Loti-Bot Skill Builders

When first starting to use Loti-Bot, you may want to explore these simple skill builders to learn about the Loti-Bot programming basics.

Skill Builder List

1.0 The Green Flag - learning to code with the Green Flag to begin a program.
1.1 How to make Loti-Bot Move - learn how to make Loti-Bot move using the block-based coding app.
1.2 Making Loti-Bot turn – inputting degrees and speed to make Loti-Bot turn.
1.3 Drawing Shapes 1 – combining movement blocks to draw shapes.
1.4 Drawing Shapes 2 – using loops to draw shapes.
1.5 Changing the Lights 1 – learn how to change colour of the LED lights.
1.6 Changing the Lights 2 – control colour of LEDS to create own colours.
1.7 The Forever Loop – learning how to program using a continuous loop.
1.8 Sounds – using the 20 stored sounds and musical notes to play different sounds.
2.0 IF Statements – Use If Then Else statements to represent branches of a decision tree.
2.1 The Light Senor – learn how to use the light sensor.
2.2 The Sound Sensor – learn how to use the sound sensor.
2.3 The Proximity Sensor – learn how to use the ultrasonic distance sensor.
2.4 The Temperature Sensor –learn how to use the temperature sensor.
2.5 The Compass – learn how to use the compass sensor.
2.6 The Bumper Sensors –learning and using the bumper sensor.

Sensor Data Sheet

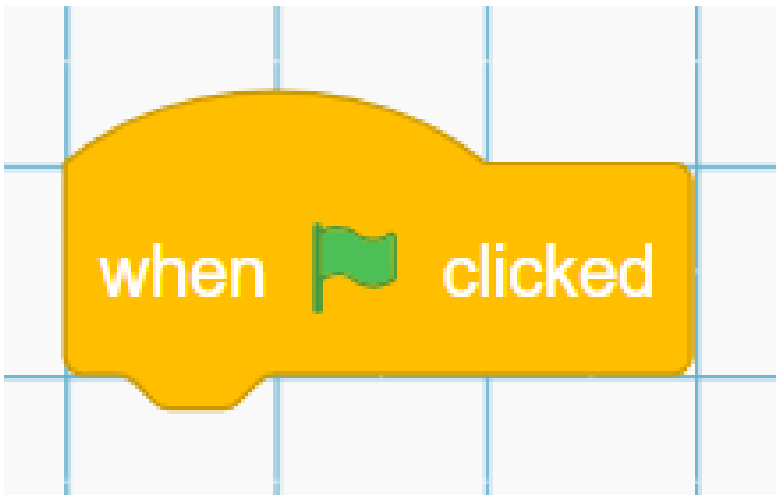
Shows you the values and unit the sensors work in.

Coding Dictionary

Provides you with example codes for drawing shapes to use to support pupils or to alter and create debugging worksheets.

Skill Builder 1.0 – The Green Flag

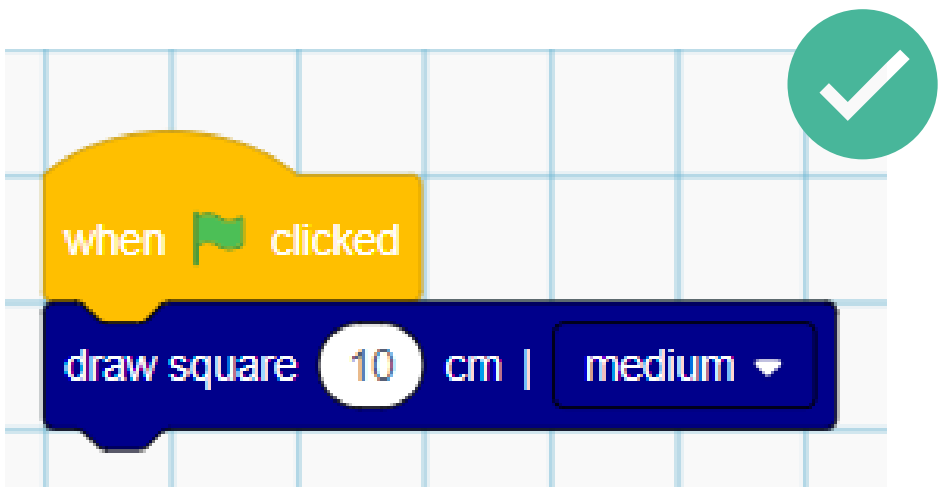
Blocks Dictionary

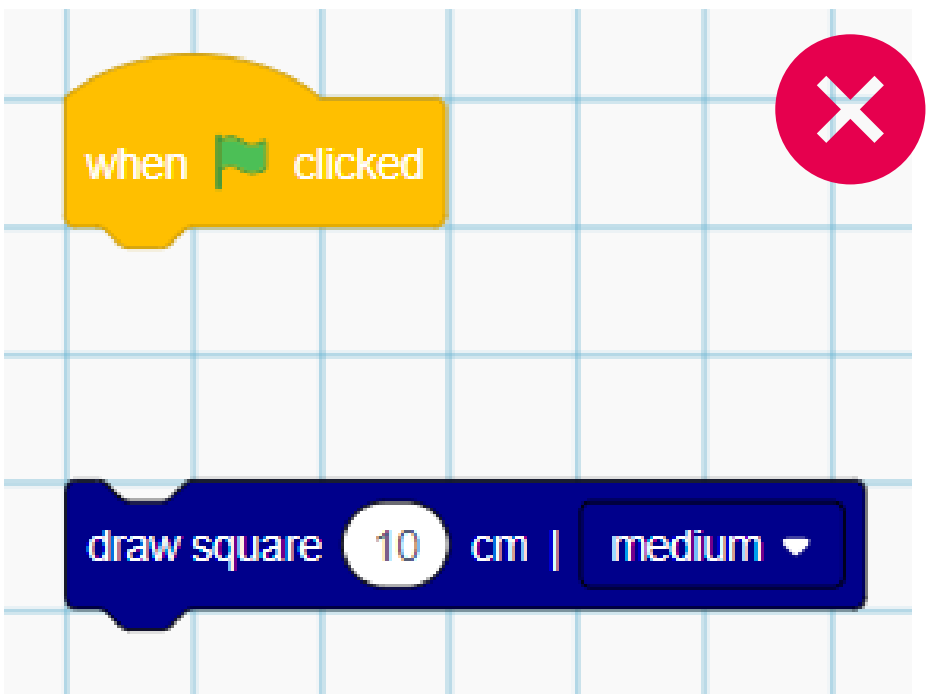


The **green flag** is used to tell Loti-Bot that you want to start executing the program. Every program must begin with a curved top yellow block like this. Most programs will begin with this block - **When green flag clicked.**

To run (execute) your code press the large green flag in the bottom right of the coding area, it looks like this:

Complete Code





Activities

- What do you think the code will do?
- What do you think the number 2 refers to?

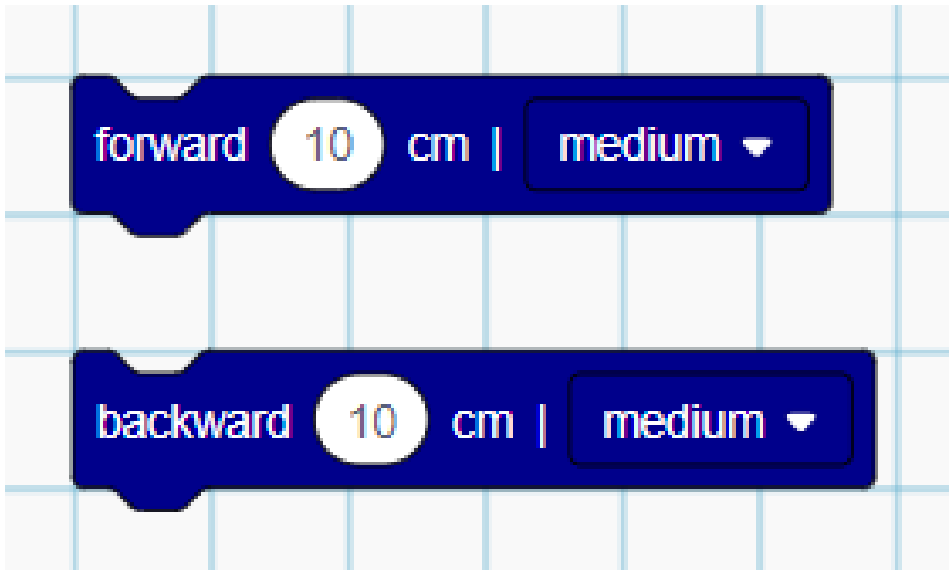
- Build the code and test the output – remember to click all the blocks together as shown and press the green flag when you are ready to begin.

Stretch and Challenge

- Can you modify the code to draw a bigger square?
- What is the smallest square that Loti-Bot can draw?
- What is the impact of changing the speed? Which would you recommend for drawing?

Skill Builder 1.1 – How to make Loti-Bot Move

Blocks Dictionary

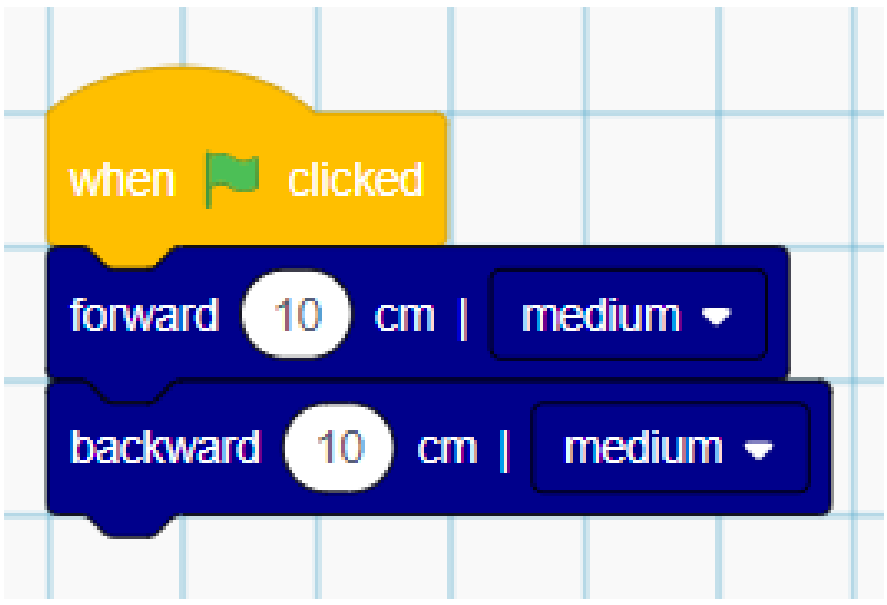


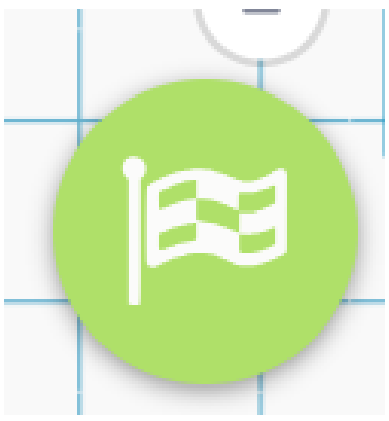
Loti-Bot has lots of blocks that can be used in a program to make her move. These two blocks will make Loti-Bot move **forward** and **backwards**.

Once you drag the block into the workspace you must:

- Input the distance as a number into the white space
- Select the speed you would like from the drop-down menu.

Complete Code





Don’t forget to press the **green flag** to execute your program

Activities

Copy the complete code example and execute the program – what is the impact of changing the **variable** distance?

