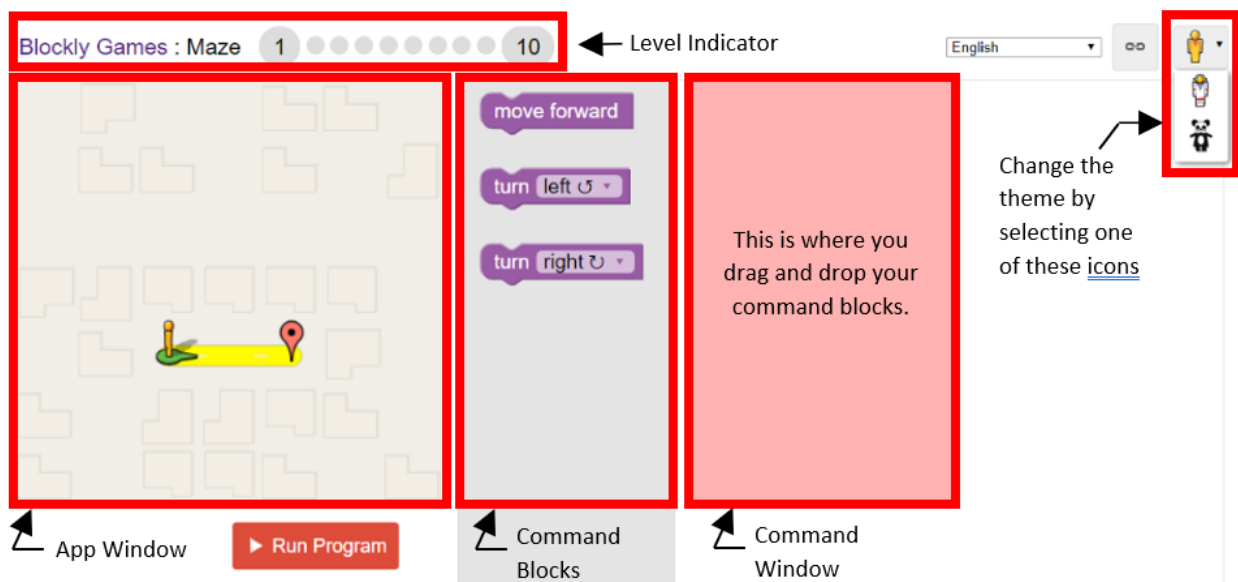


Introduction/How to Navigate the Website (Buttons, skins, moving blocks etc.)

Welcome to the coding activity! You will be using <https://blockly.games/maze> to learn about the process of solving coding problems. Blockly is a drag and drop coding website that will help you learn the concept of coding without having to write actual code itself. Once a. The object is to navigate the avatar to the marker by dragging the purple commands into the white workspace on the left.

In the screenshot below, you will be navigating your character through the maze located in the app window. There are a total of 10 levels, each increasing in difficulty. A level indicator is present at the top left of the screen. After dragging the purple command blocks to the command window, you will select “Run Program” to test your code. Good luck!

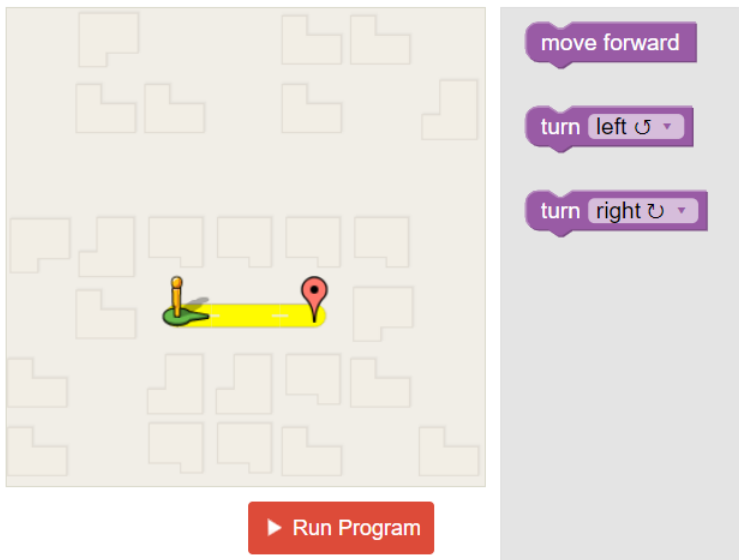


While solutions are provided for each level, there might be alternative ways to solve them. Not all blocks are required for each solution either.

