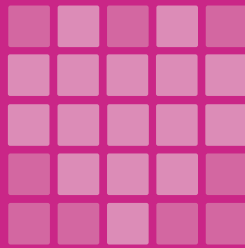


# PART 1





# 1

## Program the robot to move



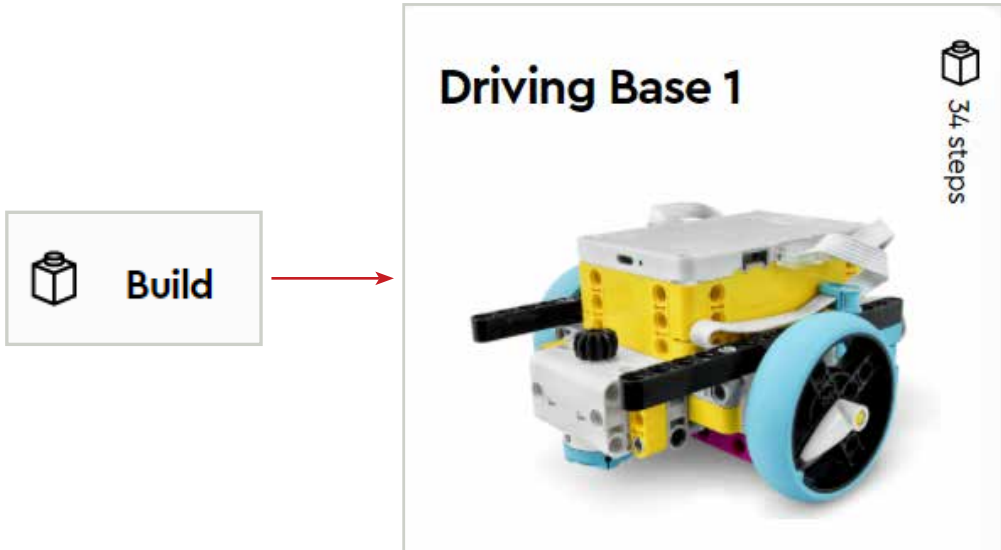
### Chapter objectives

Upon completion of this chapter, the students will:

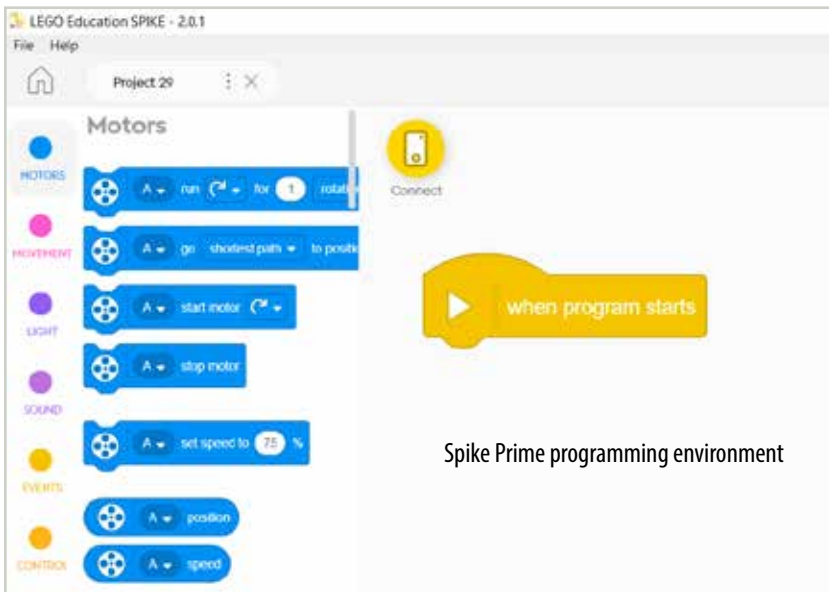
- 1 know the basic programming blocks to make the robot move (straight forward/backward, at an angle),
- 2 know all the operating modes of the motors (steering/ tank) and their properties,
- 3 be able to program their robot to perform simple missions based on the suggested activities,
- 4 be able to correctly answer the questions on the evaluation sheet at the end of the chapter.