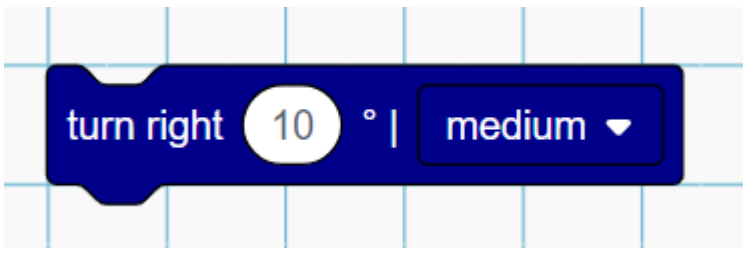
Stretch and Challenge

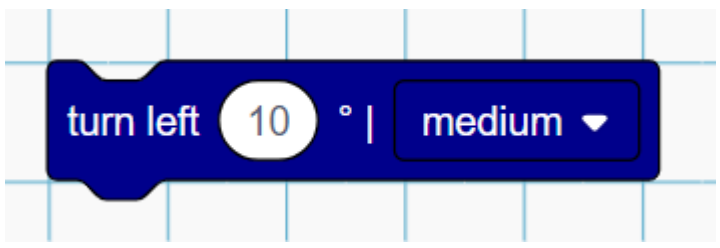
In groups set up a race between three Loti-Bots:

- On the floor indicate a start and finish line 100 cm apart
- Set each robot to a different speed
- Use a stopwatch to time the Loti-Bots as they race
- In your groups calculate the speed of each of Loti-Bots three speed settings

Skill Builder 1.2 – How to make Loti-Bot turn

Blocks Dictionary

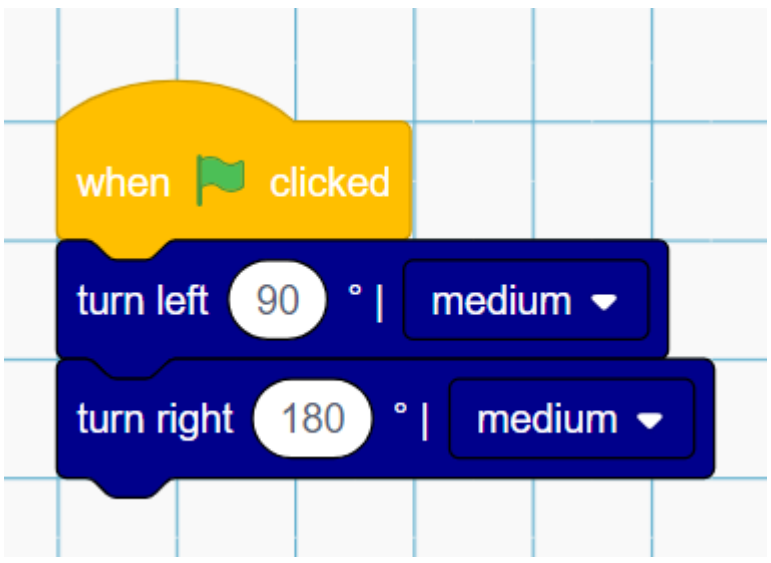


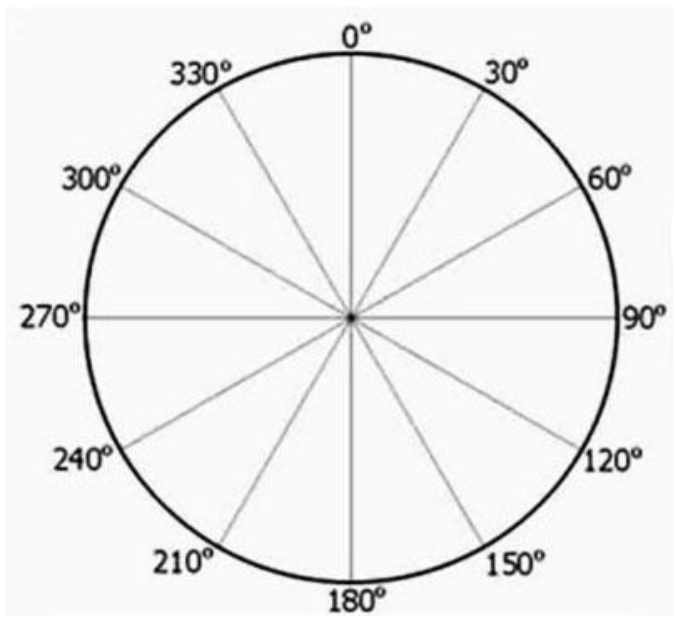


Loti-Bot can turn to the right (clockwise) and to the left (anti-clockwise) in degrees. The smallest amount Loti-Bot can turn is 1 degree and the largest amount that she can turn is 360 degrees – which is a whole turn. To use this block, you must:

- Input the degrees as a number into the white space
- Select the speed you would like Loti-Bot to turn from the drop-down menu.

Complete Code





Activities

Copy the complete code example and execute the program – what is the impact of changing the **variable** degrees?

Using the **forward** block can you program Loti-Bot to travel down a line and then turn and return back up the same line, always facing forwards?

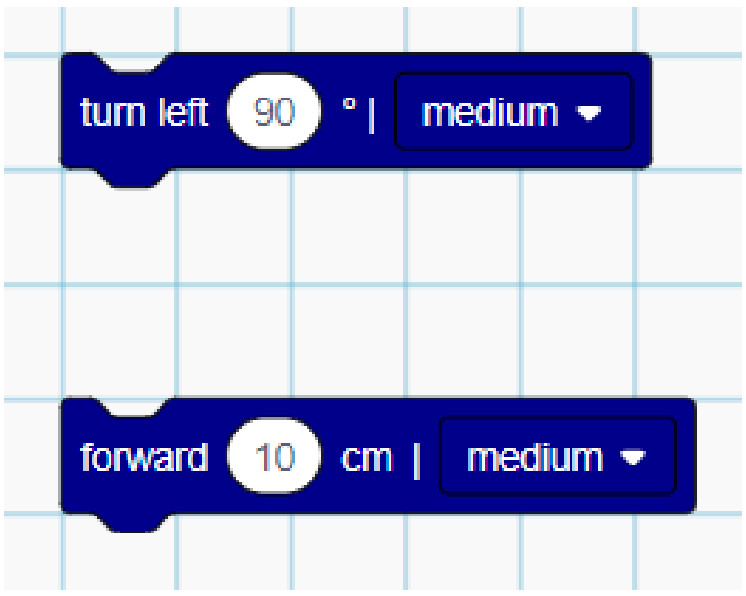
Stretch and Challenge

Using a pair of compasses draw a clock on an A3 piece of paper. The clock must be larger than Loti-Bot. Place Loti-Bot in the center of your drawing

Can you turn Loti-Bot to quarter past, half past and 5 to the hour?

Skill Builder 1.3 – Drawing Shapes 1

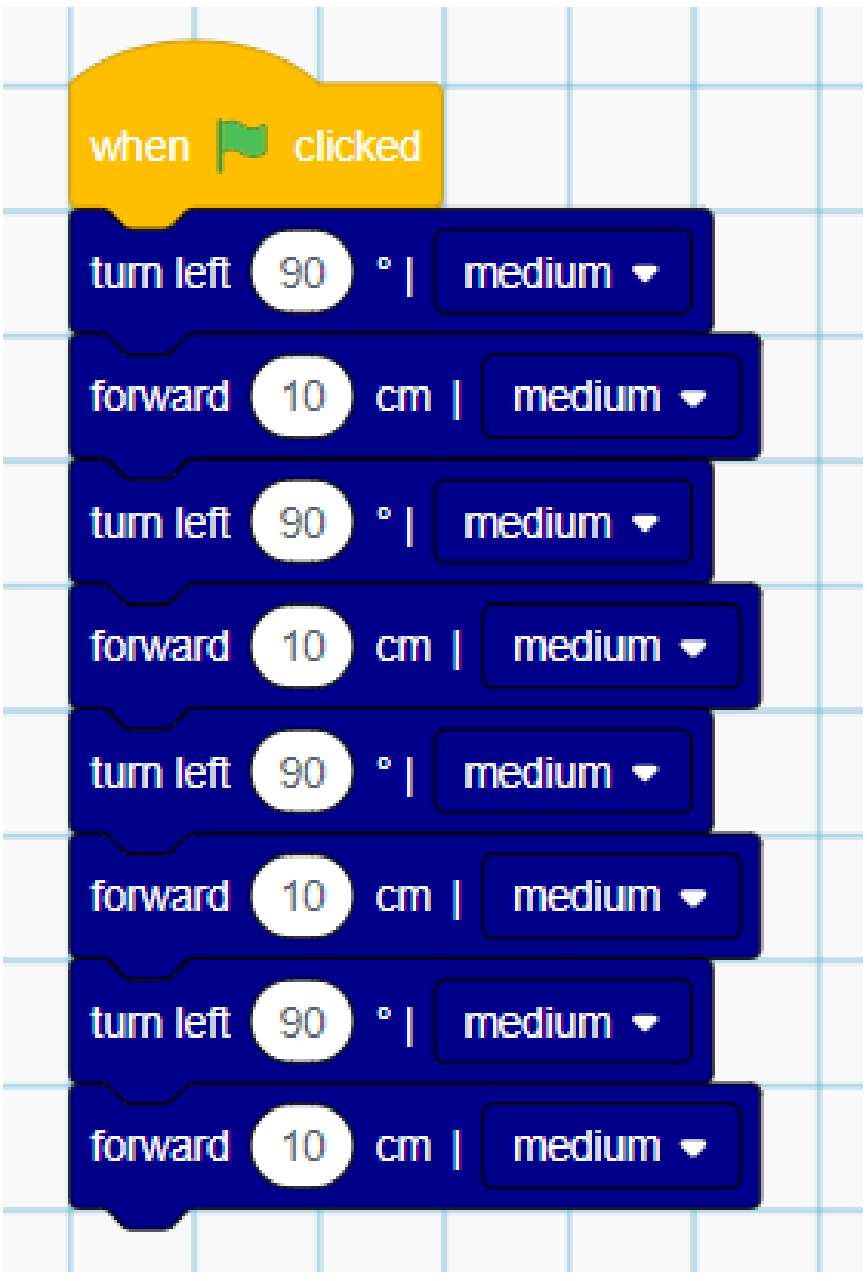
Blocks Dictionary



This skill requires combining two movement blocks:

- The **turn** block – it doesn't matter if you turn left or right but you must use the same block throughout
- The **forward** block

Complete Code



Activities

Read the code and describe what you think it is going to do.

Copy the complete code example and execute the program – what is the impact of changing the **forward** value?

what is the impact of changing the **degree** value?

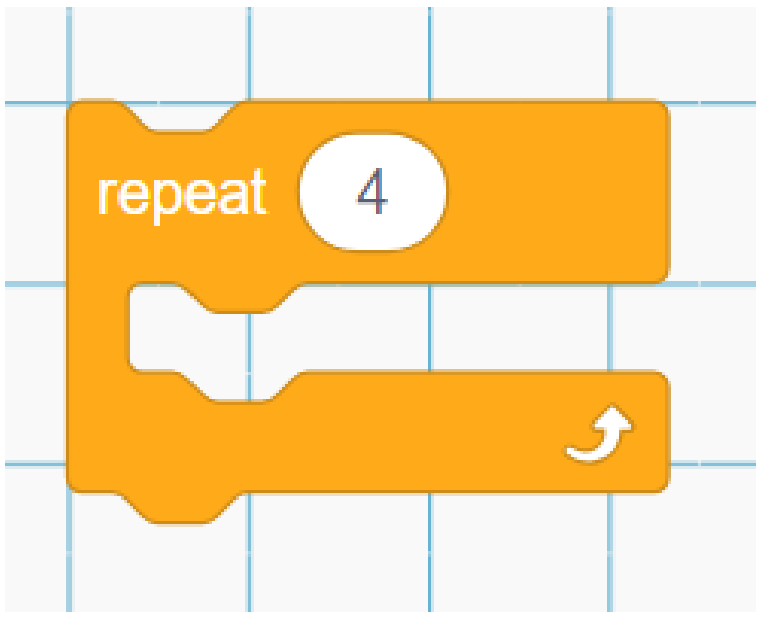
Stretch and Challenge

Can you amend the code to successfully draw a different quadrilateral?

Can you amend the code to successfully draw a different polygon?

Skill Builder 1.4 – Drawing shapes 2

Blocks Dictionary

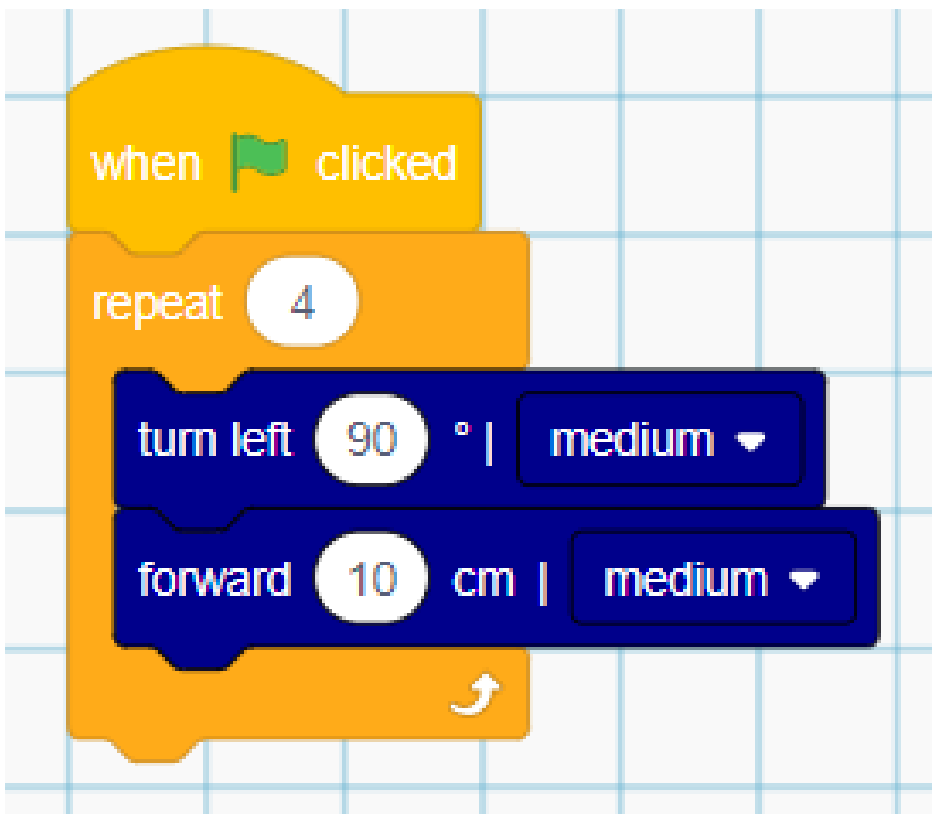


Sometimes it is more **efficient** to use **loops** in your programming. Loops are used when the program is **repeating** the same instructions more than once. There are lots of different types of loops you can use. In Computing the name that we give to all loops is **iteration.**

This is a **count-controlled** loop. It iterates for a set number of times or "counts". Here the example will repeat the step 4 times then the program will move on.

