

## U3-1.4 Let's explore stacking and nesting loops

Writing programs using loops lets you be more efficient because you can get a computer to repeat actions without needing to write out the commands multiple times. Using loops also lets you tell a program to do something forever, which you couldn't do if you had to write out every command one by one.

You can also use more than one loop in a program, and you can use the loops in different ways: by **stacking** the loops together or **nesting** loops inside other loops.



### Jargon buster

In block-based programming languages like EdScratch, adding blocks together is sometimes called **stacking** blocks and a program is sometimes called a **stack** or a **block stack**. That's why if you use multiple loops together in a program one after another, you can say you are **stacking** the loops.

You can also put a loop block inside another loop block. This is called **nesting** loops.

Why would you use loops in stacks or by nesting them together? Using multiple loops together in this way lets you write programs with repeating patterns. You can even write programs with patterns that repeat inside of other patterns.



### Why is that?

Think about an alarm clock on a mobile phone. The alarm can be set to go off in the morning at 7:00 AM. You can set the phone to repeat that alarm every day. When the alarm goes off, it beeps on and off a set number of times. If you snooze the alarm, it stops for a certain amount of time, then comes back on, beeping on and off again for a set number of times.

Can you see how there are repeating patterns inside of other repeating patterns?

This is an example where using stacked and nested loops to write a program would be very **helpful**. That's because **stacking and nesting loops** lets you repeat whole sets of commands inside your program.

Stacking and nesting loops have different uses. By stacking loops, we can write programs to get Edison to do different sets of actions multiple times, then move on to a new set of repeated actions. By nesting loops together, however, we can write programs to get Edison to repeat whole patterns multiple times.

## Task 1: What's going to happen?

Programs that use multiple loops, especially nested loops, might seem a bit confusing at first. To understand what the program is going to do, you need to think about each action that is going to happen in sequence.

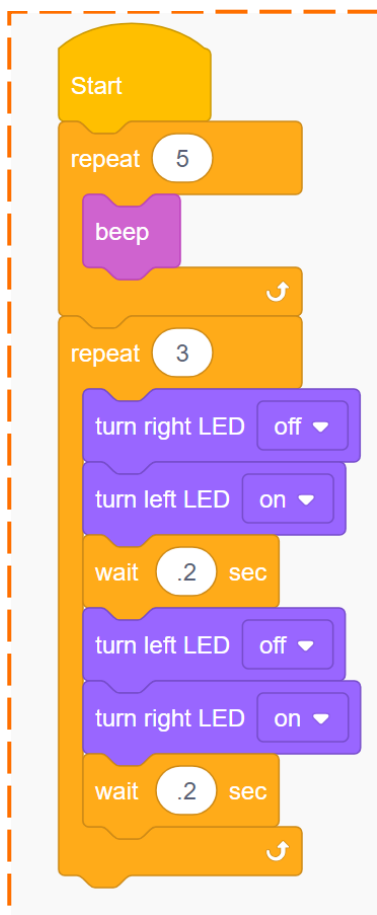


### Don't forget

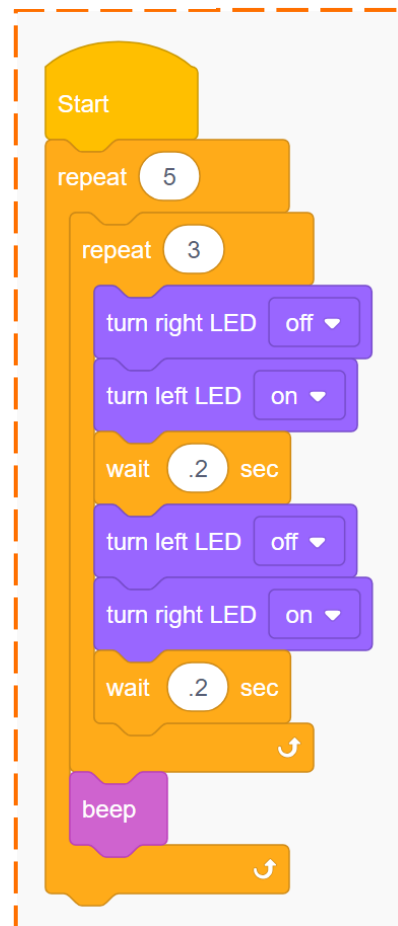
When you make a program for Edison in EdScratch, the robot will start with the top block and do each action one by one. Once it completes a block, it will move to the next block. This is true of all EdScratch programs – whether there are zero loops, one loop or multiple loops!

Look at the following programs and answer the questions about what is going to happen in each program.

Program 1:



Program 2:



1. In program 1, how many times will the right LED turn on?

\_\_\_\_\_

2. In program 1, which will finish first: all of the beeps or all of the LED flashes?

\_\_\_\_\_

3. In program 2, how many times will the right LED turn on?

\_\_\_\_\_

4. In program 2, which will finish first: all of the beeps or all of the LED flashes?

\_\_\_\_\_



**Hint!**

Can you follow along with what is happening in each program? If you want to double check your answers, try writing each program in EdScratch, then download it to your Edison robot. Run the program to see what happens.

**Task 2: Drive the pattern**

Just like a loop lets you repeat a pattern multiple times, nesting loops allows you to repeat multiple patterns! For this activity, you need to use activity sheet U3-6.

5. Look at the pattern on activity sheet U3-6. How would you describe the pattern?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

You need to write a program so that Edison will drive the pattern on activity sheet U3-6. Your program can have Edison go across the same line more than once, but the robot must touch all the lines.

6. How do you think you can use a nested loop to help you write an efficient program for your Edison robot to drive the pattern on the activity sheet?

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Try writing an EdScratch program so that you get your Edison robot to drive the pattern on activity sheet U3-6. Test your idea for using a nested loop to see if it works.



**Hint!**

You can write a program that completes the activity sheet using just five EdScratch blocks!