For an extra challenge, try thinking of multiple ways to solve each maze or use as few blocks as possible!

Level 1:

Blockly Games : Maze 1 ● ● ● ● ● ● ● ● ● ● 10



move forward

turn left ↶

turn right ↷

▶ Run Program

Objective:

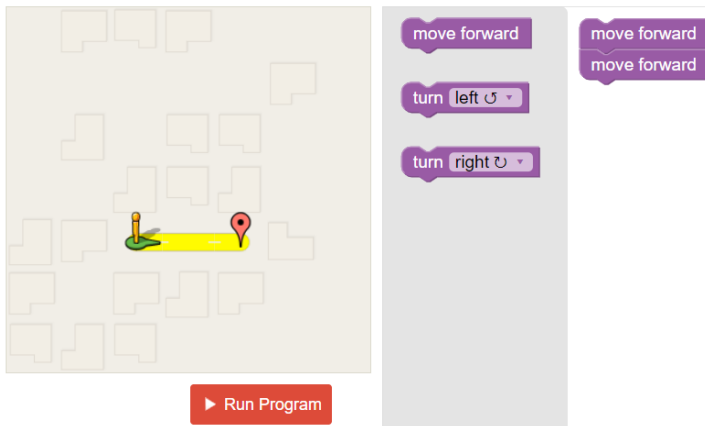
- The forward movement command is fully understood by the player.

Approach:

In order to solve the program, testing how each block works is important. The 'move forward' block will move the character one space forward. The 'turn left' only turns the character 90 degrees to the left but does not move it, and vice versa for the 'turn right' block. To test the program, the 'run program' button will move the character based on the blocks chosen. It will read the instructions from the top to the bottom. With that information to reach the goal the character needs to move forward twice.

Solution:

Blockly Games : Maze 1 ● ● ● ● ● ● ● ● ● ● 10



move forward

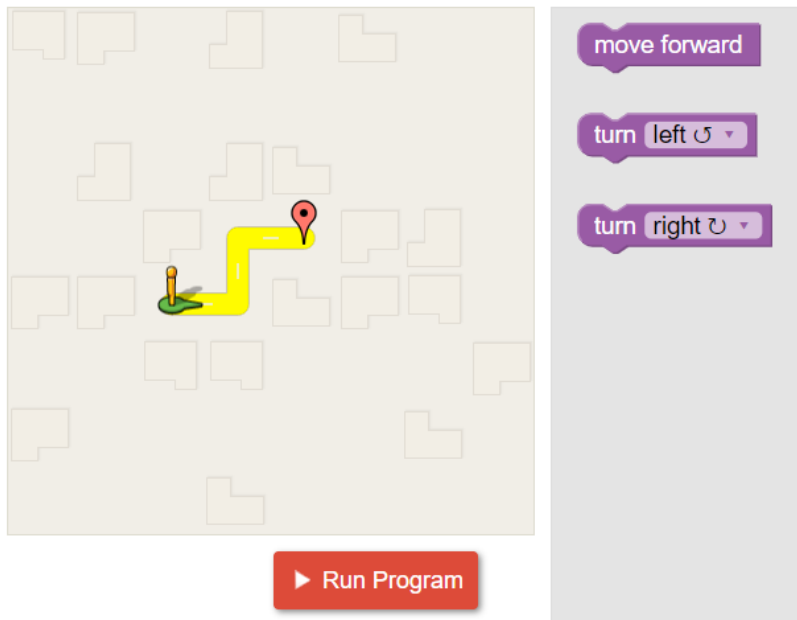
turn left ↶

turn right ↷

move forward

▶ Run Program

Level 2:



