# SPIKE PRIME LESSONS

By the Creators of EV3Lessons



# **LOOPS**

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# LESSON OBJECTIVES

Learn how to repeat an action using loops

## REPEATING CODE

- Let us say that you want the robot to repeat an action over and over again.
  - Would you copy the blocks over and over?
  - What if you wanted to repeat the action forever?
- You can use the loops to repeat an action for a number of times or until some exit condition is met
- Loops make repeating a task multiple times easy
- The added benefit is that a loop can end whenever you want (a specific number of times, run forever, a specific condition, etc.)
- There are two types of loops: for loops and while loops

## FOR LOOPS

For loops are used to iterate over a sequence

```
numbers = [1, 4, 9, 13]
for number in numbers:
   print(number)
```

#### Output:

13

#### Note:

Remember to indent the code you want to run in the loop

# FOR LOOPS WITH RANGE()

If you want the loop to iterate a certain number of times, you can use the range() function

```
for x in range(4):

print(x)

Output:

0
1
2
3
```

Note that the range function begins at 0. You can also set a start position by doing this

```
for x in range(2, 4): Output:
    print(x)
    4
```

- Notice that 4 was not included. The range() function excludes the maximum that you set.
- Finally, you can increment by different values other than I

### WHILE LOOPS

- While loops keeps repeating while a boolean condition returns true
- This is useful for repeating a task until a certain sensor reading
- They can also be used to loop a certain number of times

```
i = 0 Starting point
```

```
while (i < 10): Ending point

i = i + 1 Increment
```

- This loop will run 10 times
- Just like the range() function, you can set the starting point, ending point, and increment
- You can also use while loops to loops forever

#### while True:

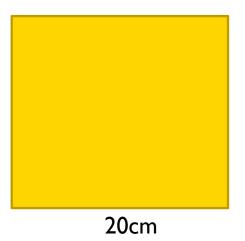
By setting the condition to be True always, the loop will repeat forever

### **USING A WHILE LOOP**

In this example, the robot adjusts the speed of the motors based on the Force sensor until the Force sensor is released. This type of loop is different than a wait function since you can perform different actions while you are waiting

## CHALLENGE: AROUND THE BOX

- Go around the box
- To do this, you will have to move forward 20 cm and turn right
- Repeat this action 4 times till you are all the way around the box
- You will have to remember the lesson on Moving Forward and Turning to complete this challenge
- You repeat those two actions using either of the two types of loops



### CHALLENGE SOLUTION

- In previous lessons, you learnt how to configure your robot. The first set of lines sets the movement motors, % Speed, Move CM and sets the motors to hold. (see Configuring Your Robot Lesson). This program has been configured for Droid Bot IV
- Code to move the robot 20cm forward (see Moving Lesson) and Turning 90 degrees (see Turning with Gyro Lesson)

```
from spike.operator import greater_than_or_equal_to
motor_pair = MotorPair('A', 'E')
motor_pair.set_stop_action('brake')
motor_pair.set_motor_rotation(17.5, 'cm')
motor_pair.set_default_speed(50)
for x in range(4):
    motor_pair.move(20, 'cm')
    motor_pair.start_tank(20, 0)
    hub.motion_sensor.reset_yaw_angle()
    wait_until(hub.motion_sensor.get_yaw_angle, greater_than_or_equal_to, 90)
motor_pair.stop()
```

## **CREDITS**

- This lesson was created by Arvind Seshan for SPIKE Prime Lessons
- More lessons are available at www.primelessons.org



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