Loti-Bots loops all look like a mouth. All the instructions that you would like iterating must be slotted in between the top and bottom jaw of the mouth.

Complete Code



Activities

Compare this code to that in Skill 1.3 – what are the differences? Which do you think is a better approach, why?

Execute this code using your Loti-Bot

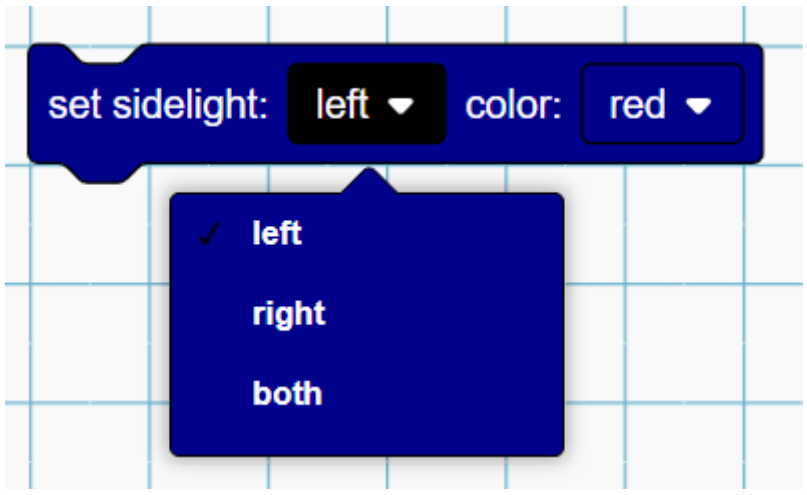
Stretch and Challenge

Can you amend this code to draw complex polygons?

- What would the code for a hexagon look like?
- How about a circle?

Skill Builder 1.5 – Changing the lights 1

Blocks Dictionary



Loti-Bot has two strips of programmable LEDs, one on her left and one on her right.

This block allows you to control the colour of the LEDs.

It is possible to change either just the right, just the left or both set of LEDs, this is selected from the first drop-down menu.

The second drop-down allows you to select the color you need.

Complete Code

Activities

Copy the complete code example.

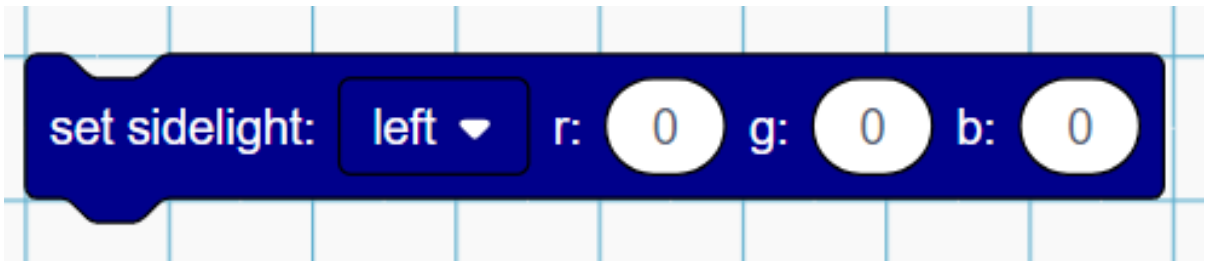
Can you extend and modify the code to replicate the lights of an emergency services vehicle? Red and Blue on each side flashing alternately?

Stretch and Challenge

Using the skills you already have can you program Loti-Bot to draw a shape and change to a different colour for each side?

Skill Builder 1.6 – Changing the lights 2

Blocks Dictionary

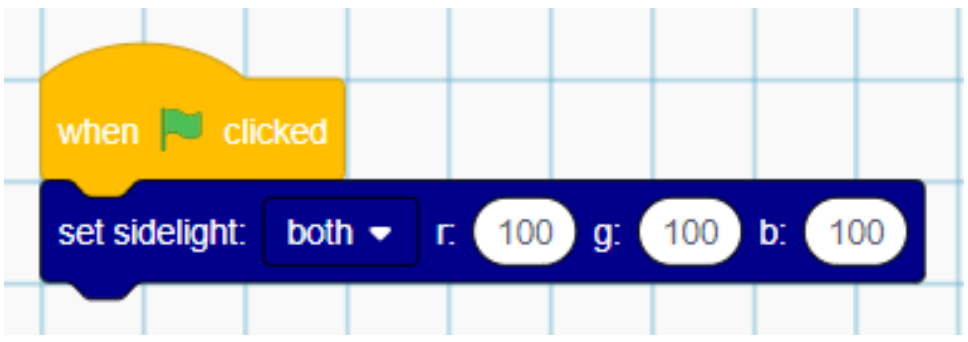


Loti-Bot has two strips of programmable LEDs, one on her left and one on her right.

This block allows you to control the colour of the LEDs using a more advanced method.

Here you can create your own colours by inputting the values for Red, Green and Blue. Each value can be set between 0 and 255 and the R, G and B value will blend together to create your colour.

Complete Code



Activities

Copy the complete code example – What color does it make?

Use the Internet to find an RGB color picker tool.

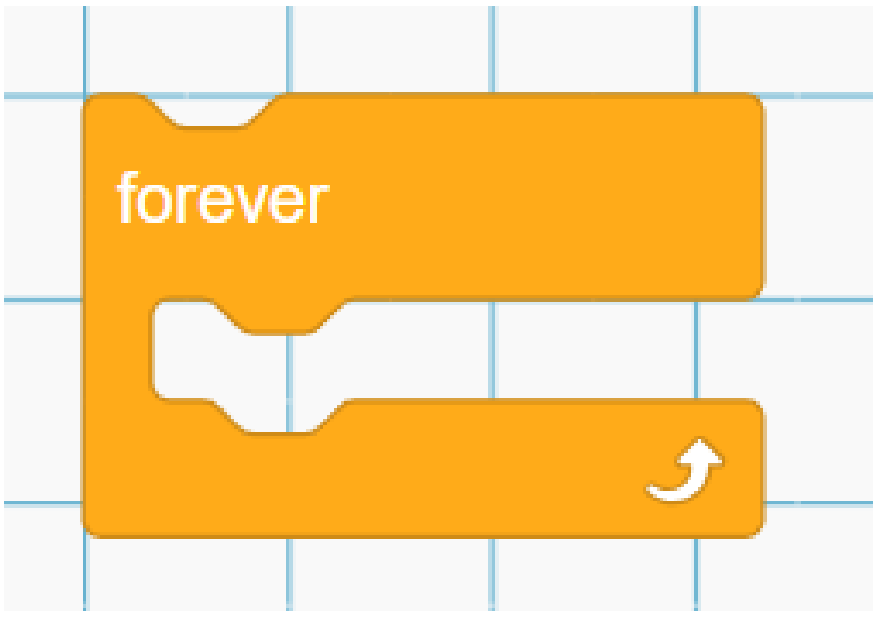
Find the codes for dark green, light blue and hot pink, program your Loti-Bot to replicate these colors.

Stretch and Challenge

Can you calculate the total number of different colors that Loti-Bot could make using this block?

Skill Builder 1.7 – The Forever Loop

Blocks Dictionary

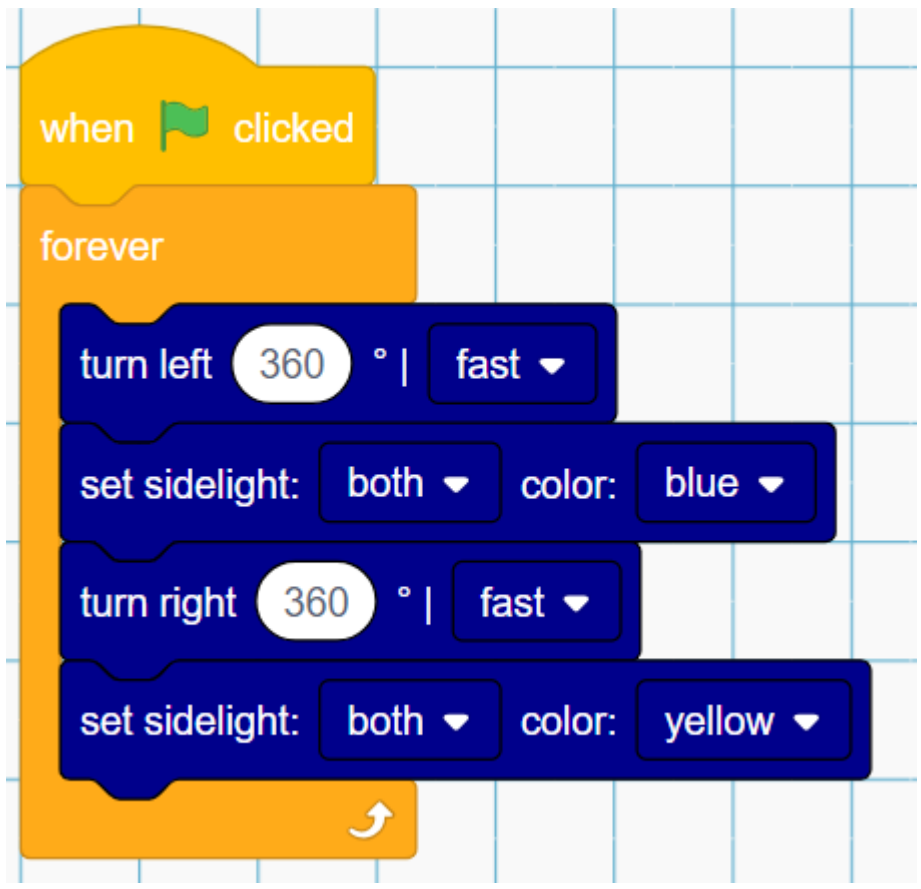


The forever loop is another type of useful iteration that you can use.

This type of loop is described as **conditiona**l iteration. In this case it will continue while a **condition is true,** which is that the **green flag** has been clicked.

Loti-Bots loops all look like a mouth. All the instructions that you would like iterating must be slotted in between the top and bottom jaw of the mouth.

Complete Code



Don't forget to press the **red flag** to end the execution of your program

Activities

What do you think this program will do?

Using a pair of compasses draw a clock on an A3 piece of paper. The clock must be larger than Loti-Bot.

Place Loti-Bot in the center of your drawing.

Program your robot to turn around the clock continuously shining blue before half past the hour and red after half past the hour.

Stretch and Challenge

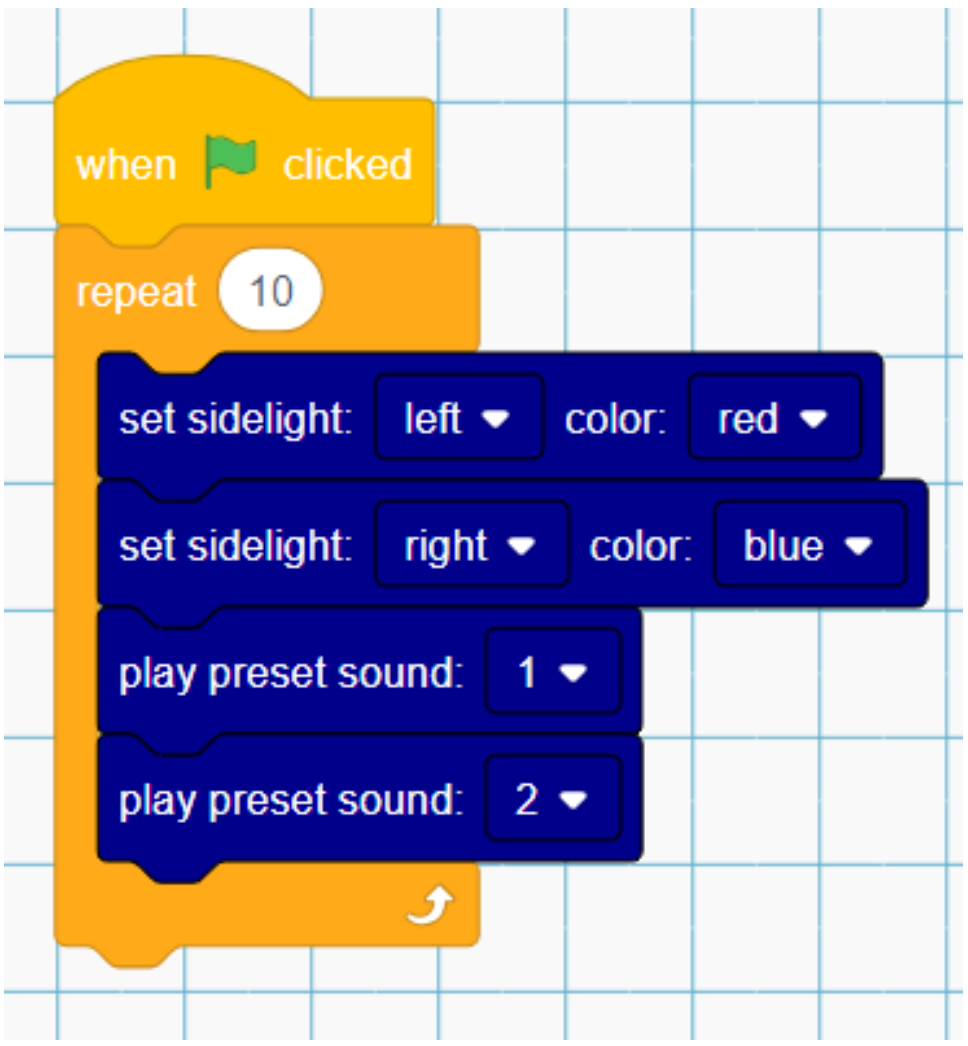
Can you program the robot to tick round the clock second by second?

