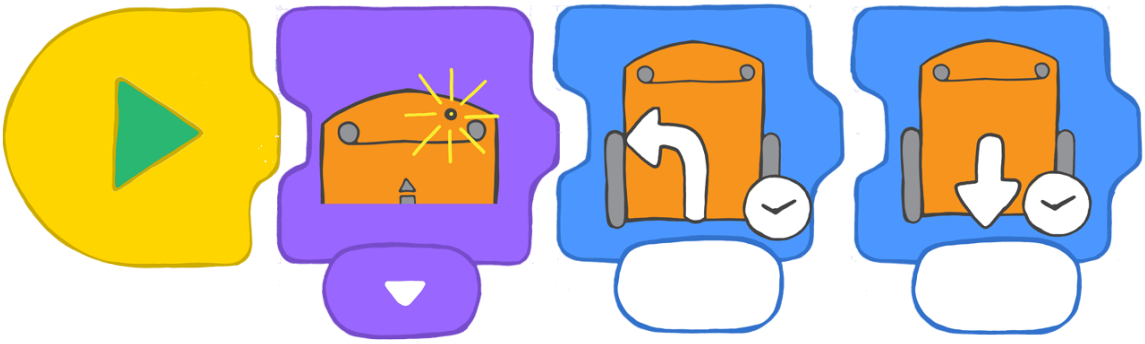
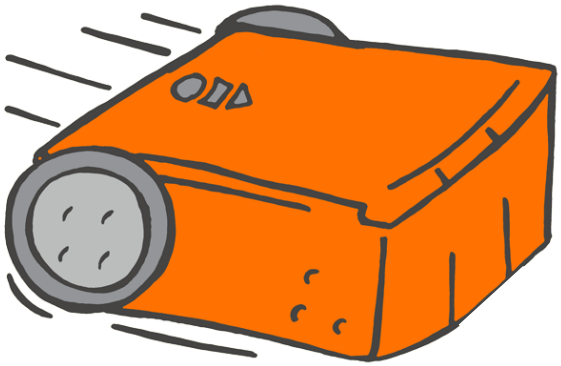
EdBlocks lesson activities

Student worksheet and activity sheet set





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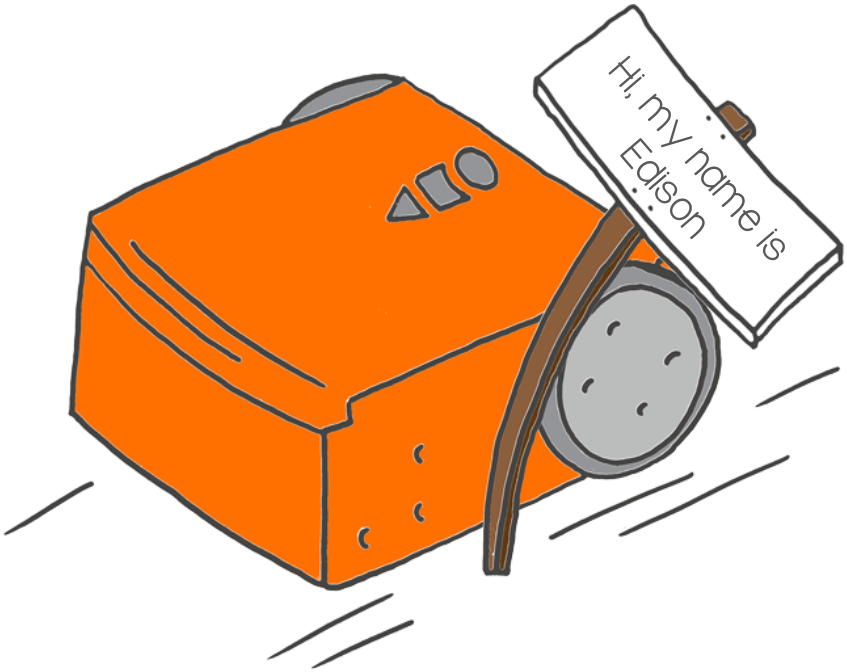
Document number: 3.2.3.3.1 Rev 1.1

Programmer's Name _____

Meet Edison

This is Edison, the programmable robot.



What is a robot?

A robot is a machine that can be made to do a task on its own.

There are many types of robots. Different robots can do different things.

What do you think of when you imagine a robot?

Draw your own robot here.

What can you do with Edison?

We can do a lot of different things using Edison!

This is because Edison can be programmed.

Programmed means that we can tell Edison what to do.

We can program Edison different ways. One way to program Edison is by using barcodes.

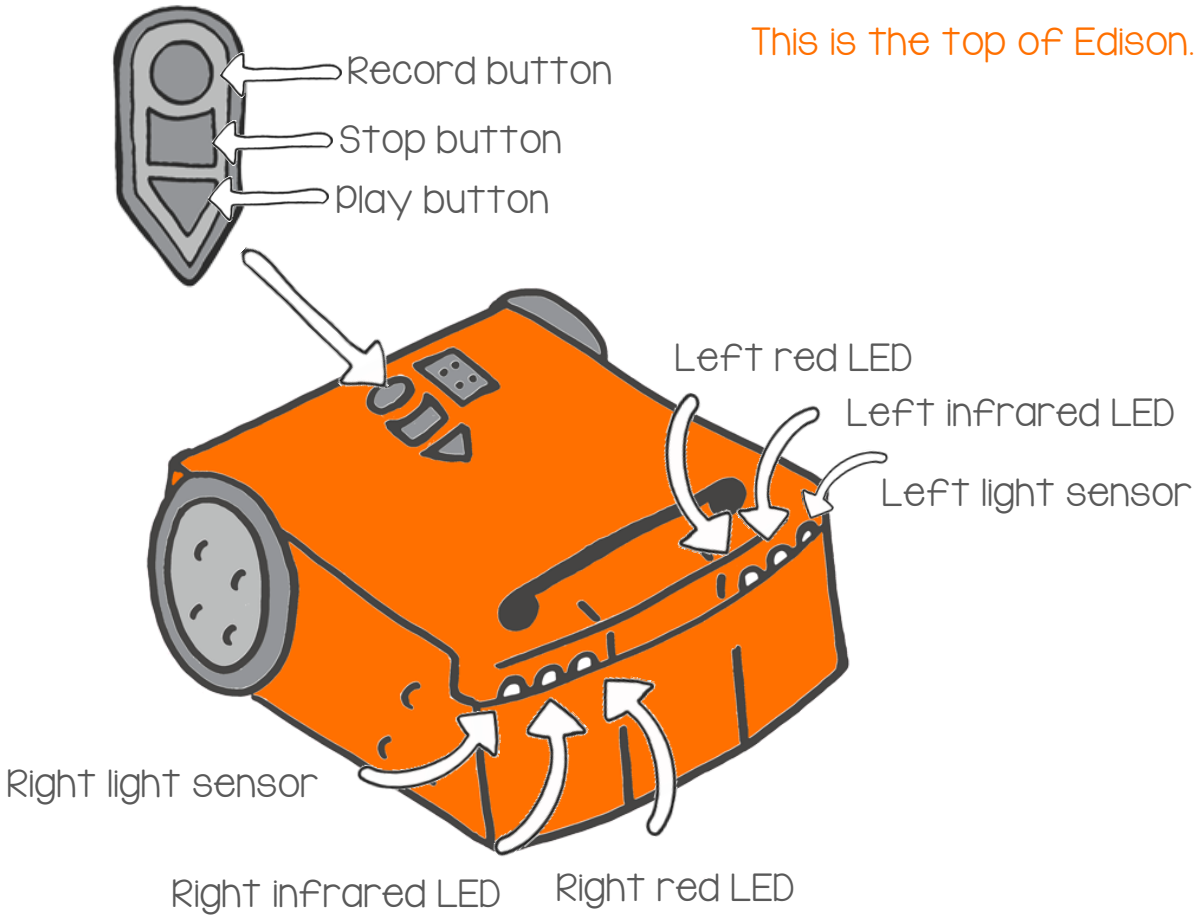
You can also program Edison using computers.

Let's use Edison to learn more about robotics and programming.

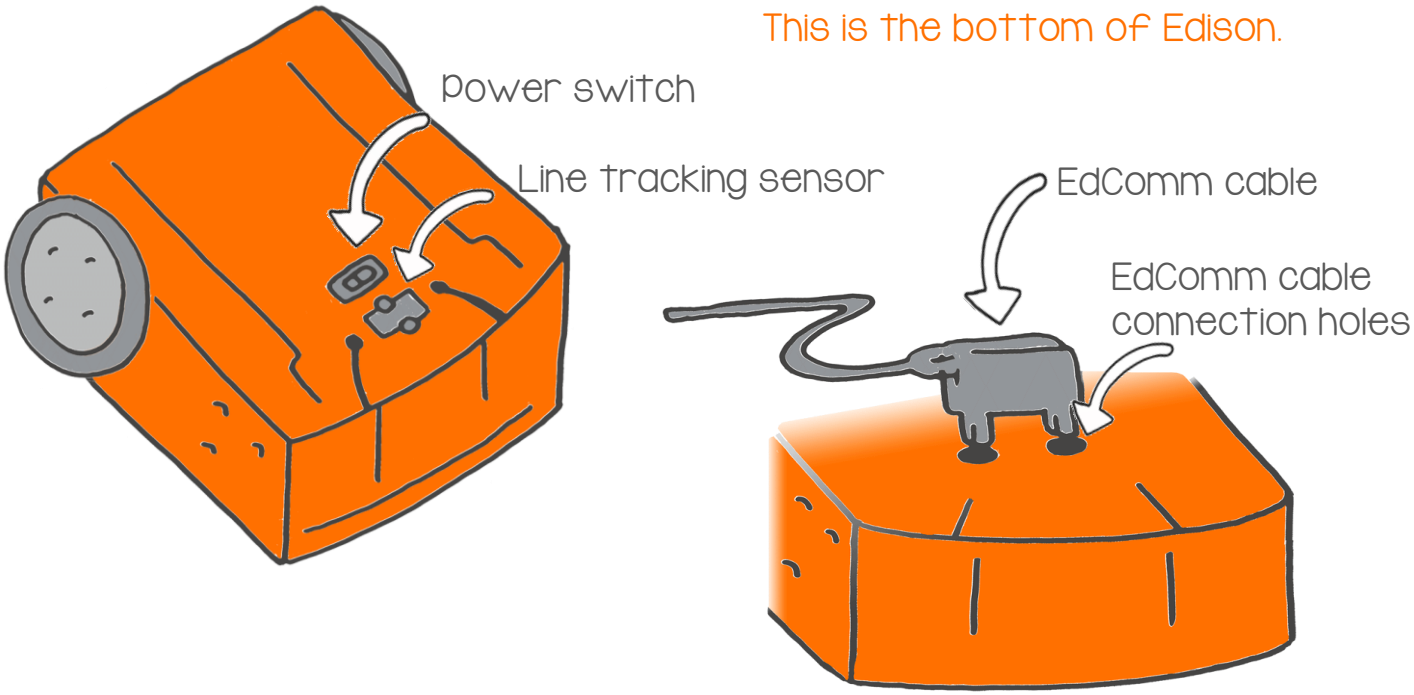
Activity

Before we start programming Edison, let's get to know Edison. In the pictures below you can see all of Edison's different parts. Can you find all of these parts on your Edison robot?

This is the top of Edison.

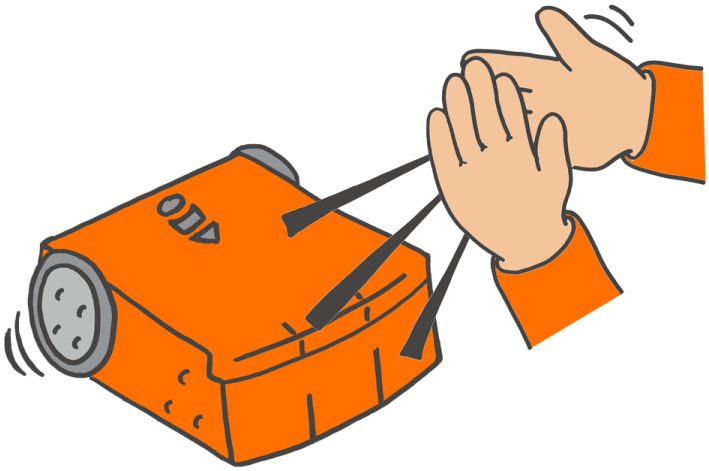


This is the bottom of Edison.



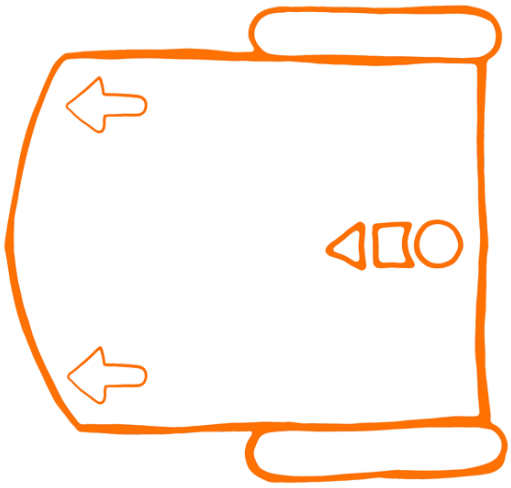
Programmer's Name _____

Clap controlled driving



Edison has a sound sensor which can hear loud sounds, like when you clap your hands.

The barcode below has a built-in program. The program makes Edison do things when it hears loud sounds.



Read the barcode

Put Edison on the outline above.
Press the record button (round button) three times.

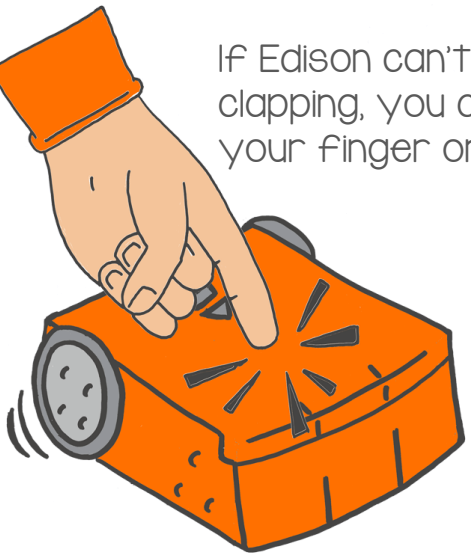
Edison will quickly drive forward and scan the barcode.

What to do with Edison

Put Edison on the floor or table.
Press the play button (triangle button).

Now, clap your hands one time. Edison will turn to the right.

Clap your hands two times. Edison will drive forward.



If Edison can't hear you clapping, you can tap your finger on the top.

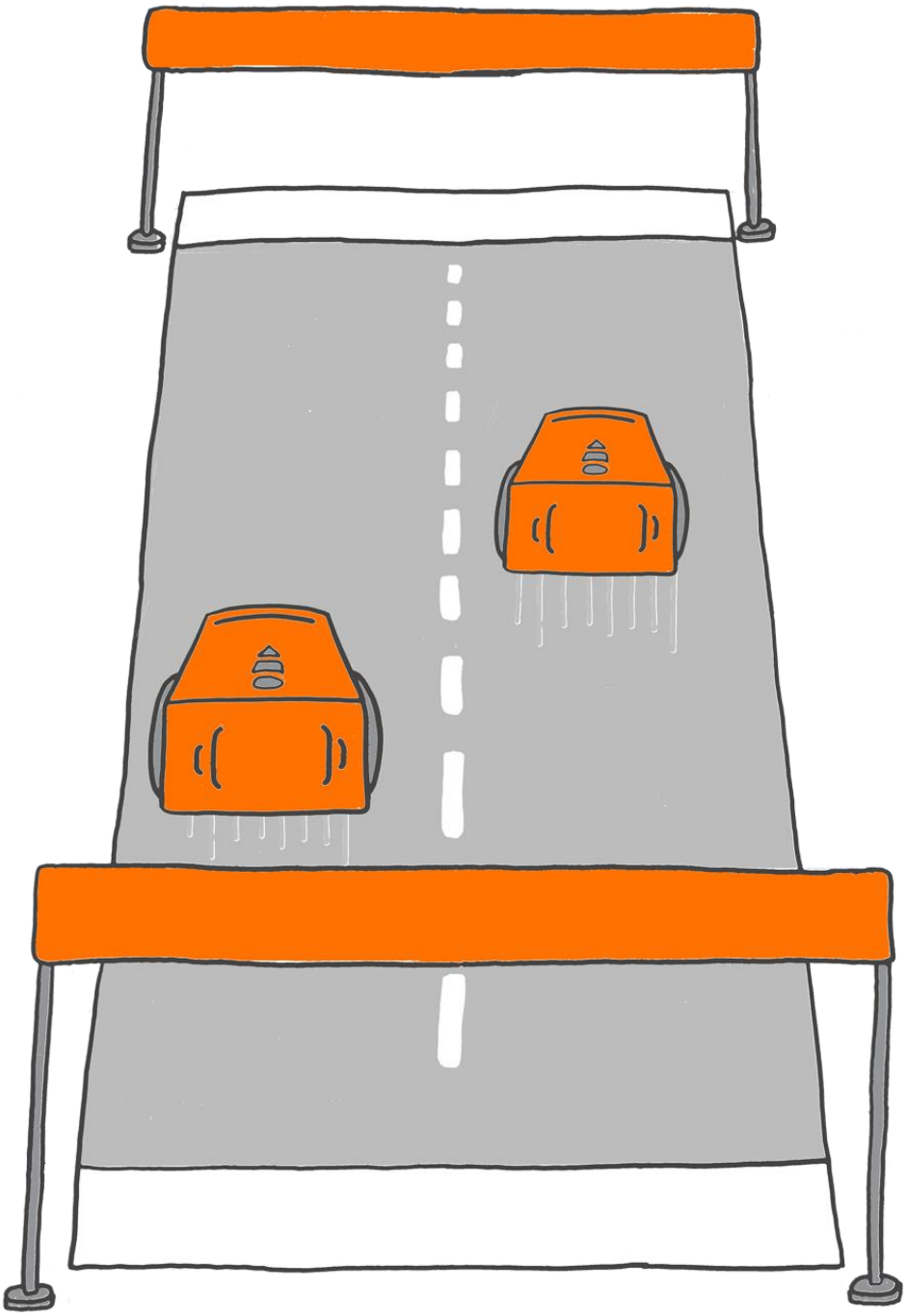
Activity

Let's make two Edison robots have a race.
You can make your own race track. Don't forget to scan the barcode with Edison.

