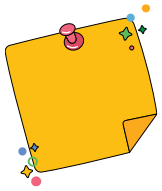
Name _____

Let's explore repeating steps

To get a computer, like the Edison robot, to do what you want it to do you need to give very specific instructions. You need to write code that says exactly which actions you want to happen in exactly which order you want each action to happen.



Don't forget

When you write a program for your Edison robot in EdScratch, you are telling the robot what to do and in what order to do each thing. Each EdScratch block is one action you are telling the robot to take. The order you connect the blocks in your program tells the robot in what sequence to do each action. Edison will do the actions one at a time, starting with the top block.

Drive in a square

Write a program for Edison using EdScratch so that your robot can drive in a square. Your program should only use blocks from the Drive category to control the motor outputs. Download your program and use the activity sheet on page 82 to test your program.
Make sure your program has Edison end in the exact same spot it started.

How many blocks do you have in your program not counting the start block?

Look at the blocks in your program. What do you notice? Is there a pattern to the blocks?

Use a loop to drive a square

To get Edison to drive a square, you need to program the robot to drive each side of the square and turn at each corner of the square. You might have noticed that this makes a pattern in the code: drive the side, turn, drive the side, turn, drive the side, turn, drive the side, and turn one last time, back to the starting position.

Lots of programs have repetition, where a bit of code is used over and over. Repeating stuff is one thing that computers are really good at doing. Unlike a person, a computer doesn't get bored doing the same thing exactly the same way again and again.

Imagine you wanted to get Edison to do the same thing 100 times. Would you want to write out that program using 100 repeating blocks? Would you find that boring to write? Do you think you would be able to write the whole program without making a mistake?

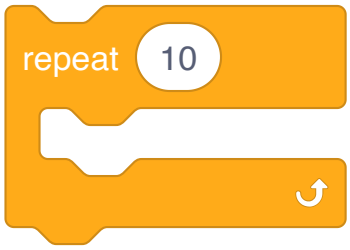
There is an easier and more efficient way to get a computer to repeat commands multiple times.

Jargon buster

A **loop** is a special piece of code that tells a computer to repeat something multiple times. Loops are a type of **control structure** because loops control other bits of code in a program.

Name _____

In coding, using loops lets us repeat other bits of code multiple times without having to write each command over and over. In EdScratch, loop blocks are in the **Control** category in the block pallet.



One of the loop blocks in EdScratch is the **repeat** block:

There are different types of loops. The repeat block is a **definite loop.**

Jargon buster

A **definite loop** is a type of loop which will repeat for a set number of times.
The **repeat** block in EdScratch is an example of a definite loop. You tell the loop how many times to repeat using this block's input parameter.

Like all loop blocks in EdScratch, the **repeat** block wraps around other blocks.

Why is that?

Look at the shape of the repeat block. See how it has a shape a bit like a mouth? Other blocks can sit inside the opening of this block's 'mouth'. Any block that sits inside the repeat block is inside this loop. All blocks inside the loop will be repeated.

Remember, Edison will follow each EdScratch block one at a time. The robot will see the loop block first and know that any blocks inside that loop need to be repeated as many times as the repeat block's input parameter says. The robot will then do the action of each block inside the loop in order. When it gets to the bottom of the blocks in the loop, it will move back to the top of the loop and start again!

Try using a **repeat** block to make a program for Edison to drive a square. You should be able to write a program for Edison which uses only three blocks after the start block, including one **repeat** block. Download your program and use the activity sheet on page 82 to test your program. Make sure your program has Edison end in the exact same spot where it started.

What value do you need to have in the input parameter in the repeat block to get Edison to drive a square?

Why do you need to have that be the value?

Name _____

Drive a triangle

Even little changes to inputs can make the output of a program completely different. A great example of this is changing the number of repetitions in a loop. Imagine if you wrote a program with a loop that repeats four times, then changed the input so that it repeats five times instead. What would happen when you ran the updated program?

What to do

Write a program for Edison using EdScratch so that your robot can drive in a triangle. Your program needs to use a definite loop control structure, so be sure to include a **repeat** block. Your program should be as efficient as possible, so try to use as few blocks as you can while still completing the task.

Download your program to your robot and use the activity sheet on page 83 to test your program. Make sure your program has Edison end in the exact same spot where it started.

How many blocks did you need to use in order to write a successful program (not counting the start block)?

