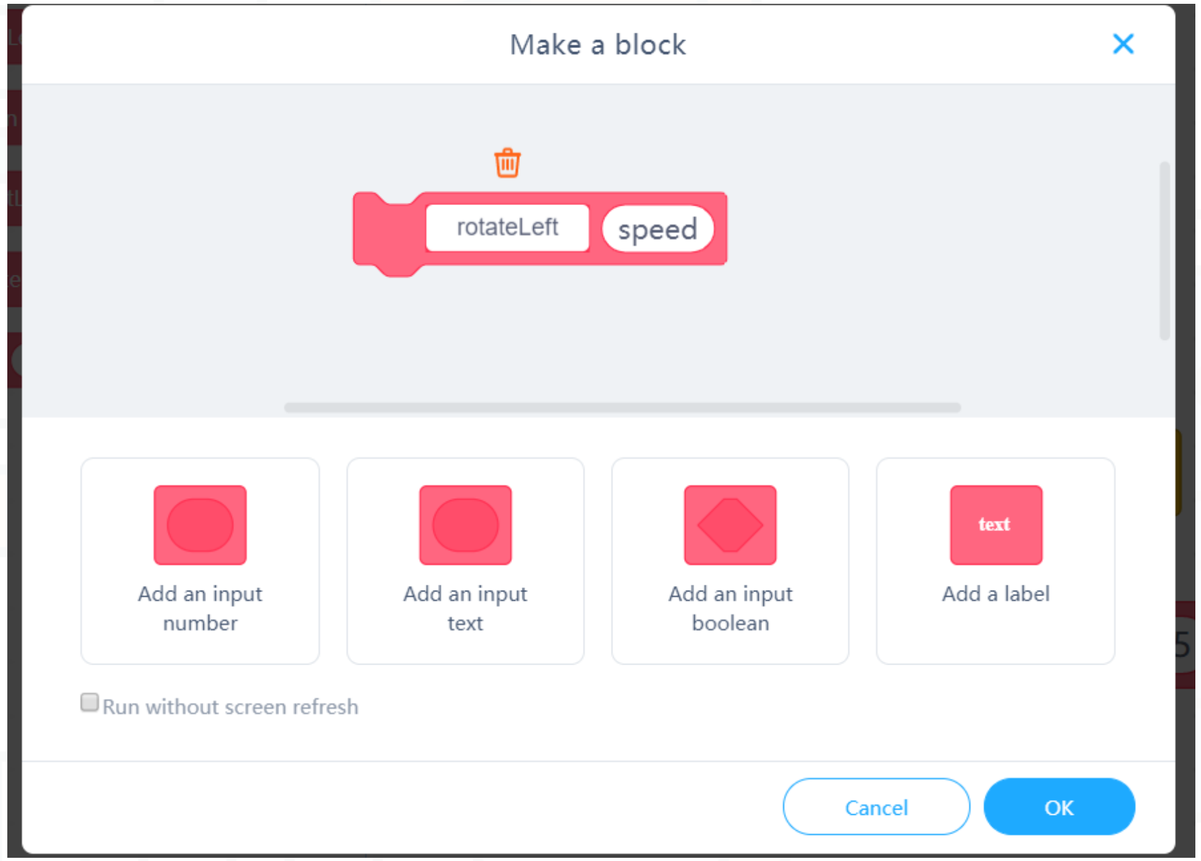
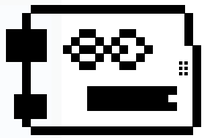
Let's make functions

