

Lesson 4: Worksheet 4.1 – Drive in a square

In this activity, you need to write a program that will allow your Edison robot to drive in the shape of a square.

Your turn:

Write a program so that when your Edison robot drives, it makes a square. Use the commands you have already learned, including `Ed.Drive()` and a variable. Be sure your program ends with your Edison in the same spot it started.

Download your program and test it using activity sheet 4.1, placing your Edison at the 'start' point and following the lines. You can also make a larger square using coloured tape to mark the lines and a 'start' point on a desk or the floor.

1. What does your program look like? Write your code down below.

2. How many function calls did you use in this program?

3. Do you have any duplicate lines of code in your program? If so, what are they and how many times did you use each?

Lesson 4: Worksheet 4.2 – Use a loop to drive in a square

In this activity, you need to write a different program that will allow your Edison robot to drive in the shape of a square.

Using worksheet 4.1, you wrote a program that used the same commands multiple times. You needed to use `Ed.Drive()` with a direction parameter of `Ed.FORWARD` four times, once for each side of the square. You also needed to use `Ed.Drive()` with a direction parameter of `Ed.SPIN_LEFT` four times, to turn each corner.

Did you find writing the same commands many times a bit boring?

Repeating the same commands over and over is no problem for a computer, but writing out a program this way isn't very efficient. Instead, it is better to use a loop structure.

Watch Mark Zuckerberg, who created Facebook, explain the concept of loops when programming:
<https://www.youtube.com/watch?v=hYvcoRkAkOU>

Who knew being a great coder could make you one of the world's youngest billionaires?
Mark Zuckerberg's net worth is estimated to be more than 70.5 billion US dollars!



We can write a program to make Edison drive in a square with less code by using a 'for' loop. This will make writing the program more efficient. Since we will need to use fewer lines of code, using the 'for' loop will also help reduce the likelihood of mistyping and having a syntax error in the program.

The 'for' loop and 'range()' function in Python

In Python, a 'for' loop is a control structure which can be used to repeat sets of commands or statements any number of times.

Using a 'for' loop allows you to repeat (also called 'iterate over') a block of statements as many times as you like.

The 'for' loop often goes together with the 'range()' function in Python.

The `range()` function returns a set of values within a certain range.

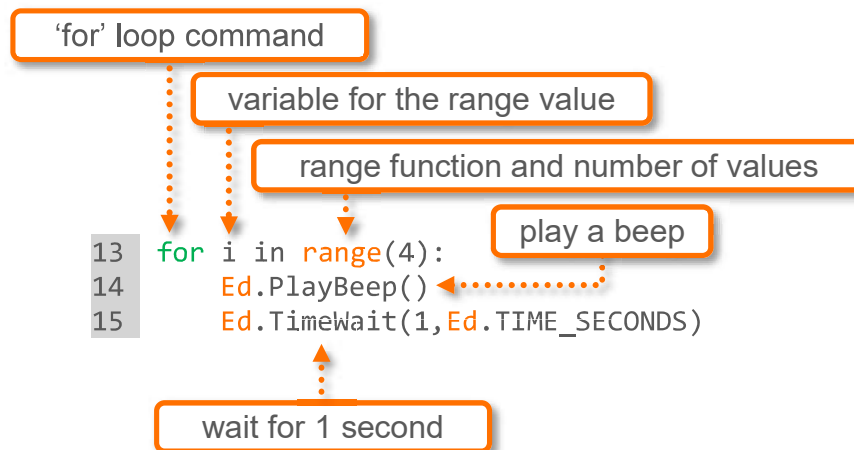
In EdPy, `range()` only has one input parameter. That input parameter determines the upper limit of the set and the lower limit is always 0.

The `range()` function returns values from 0 to (input parameter – 1).

Example:

`range(4)` → there are 4 values in the set: 0, 1, 2, 3.

Let's look at an example:



In this example, the 'for' loop iterates four times, causing the variable 'i' to have the values 0, 1, 2 and 3. Each time it iterates, the loop executes the statement block consisting of `Ed.PlayBeep()` and `Ed.TimeWait()`.

The result? The beep is played four times with a one-second delay in between each beep.

Your turn:

Write a program using the 'for' loop and the 'range()' function so that when your Edison robot drives, it makes a square. You should be able to complete the program using just two `Ed.Drive()` functions, one for forward and one for spin.

Don't forget to include a colon and proper indentation inside your loop.