Skill Builder 1.8 – Sounds

Blocks Dictionary

Loti-Bot has 20 sounds stored to each robot. Included in these sounds is full octave of musical notes. To select the different sounds, use the drop-down menu on the block.

Complete Code



Activities

Can you modify the example so that the lights flash and the sounds replicate an emergency services vehicle?

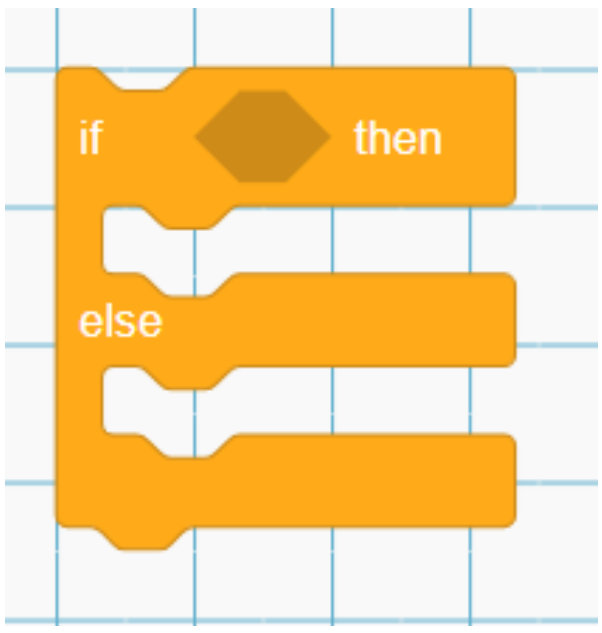
Stretch and Challenge

Listen to all of the 20 sounds in the Loti-Bot Library, can you find and identify the musical notes?

Use the internet to find the notes to a simple tune, can you program Loti-Bot to play your chosen piece?

Skill Builder 2.0 – IF Statements

Blocks Dictionary



IF Then Else statements are examples of branching. These are used to help your program make decisions. They work this like this:

IF this **THEN**

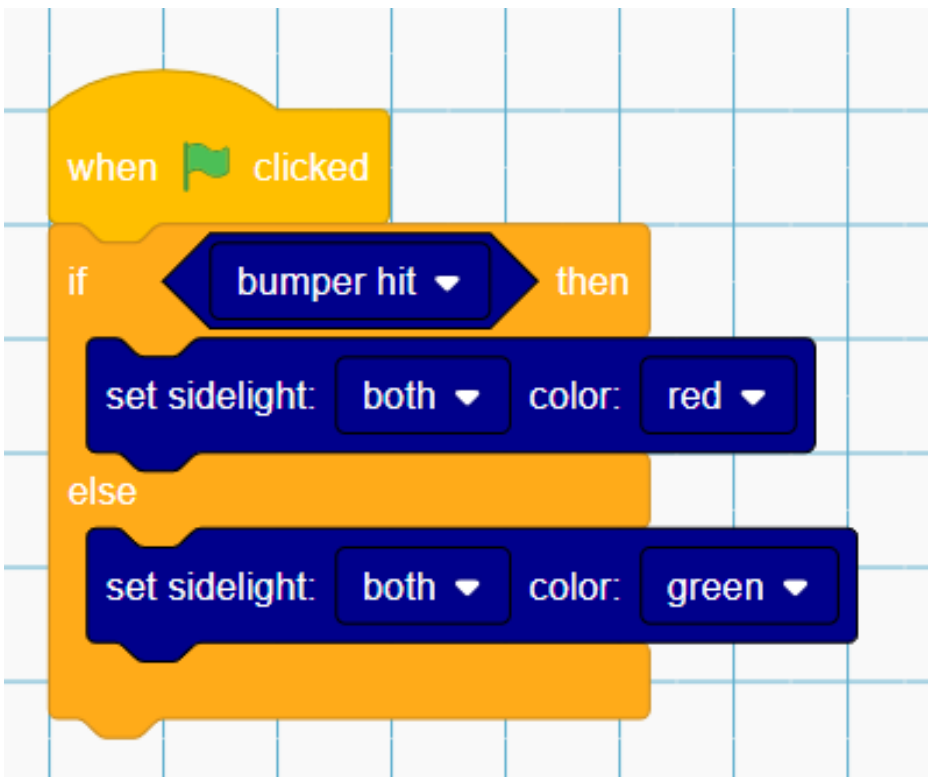
Do this thing

Else (otherwise)

Do thing other thing

Each outcome represents the branches of a decision tree

Complete Code



Activities

How would you modify the example code to always start with teal lights before the bumper is hit?

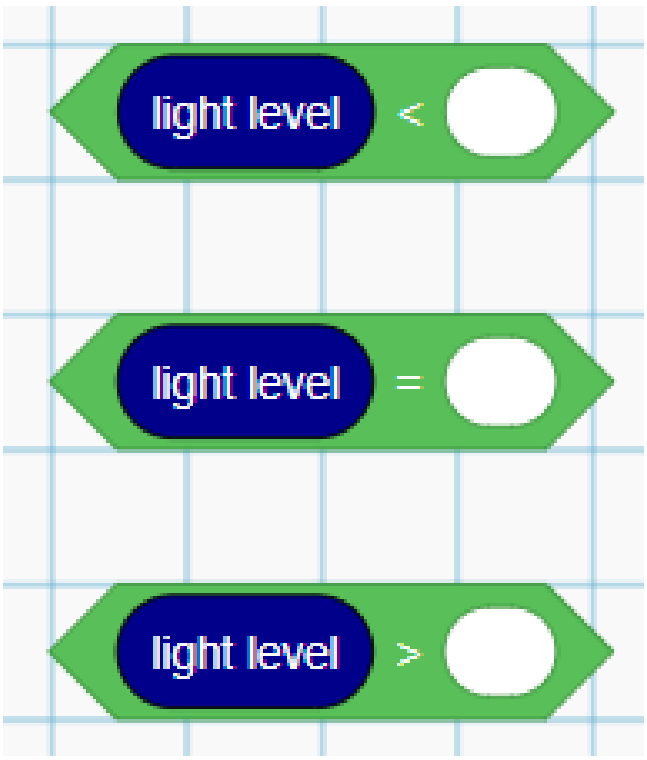
Stretch and Challenge

Can you modify the example so that when the rear bumper is hit Loti-Bot changes her lights, makes a surprised sound and moves forward 10cm?

Skill Builder 2.1 – The Light Sensor

Blocks Dictionary

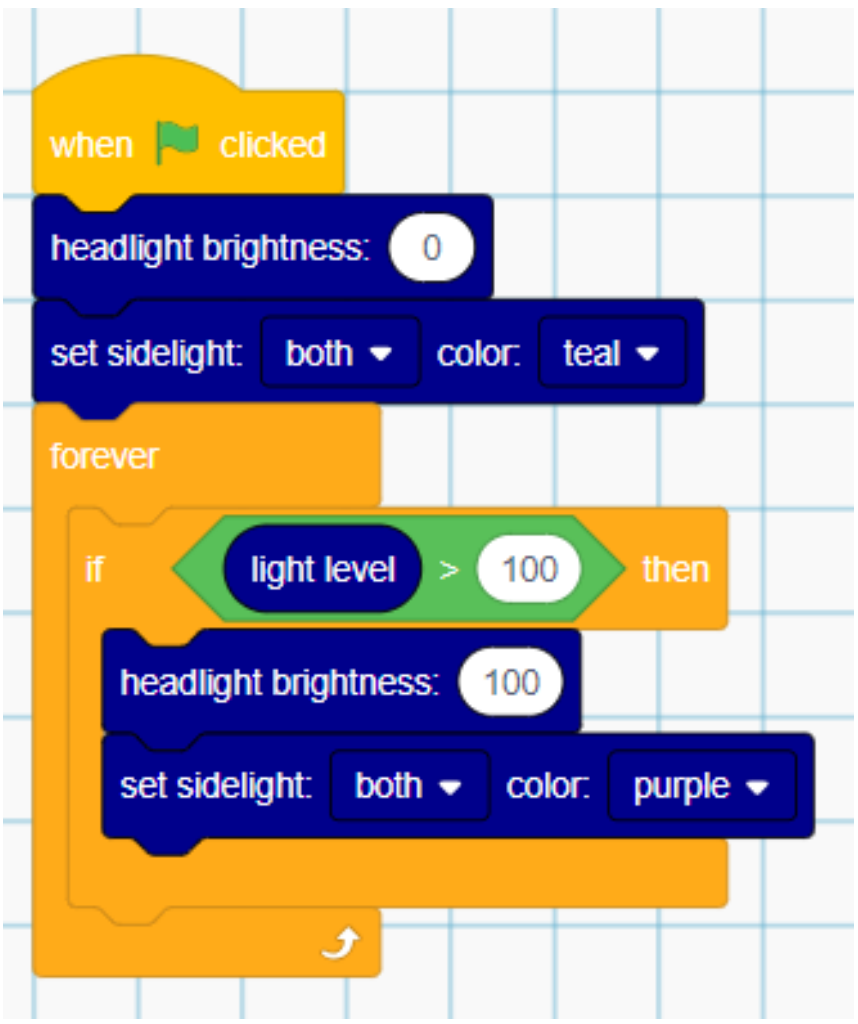
The light sensor is a rounded shape that must sit inside a green **operator** block.



Here you can see the light sensor in a less than, equal to and greater than **operator** block.

The operator block works best inside a loop, this way Loti-Bot will continually check the sensor you are using.

Complete Code



In this example you must put an **IF Statement** inside of a **Forever Loop**

Activities

How would you modify the example code to return to teal lights and headlights off when the light sensor detects light, without ending the program?

The lowest value Loti-Bot can sense is 0 lux (totally dark) to 32,000 (extremely bright!)

Can you use Loti-Bot to read the average light levels in your classroom? Can you program her to display a color when the lights are off and play a sound and change color when the lights are turned on?

Stretch and Challenge

Starting your own program can you replicate a sunrise on Loti-Bot's LEDS as the light increases?

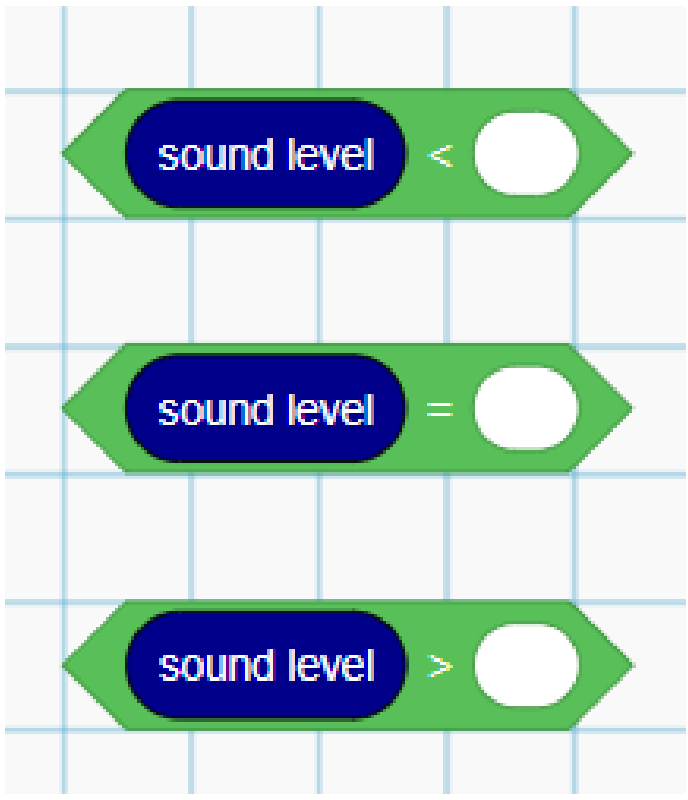
Skill Builder 2.2 – The Sound Sensor

Blocks Dictionary

The sound sensor is a rounded shape that must sit inside a green **operator** block.