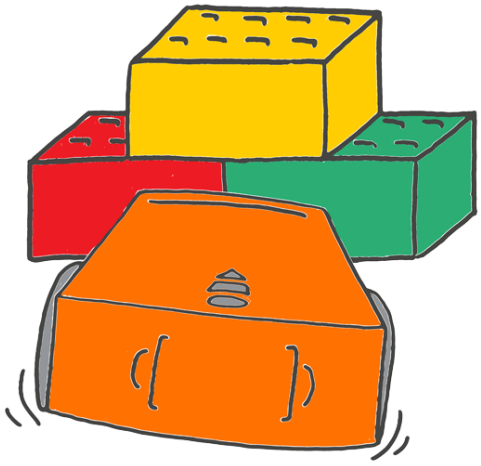
Get ready to race!

Clap your hands or tap Edison two times so that it will drive forward. When Edison stops, clap two more times.

The first Edison to reach the finish wins!



Avoid obstacles

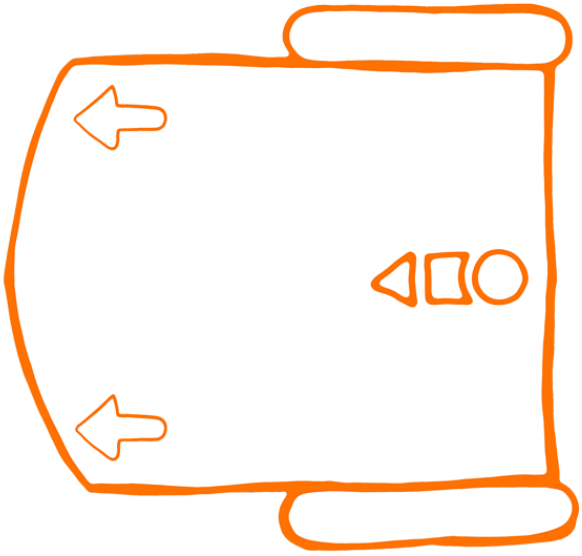


Edison can tell when there are things in front of it.

How?

Edison uses infrared light to detect objects. You can't see this light because infrared light is invisible to people.

Edison uses infrared light to find things in its path. If there is something in front of Edison, Edison can turn away and avoid running into it.



Read the barcode

Put Edison on the outline above.
Press the record button (round button) three times.

Edison will quickly drive forward and scan the barcode.

What to do with Edison

Put Edison on the floor or table.
Put some objects around Edison.

Press the play button (triangle button).

Watch as Edison drives towards an obstacle. Edison will see the object, turn and drive away in a different direction.

Build a stack of blocks or books in front of Edison.

Activity

Let's trap Edison.

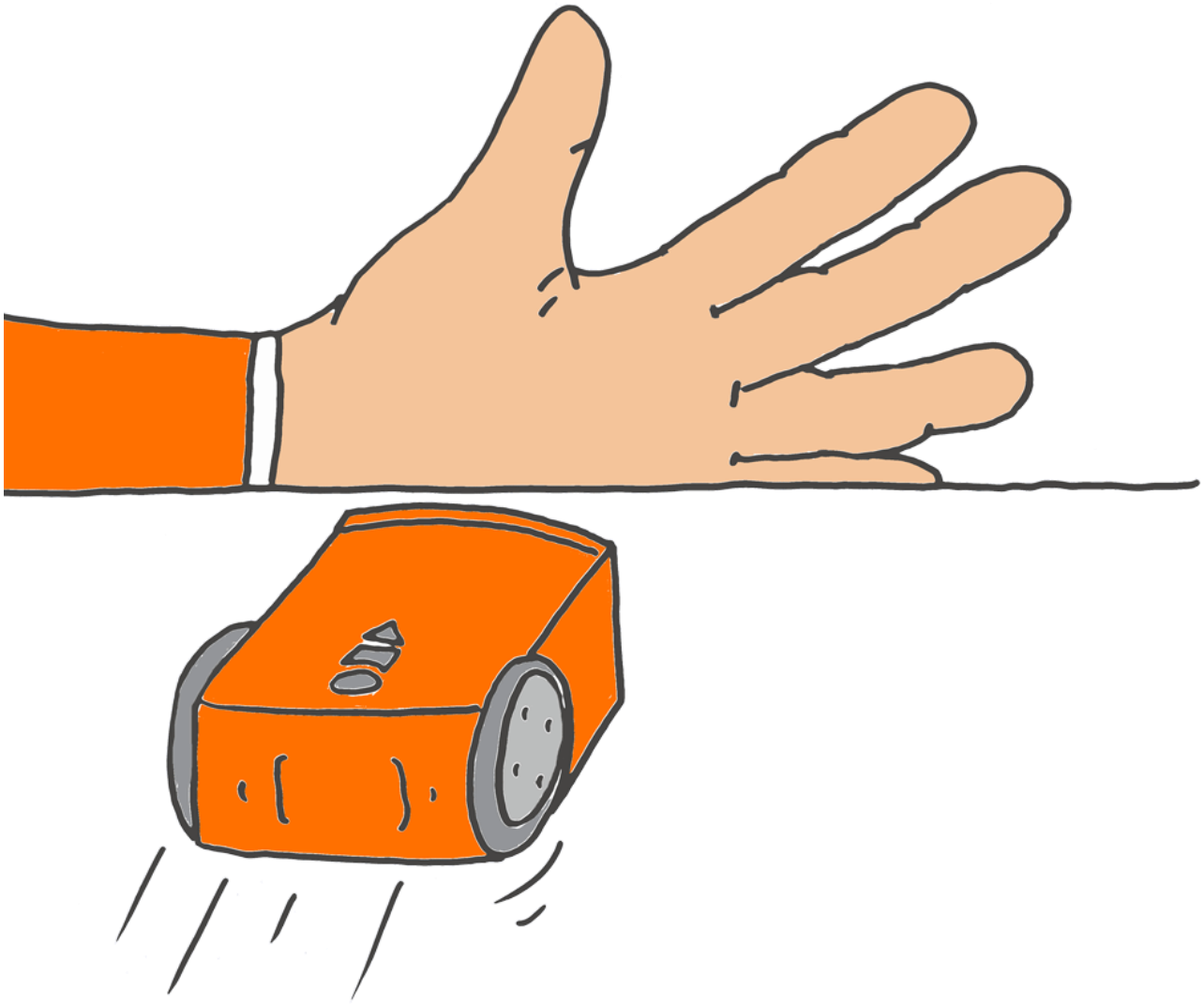
In a group, sit at a table. Scan the barcode with Edison. Now put Edison in the middle of the group.

Everyone put your hands up to block Edison.

Press the play button (triangle button).

Edison will drive around. When Edison finds an obstacle, Edison will turn and try to escape another way.

Don't let Edison escape!



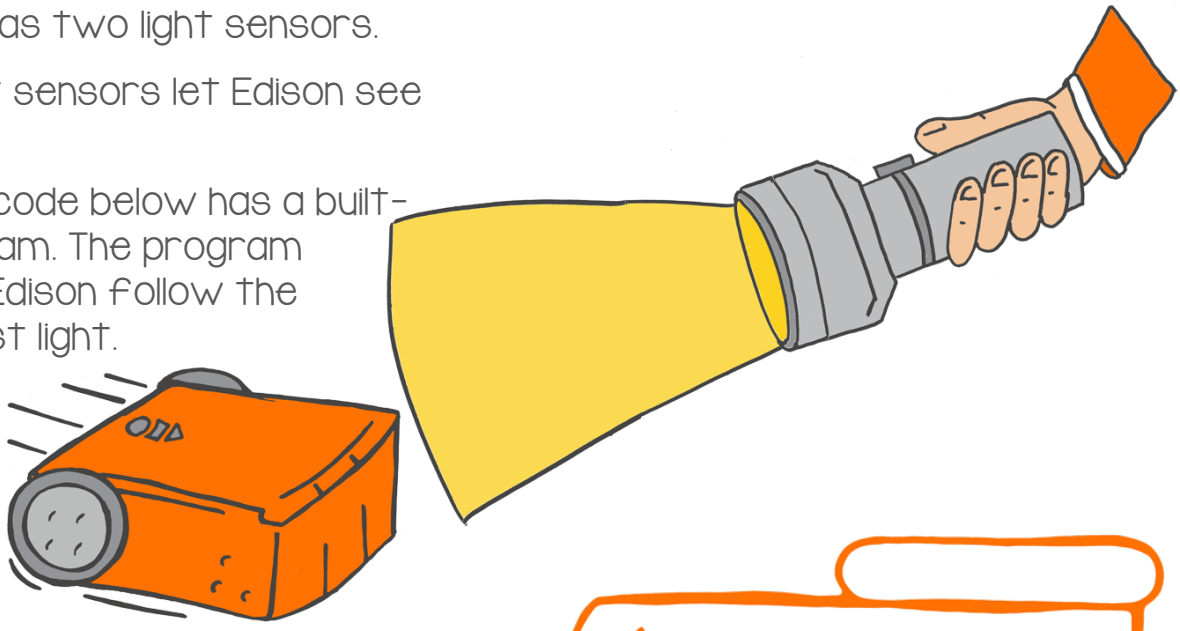
Programmer's Name _____

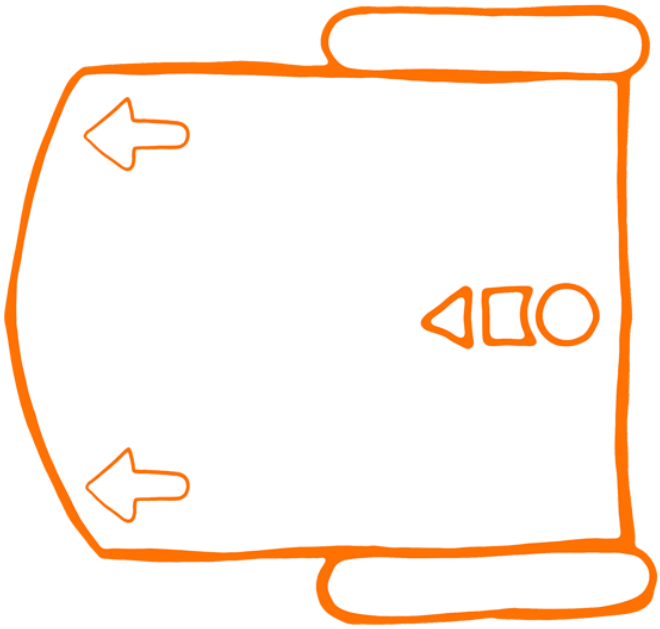
Follow a torch

Edison has two light sensors.

The light sensors let Edison see light.

The barcode below has a built-in program. The program makes Edison follow the brightest light.





Read the barcode

Put Edison on the outline above.
Press the record button (round button) three times.

Edison will quickly drive forward and scan the barcode.

What to do with Edison

Put Edison on the floor or table. Get a torch ready.

Press the play button (triangle button).

Now shine the torch at Edison. Edison will follow the torch around.

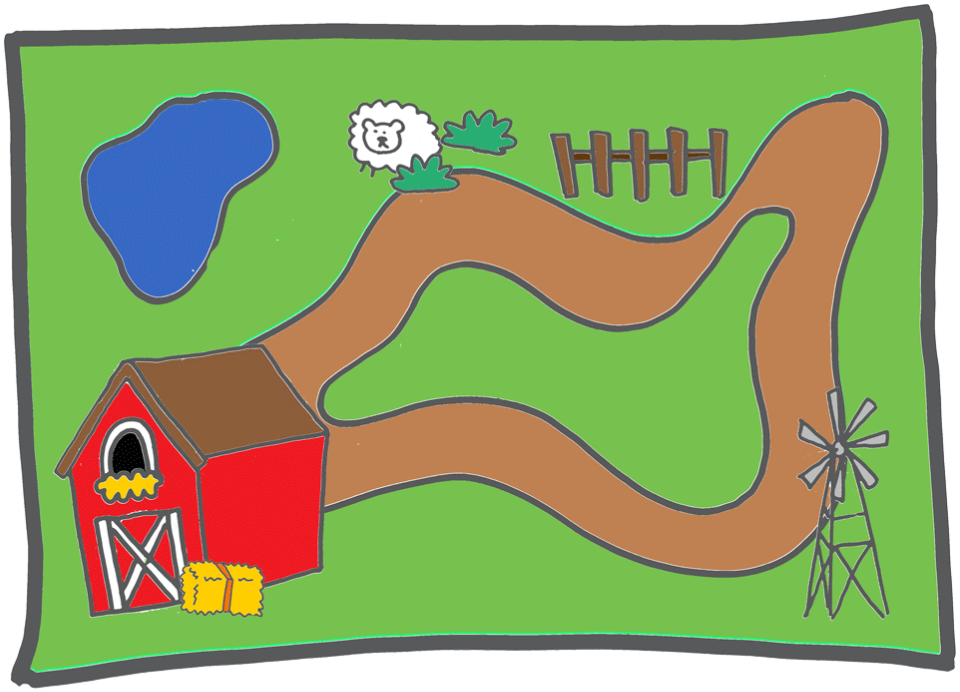
Activity

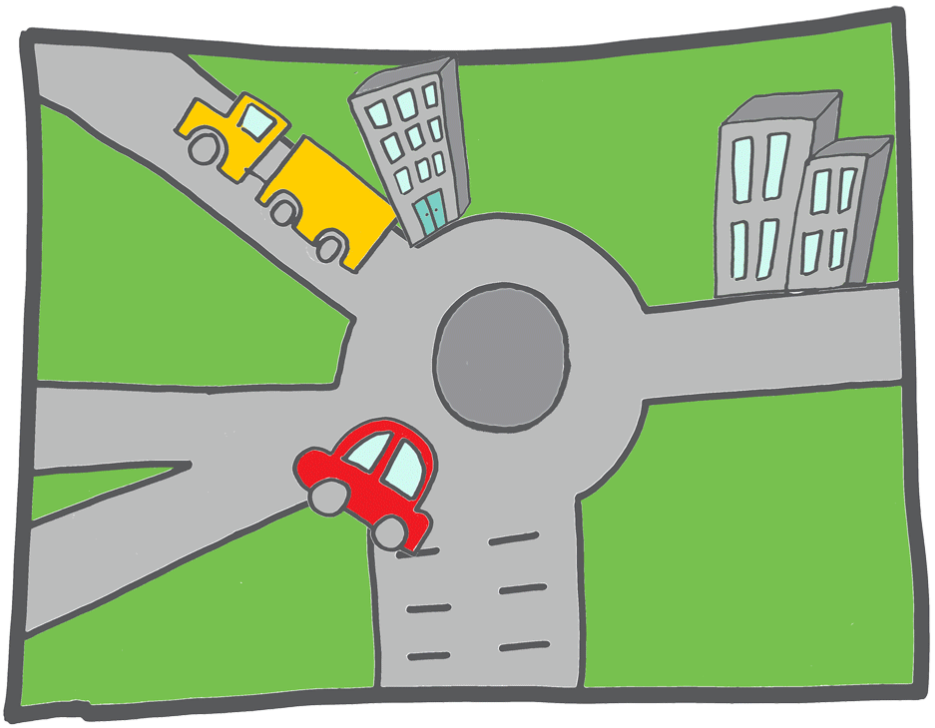
In groups, create a road map that Edison can drive on. You could make a map of your town, a busy city scene, or have Edison help on a farm. Using a large piece of paper, draw or paint any design you like.

Scan the barcode with Edison. Get a torch ready and put Edison on the floor.

Press the play button (triangle button). Then, shine the torch at Edison.

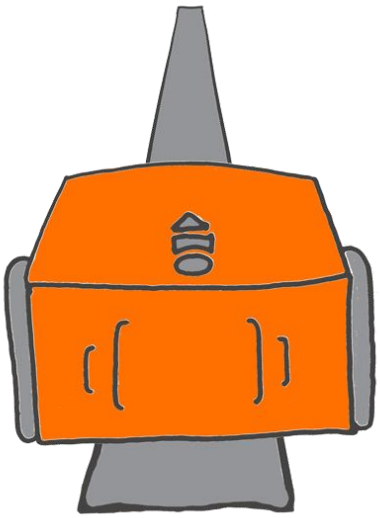
Use the torch to get Edison to drive around the map.





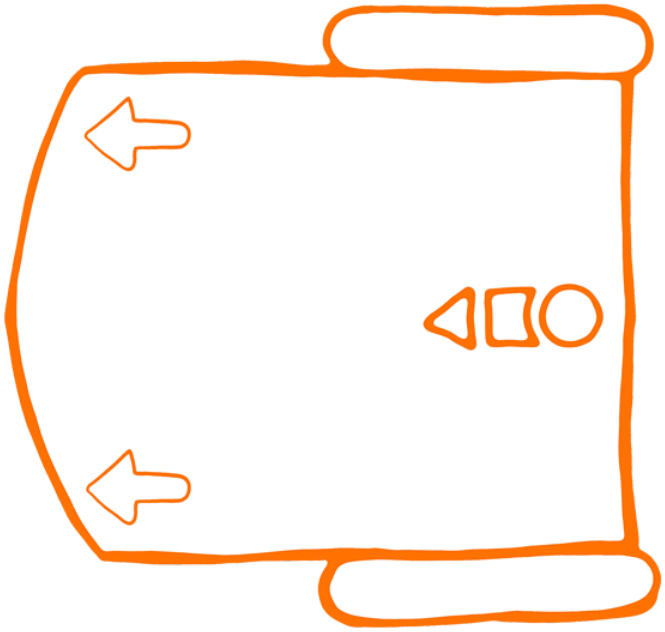
Programmer's Name _____

Line tracking



Edison uses a tracking sensor to see the difference between dark and light surfaces. Edison can use this sensor to follow a black line.

The barcode below has a built-in program. The program tells Edison to find the black line and follow it around.



Read the barcode

Put Edison on the outline above.
Press the record button (round button) three times.

Edison will quickly drive forward and scan the barcode.

What to do with Edison

Use the track on the next page.

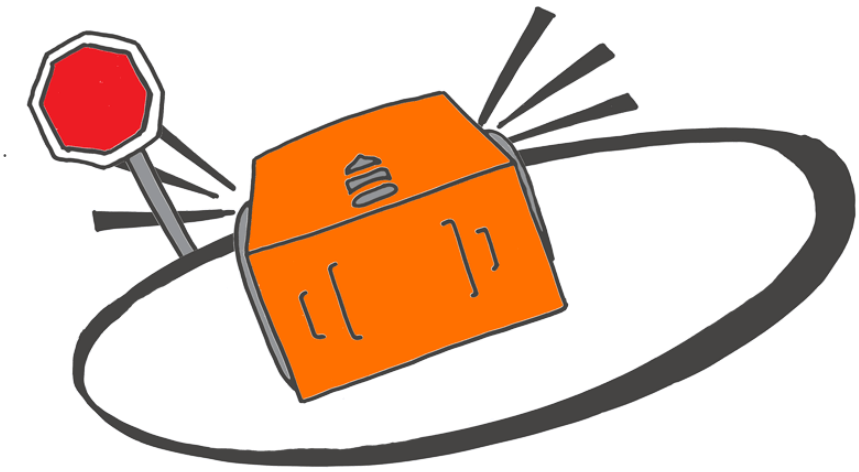
Put Edison inside the track. Don't put Edison on top of the black line to start. Put Edison next to the line instead.