Download your program and test it using activity sheet 4.1, placing your Edison at the 'start' point and following the lines. Be sure your program ends with your Edison in the same spot it started. You can also make a larger square using coloured tape to mark the lines and a 'start' point on a desk or the floor.

1. What does your program look like? Write your code down below.

Lesson 4: Worksheet 4.3 – Drive in a triangle and a hexagon

In this activity, you need to write two different programs to get your Edison robot to drive in the shape of a triangle, and then in a hexagon.

Your turn:

Task 1: Drive in a triangle

Write a program so that when your Edison robot drives, it makes a triangle.

Download your program and test it using activity sheet 4.2, placing your Edison at the 'start' point and following the lines. You can also make a larger triangle using coloured tape to mark the lines and a 'start' point on a desk or the floor.

1. How many times did your 'for' loop execute for your triangle shape?

Task 2: Drive in a hexagon

Write a program so that when your Edison robot drives, it makes a hexagon.

Download your program and test it using activity sheet 4.3, placing your Edison at the 'start' point and following the lines. You can also make a larger hexagon using coloured tape to mark the lines and a 'start' point on a desk or the floor.

2. How many times did your 'for' loop execute for your hexagon shape?

3. You should see a pattern emerging between the number of sides of the shape and the number of times the 'for' loop executes. Describe that pattern.

4. How many times you would need the 'for' loop to execute to draw a regular (meaning that all sides are equal) 12-sided shape?

Lesson 4: Worksheet 4.4 – Challenge! Drive in a circle

In this activity, you need to write a program to get your Edison robot to drive in a circle.

Your turn:

Write a program where your Edison robot drives in a circle. Your Edison needs to drive in the shape of a circle, not just spin in one spot.

Download your program and test it using activity sheet 4.4, placing your Edison at the 'start' point and following the line. You can also make your robot drive around any circular object, like a round rubbish bin or a round table.

Hint: A shape with many hundreds of very small sides can closely approximate a circle.

1. How many times does your loop execute to make your shape a circle?

2. How far does your robot travel each time you execute your loop?

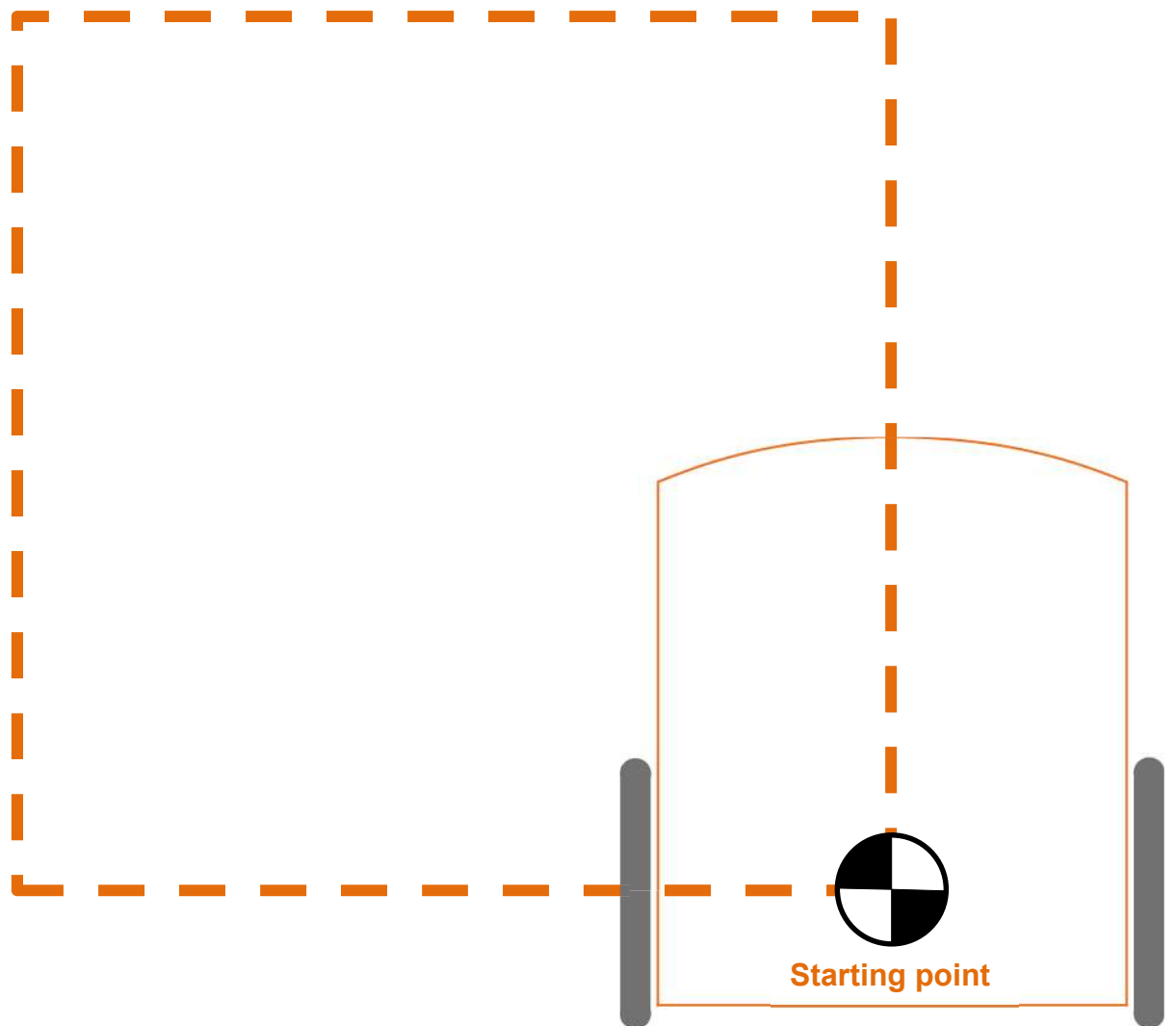
3. Does your robot drive in a perfect circle? If not, can you think of a reason why not?