Here you can see the sound sensor in a less than, equal to and greater than **operator** block.

The operator block works best inside a loop, this way Loti-Bot will continually check the sensor you are using.



Complete Code

Loti-Bot uses a 7 scale system to measure sound:

1 – below 50dB

2- 51-60dB

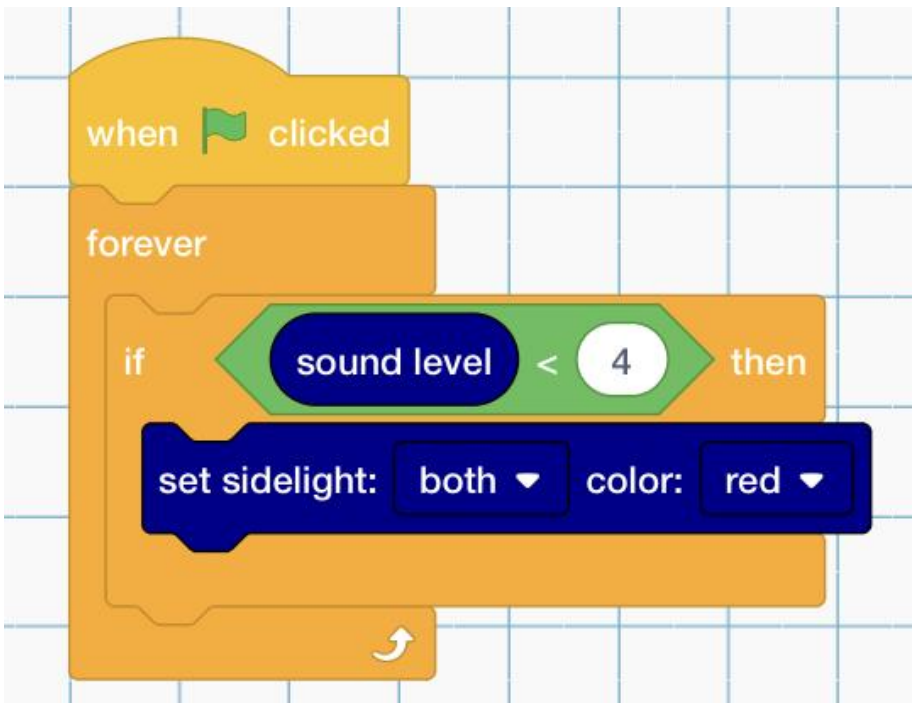
3 – 61-70dB

4 – 71 – 80 dB

5 – 81 – 90 dB

6 – 91 -100 dB

7 – Over 101 dB



Activities

What do you think the example code will do? Why do you think that?

How would you modify the example code to return to teal lights and headlights off when the sound sensor detects no sound, without ending the program?

Stretch and Challenge

Why do you think it is more reliable to use the greater than operator rather than the equals to operator in this example code?

Can you program Loti-Bot to dance, getting faster and more colorful as the volume increases?

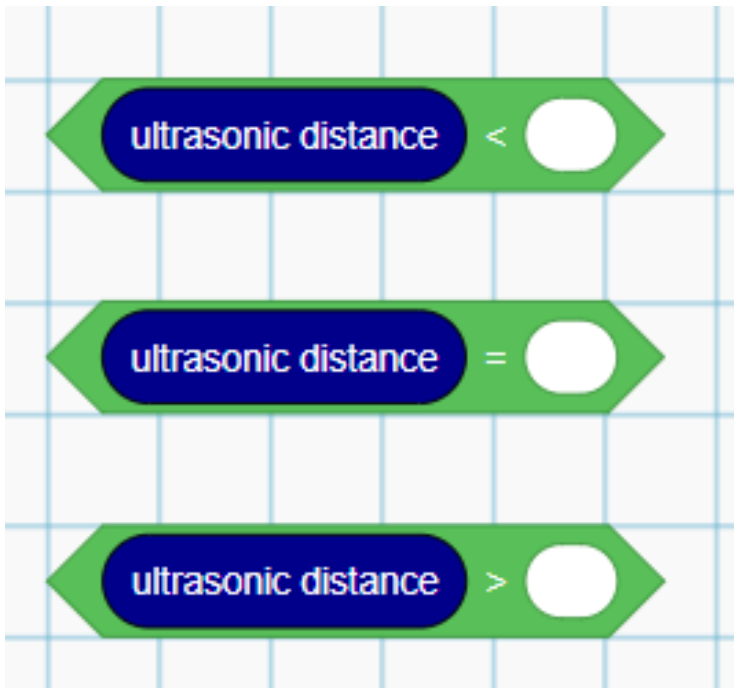
Skill Builder 2.3 – The Proximity Sensor

Blocks Dictionary

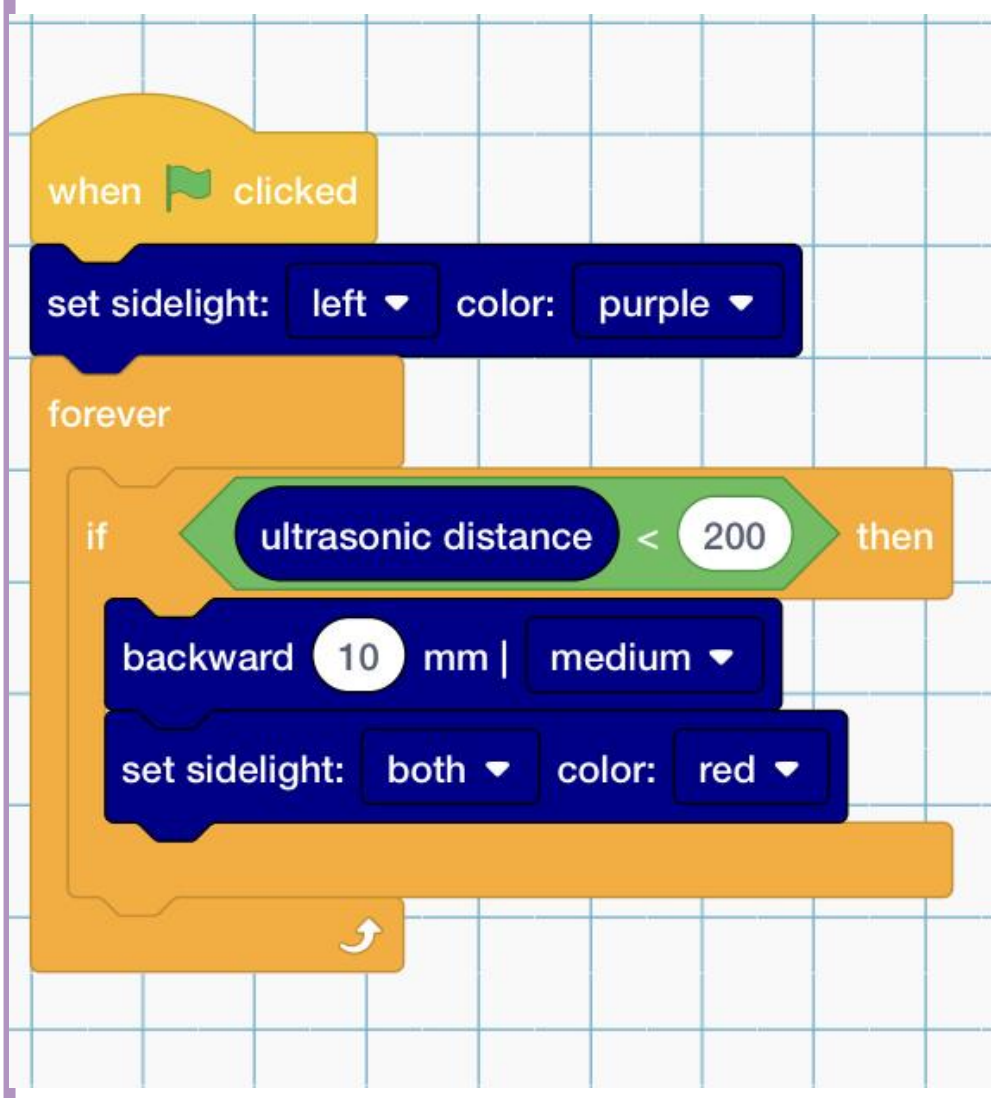
The Ultrasonic distance sensor is a rounded shape that must sit inside a green **operator** block.

Here you can see the ultrasonic distance sensor in a less than, equal to and greater than **operator** block.

The operator block works best inside a loop, this way Loti-Bot will continually check the sensor you are using.



Complete Code



Activities

What do you think the example code will do? Why do you think that?

How would you modify the example code to continually move towards a moving object, for example follow your hand.

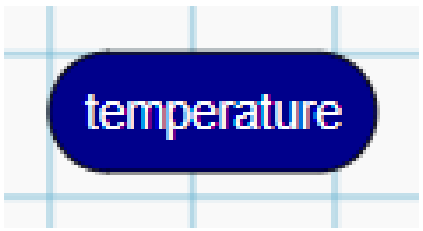
Where might you see a sensor like this used in the real world? What for?

Stretch and Challenge

In groups can you build a maze big enough for Loti-Bot to travel through? Program your Loti-Bot to move forwards through the maze avoiding hitting the walls. Debug and refine your program so that Loti-Bot can complete the maze, even when obstacles are moved.

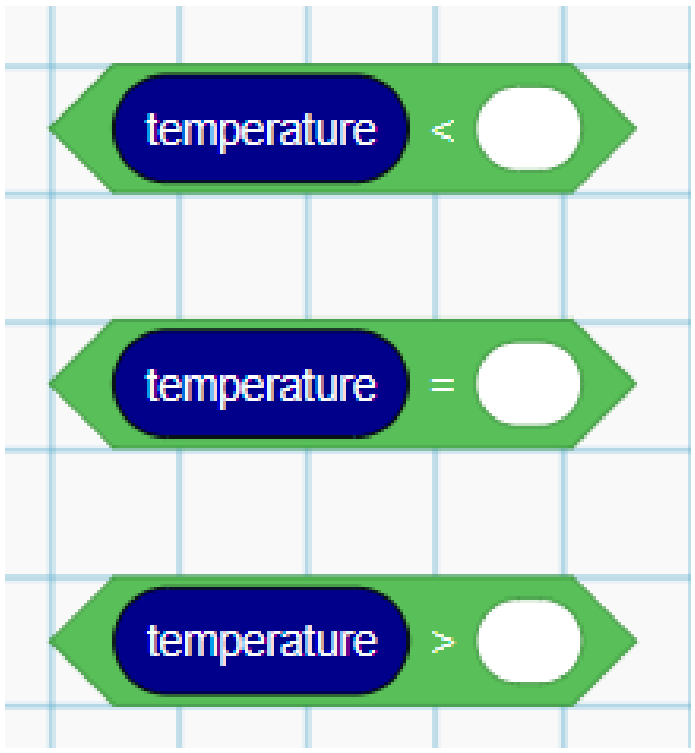
Skill Builder 2.4 – The Temperature Sensor