What value do you need to have in the input parameter in the **repeat** block to get Edison to drive a triangle?

Why do you need to have that be the value?

Drive a hexagon

Even little changes to inputs can make the output of a program completely different. A great example of this is changing the number of repetitions in a loop. Imagine if you wrote a program with a loop that repeats four times, then changed the input so that it repeats five times instead. What would happen when you ran the updated program?

What to do

Write a program for Edison using EdScratch so that your robot can drive in a hexagon. Your program needs to use a definite loop control structure, so be sure to include a **repeat** block. Your program should be as efficient as possible, so try to use as few blocks as you can while still completing the task.

Download your program to your robot and use the activity sheet on page 84 to test your program. Make sure your program has Edison end in the exact same spot where it started.

How many blocks did you need to use in order to write a successful program (not counting the start block)?

What value do you need to have in the input parameter in the **repeat** block to get Edison to drive a hexagon?

Why do you need to have that be the value?

Name _____

Challenge up: Choose your own shape

Using a definite loop allows you to write a program to get Edison to drive a shape using only a few blocks of code. You can control how many times the program repeats the code commands inside the loop by changing the input of the repeat block.

What do you notice about the number of sides and angles a shape has compared with the input you need in your definite loop? Can you use this pattern to help you write a program to drive any shape?

What to do

Choose a shape which has sides and angles to drive using your Edison robot.

Make a workspace to test your program by either drawing your shape on paper or marking it out on the floor or a desk with coloured tape.

Write a program for Edison using EdScratch so that your robot can drive your shape. Your program needs to use a definite loop control structure, so be sure to include a **repeat** block. Your program should be as efficient as possible, so try to use as few blocks as you can while still completing the task.

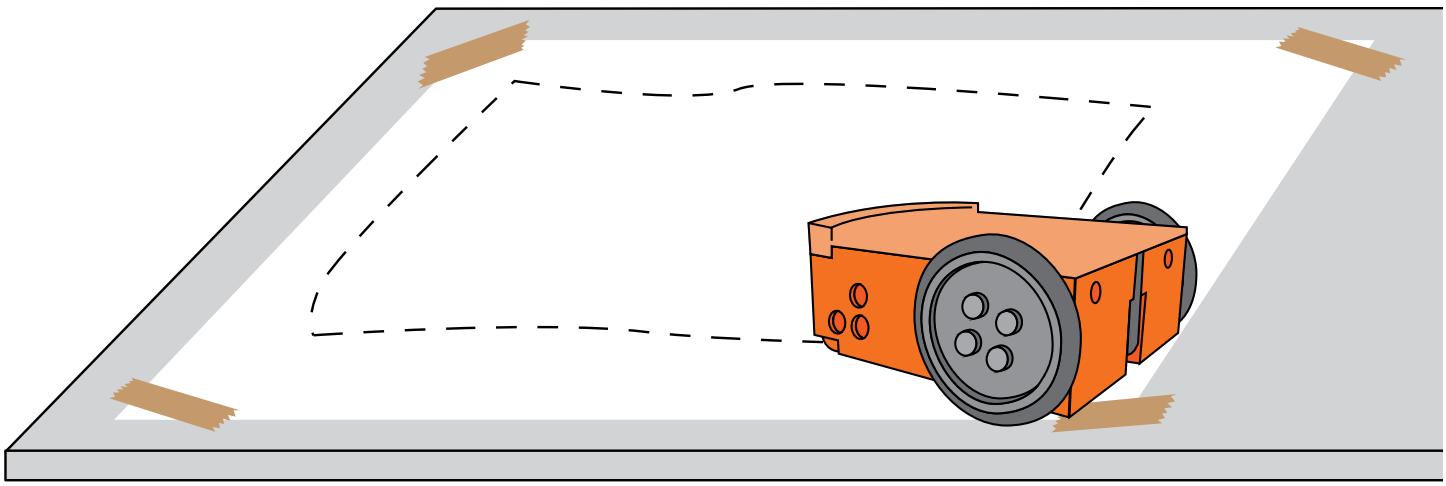
Download your program to your robot and test it out using your workspace.

Hint

You might want to choose a regular shape for this challenge. A regular shape means a shape where all the sides are equal.

What value would you need to have in the input parameter in the **repeat** block to get Edison to drive a regular (meaning that all sides are equal) 12-sided shape?