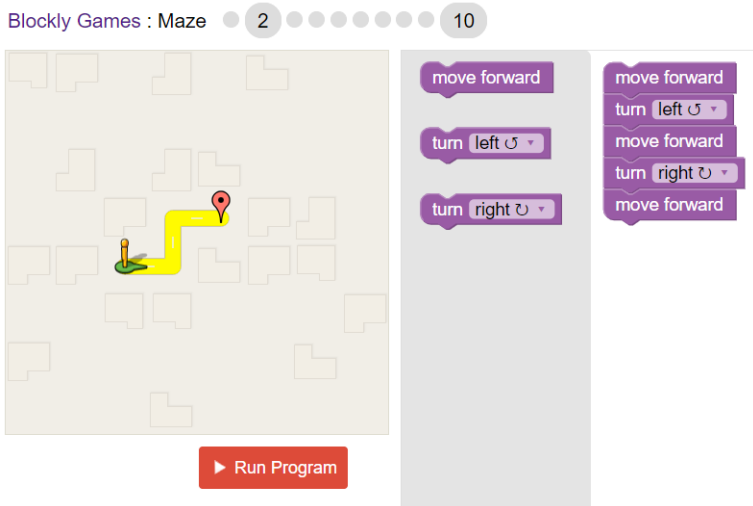
Objective:

- The left turn movement command and right turn movement command are fully understood by the player.

Approach:

In this level, the basic commands are further explored. The character needs to navigate using the given commands to the marker. Commands can be stacked on top of each other in the order they need to be performed. The Run Program button executes the stacked commands in order from top to bottom.

Solution:



Level 3:

Blockly Games : Maze

3

10

You have 0 blocks left.

▶ Run Program

Objective:

- Player understands the repetition of the forward command until the appropriate condition has been met.

Approach:

In this stage, the concept of repeating a command is introduced. By only allowing a limited number of blocks to be used. The “repeat until” command allows a command to be completed until the target is reached. At this point, the program is ended. In this task, the player needs to repeat the “forward” command by placing it within the “repeat until” command.

Solution:

Blockly Games : Maze

3

10

You have 0 blocks left.

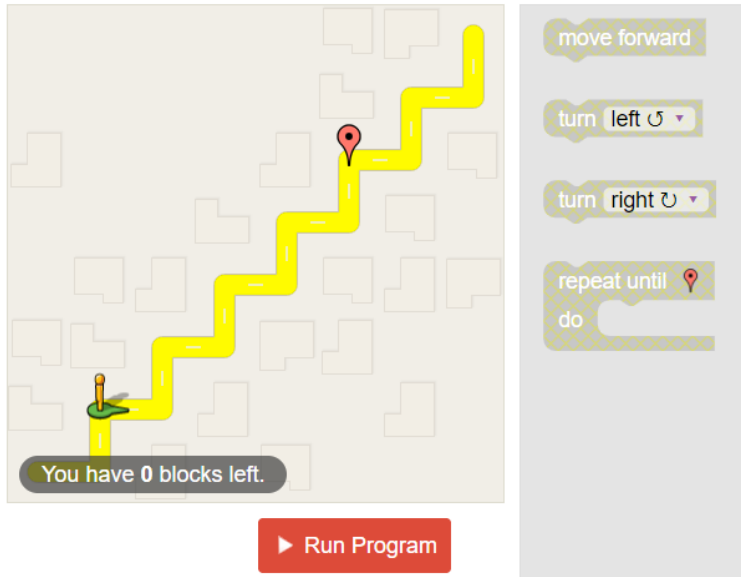
▶ Run Program

Level 4:

Blockly Games : Maze

4

10



move forward

turn left ↶

turn right ↷

repeat until 📍

do

You have 0 blocks left.