Blocks Dictionary



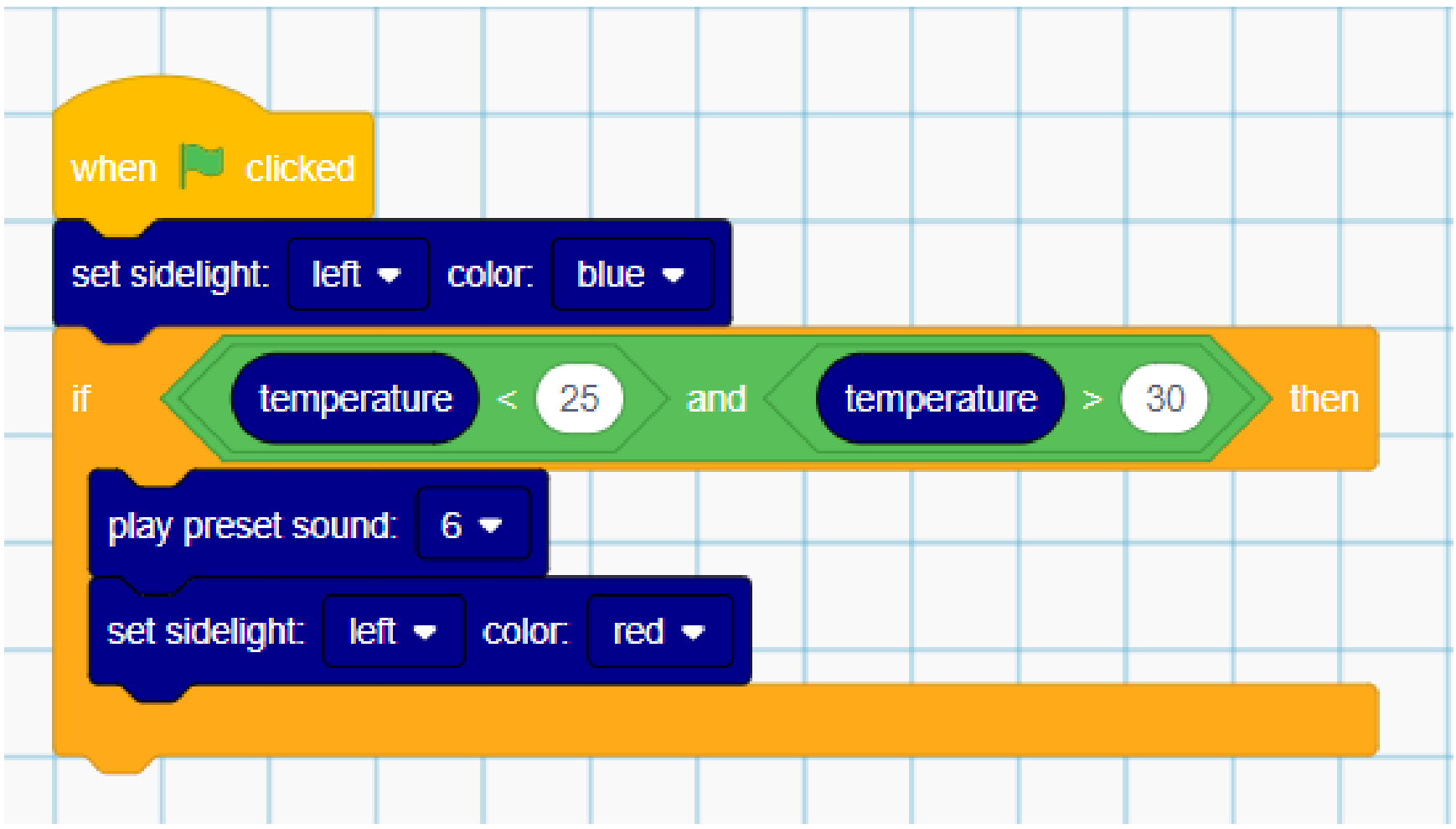
The temperature sensor is a rounded shape that must sit inside a green **operator** block.

Here you can see the temperature sensor in a less than, equal to and greater than **operator** block.



The operator block works best inside a loop, this way Loti-Bot will continually check the sensor you are using.

Complete Code

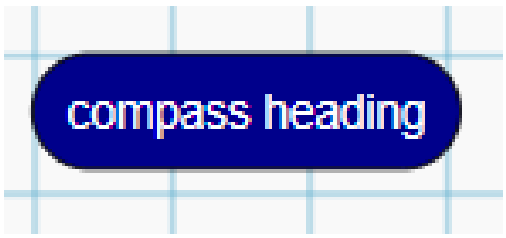


This code utilises logic in the form of an AND operator to select a range of temperatures to detect. Can you identify which temperatures would cause Loti-Bot to glow red?

Are you able to program Loti-Bot to move through darker shades of blue as she gets colder, can you make her chatter and shiver as she moves into low temperatures?

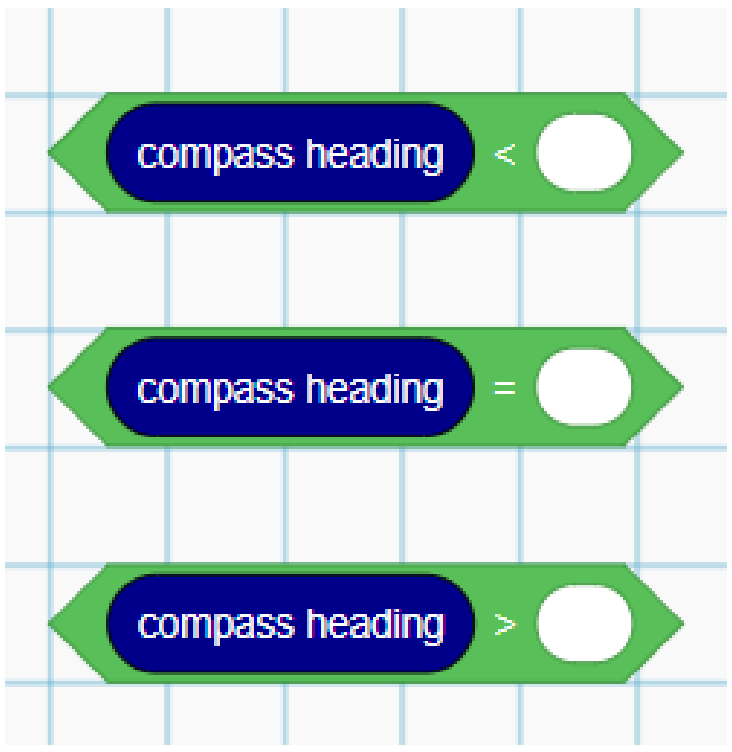
Skill Builder 2.5 – The Compass

Blocks Dictionary



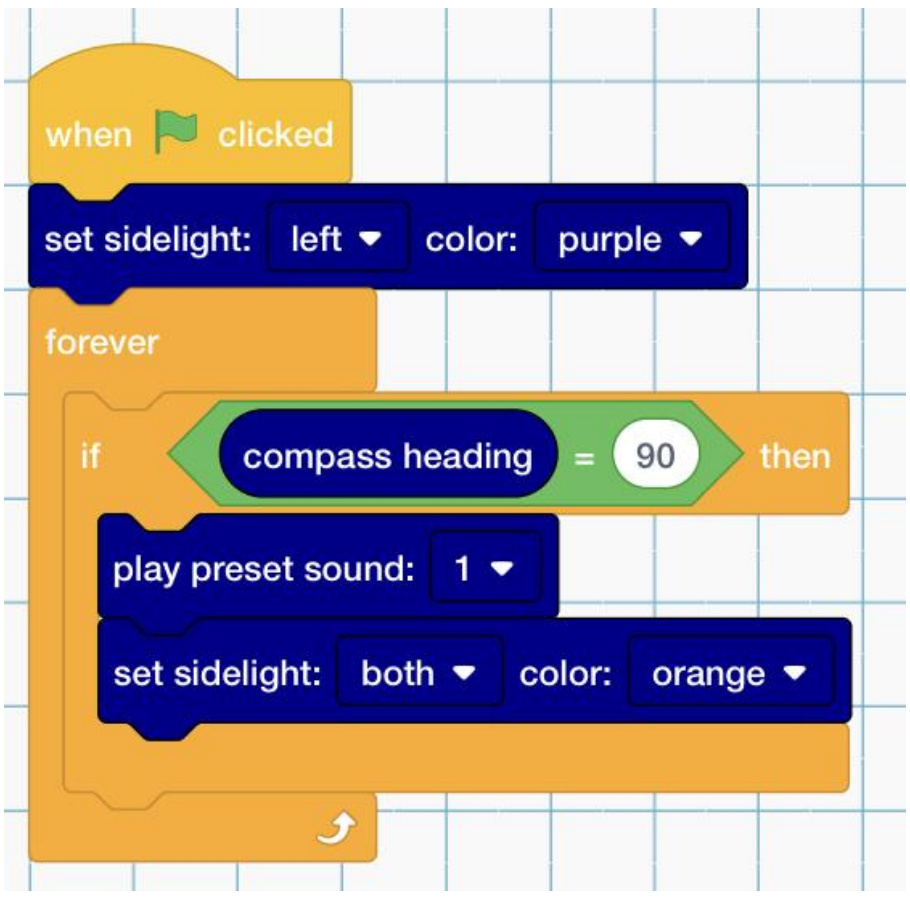
The compass sensor is a rounded shape that must sit inside a green **operator** block.

Here you can see the comass sensor in a less than, equal toand greater than **operator** block.

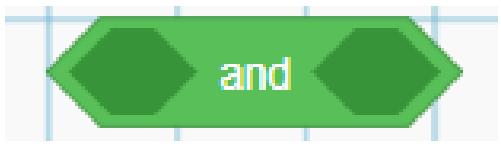


The operator block works best inside a loop, this way Loti-Bot will continually check the sensor you are using.

Complete Code

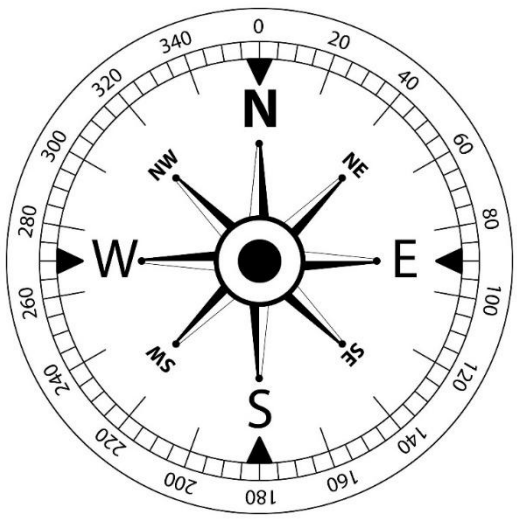


Sometimes it is easier to give Loti-Bot a **range** to work with, one way to achieve this is using the **AND** operator.

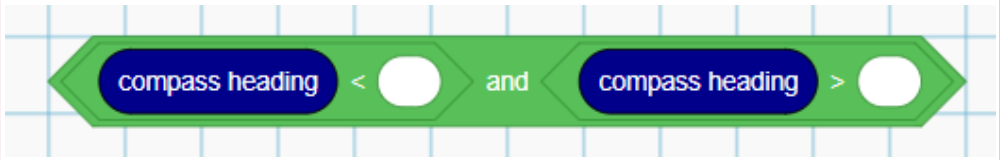


Activities

Use the compass to modify the code to turn orange when Loti-Bot is facing due south – how is that expressed as a number?



Stretch and Challenge



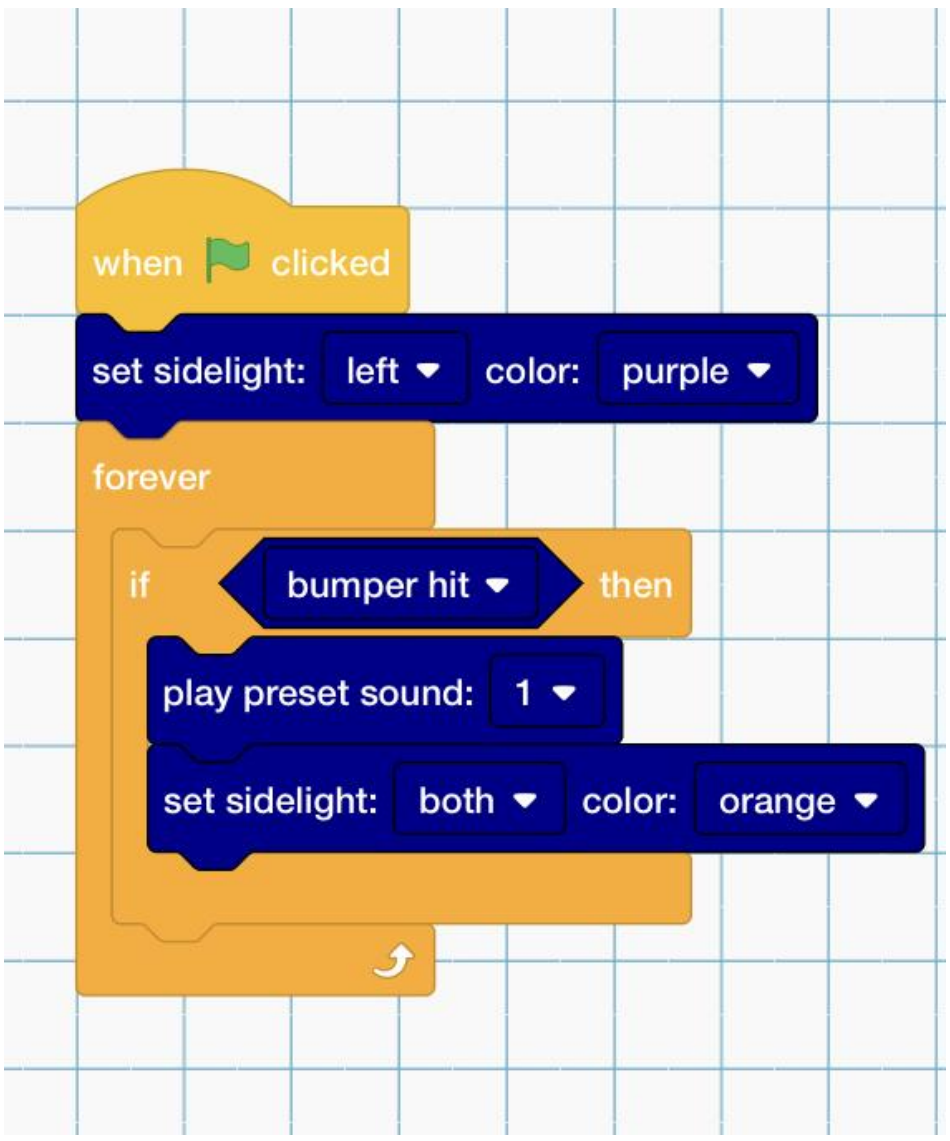
How could this technique be used to program an output between a North to East reading?