Press the play button (triangle button).

Edison will search for the track. Once Edison finds the track, Edison will continue to drive around and around on the track.

Ready, set,
GO!

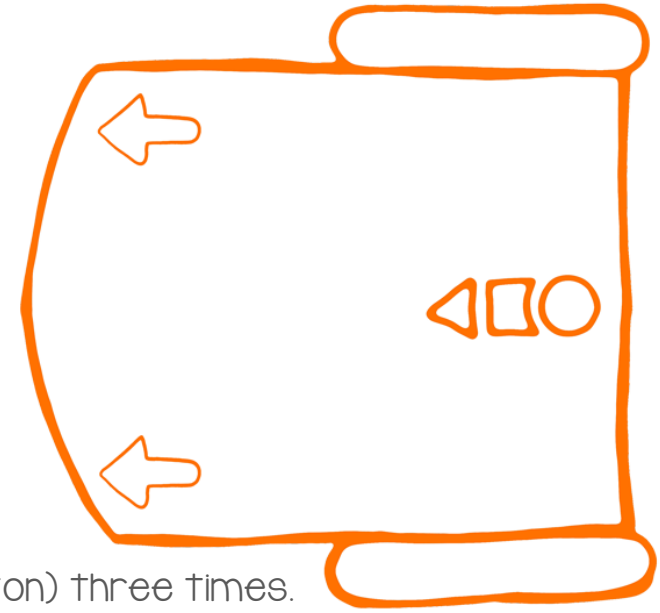
Bounce in borders



Do you remember that Edison has a tracking sensor to see the difference between dark and light surfaces?

Edison can use this sensor to avoid crossing a black line.

The barcode below has a built-in program. The program tells Edison not to cross a black line.



Read the barcode

Put Edison on the outline above.
Press the record button (round button) three times.

Edison will quickly drive forward and scan the barcode.

What to do with Edison

Use the track on the next page.

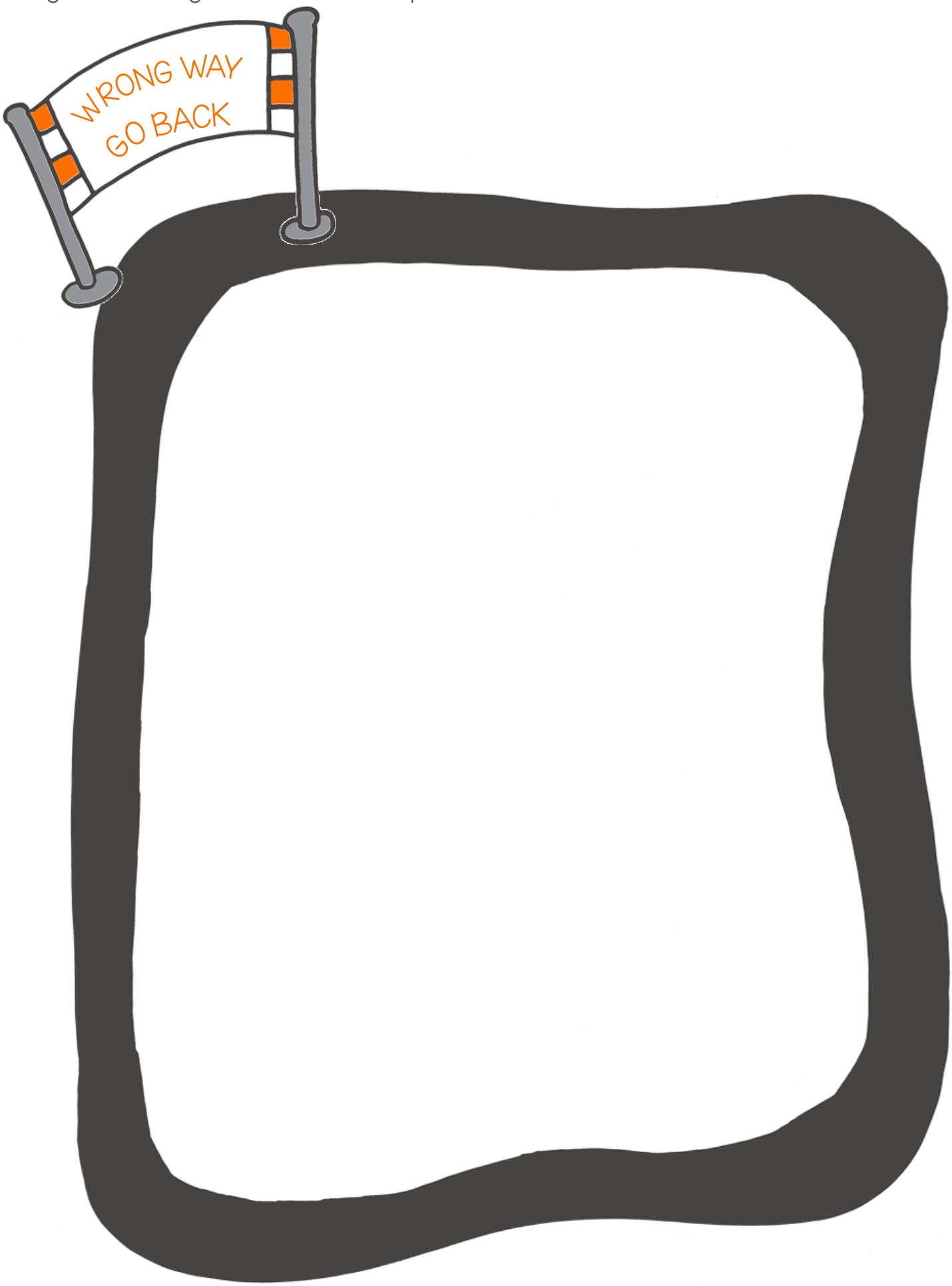
Put Edison inside the track. Press the play button (triangle button).

What happens when Edison senses a black line?

Instead of crossing the line, Edison will turn away and drive somewhere else.

Activity

Try bouncing in borders inside the track. You can also try making a really big track using dark coloured tape on the floor.



Programmer's Name _____

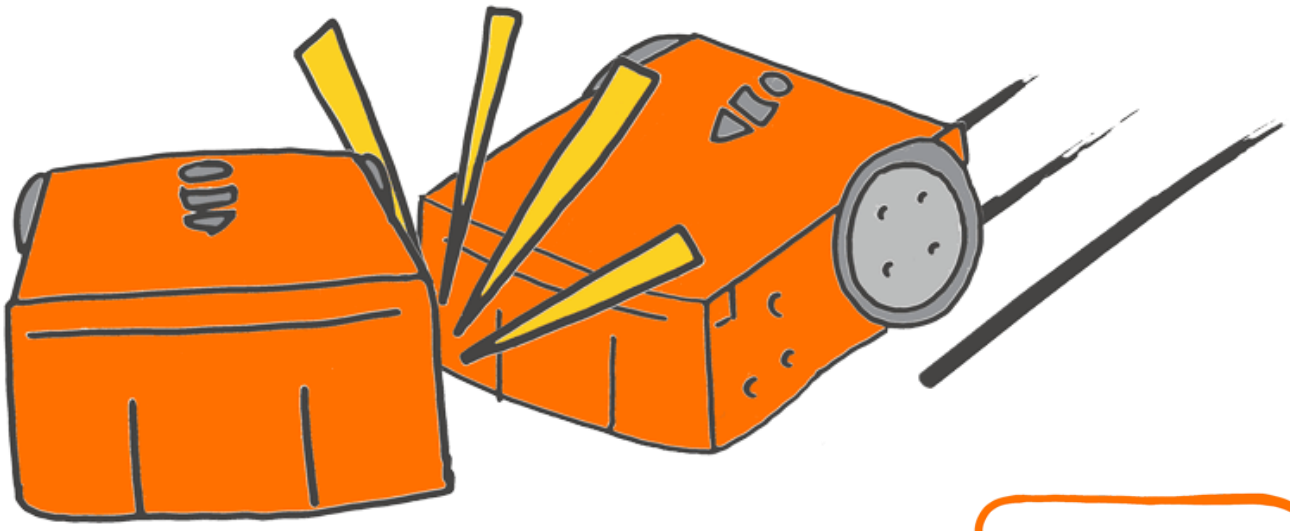
Sumo wrestle

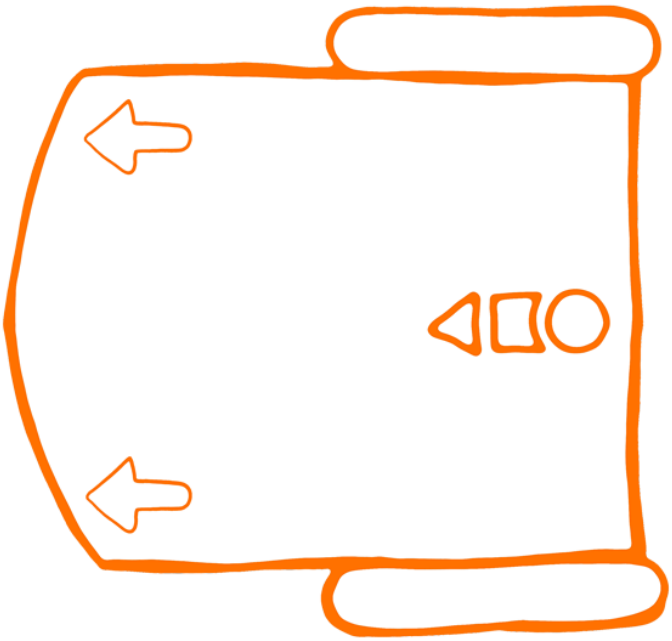
The barcode below has a built-in program. The program combines two of Edison's other programs - bounce in borders and obstacle detection.

What does the combined program do?

It lets two Edison robots sumo wrestle!

The obstacle detection part of the program helps the robots find the other robots. The line detection helps Edison find a line to knock the other robot out of the ring.





Read the barcode

Put Edison on the outline above.
Press the record button (round button) three times.

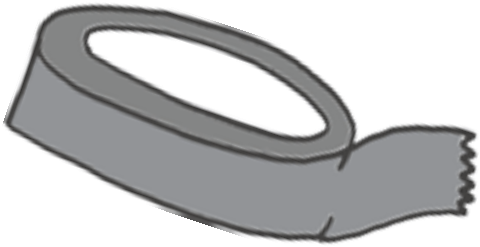
Edison will quickly drive forward and scan the barcode.

What to do with Edison

You will need to work together for this activity.

Scan the barcode with two Edison robots.

Next, make a ring for your Edison sumo match.



Use a dark coloured tape to make the sumo ring.

Be sure to make the ring big enough for both robots to drive around inside.

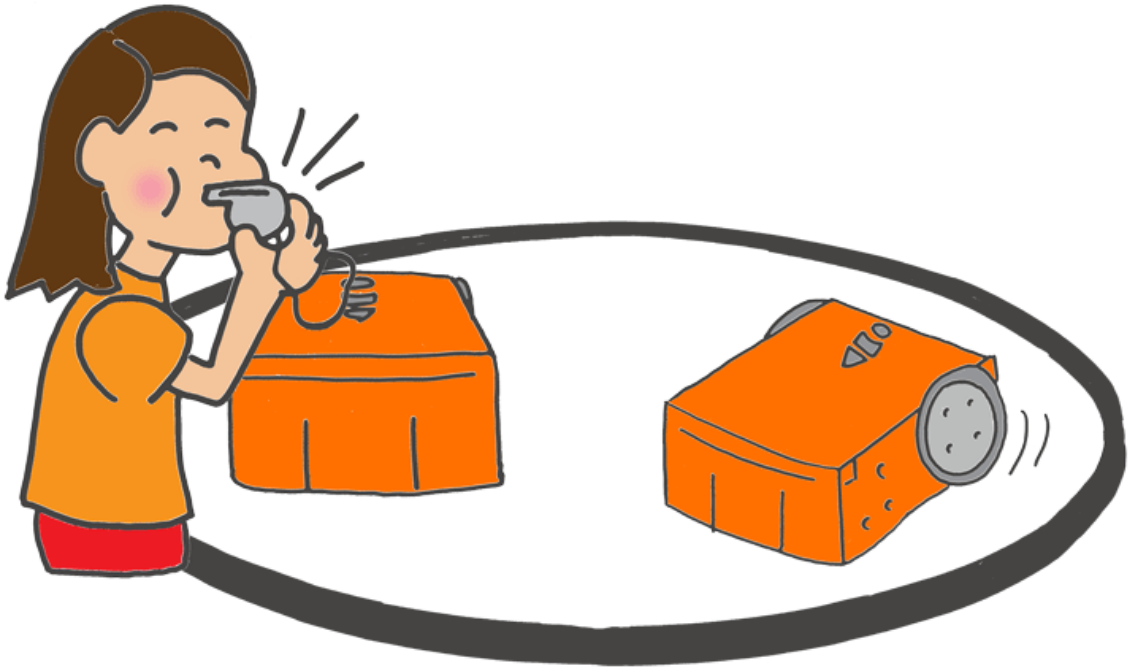
Activity

Put both Edison robots in the ring.

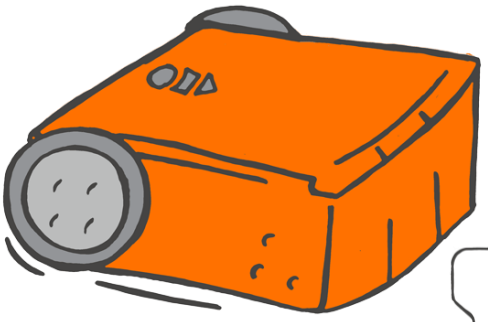
Press the play button (triangle button) on both robots at the same time.

Each Edison robot will start to drive around the inside of the circle slowly, looking for the other robot. When one Edison sees the other, it will speed up to hit it and try to push it out of the ring.

The Edison that stays in the ring wins!

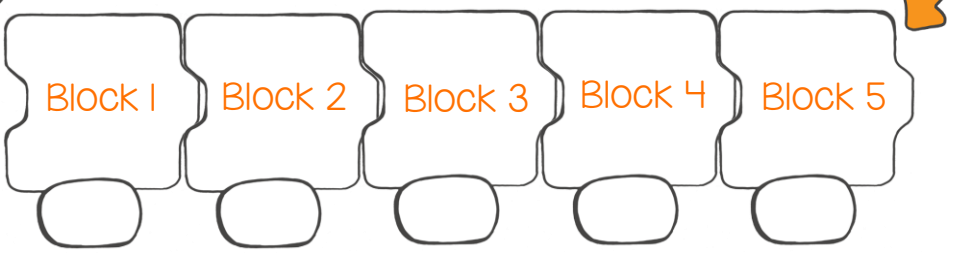


Welcome to EdBlocks



You already know Edison.

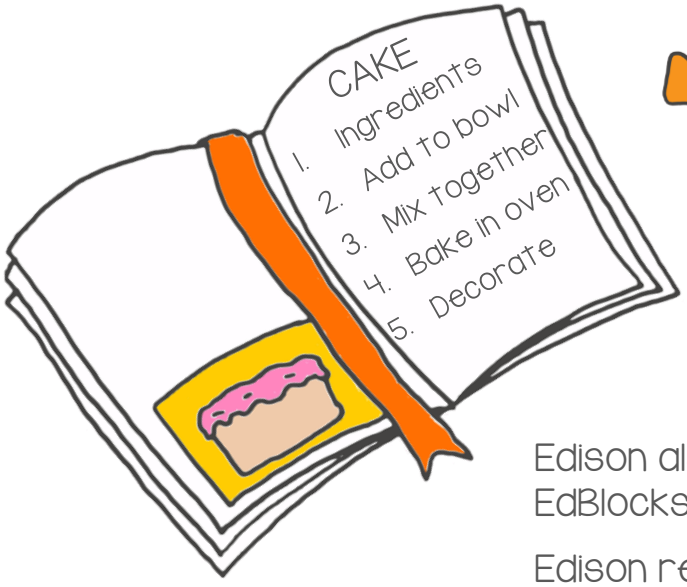
Now it is time to use EdBlocks.



What is EdBlocks?

EdBlocks is a robot programming language we can use to program Edison.

You can program Edison to do different things using EdBlocks.



How do EdBlocks work?

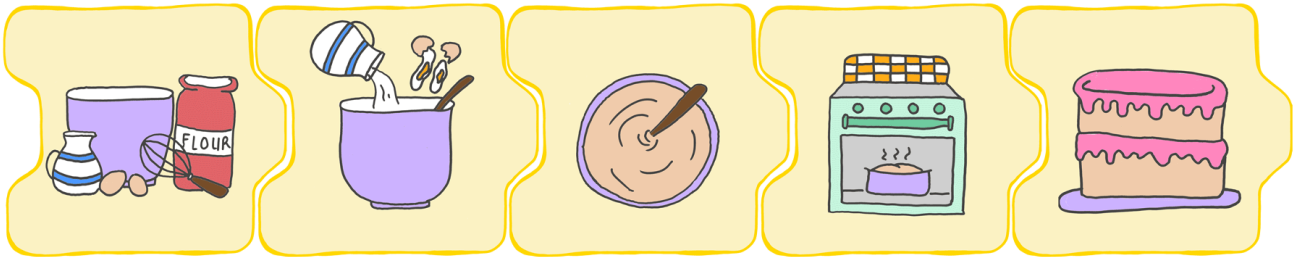
Imagine you are baking a cake. How would you know what to do?

When you read a cookbook, you follow each step one by one.

Edison also follows steps one by one, using EdBlocks.

Edison reads EdBlocks from left to right, starting at block one. Edison then moves along the EdBlocks one block at a time.

So, Edison can follow the same instructions, just in a different way.