### Remember:

Before you start programming, you need to build a **Driving Base 1** robot. You will find it on the home page of the Spike Prime application in the **Build** category.



After you open the application and create a new project, you should see the picture below. Most of the programming codes you will learn will be “built” under the block **when program starts**. You will find this block in the **Events** category.



## Move straight

There are many ways to make the robot move straight in any direction. You can choose any way you want to program any mission.


**KEEP IN MIND:** in some cases, one way may be more suitable than the other.

Let us see step by step all the ways of implementation that you can easily use in any exercise that requires movement.

### 1<sup>st</sup> way

#### Step 1:

To make the robot move, you first have to specify which ports the motors are connected to.

Select block  in the **Movement** category

and drag it under the block .


This block makes your robot “smarter”, as it informs it of which motors will operate simultaneously.




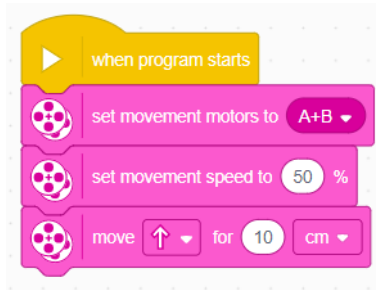
At the top of your screen, you can see which motors you have connected to which ports.



#### Step 2:

In the same blocks category, select block  and drag it into your code. This makes your motors reach the same speed simultaneously [-100, 100]. If you choose not to use it, the robot will move at the default speed of 50%.

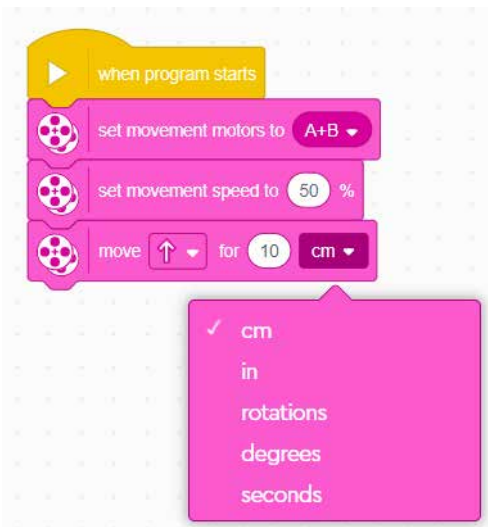
Then add block  , which specifies the direction your robot will move in and the distance it will travel. In our example, the robot will move straight (because of the arrow) at a speed of 50% for 10 cm.



Final code

## Operating options of the motors

Spike Prime offers different options for the operation of the motors. In the previous example, the robot moved using the option “centimeters”. The other options are: angles, inches, seconds, and rotations.



## Movement direction

The direction of the robot depends on the motors you specified in the 1st block you added to your code.



Spike Prime “reads” which motor is on the left and which is on the right. This is what determines the movement direction. After you run your code (picture 1), change the setting of the motors (picture 2) and run it again.



Picture 1

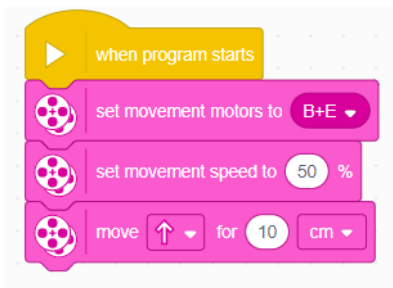


Picture 1

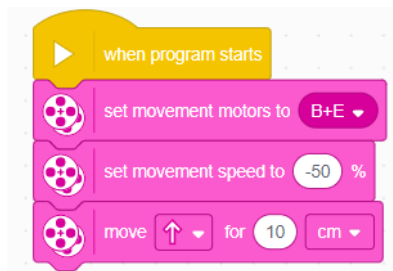
**WHAT DID YOU NOTICE?** The 1st time the robot moved forward, and the 2nd time it moved backward.

Another factor that affects the direction of the robot is the values you give. Positive values make the robot move forward, negative ones make it move backward.