▶ Run Program

Objective:

- Player understands how to recognize repeated movement patterns and nesting them within a “repeat until” command in order to reach the endpoint. The pattern of movement required builds off of the commands learned previously.

Approach:

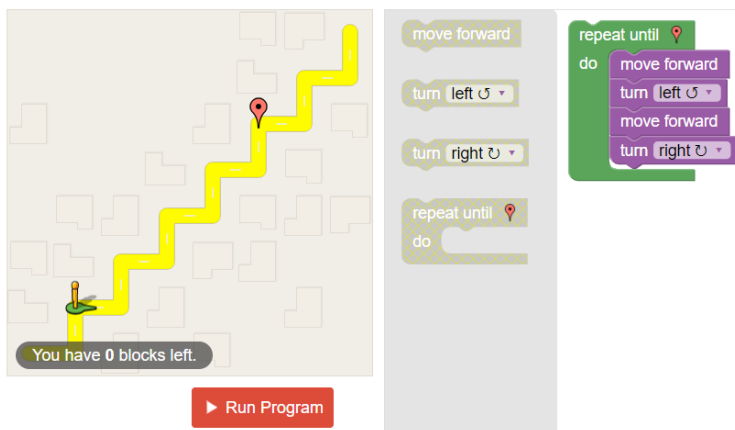
This stage builds on the use of the “repeat until” command. The proper combination of turns and moving forward must be entered into the repeat block. If blocks are not in the proper order, the program will repeat the wrong path resulting in the character leaving the path. A pattern of moving forward, turning left, moving forward, then turning right repeats itself. Therefore, by nesting the command blocks within the “repeat until” command, this pattern of movement will continue until the player has reached the endpoint.

Solution:

Blockly Games : Maze

4

10



move forward

turn left ↶

turn right ↷

repeat until 📍

do

move forward

turn left ↶

move forward

turn right ↷

You have 0 blocks left.

▶ Run Program

Level 5:

Blockly Games : Maze

5

10

You have 0 blocks left.

Run Program

- move forward
- turn left 90°
- turn right 90°
- repeat until [target icon]
do

Objective:

- Pairing the repetition command with manual guidance

Approach:

This stage explores when to use the repeat command. Other commands can be used before or after the repeat command, but still be outside. Once again, order is important. The program will execute other commands in order before the repeat command. Since the program does not exit until the marker, it might be useful to utilize this command last so any other maneuvers can be made first.

Solution:

Blockly Games : Maze

5

10

You have 0 blocks left.

Run Program

- move forward
- move forward
- turn left 90°
- repeat until [target icon]
do
move forward
- turn right 90°

Level 6:

Blockly Games : Maze

6

10

move forward

turn left ↶

turn right ↷

repeat until 📍

do

if path to the left 📍

do

▶ Run Program

Objective:

- Introduce the “if” command while reinforcing the repetition command

Approach:

- Look for patterns of motion required to navigate and factors that would necessitate a change in motion. In this task, the primary pattern of motion is to move forward, but the direction needs to change to the left at each corner. To do this, use the “repeat until” command to pair a “move forward” command with an “if path” command. Then specify what you want the “if path” command to look for in order to “activate” the commands inside it, and select the appropriate command. In our solution, the player moves forward one time and checks if there is a path to the left. If there is not a path, the loop repeats. If there is a path to the left, the turn left command is executed and the cycle continues. Alternatively, you could set the “if” condition to activate a left turn if there is a path directly ahead

Solution:

Blockly Games : Maze

6

10

move forward

turn left ↶

turn right ↷

repeat until 📍

do

move forward

if path to the left 📍

do

turn left ↶

repeat until 📍

do

▶ Run Program

Level 7:

Blockly Games : Maze

7

10

move forward

turn left ↶

turn right ↷

repeat until 📍

do

if path ahead ▾

do

▶ Run Program

Objective: To utilize the “if path ahead” button

Approach: This code has many straightforward paths so when you start to code one should realize that using the “if path ahead” button will allow for less blocks to be used. From here all we need to do is add the turns for the character to reach the goal.