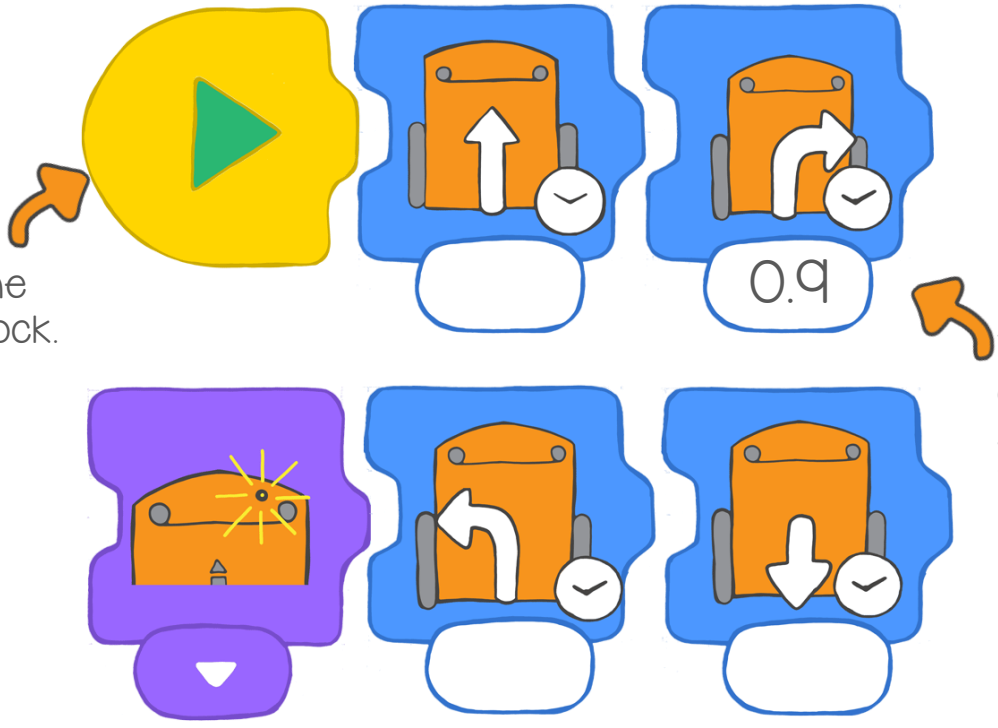
Find the answer

Let's practice using EdBlocks.

We need to get Edison to do several things, one by one. Get Edison to do the following things in this order:

1. Drive forward for 2 seconds
2. Turn left for 0.4 seconds
3. Turn on the right LED light
4. Drive backwards for 3 seconds
5. Turn right for 0.9 seconds

Look at the blocks below. These are the blocks we need to write the program, but they are in the wrong order.



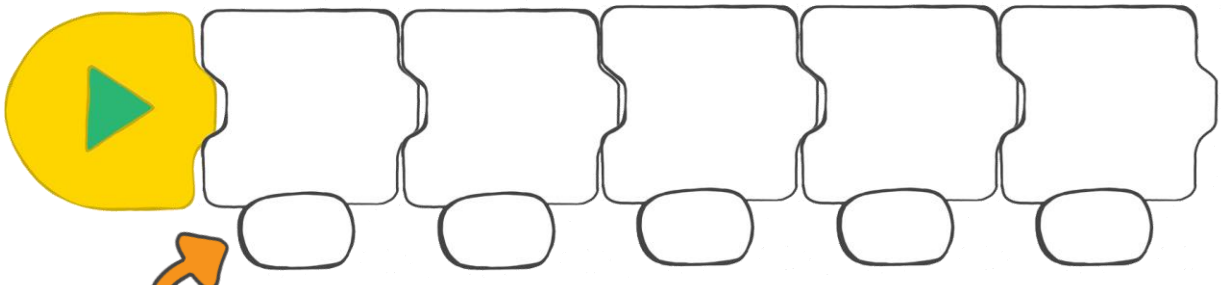
This is the start block.

This is the amount of seconds Edison is turning for.

Your turn

Organise the blocks into the correct order.

Draw the blocks in the right order here.



Write in the correct number of seconds Edison is driving or turning in this spot.

Programmer's Name _____

Let's download a program

Now that you know about Edison and EdBlocks, we can use EdBlocks to tell Edison what to do. To do this, we need to download a program onto Edison.

On your computer, go online to

www.edblocksapp.com

This time, we are going to load a program that has already been made. Once you know how to download a program, you can start to make your own programs.

Step 1: Check the computer

Make sure the volume is turned up all the way on the computer.

Step 2: Open the EdBlocks app

Go to www.edblocksapp.com

Step 3: Select 'Menu'

After opening the app, look in the top left corner. Click on the Menu button.

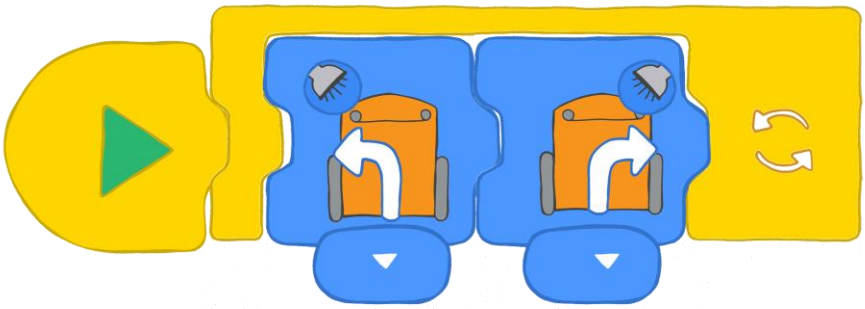
Step 4: Select 'Load Demos'

Scroll down and find 'Load Demos' in the list. Click on Load Demos.

Step 5: Select 'Follow torch/flashlight'

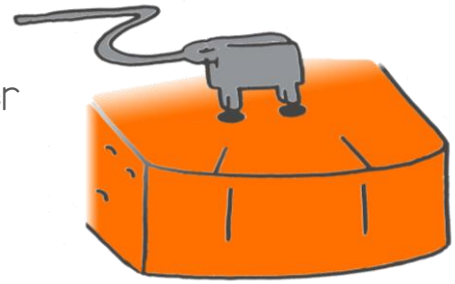
Find and click on the program called **'Follow torch/flashlight'**.

A program will open in the main screen. It looks like this:



Step 6: Plug Edison in

Connect Edison to the computer with the EdComm cable.



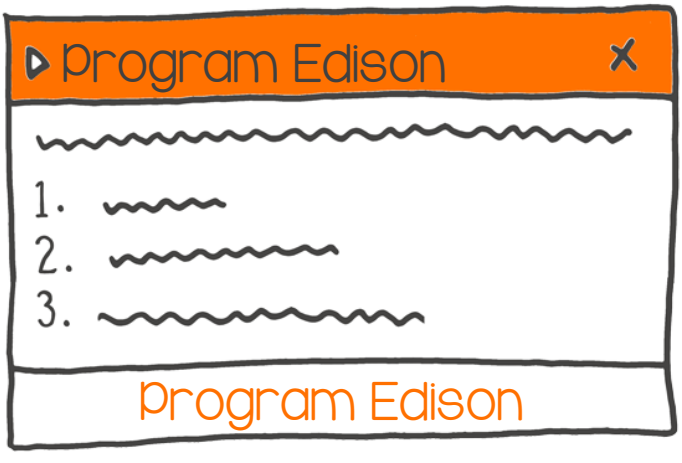
Step 7: Get Edison ready

Push the record button (round button) on Edison one time.

Step 8: Program Edison

Look in the top right corner of the app. See where it says 'Program Edison'? Click on Program Edison.

A new pop-up message box will open.

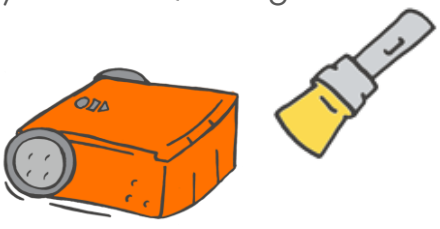


In the bottom of the box, click on Program Edison.

You will hear the program being downloaded to Edison. Once it is done downloading, Edison will beep. Don't unplug Edison until you hear the beep!

To run the program, unplug Edison, then push the play button (triangle button).

Activity



Let's take Edison for a walk in the dark.

Get a torch ready and put Edison on the floor.

Press the play button (triangle button). Turn the lights off in the room. Now, shine the torch at Edison.

Edison will drive around following the light of the torch. Take Edison for a walk in the room.

Can you make Edison do tricks?

Try to make Edison turn around or do a spin!

Let's drive

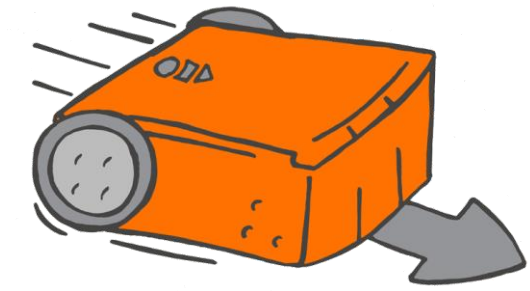
To use EdBlocks to program Edison, you need to use the EdBlocks app. Go to the app online at www.edblocksapp.com

What to do with EdBlocks

We can program Edison to drive forward for a set amount of time using EdBlocks.

Using the EdBlocks app, find the block to make Edison drive forward for a set amount of time.

You can change the amount of time by clicking on the number box and typing in the time you want.



What to do with Edison

Let's get Edison to drive forward on the track on the next page.

How long will it take Edison to drive the track?

Write a program for Edison using EdBlocks. Download the program to Edison, then put Edison behind the start line.

Can you make Edison drive from the start line and stop driving after crossing the finish line?

Try changing the amount of time in EdBlocks to get Edison to drive the track.

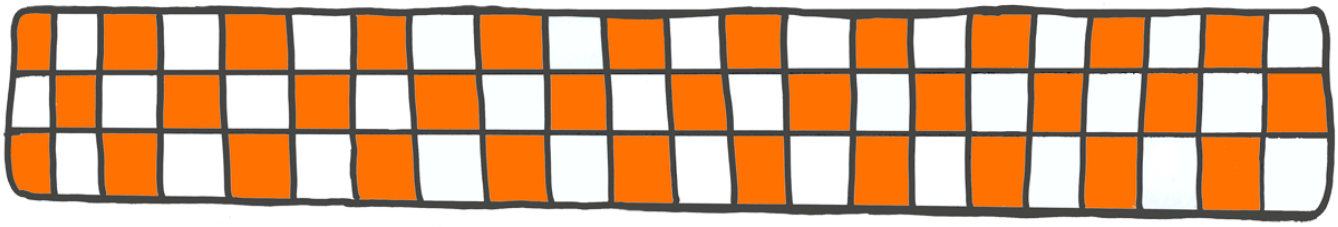
Find the answer

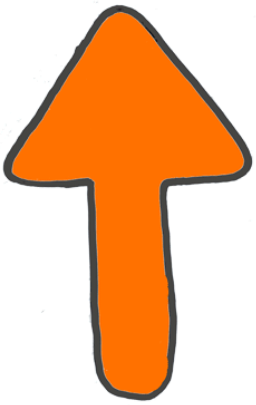
How many seconds did it take Edison to travel from the start to the finish?

Write your answer in the time box of the block below.

Write your result here.

FINISH LINE





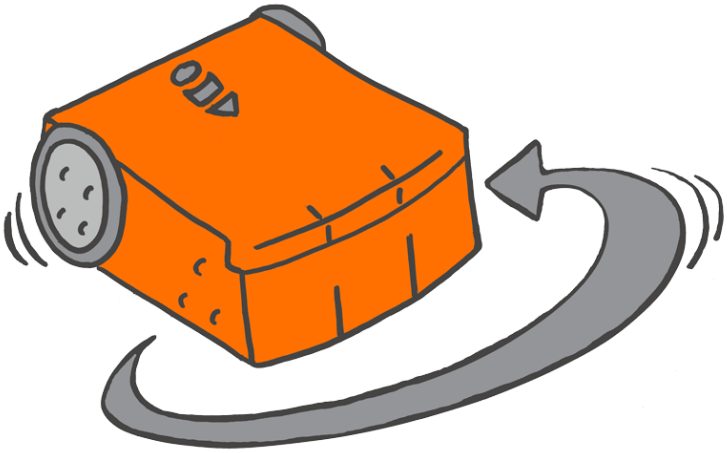
START LINE

Programmer's Name _____

Let's turn

To use EdBlocks to program Edison, you need to use the EdBlocks app. Go to the app online at www.edblocksapp.com

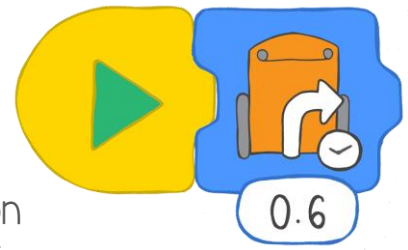
Using the blocks in EdBlocks, we can program Edison to turn left or right.



What to do with EdBlocks

We can program Edison to turn left or right for a set amount of time using EdBlocks.

Using the EdBlocks app, find the block to make Edison turn right for a set amount of time.



You can change the amount of time by clicking on the number box and typing in the time you want.

Can you also find the block to program Edison to turn left for a set amount of time?

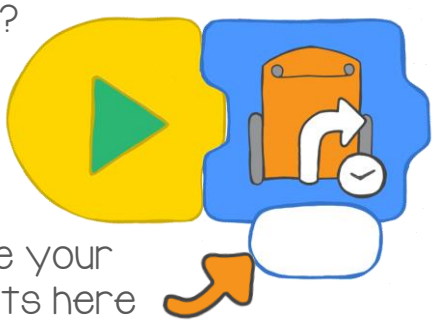
What to do with Edison

Let's get Edison to make some turns using the roads on the next page. How long will it take Edison to make the different turns?

Program Edison using EdBlocks. Then, put Edison on the road to test your program. Try changing the amount of time in EdBlocks to get Edison to follow the arrows and stop at the finish line.

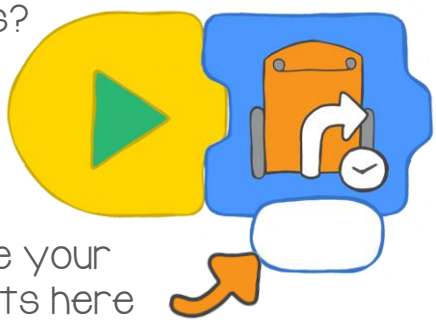
Find the Answer

1. How many seconds does it take to get Edison to turn right 90 degrees?

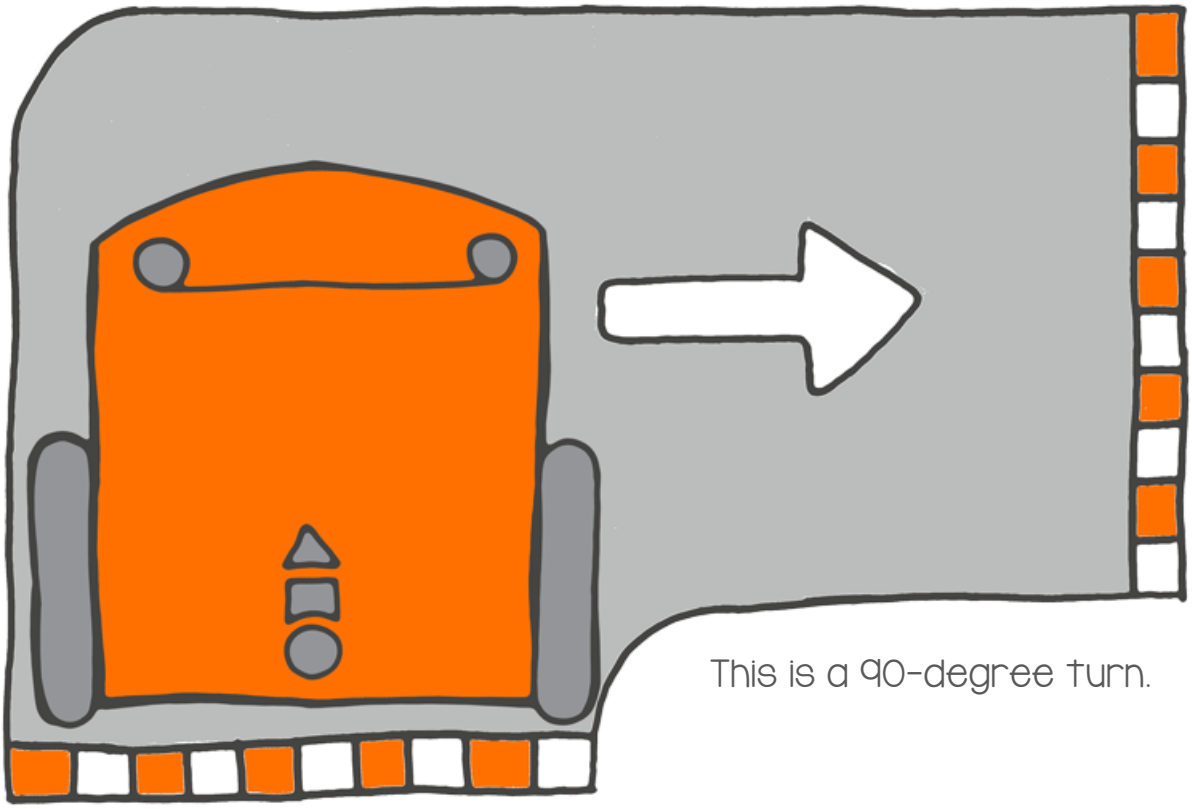


Write your results here

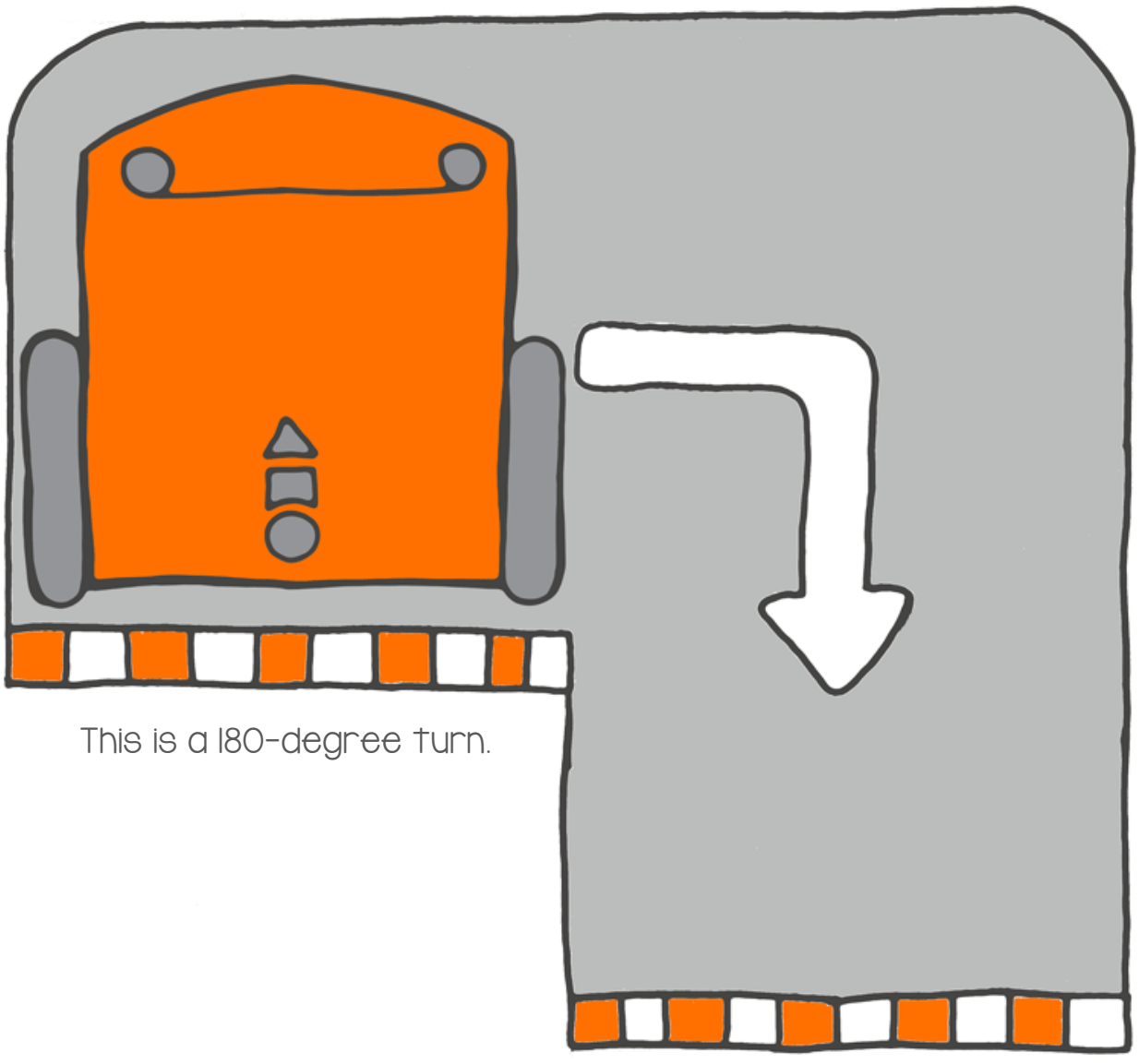
2. How many seconds does it take to get Edison to turn around 180 degrees?