Skill Builder 2.6 – Bumper Sensors

Blocks Dictionary

Unlike some of the other sensors, the Bumper Hit block does not need to be seated inside a green **operator**. This is because it is a **boolean** sensor and only has two states (hit or not hit) whereas other sensors have a larger range of potential readings.

Complete Code



Activities

What do you think the example code will do? Why do you think that?

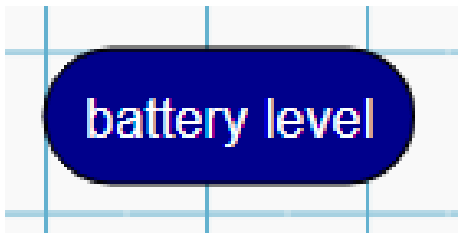
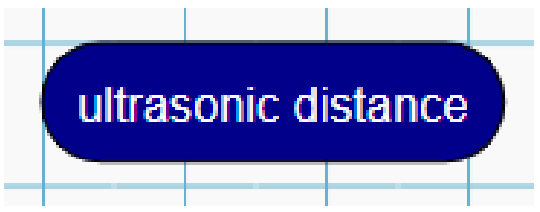
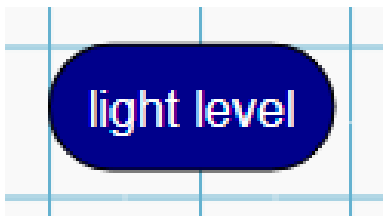
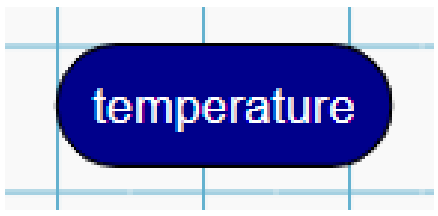
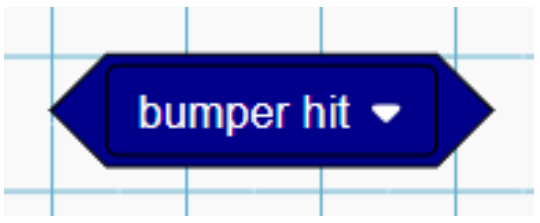
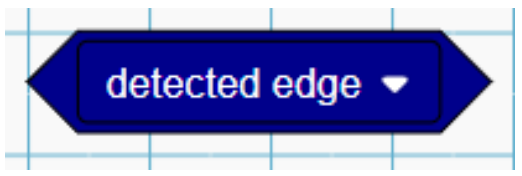
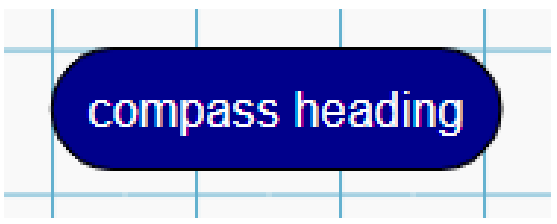
Can you program Loti-Bot to move forward 10cm every time the bumper sensor is hit?

Stretch and Challenge

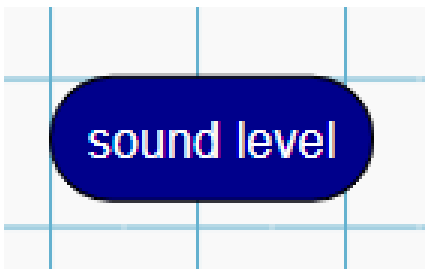
Where in the real world might you see a sensor like this used?

Can you program Loti-Bot to behave like a real-world robot of your choosing?

Sensor Data Sheet 1

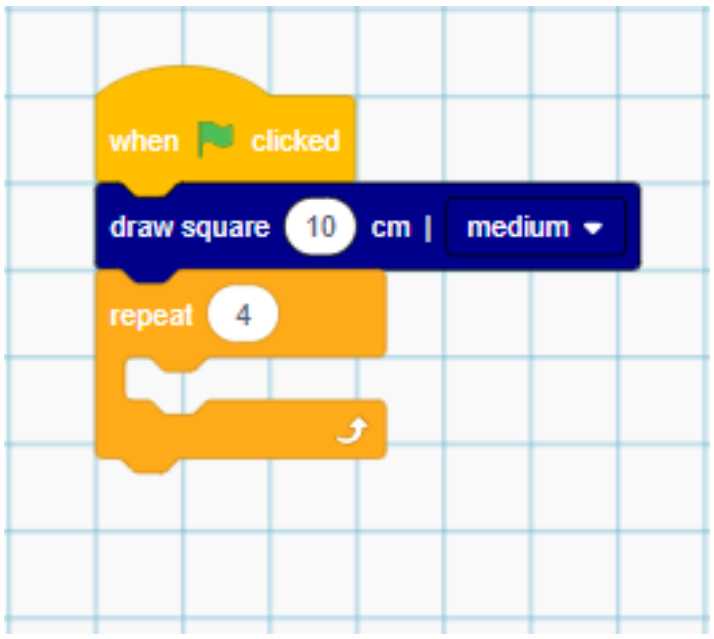
	Minimum value	Maximum value	Unit
	0	100	%
	50	2000	mm
	0.01	32,000	Lux
	0	50	Degrees Celsius
	False	True	Boolean
	False	True	Boolean
	1 (North)	360	Degrees

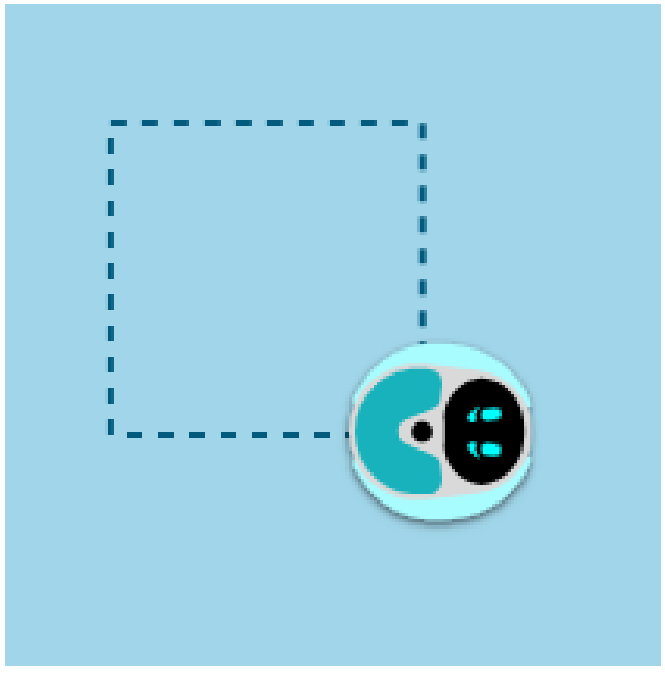
Sensor Data Sheet 2

	Minimum value	Maximum value	Unit
	1	7	1 – below 50dB 2- 51-60dB 3 – 61-70dB 4 – 71 – 80 dB 5 – 81 – 90 dB 6 – 91 -100 dB 7 – Over 101 dB

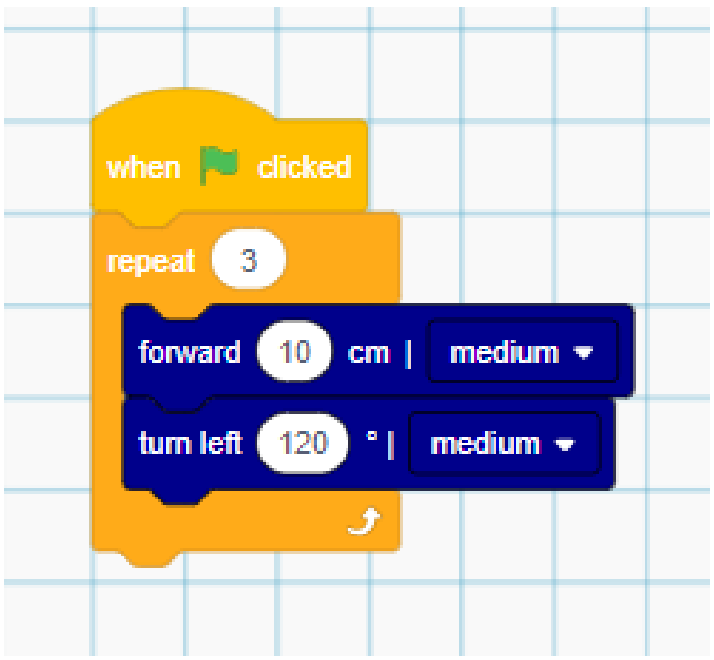
Example Coding Sheet 1

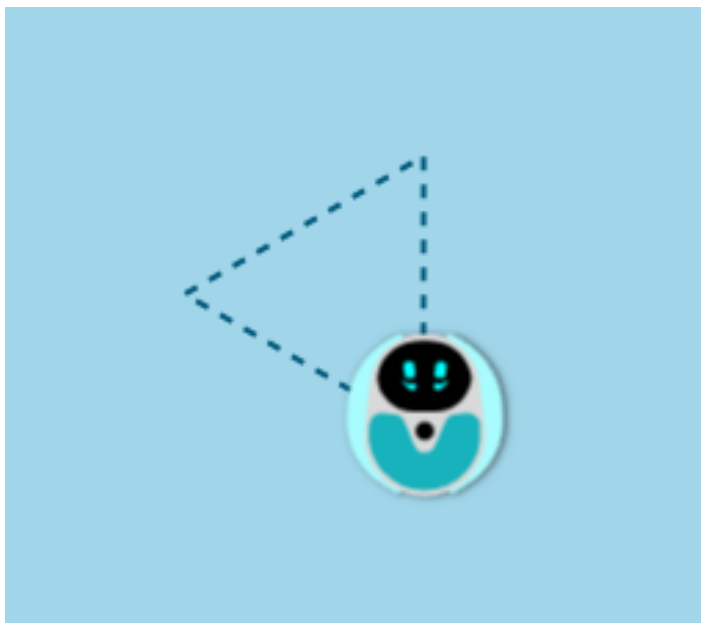
How to draw a square...



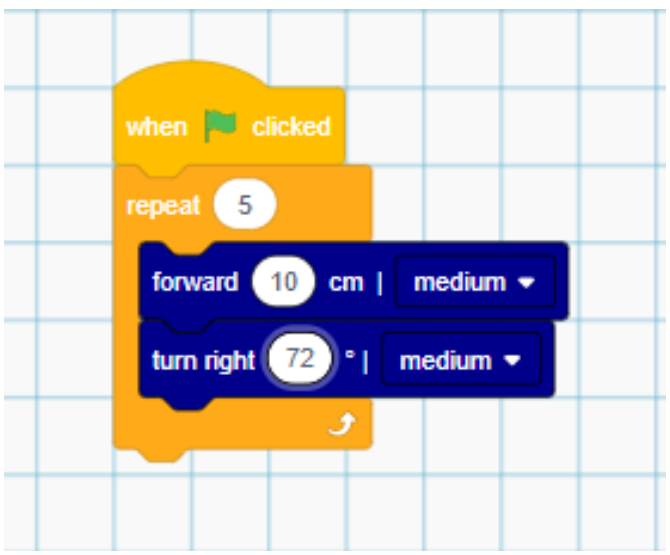


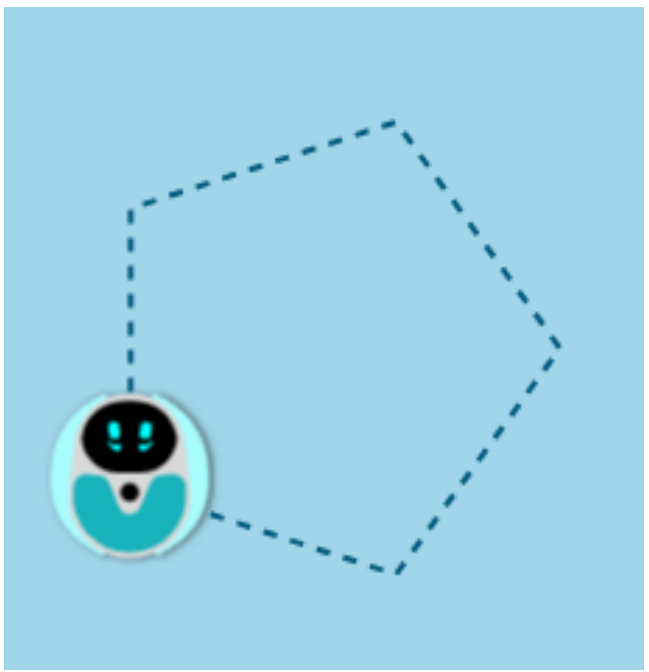
How to draw a triangle...