Step 1: Define the function





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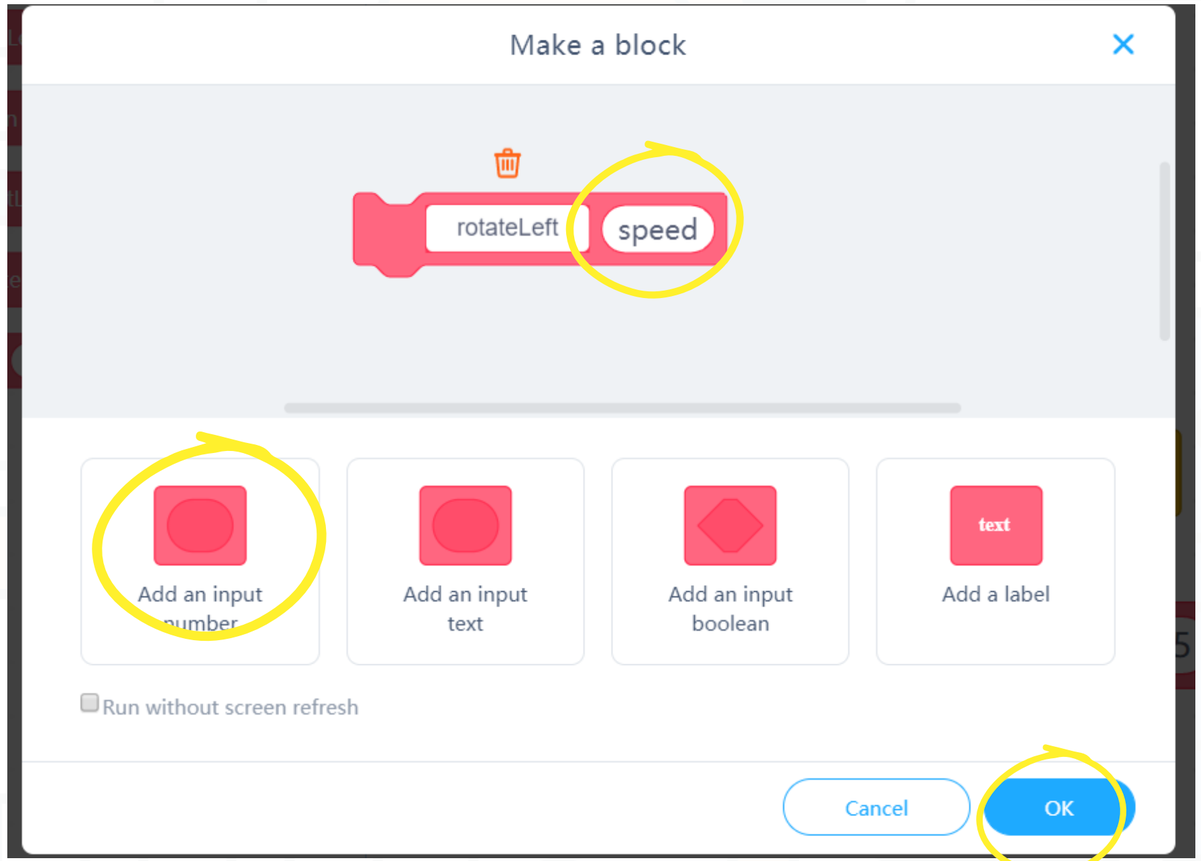
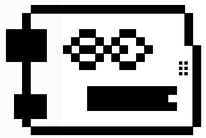
Let's make functions