Write your results here



This is a 90-degree turn.



This is a 180-degree turn.

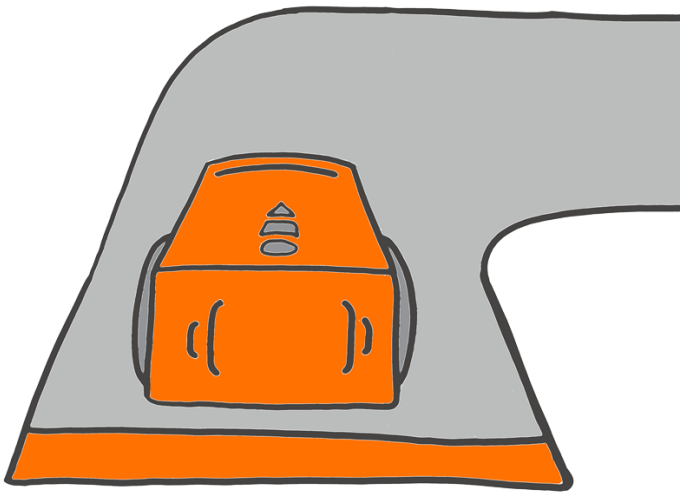
Programmer's Name _____

Let's try a maze

To use EdBlocks to program Edison, you need to use the EdBlocks app. Go to the app online at www.edblocksapp.com

What to do with EdBlocks

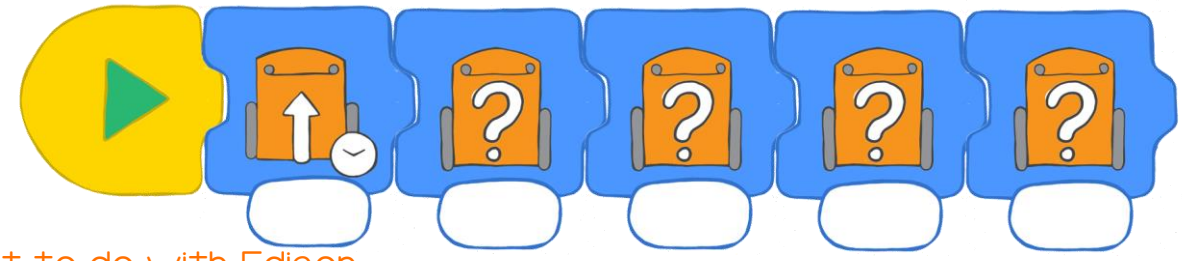
Using the EdBlocks app, design a program that will get Edison through the maze on the next page.



You can beat the maze using five blocks. Drive straight is the first block you will need.

What are the next four blocks?

How long should Edison do each action?

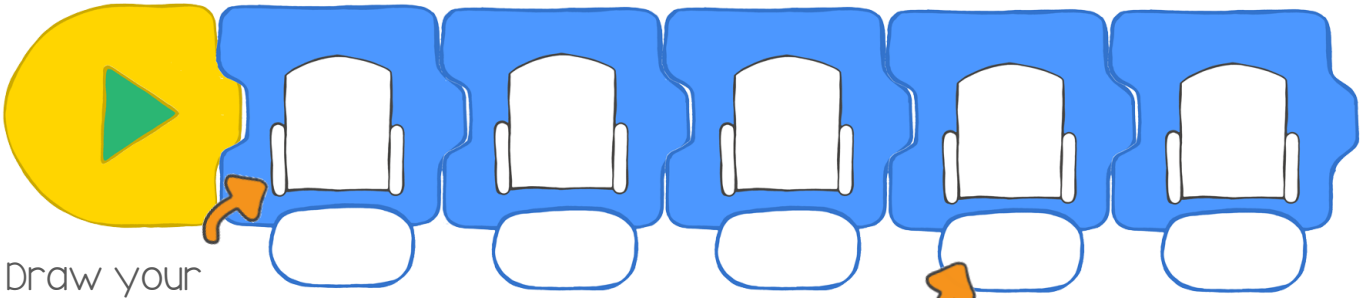


What to do with Edison

Download your program to Edison, then place Edison at the start of the maze. Test to see if your program works. Edison needs to reach the finish line to complete the maze.

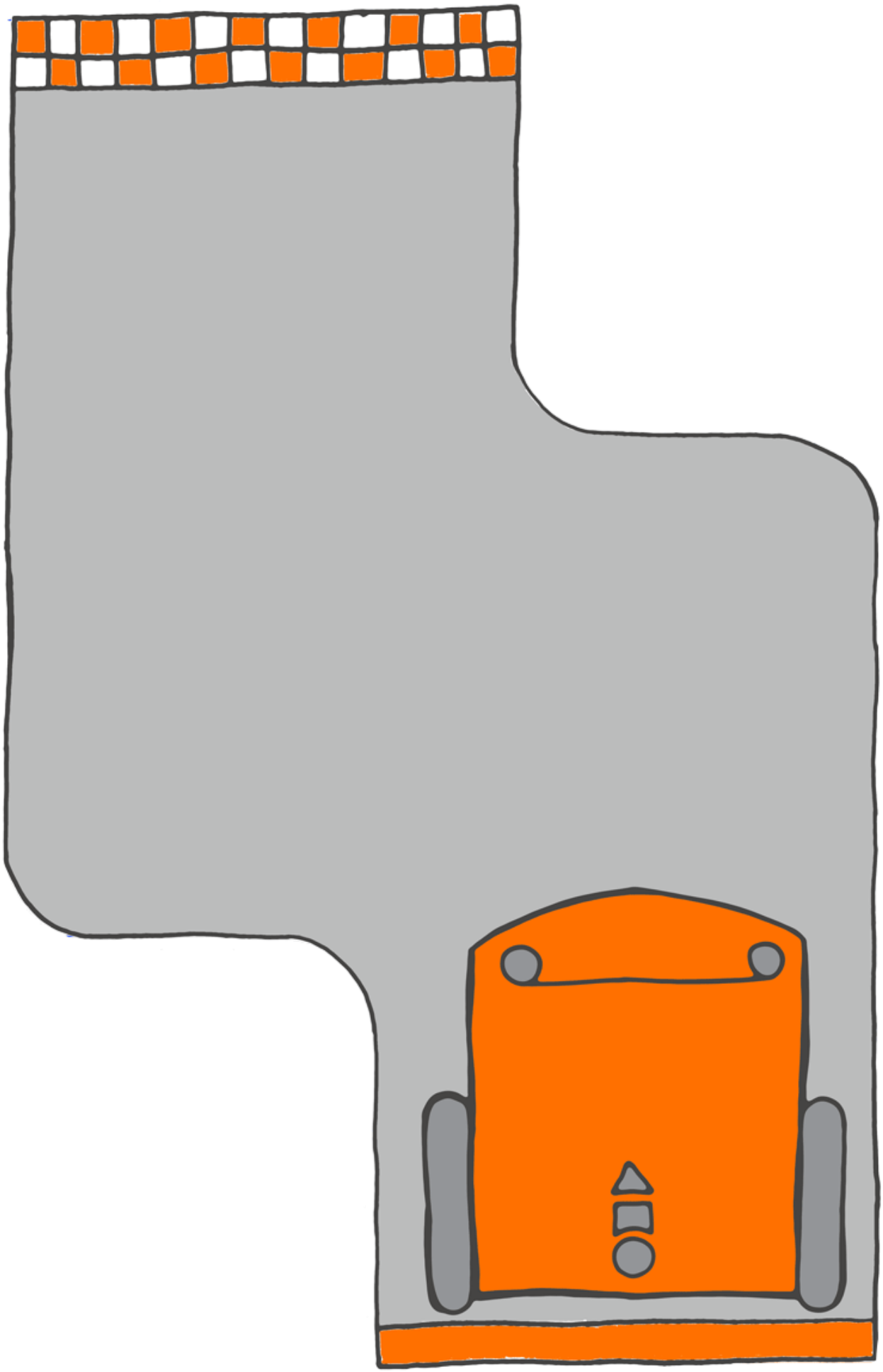
Find the Answer

Once, you complete the maze, write down your program here.



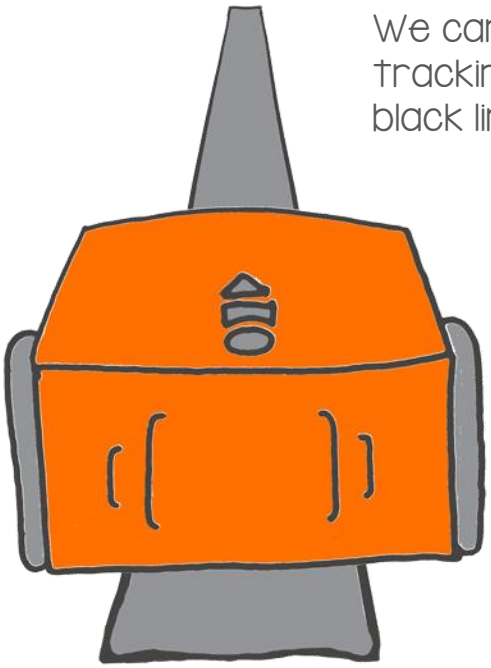
Draw your arrow direction here.

Write your times here.



Let's follow a line

Remember Edison's tracking sensor? It is the sensor that lets Edison see the difference between dark and light surfaces.



We can make a program that uses the tracking sensor to tell Edison to drive along a black line.

What to do with EdBlocks

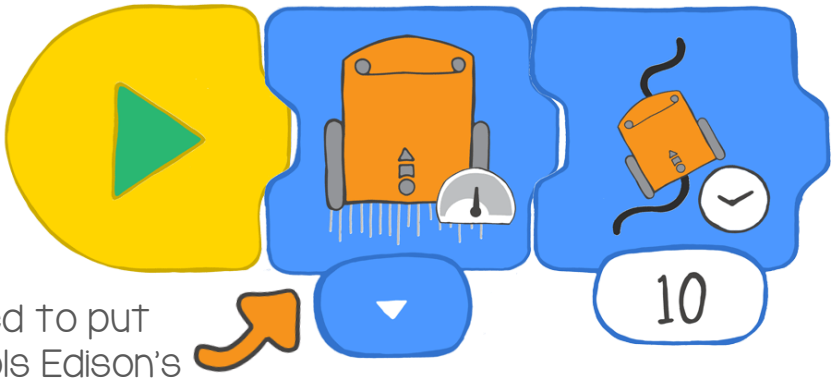
Go to the EdBlocks app online at www.edblocksapp.com

Using the EdBlocks app, arrange the blocks into the program below.

This program tells Edison to travel along a black line.

You can change the time Edison will follow the line.

You can also change the speed that Edison is driving.



This is where you need to put the block that controls Edison's speed.

You can choose slow, normal or fast.

Now, make a program with a speed control block and the follow the line block. Set the time for however long you like.

What to do with Edison

Create your own track for Edison to travel along. Use a large piece of paper and black paint, marker or tape to make a line for Edison to follow. The track line needs to be a dark colour and at least 1 cm wide.

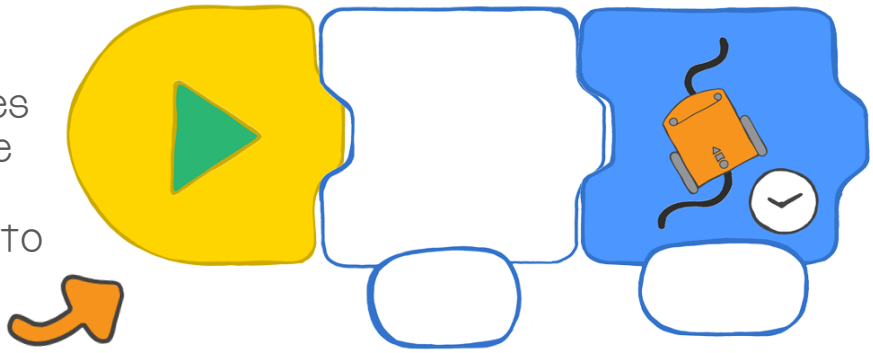
Download your program to Edison.

Put Edison on your track. Run the program by pressing the play (triangle) button.

Now try using a different speed block in your program. What changed?

Find the answer

1. Which block makes Edison drive at the fastest speed? Draw that block into the program.



2. How long did you have Edison follow a line? Write your time into the program.

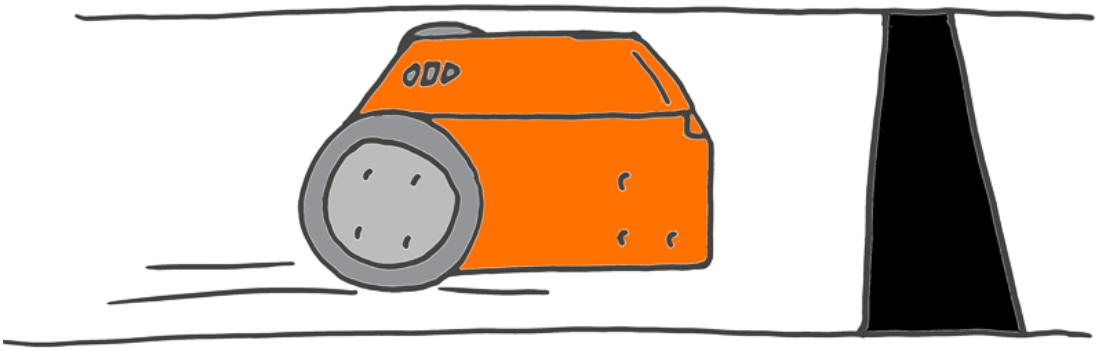
3. What did your track look like? Draw a small version in the box.

4. Think about how Edison drove on your track. Did your track give Edison enough space to run your program? How could you make your track or your program better?

Let's stop at a black line

Edison's tracking sensor is the sensor that lets Edison see the difference between dark and light surfaces. We can use this sensor in many ways using EdBlocks.

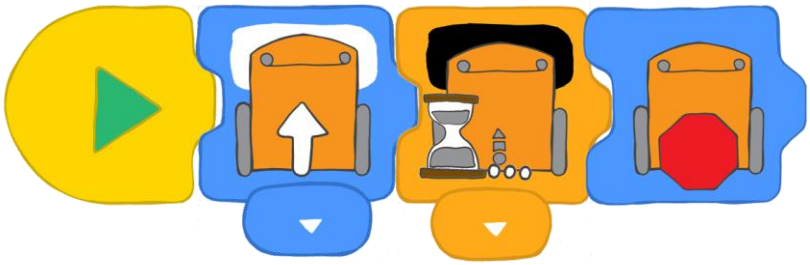
This time, let's make a program that uses the tracking sensor to tell Edison to stop driving on a black surface.



What to do with EdBlocks

Go to the EdBlocks app online at www.edblocksapp.com

Using the EdBlocks app, arrange the blocks into the program below.



What does the program do?

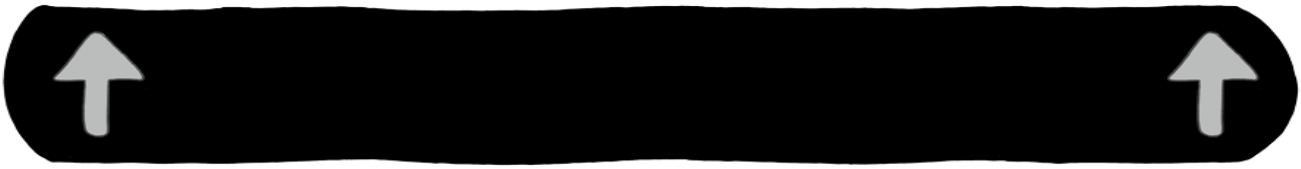
The first block tells Edison to drive forward on a white surface. The second block tells Edison to wait until a black surface is detected. When a black surface is detected, the program moves to the third block, which tells Edison to stop.

What to do with Edison

Download the program to Edison. Put Edison on the white part of the track on the next page, pointing towards the black line. Run the program by pressing the play (triangle) button.

Did Edison stop?

Now try again, but point Edison at one of the coloured lines. What happens?



Find the answer

1. Did Edison stop at the red line?

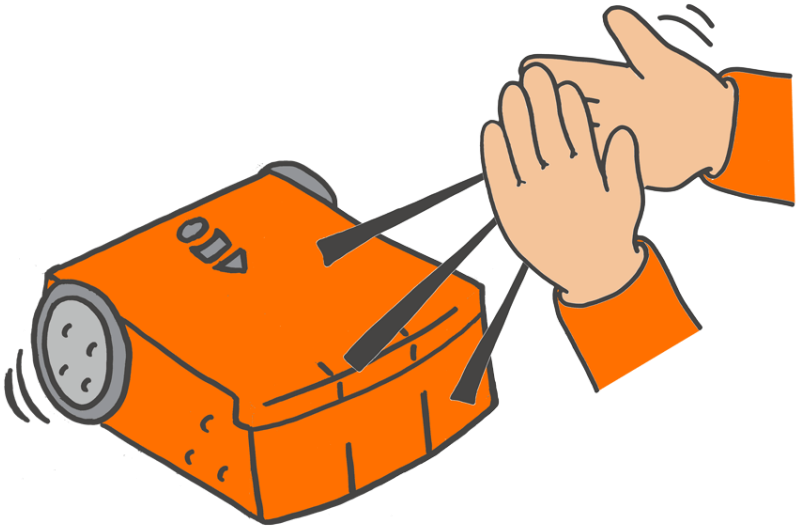
2. Did Edison stop at the blue line?