There is a pattern between the number of sides and angles a shape has and the number of times you need a loop to repeat in order to drive that shape. Describe how you used this pattern to help you determine the input parameter you needed in the **repeat** block to get Edison to drive your shape.



Name _____

Challenge up: Drive a circle

Using a definite loop, like the repeat block, is helpful when you want to write a program for Edison to drive in a shape because shapes have repeating patterns. You have probably noticed a pattern between the number of sides and angles a shape has compared with the input you need to use in a definite loop in a program that gets Edison to drive that shape. Can this pattern help you drive a circle even though a circle has no sides or angles?

What to do

Write a program for Edison using EdScratch so that your robot can drive in a circle. Your Edison needs to drive in the shape of a circle, not just spin in one spot. Your program needs to use a definite loop control structure, so be sure to include a **repeat** block. Your program should be as efficient as possible, so try to use as few blocks as you can while still completing the task.

Hint

What do you notice about how a shape looks the more sides it has? If you are feeling stuck, try looking at shapes with many sides, such as a decagon and an icosahedron. Use the pattern you see to help you write your program.

Download your program to your robot and use the activity sheet on page 85 to test your program.

What does your program look like? Write your program below. Be sure to include all the input parameters you used. Or take a photo of the program and insert in box on right below.

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

Name _____

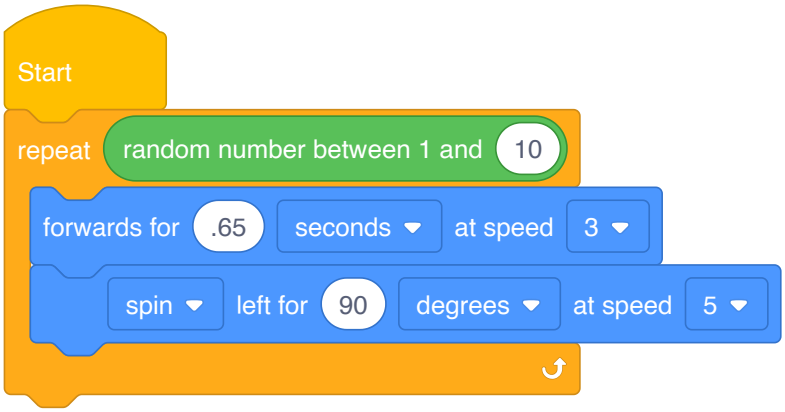
Change it up: Drive a square

How many loops does it take to drive in a square? You know that a square has four sides and four angles, so the robot needs to repeat driving and turning four times. That means that if you write a program for Edison to drive in a square using a definite loop, like the **repeat** block, you need to have the loop repeat four times.

What happens if the loop only repeats three times? How about if it repeats nine times?

What to do

Look at this EdScratch program:



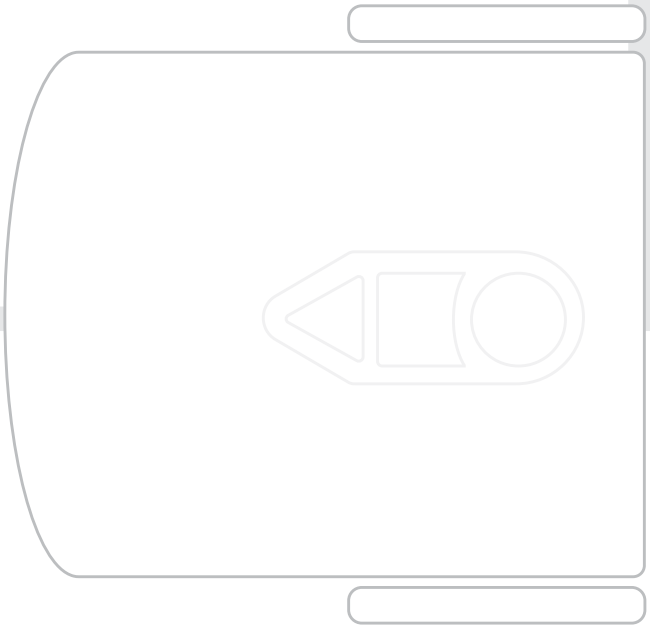
This program is using a special input parameter for the **repeat** block: the **random number** block! This block tells Edison to pick a number between 1 and 10 at random. That's how many times the robot will loop the code inside the **repeat** block.