Step 2: Define parameters





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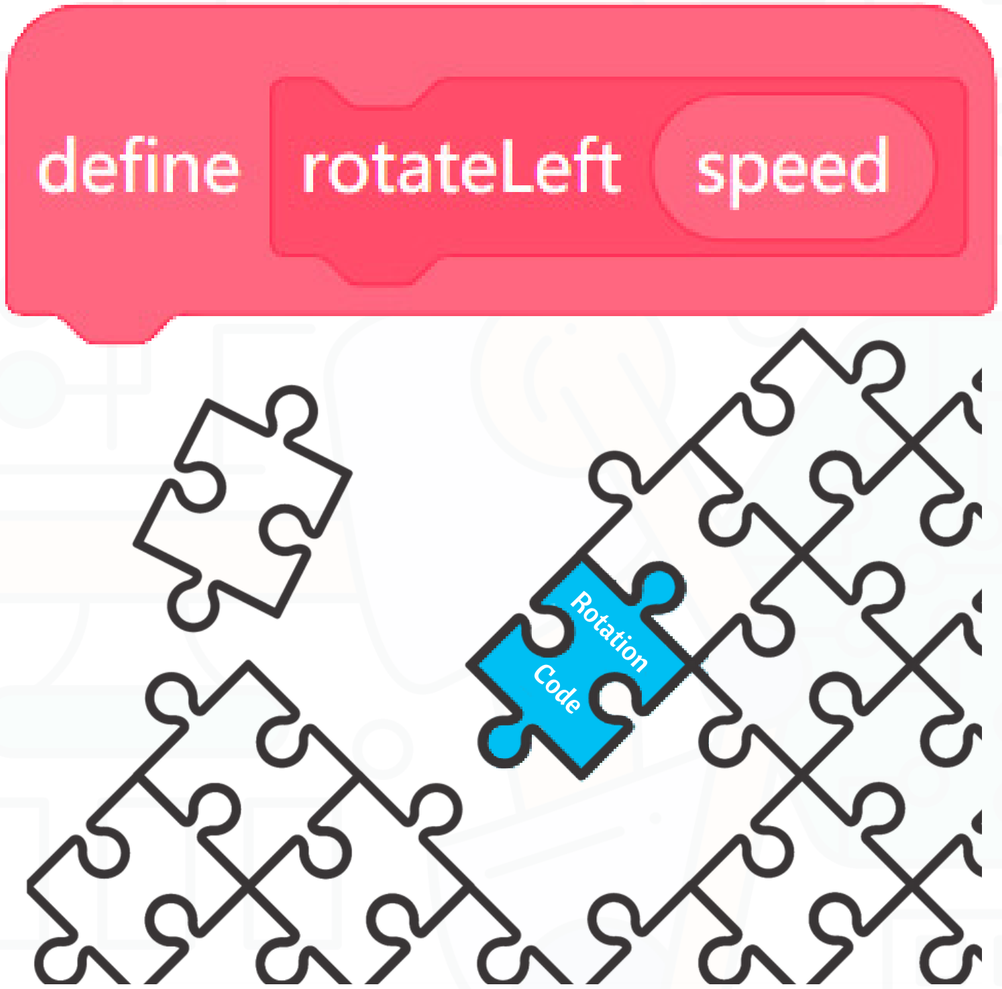
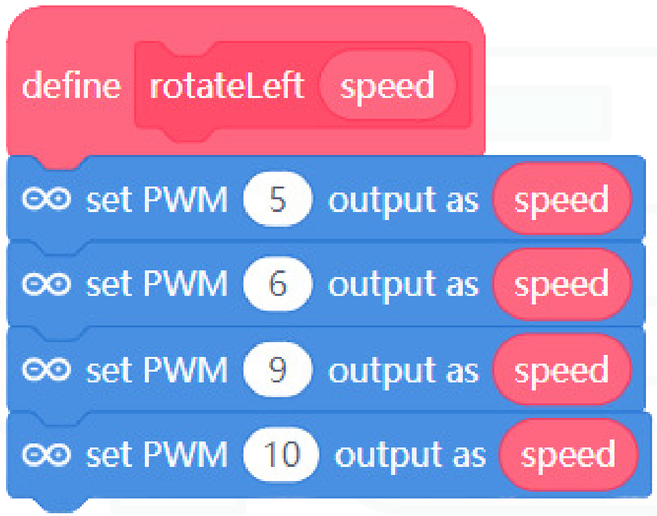
Let's make functions