3. Did Edison stop at the green line?

4. Which colour do you think is best to get Edison to stop? Why do you think that it is the best?

Let's make noise

Do you remember that Edison has a sound sensor? It is the sensor that lets Edison detect loud sounds, like when you clap your hands.



We can make a program that uses the sound sensor. Let's make a program that tells Edison to wait for a clapping sound before taking the next action in the program.

What to do with EdBlocks

Go to the EdBlocks app online at www.edblocksapp.com

Using the EdBlocks app, arrange the blocks into the program below.

Download the program to Edison. Press the play (triangle) button.

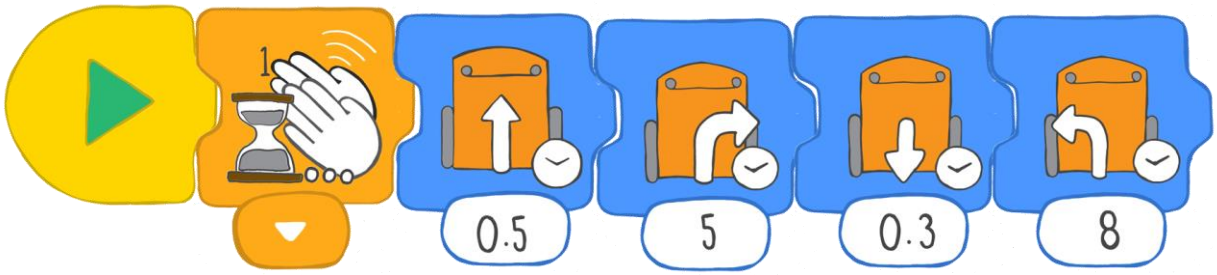
This program tells Edison to wait until one clap is detected, then drive forward for 0.5 seconds. Then the program tells Edison to wait until two claps are detected, then turn left for 0.3 seconds.

What to do with Edison

Now you know how to drive forwards, backward, turn left and turn right using EdBlocks. You can make Edison dance!

Find the answer

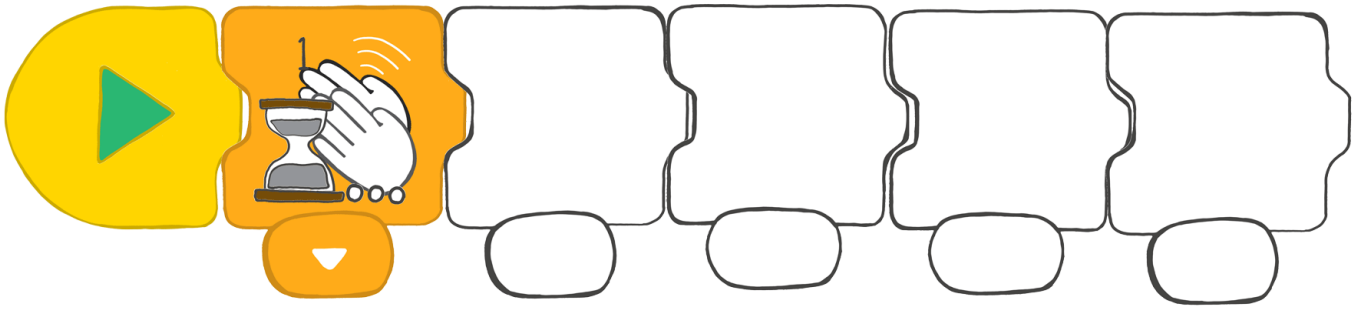
The program below is one example of how Edison can dance.



Make your own program so that when you clap, Edison will dance.

Have Edison change directions and do different things for different amounts of time. Try adding some places for Edison to wait until you clap again. Make the program as long as you want!

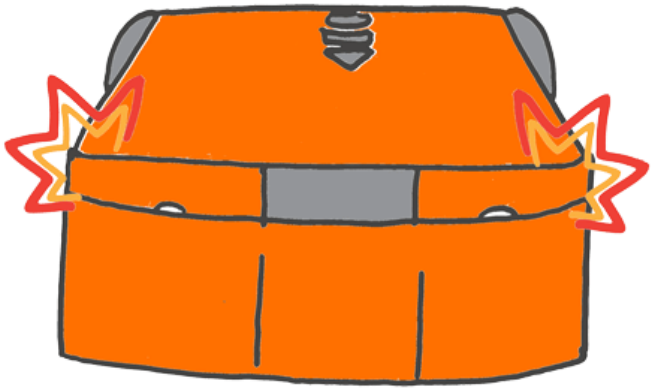
Draw your program below.



Programmer's Name _____

Let's use the lights

How can we program Edison to turn on and off the LED lights forever? By using a loop!



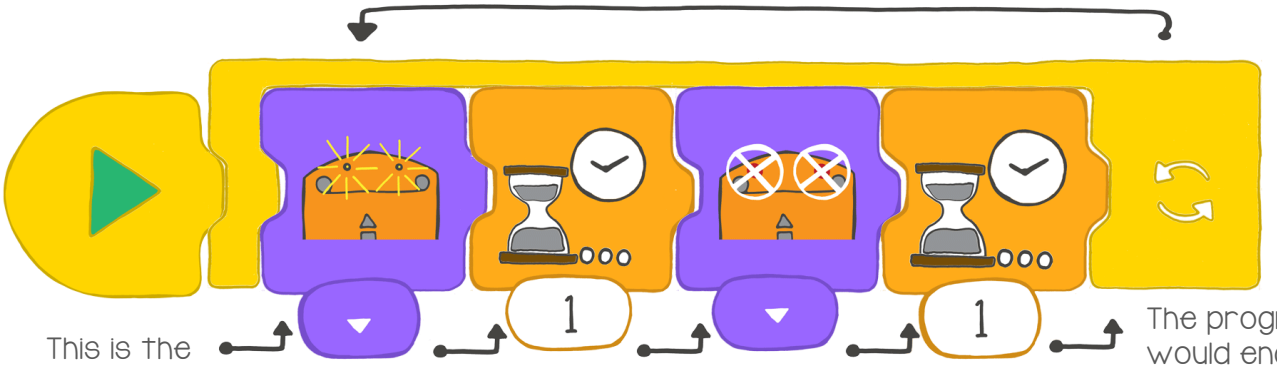
What is a loop?

A loop is a special block in EdBlocks. We can put a loop around other blocks.

The loop will make any blocks inside the loop repeat.

Look at the program below.

This program tells Edison to turn the LED lights on, wait for one second, then turn off the LED lights and wait for one second. The loop then tells Edison to go back to beginning of the program and start again.



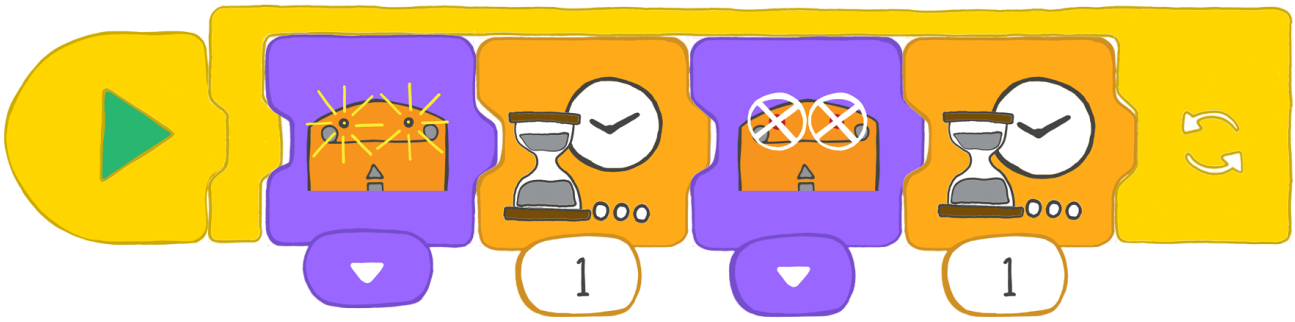
This is the start of the program.

The program would end here, but the loop tells the program to go back to the start.

What to do with EdBlocks

Using the EdBlocks app, arrange the blocks into the program below.

Make sure to wrap the main program inside the loop block.



What to do with Edison

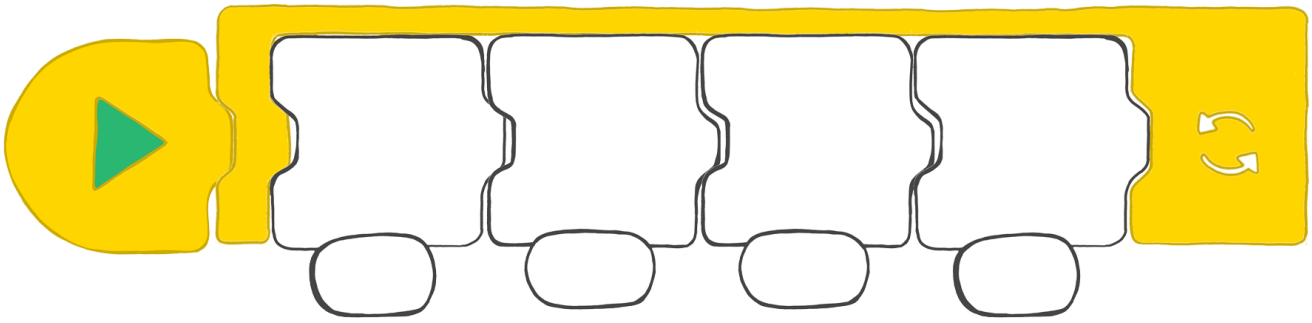
Download the program from the last page to Edison. Run the program to see what happens.

Find the answer

1. Why do we use the loop block?

2. Look at the lights program again. Imagine the program doesn't have a loop block. What would the program do if there was no loop?

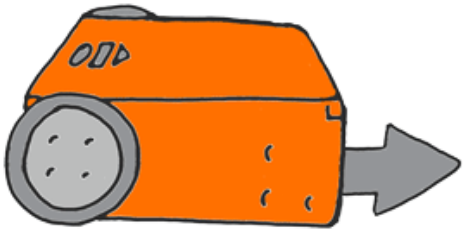
3. In the EdBlocks app, make your own program using the loop block. Write down your program here. (Hint: try using drive blocks.)



4. What does your loop program do? Describe what your program does here.

Let's detect obstacles

We can write a program that will stop Edison from running into objects. This program needs Edison's infrared light sensors to work.



What is infrared light?

There is a wide range of light. People can see some of this range, but not all. Infrared light (also called IR) is invisible to people.

Did you know you use IR a lot?

Infrared light is used in TV remote controls. It is how the remote tells the TV to change the channel or turn up the volume!

Infrared light and Edison

Just like a TV remote, Edison can use infrared light.

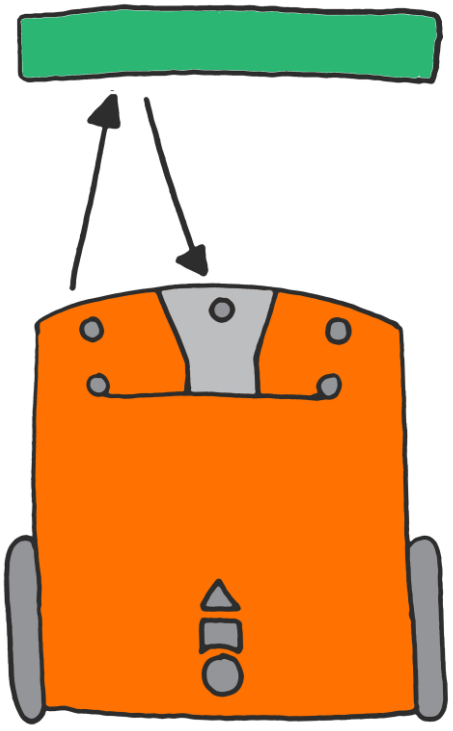
Edison has two IR light emitter diodes (or LEDs) on the front, one on the left and one on the right. Edison also has an IR sensor on the front, right in the middle.

We can program Edison to use IR to find obstacles and avoid running into them.

Using EdBlocks, we can write a program that tells the IR LEDs to send out infrared light.

That light is reflected off any objects nearby and bounces back towards Edison. Edison can detect that light with the IR sensor.

Our program tells Edison not to run into any object it can detect.

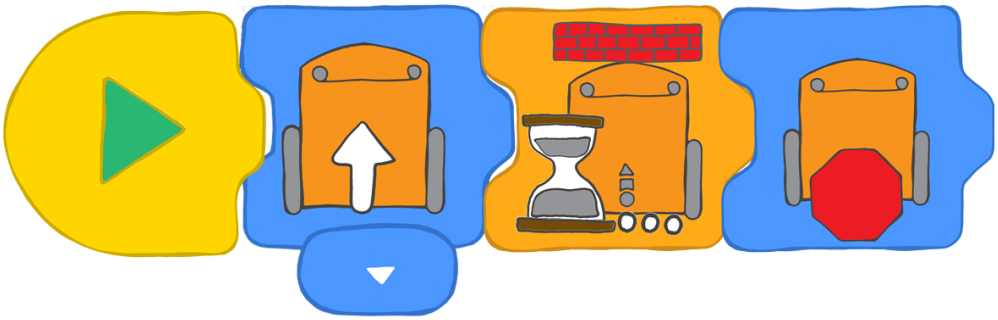


Infrared light reflects off the object.

Edison detects it and the program tells Edison to stop.

What to do with EdBlocks

Using the EdBlocks app, arrange the blocks into the program below.



What is this program telling Edison to do?

This program has Edison drive forward until it detects an obstacle is in the way. When Edison can 'see' the obstacle, it will stop.

What to do with Edison

Download the program to Edison. Put Edison on one side of your desk. Then place an object, like a pencil case, on the other side of the desk. Aim Edison at the object, then press the triangle button. Watch Edison drive forward towards the object.

Did Edison stop before hitting the object?

Find the answer

If an obstacle is too small or doesn't reflect enough infrared light, Edison cannot detect it.

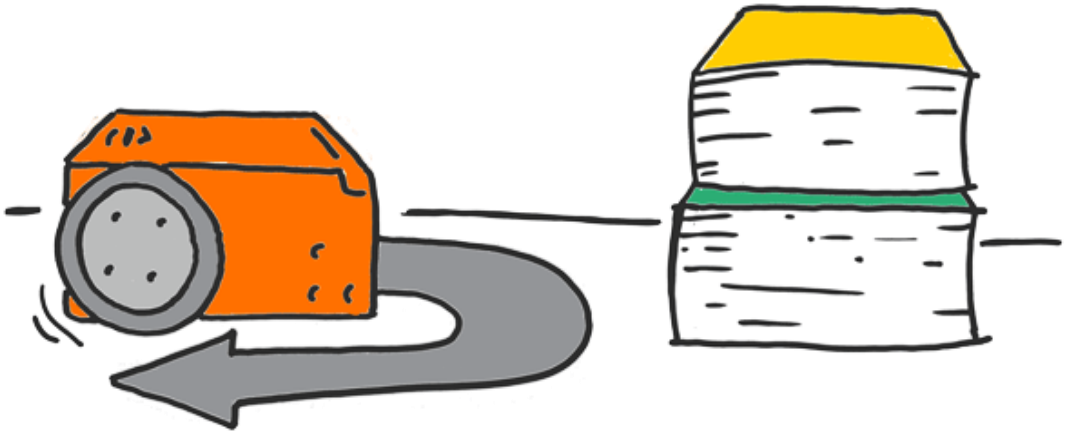
Let's see what things Edison can and cannot detect. Try placing different objects in Edison's way and test what happens. Try things that are different shapes and colours. Record your results below.

Object	Colour and shape	Did Edison stop? Why or why not?

Let's detect and avoid

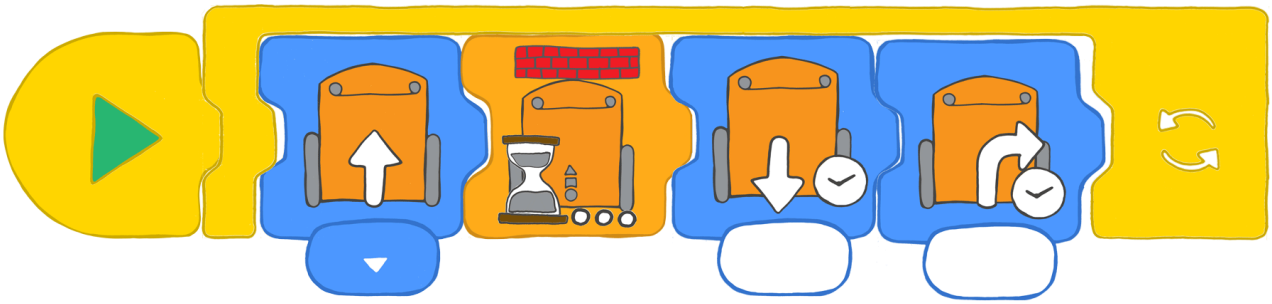
Edison's infrared light sensors let Edison detect objects. We can use these sensors to make different programs using EdBlocks.

This time, let's make a program that uses the infrared light sensors to tell Edison to detect obstacles, then turn away before running into them.



What to do with EdBlocks

Using the EdBlocks app, arrange the blocks into the program below.



What does the program do?

The first block tells Edison to drive forward and the second block tells Edison to wait until an obstacle is detected. When an obstacle is detected, Edison moves to the third block, which tells Edison to back up. Then the fourth block turns Edison away from the obstacle. The loop tells the program to then start back at the first block.

You will need to experiment to work out how much time to put in the drive backwards and turn blocks.

What to do with Edison

Download the program to Edison. Put some obstacles you know Edison can detect around Edison. Run the program by pressing the play (triangle) button.