Write the program in EdScratch. Download your program to your robot and use the activity sheet on page 82 to test your program. Try running the program several times to see what happens.

What happened when you ran the program? Did the same thing happen every time? Why or why not?

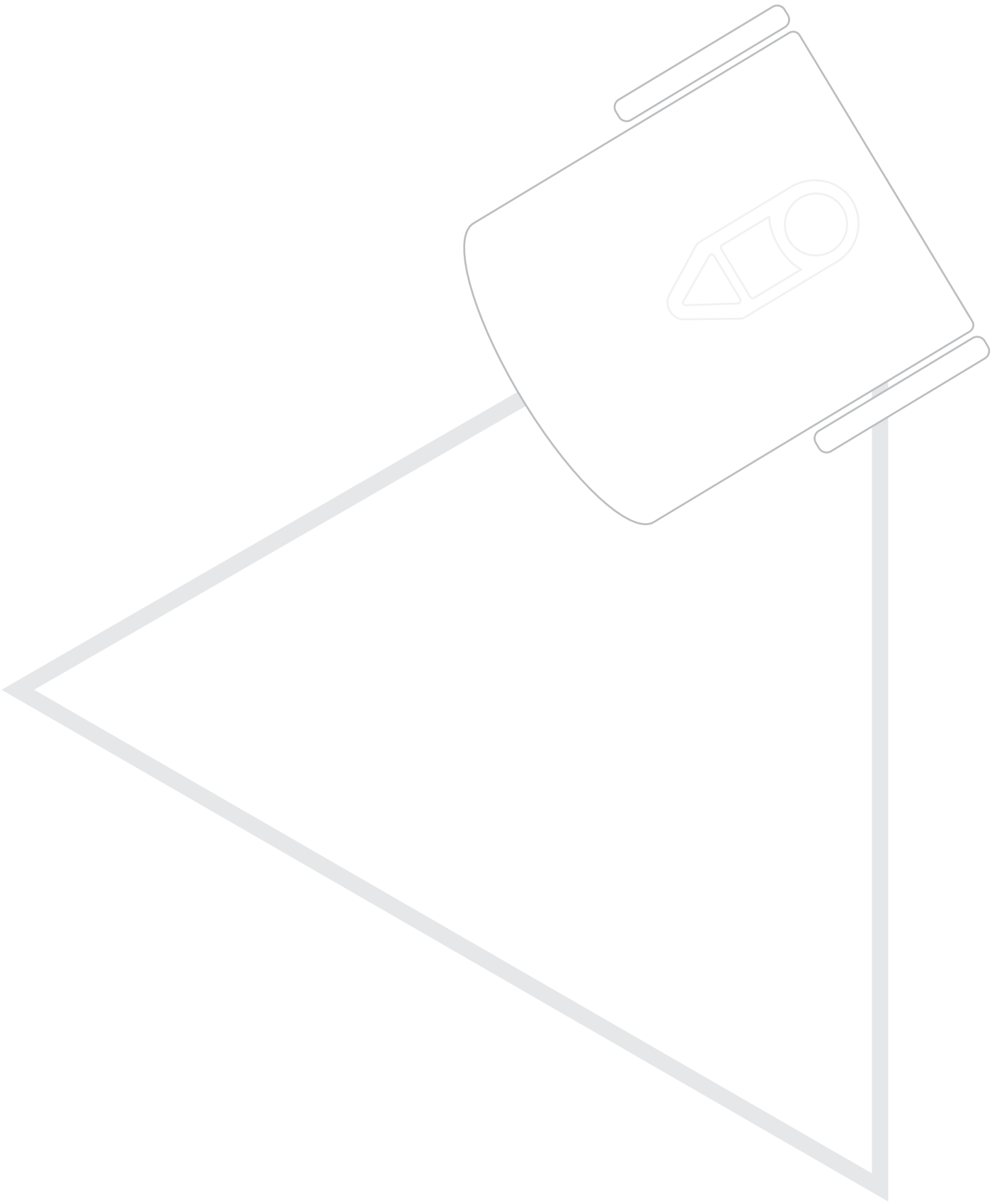
Name _____

Activity sheet: Drive a square



Name _____

Activity sheet: Drive a triangle



Name _____

Activity sheet: Drive a hexagon

Name _____

Activity sheet: Drive a circle