Step 3: Build function block

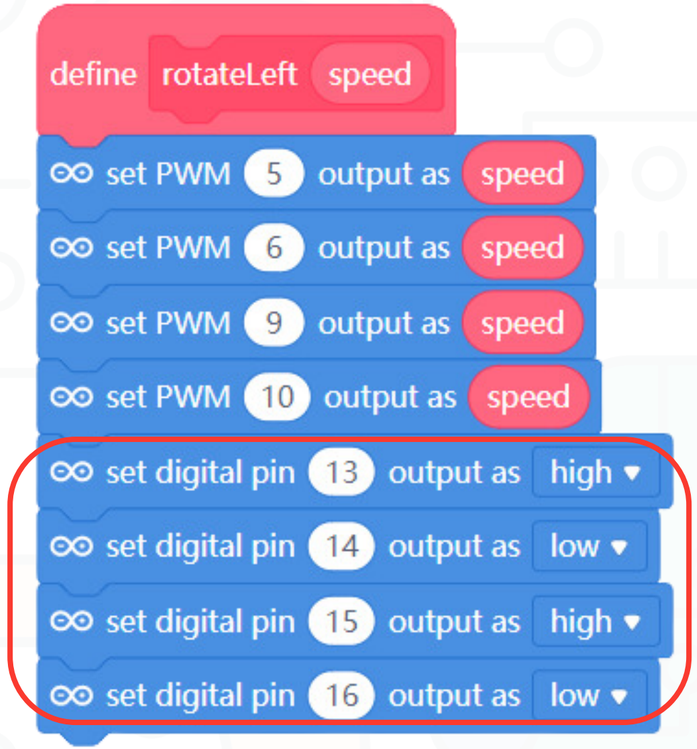


Let's make functions

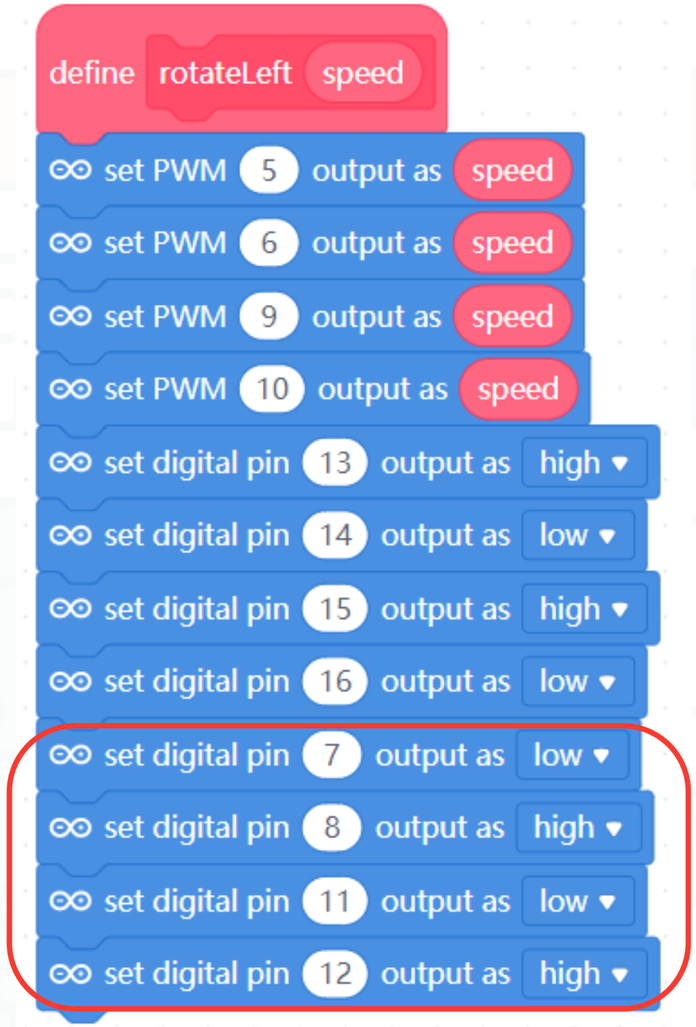
Step 4: Build function block



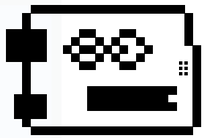