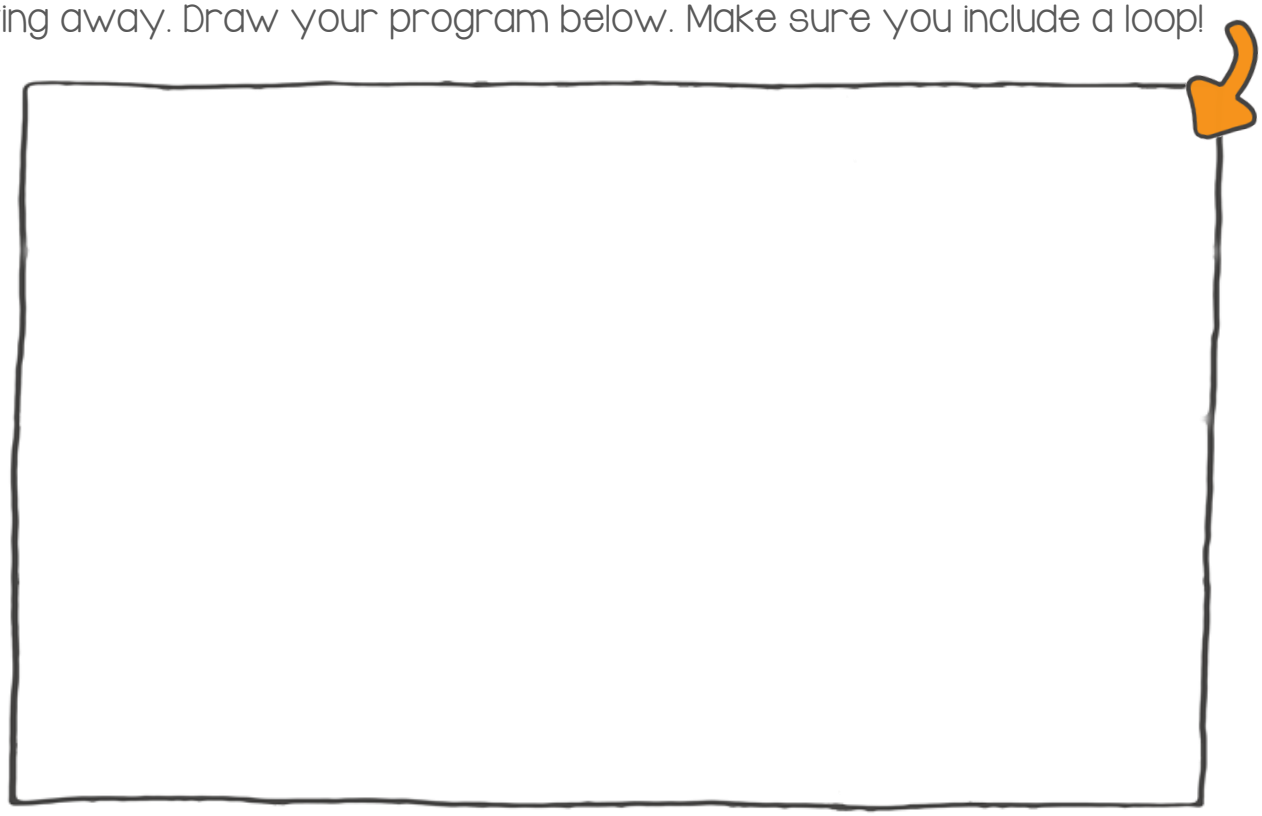
Watch as Edison uses the program to detect an object, then turn and drive away.

Find the answer

1. What time, in seconds, did you use in the 'drive backwards' block? Why did you use that time?

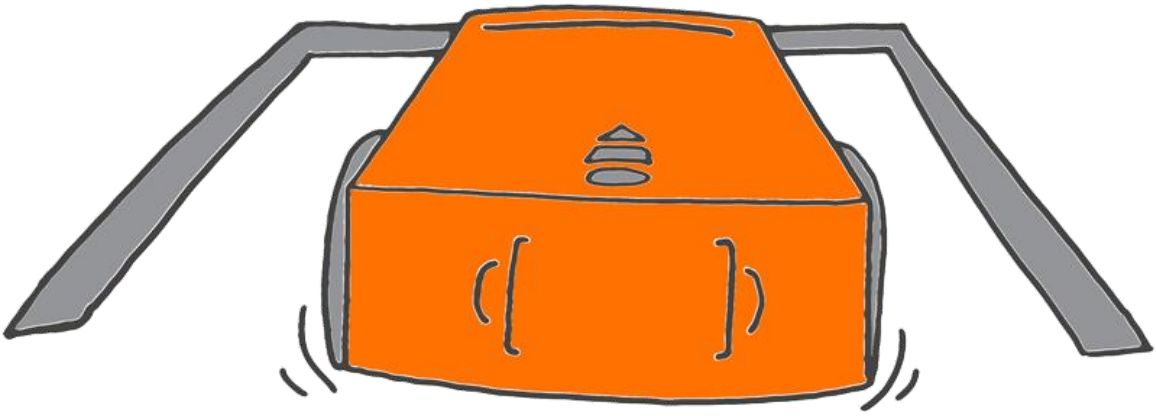
2. What time, in seconds, did you use in the 'turn right' block? Why did you use that time?

3. What else could Edison do when it detects an object? Try making a program where Edison alerts you it has detected an object before driving away. Draw your program below. Make sure you include a loop!



Let's stay in the borders

Remember Edison's tracking sensor? It is the sensor that lets Edison see the difference between dark and light surfaces. We can make a program that uses the tracking sensor to tell Edison to avoid crossing a black line.



What to do with EdBlocks

Using the EdBlocks app, arrange the blocks into the program below.

Make sure to wrap the main program in the loop block.

This program tells Edison to drive forward. If Edison detects a dark surface, the program tells Edison to reverse, then turn right. This will keep Edison in the border.

How far does Edison need to drive backwards to make enough space to turn right? For how many seconds should you make Edison turn right?

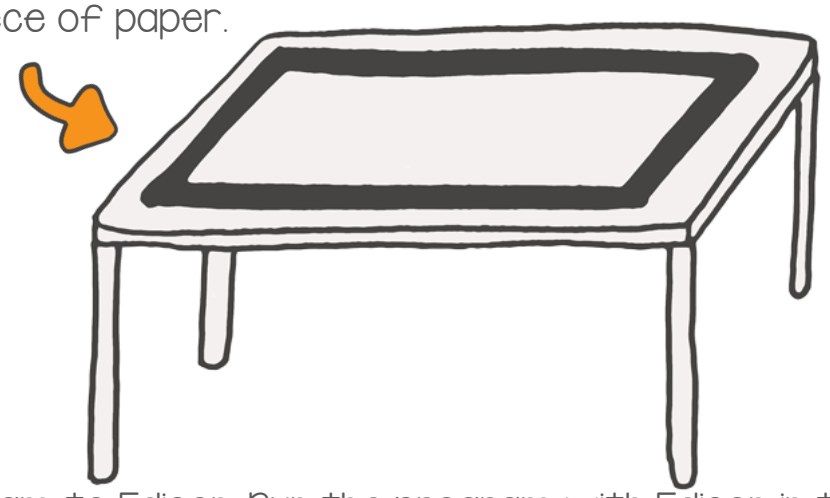
Test different times to see what gives you the best results.

This block controls Edison's speed.

You can choose slow, normal or fast.

What to do with Edison

Use some black tape to create a border on a desk for Edison to stay inside. You can also use the track from activity 6 or draw a black border on a large piece of paper.



Download your program to Edison. Run the program with Edison in the border.

Experiment with your program. Test different times in the 'reverse' block and the 'turn right' block.

You should also try using different speed blocks to see what happens.

Find the answer

1. What time, in seconds, worked the best in the 'drive backwards' block?

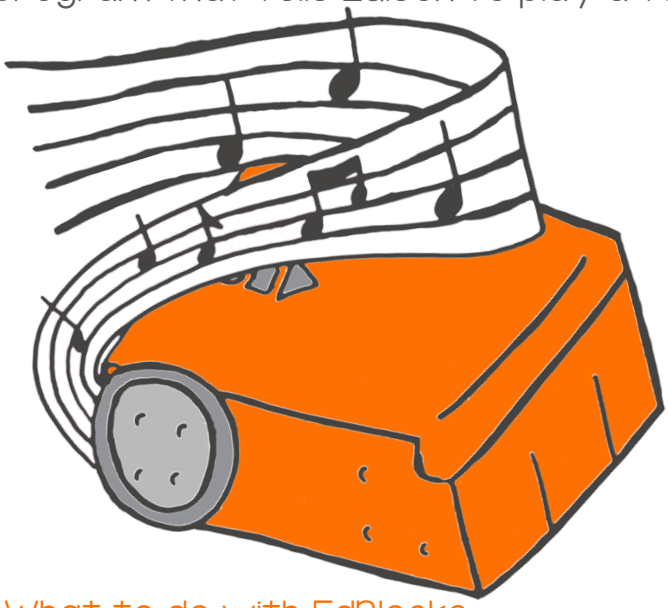
2. What time, in seconds, worked the best in the 'turn right' block?

3. Which speed block worked best? What made it the best choice?

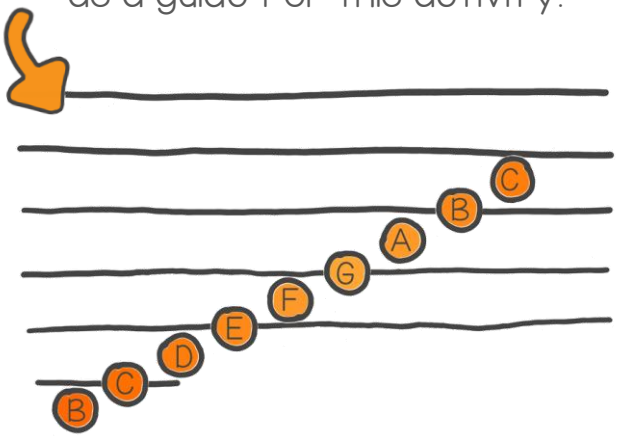
4. What if cars had a program like this in real life? Would that be good? Why do you think it would be good or bad?

Let's make music

Edison can play different musical notes. Using EdBlocks, we can make a program that tells Edison to play a tune.



These are the music notes on the scale. You can use this as a guide for this activity.



What to do with EdBlocks

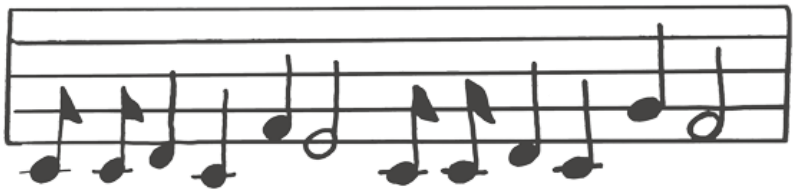
Using the EdBlocks app, arrange the blocks into the program below.

This program will tell Edison to play the first line of the tune 'Hot Cross Buns.'

What to do with Edison

Download the program to Edison. Run the program by pressing the play (triangle) button. Edison will play the song.

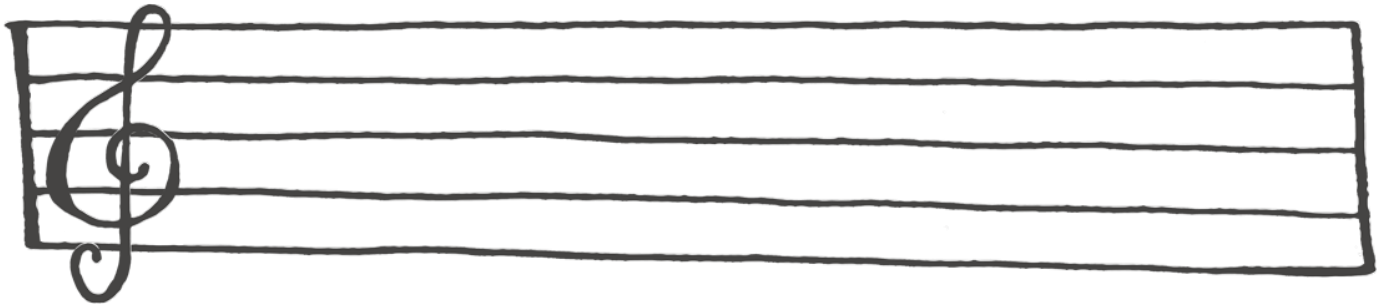
You can make Edison play other songs too! Use sheet music to help you make music programs using EdBlocks. Or try making up your own song!



This is 'Happy Birthday to You' in sheet music. What other songs can you play?

Find the answer

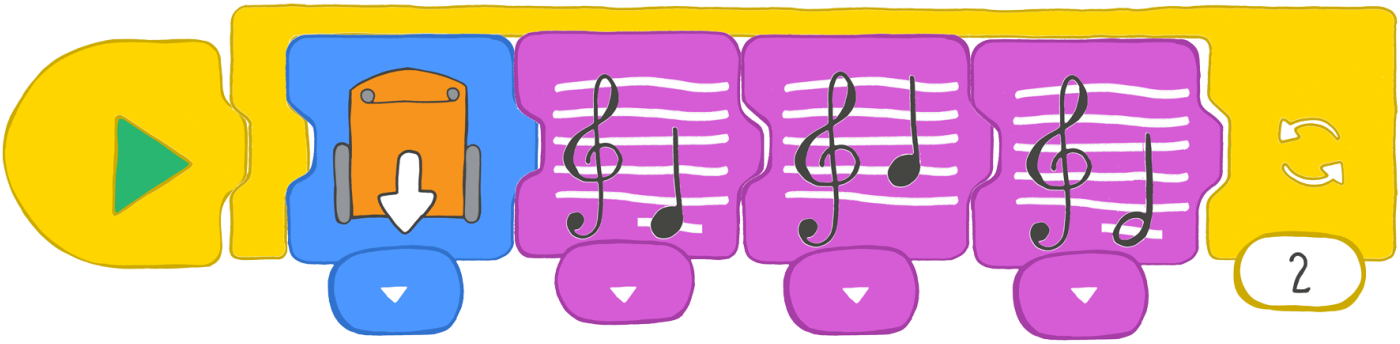
1. Make your own music program. Draw the notes you used in your program as sheet music, like the 'Happy Birthday' example.



2. Find the metronome block. This block can change the tempo, or speed, of the notes played after it.
Add a metronome block to the beginning of your music program, then try downloading and playing it.

Which block did you use? What did the metronome block do to your program?

3. Can Edison drive and play music at the same time? Let's test and see! Using the EdBlocks app, arrange the blocks into the program below. Download it to Edison.



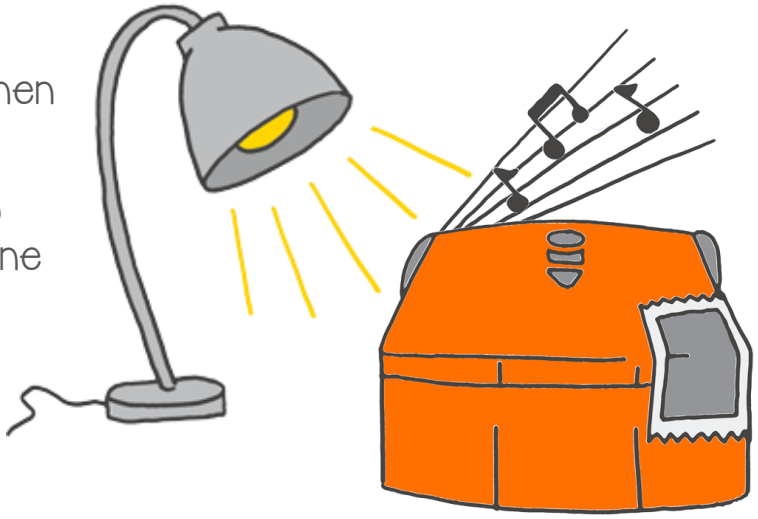
Describe what Edison does when you play this program.

Let's perform

Remember Edison's light sensors? These sensors let Edison detect light. We can use these sensors and make a program for Edison using EdBlocks.

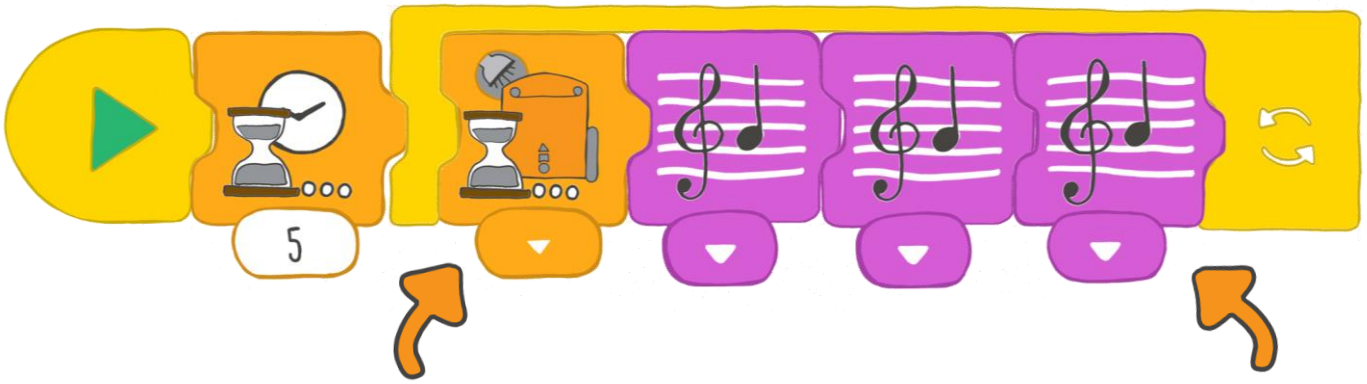
Let's make a program that gets Edison to play music when a light is detected.

This time, we want Edison to detect the light from only one side. We need to cover the opposite side of Edison with dark tape or cardboard.



What to do with EdBlocks

Using the EdBlocks app, arrange the blocks into a program like the program below. Your program first needs to tell Edison to wait for five seconds. Then it should tell Edison to play a tune whenever it detects a light from one side.



Which side should Edison use to detect the light? You can choose!

If Edison is looking for light on the left side, the right side of your Edison robot needs to be covered.

If Edison is looking for light on the right side, the left side of your Edison robot needs to be covered.

What music should Edison play?

You can use any tune you like. Find some sheet music and program a song. You can even make up your own tune!

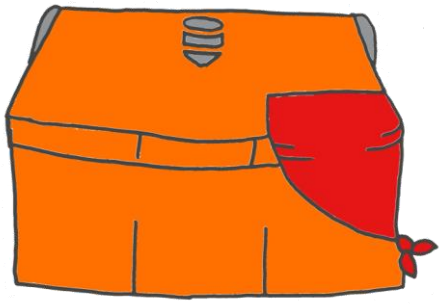
Make sure both the 'wait for light' block and music blocks are inside the loop.

What to do with Edison

Let's dress up Edison for a performance in the spotlight!

Using cardboard or tape, block out the light from one side of Edison. Then make a costume for Edison. You could make a pirate or a princess. What else could you make?

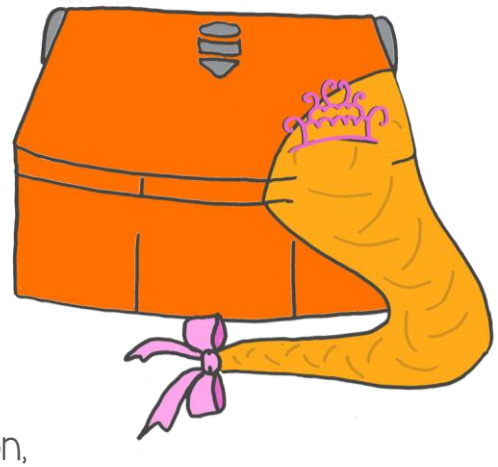
Use craft supplies and make your own character costume for Edison. Remember that your costume needs to cover one side of Edison, but leave the buttons uncovered.