Solution:

Blockly Games : Maze

7

10

move forward

turn left ↶

turn right ↷

repeat until 📍

do

if path ahead ▾

do

repeat until 📍

do

move forward

if path to the right ▾

do

turn right ↷

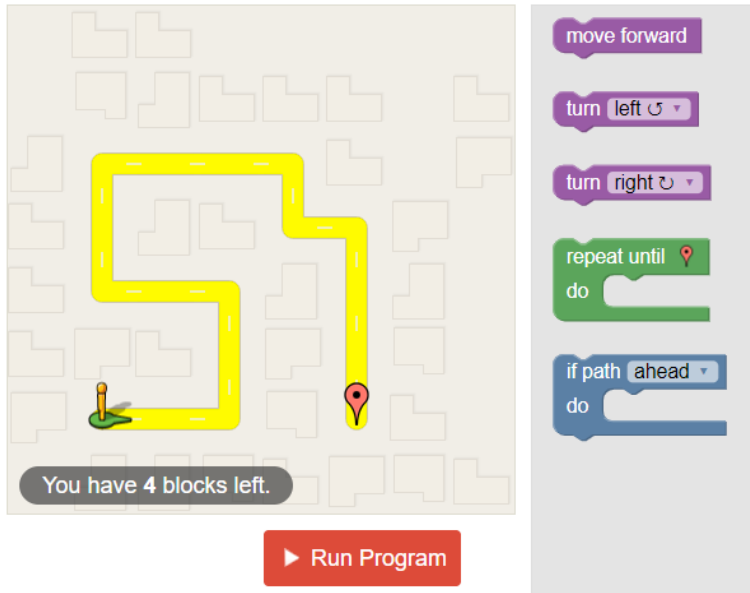
▶ Run Program

Level 8:

Blockly Games : Maze

8

10



move forward

turn left

turn right

repeat until

do

if path ahead

do

▶ Run Program

Objective: To make a more sophisticated code by decreasing the number of blocks used for the code. This is to emulate how much memory is needed in a computer to code. It's always better to decrease the amount of work needed to do something for both the programmer and the computer.

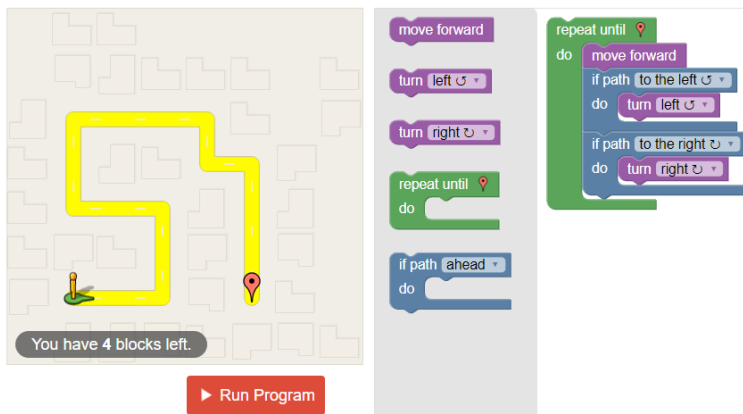
Approach: Since we can only use blocks, one needs to think of which blocks will do the most work with the least number of blocks which are the "repeat until", "if path" blocks. From here, the important thing to note is how the character's moves change depending on what is told.