Optional challenge: Draw your shape

Attach a crayon or coloured marker to your robot using some combination of LEGO block pieces or masking tape. Place your Edison on a piece of paper and run your circle program. Watch as the coloured marker draws your shape as the robot moves. See if your Edison draws a true circle or not.

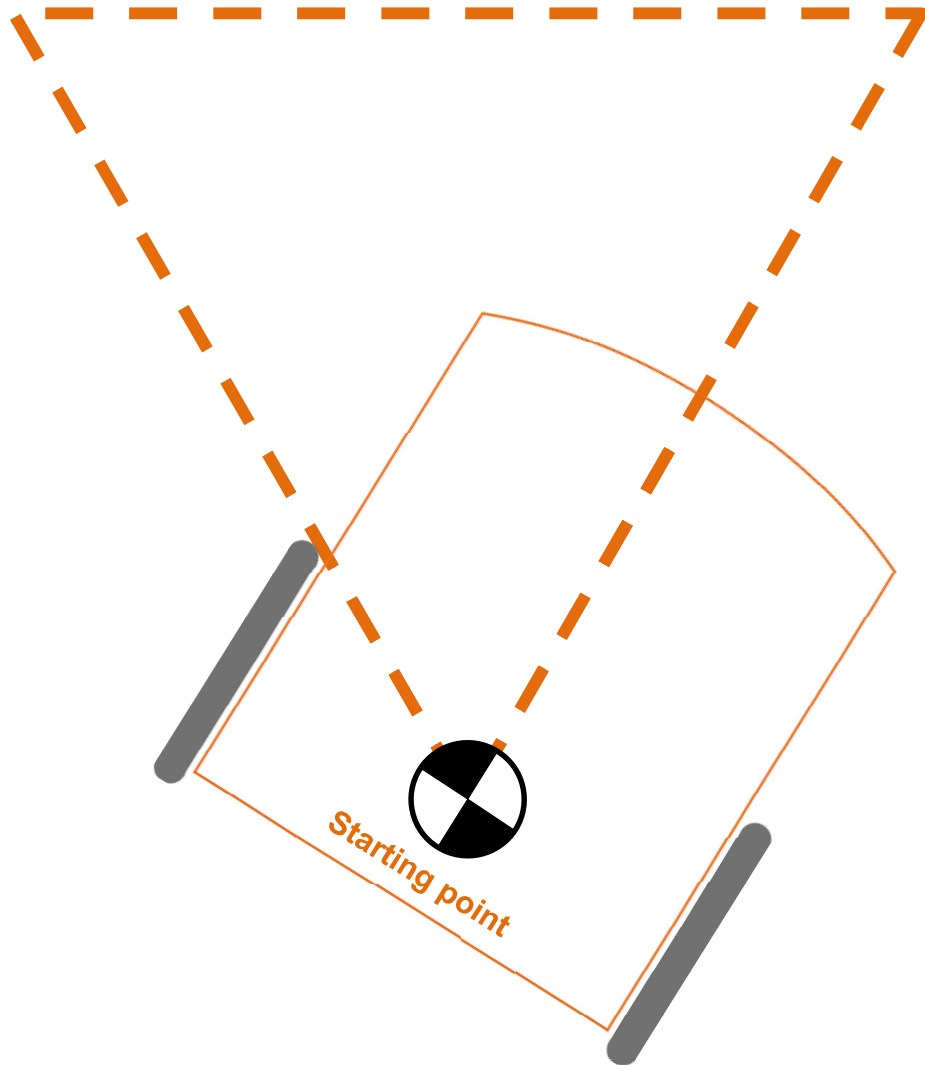
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Lesson 4: Activity sheet 4.1