A pirate with a patch?

A princess with long hair?

How do you want to dress up Edison?



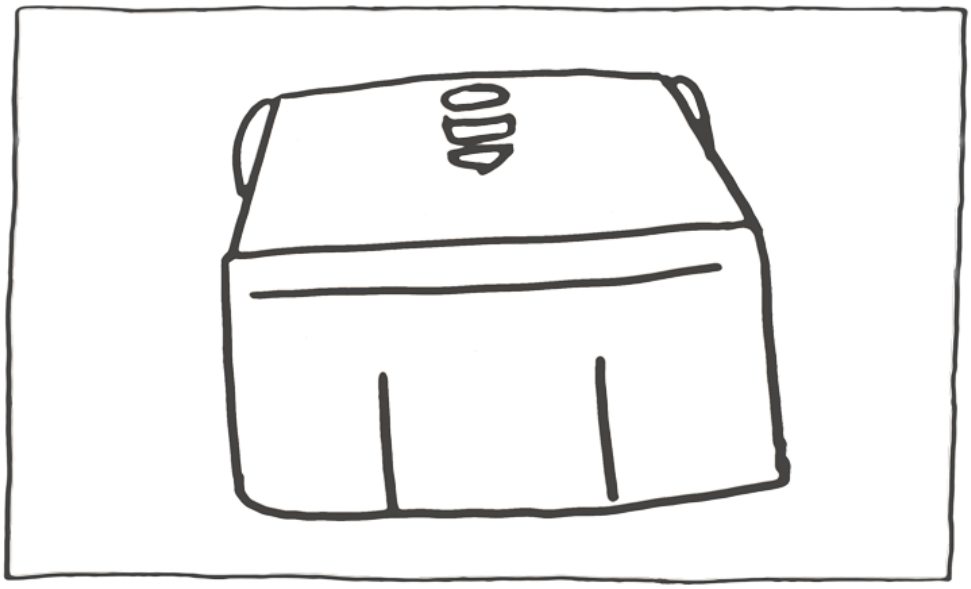
What about light?

Once you have dressed Edison, downloaded your program to Edison. Press the play (triangle) button, then put Edison in a drawer. When you open the drawer, Edison will detect the light and play your song.

Where is another dark place you can put Edison? You can try a backpack or a lunch box.

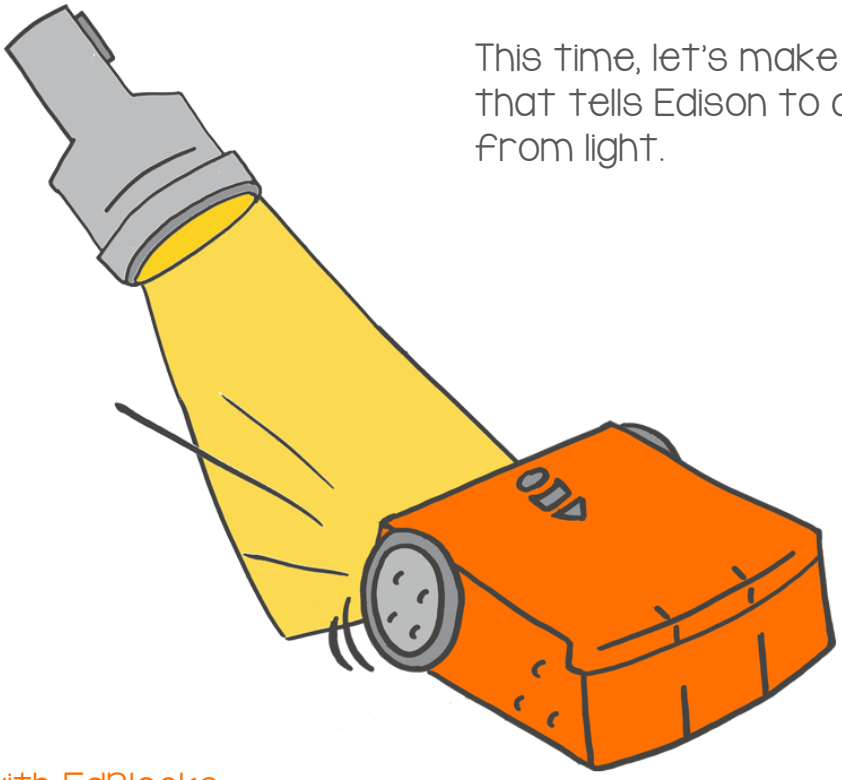
Find the answer

What was your costume? Write the costume's name, then draw your costume below.



Let's avoid the light

Edison's light sensors are the sensors that lets Edison detect light. We can use EdBlocks to make programs that have Edison react to light in different ways.

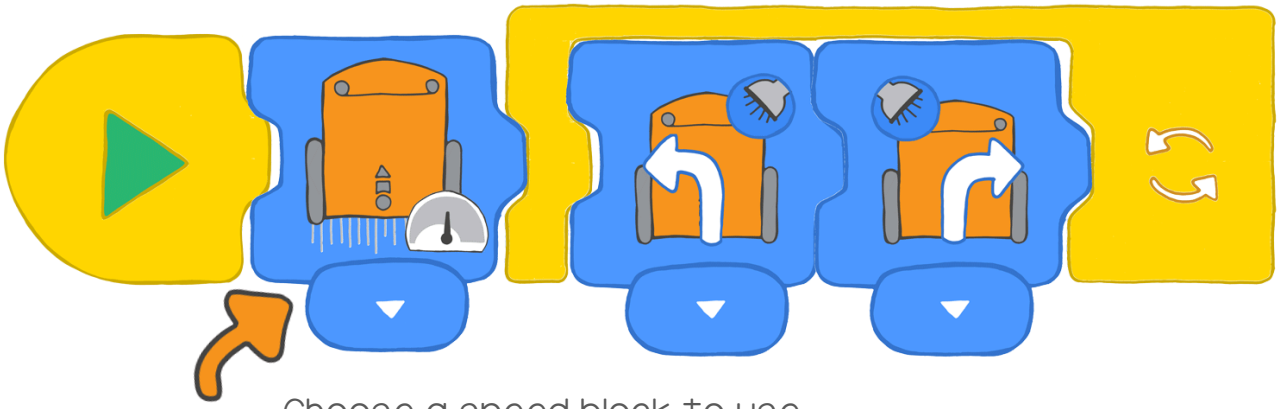


This time, let's make a program that tells Edison to drive away from light.

What to do with EdBlocks

Using the EdBlocks app, arrange the blocks into the program below.

This program tells Edison to avoid light. When Edison senses light from a torch, it will turn away.



Choose a speed block to use.

Which block do you think will work best to help Edison avoid the light?

What to do with Edison

Download your program to Edison.

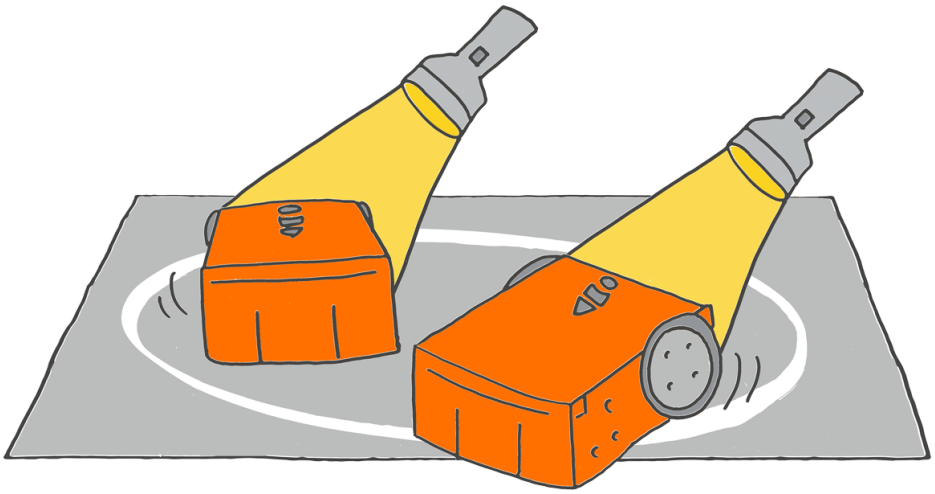
Now, let's play the cockroach game!

To play, you will need to work in groups with three or four people.

Use some tape to mark a large circle on the floor. The goal of the game is to keep your Edison robot inside the circle but push everyone else's robot out of the circle.

Everyone needs one torch. Put everyone's robot in the circle and start the program by pressing the play (triangle) button.

Use your torch to try to force other robots to move outside of the circle. You can also use your torch light to keep your robot in the circle. The last Edison in the circle is the winner!



Use some tape and write your name on your Edison robot, so you can keep track of it in the game.

Find the answer

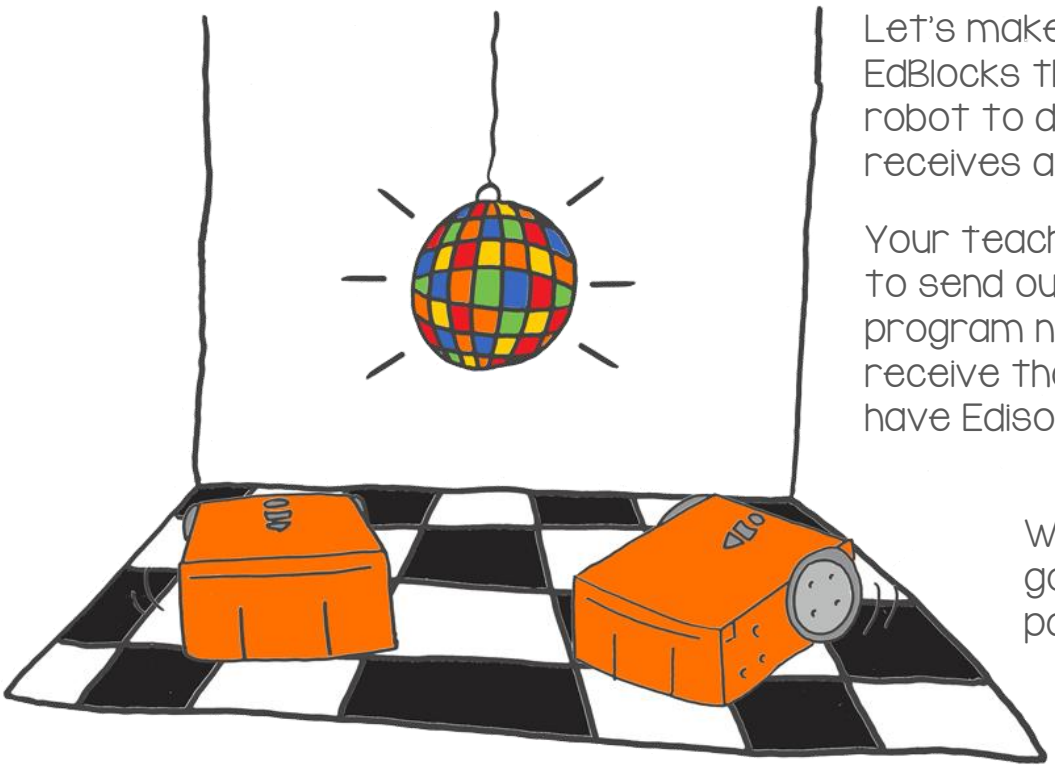
1. Who won the game?

2. Look at the program that the winning robot used. Which speed block was used in that program? Slow, normal or fast?

3. As a group, talk about what happened in the game. Think about how the robots behaved. Why do you think this game is called 'the cockroach game'?

Let's have a dance party

Remember Edison's infrared light sensors? These sensors let Edison detect obstacles. We can also use these sensors to have two Edison robots talk to each other!



Let's make a program with EdBlocks that tells your Edison robot to do a dance when it receives a message.

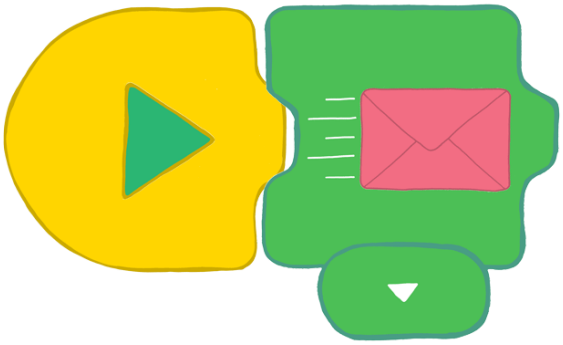
Your teacher will use an Edison to send out a message. Your program needs to wait to receive that message, then have Edison start dancing.

When the message goes out, the dance party will start!

What to do with EdBlocks

Your teacher will set up a program on their Edison robot that is going to send out a pink envelope message.

Your teacher's program will look like the one below.

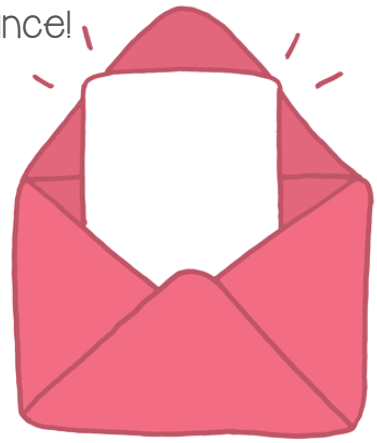


Your program needs to tell your Edison to start dancing once the pink envelope is received.

Using the EdBlocks app, create a program with your own dance routine for Edison. Use turns, LED lights, and sounds to make it really special.

What to do with Edison

Download your program to Edison. Now it's time to dance!



As a group, have everyone get their robot ready by pressing the play (triangle) buttons.

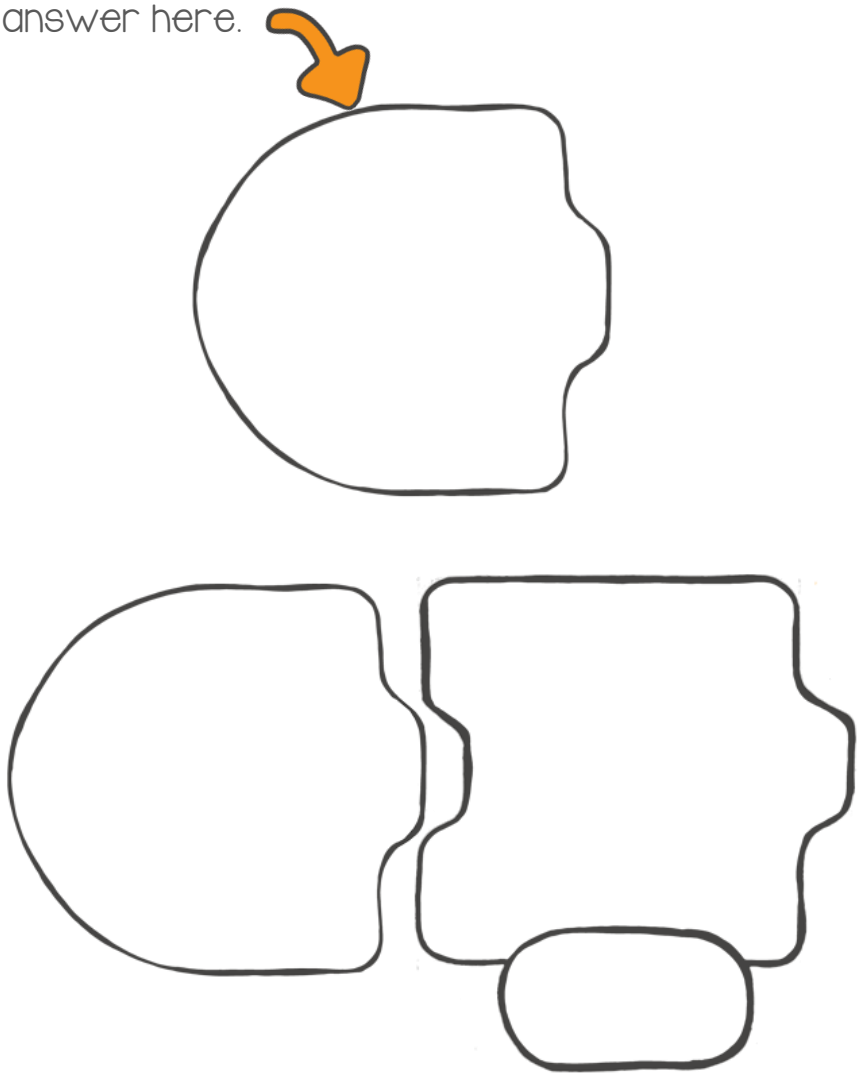
Once the robots receive the pink message, each robot will start to dance.

It's party time!

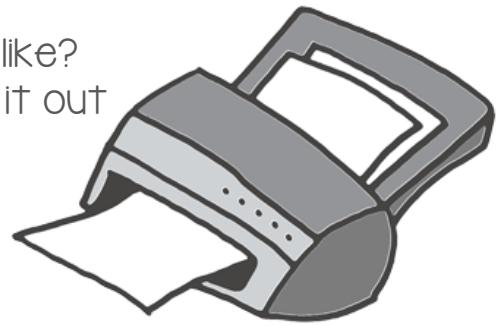
Find the answer

1. There are two ways to have Edison receive the pink message. Look at EdBlocks and find them both.

Draw your answer here.



2. What does your dance routine program look like? Take a screen shot of your program and print it out for your teacher.



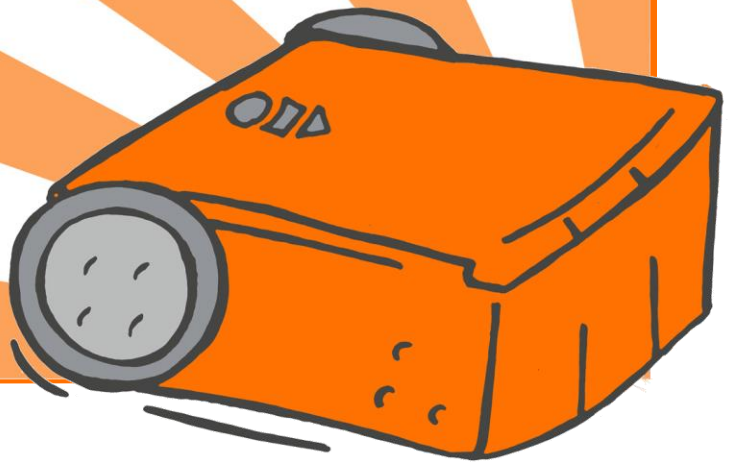
CONGRATULATIONS

This certifies that

Student's name

has completed the EdBlocks
lesson activities program.

Don't stop now! This is just the start of
your robotics and coding adventure!

Teacher's Signature

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Date