Solution:

Blockly Games : Maze

8

10



move forward

turn left

turn right

repeat until

do

move forward

if path to the left

do

turn left

if path to the right

do

turn right

if path ahead

do

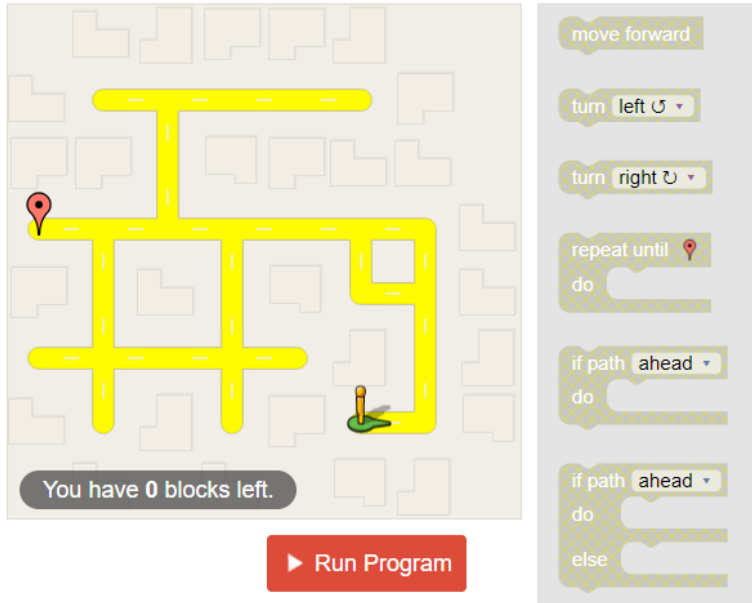
▶ Run Program

Level 9:

Blockly Games : Maze

9

10



move forward

turn left ↶

turn right ↷

repeat until 📍

do

if path ahead ▾

do

if path ahead ▾

do

else

▶ Run Program

Objective: To work through a more challenging coding problem

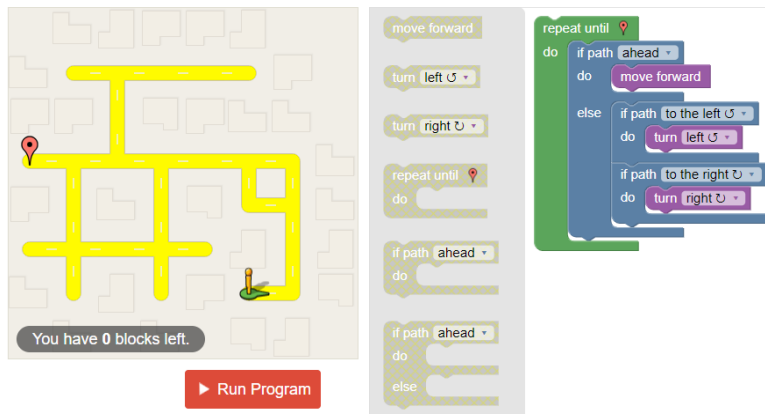
Approach: Since we can only use blocks, one needs to think of which blocks will do the most work with the least number of blocks which are the “repeat until”, “if path” blocks. From here, the important thing to note is how the character moves change depending on what is told.

Solution:

Blockly Games : Maze

9

10



move forward

turn left ↶

turn right ↷

repeat until 📍

do

if path ahead ▾

do

if path ahead ▾

do

else

if path to the left ↶ ▾

do

turn left ↶

if path to the right ↷ ▾

do

turn right ↷

▶ Run Program

Level 10:

Blockly Games : Maze

10

You have 3 blocks left.

Run Program

```
move forward
turn left
turn right
repeat until
do
if path ahead
do
if path ahead
do
else
```

Objective: “Capstone” maze: Student uses all of the tools taught in previous levels to achieve the stated goal.

Approach: This is majoritively debugging. Debugging means finding small problems in the code and fixing them. Debugging in the real world applications can take a few minutes to years to finish. In this problem we use all the skills we have gained in the other sections to complete. Though our answer works it is shown with 3 blocks left to use meaning the developer of the website

Solution:

Blockly Games : Maze

10

You have 3 blocks left.

Run Program

```
move forward
turn left
turn right
repeat until
do
  if path ahead
  do
    move forward
    turn left
  else
    if path to the right
    do
      turn right
    else
      turn right
```