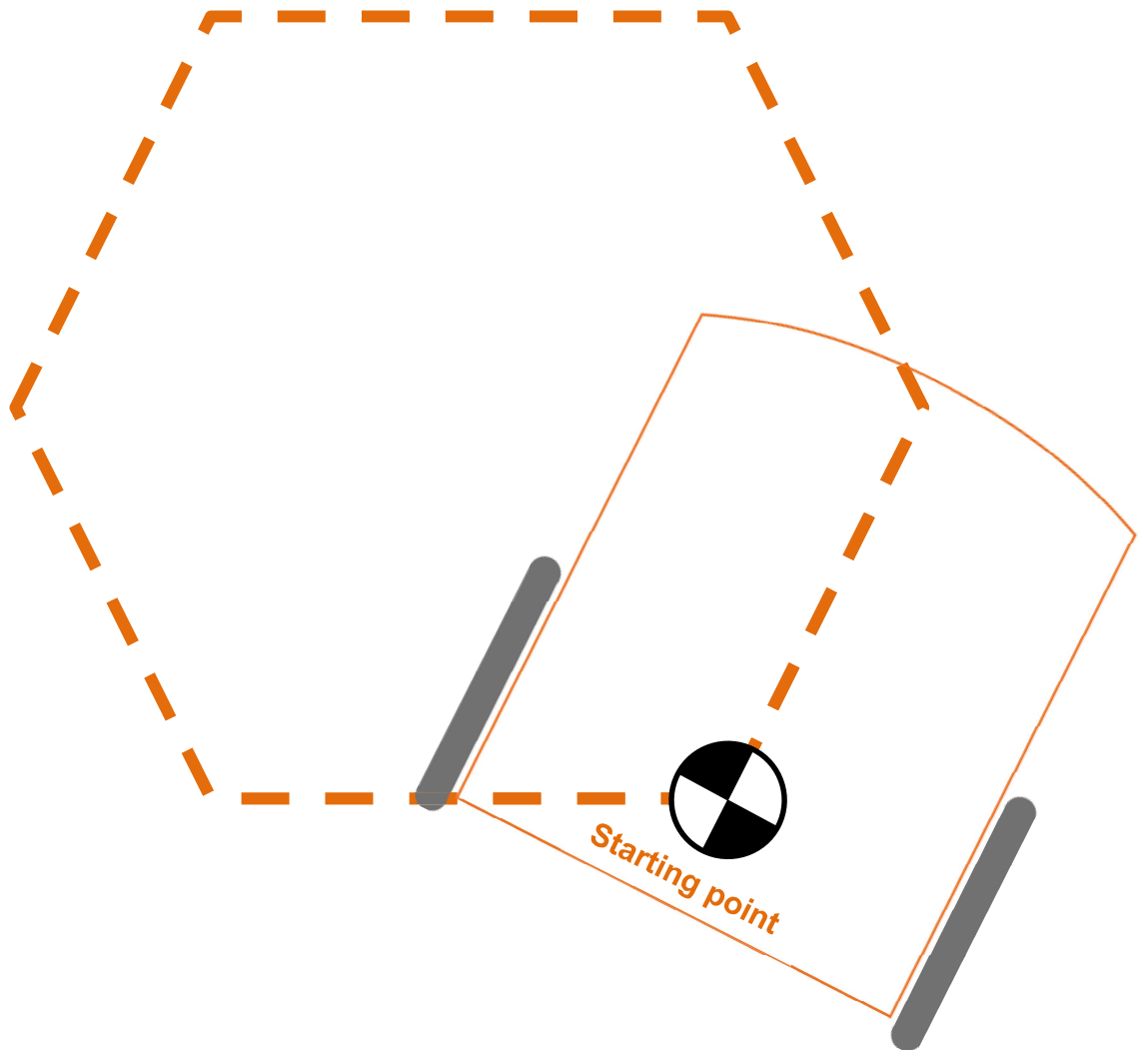
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