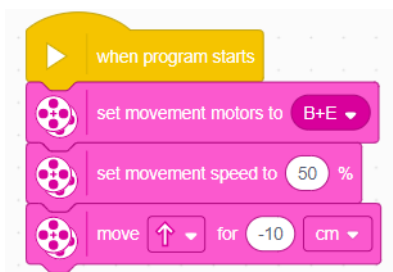
In our initial example (picture 1) the robot moves straight forward (positive values in speed and distance). Instead of changing the arrow or the setting of the motors, you could give the opposite value (negative in our case) either in speed (picture 4) or distance (picture 5).



Picture 1



Picture 4



Picture 5

**TRY THIS:** Give a negative value in speed and distance and run your code. What do you notice?

**ANSWER:** The robot moves forward.

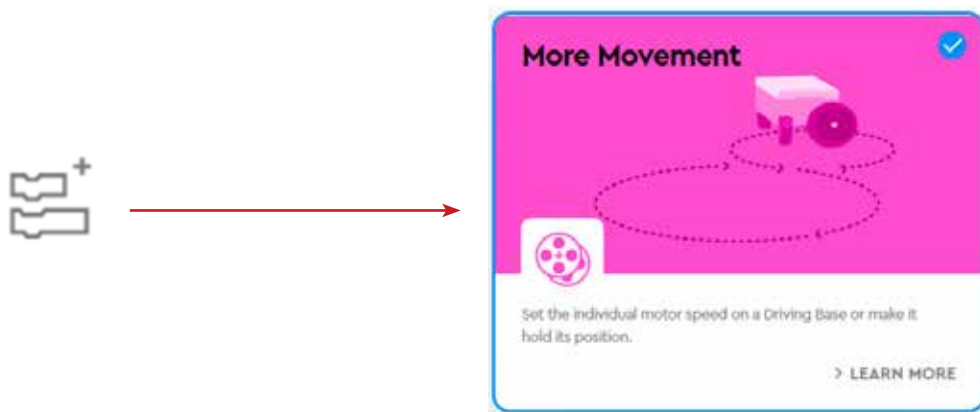
## 2<sup>nd</sup> way

### Step 1:

To implement the 2<sup>nd</sup> way, you need to add an extra category, named **More Movement**. To insert new categories, click on the icon on the bottom left-hand side and select



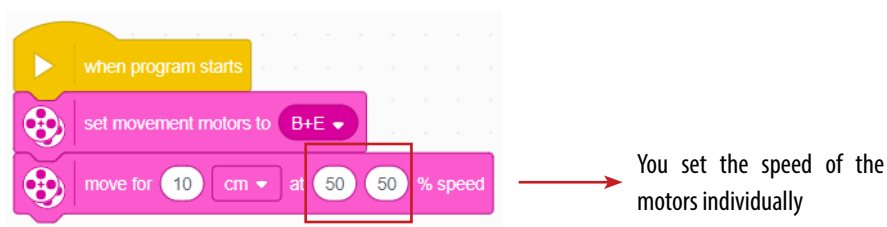
the category you want. Close the pop-up window to return to the programming environment.



**Note:** Scroll down with your mouse to find the new category.

### Step 2:


In the new blocks category, select block and drag it into your code. The difference between this block and all the others you have used is that it contains all the functions of the other blocks. Thus, your code is the same but with fewer blocks.



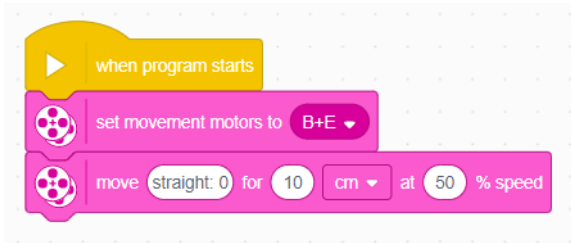
Compare the code on page 6 to the code you just wrote. Which one is correct?

**ANSWER:** There is no right or wrong code. Both codes are correct.

### 3<sup>rd</sup> way

Use block  in the new category, **More Movement**.

This block is used to make the robot move at an angle, but it can also be used to make it move straight by changing the degrees (straight = 0).



Final code



Initial value



End value

## Movement at an angle

In certain cases, the robot will have to move at an angle, either to the right or to the left.

Just like we saw in moving straight, there are many blocks that can achieve this. You can find them in the categories **Movement** and **More Movement**.

What applies to moving straight, in terms of direction and operating ways of the motors, also applies to moving at an angle.