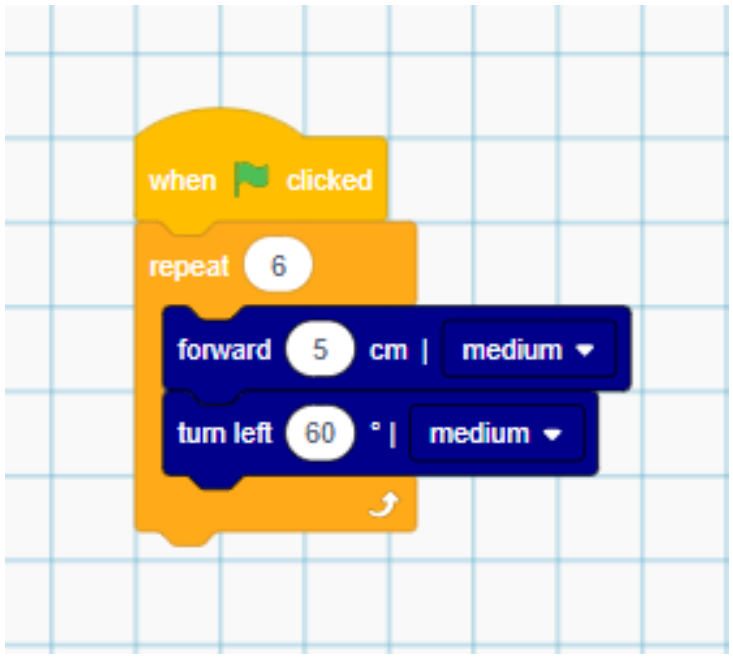
How to draw a pentagon...

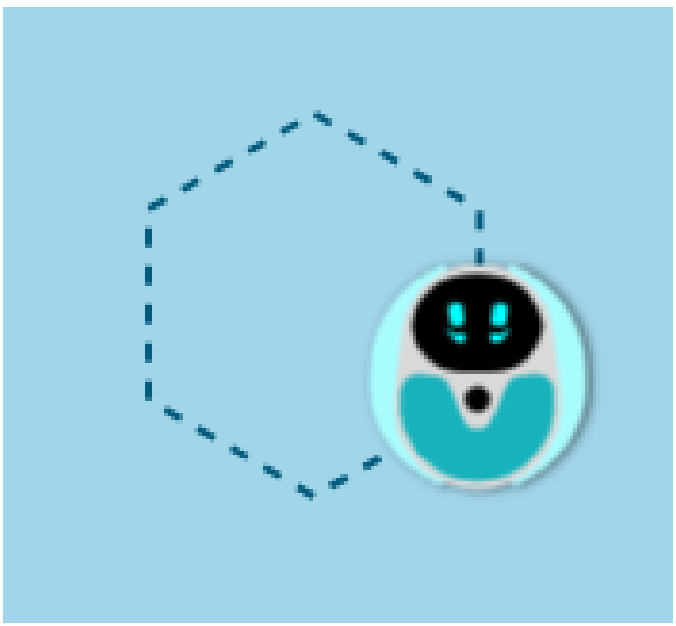




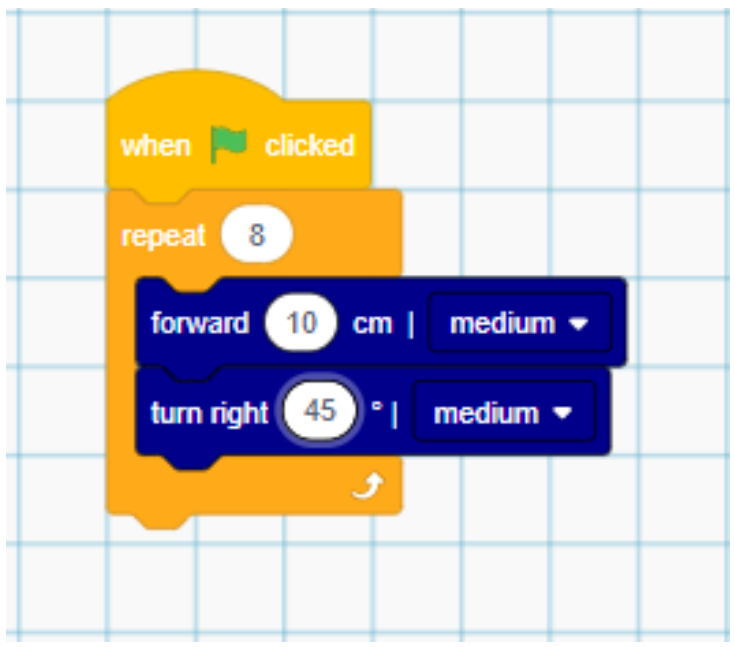
Example Coding Sheet 2

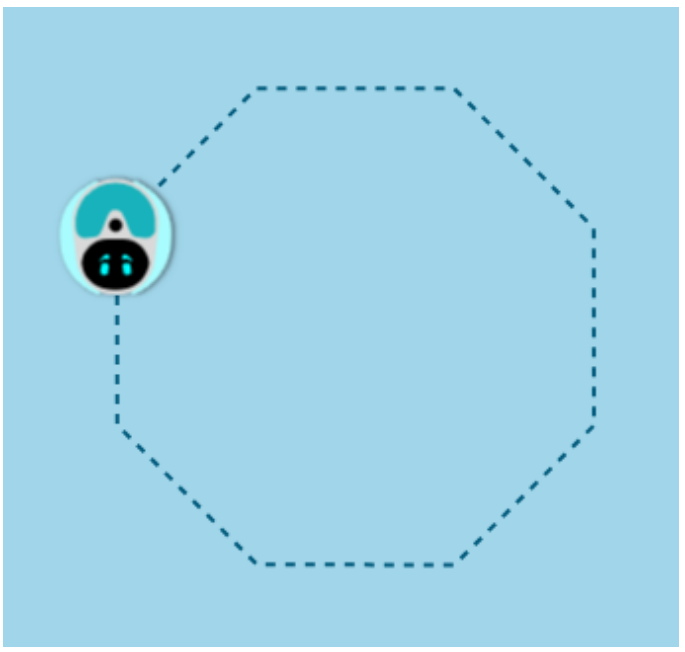
How to draw a hexagon...



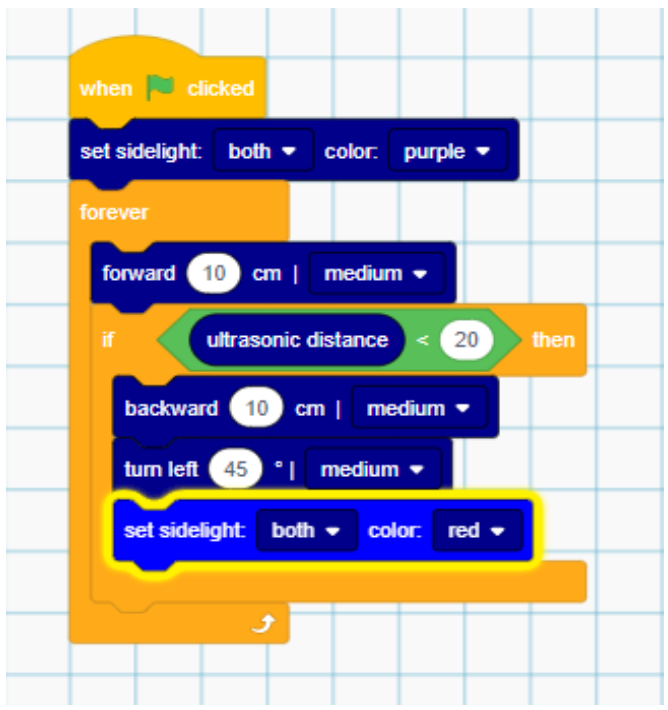


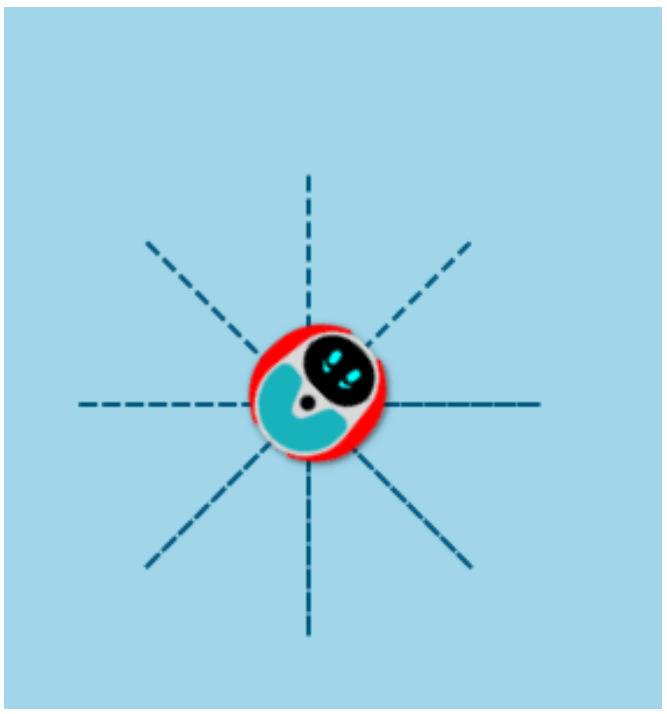
How to draw an octagon...





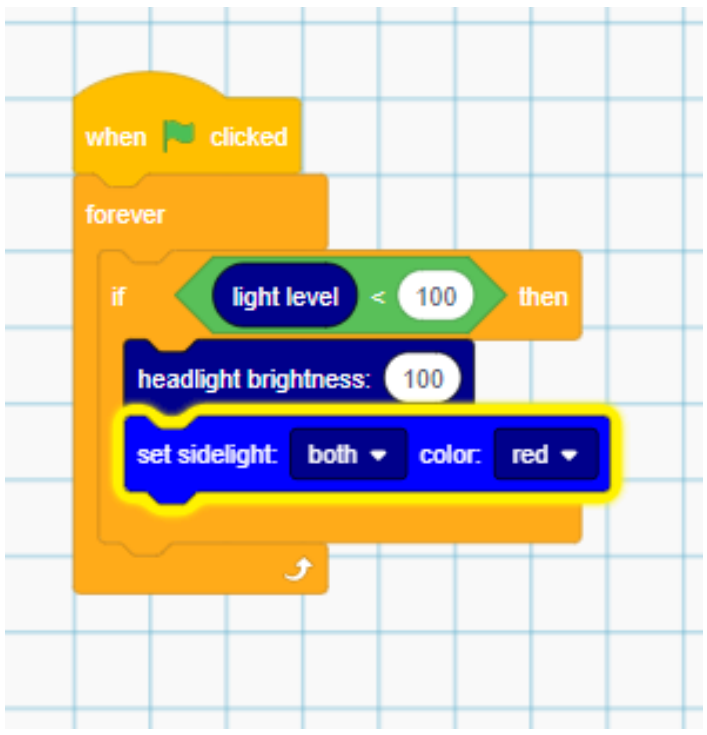
How to draw a star shape...

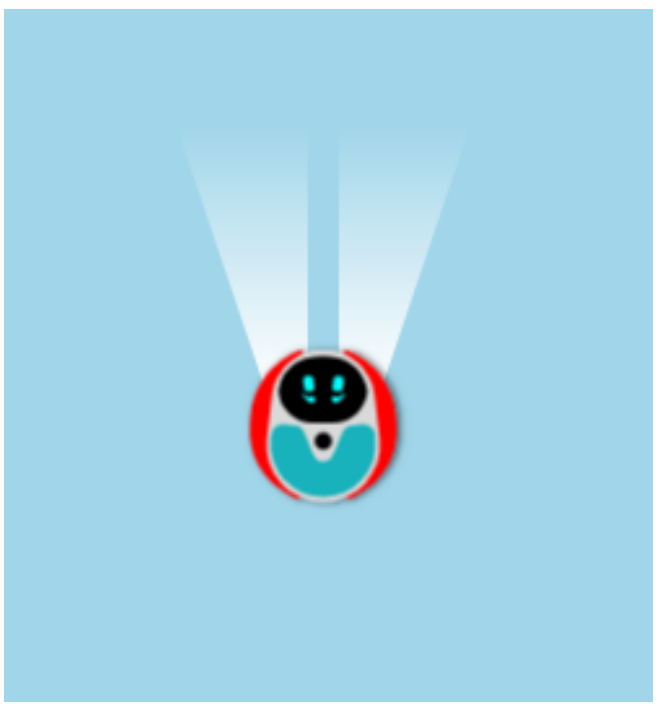




Example Coding Sheet 3

Turning on Loti-Bot's headlights based on the light sensor





Turning on Loti-Bot's sidelights based on sound level