Set motors' speed

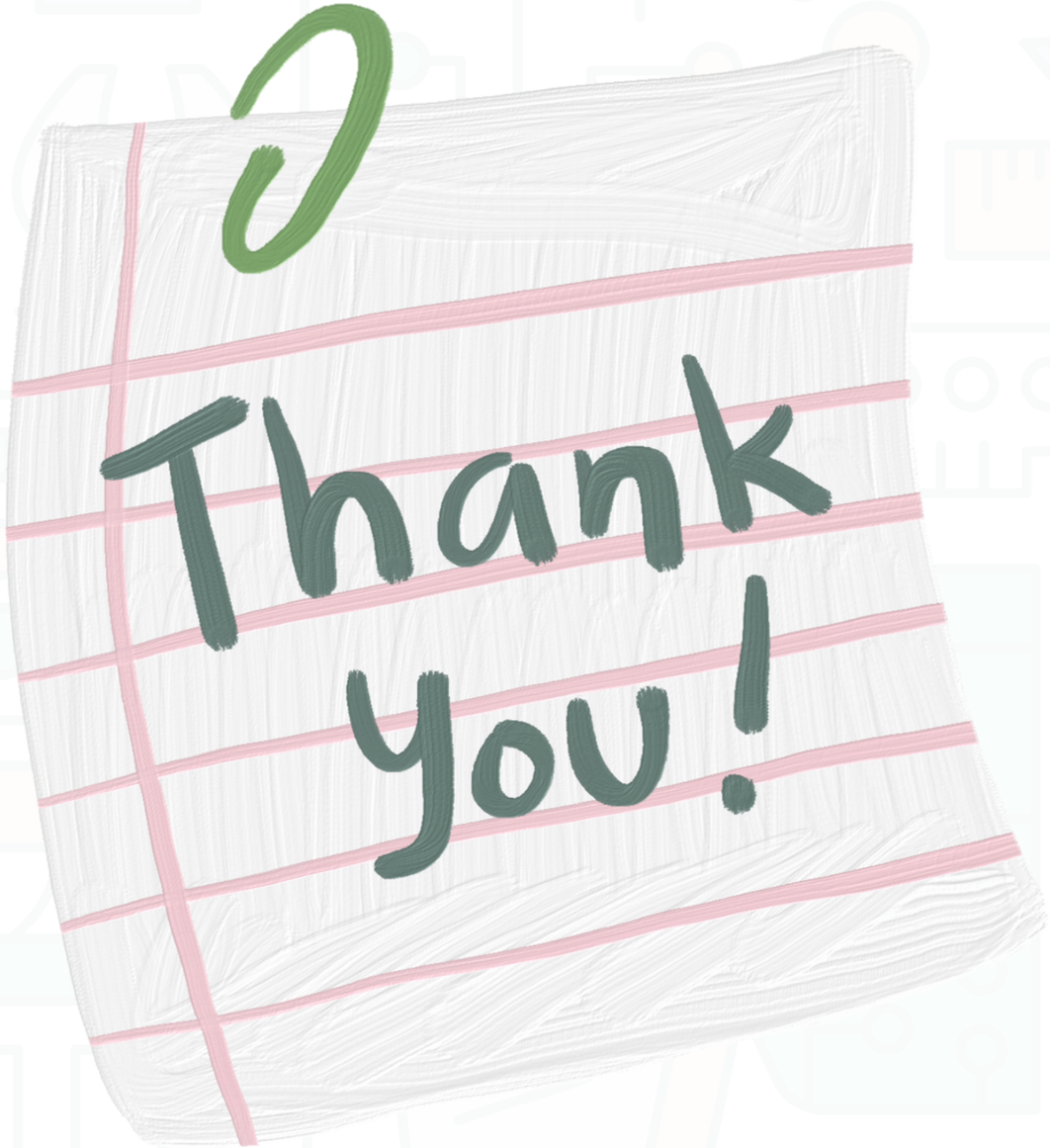


Move the right wheels forward



Move the left wheels backward





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