

Getting Started With JavaScript Blocks: Die Roll

Die Roll

Overview

The fourth project introduces the students to the selection condition IF...THEN...ELSE and how to control the individual LEDs.

.hex File

Final version of the .hex file called "04 Die Roll.hex"

POS Reference

Designs simple algorithms using loops, and selection i.e. if statements. (AL)

Declares and assigns variables. (AB)

Uses a variable and relational operators within a loop to govern termination. (AL) (GE)

Uses logical reasoning to predict outcomes. (AL)

Detects and corrects errors i.e. debugging, in algorithms. (AL)

Creates programs that implement algorithms to achieve given goals. (AL)

Understands that programming bridges the gap between algorithmic solutions and computers.(AB)

Uses nested selection statements. (AL)

I can statements

The students can:

- Use a gesture input to control the micro:bit.
- Create a randomly generated variable
- Use an IF...THEN...ELSE
- Display own patterns on the LEDs

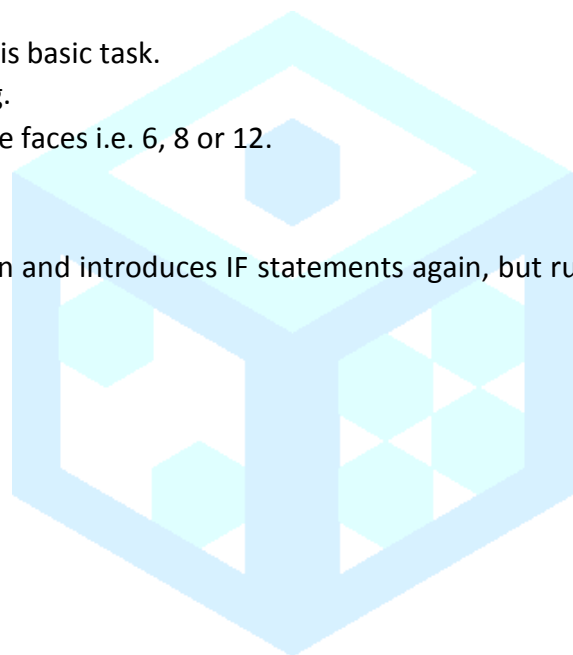
Challenges

A number of challenges could be based upon this basic task.

- Add an animation of the die faces rolling.
- Allow the user to state the number of die faces i.e. 6, 8 or 12.

Next Steps

Lesson 5 uses the gesture command, LED screen and introduces IF statements again, but runs two programming loops at the same time.

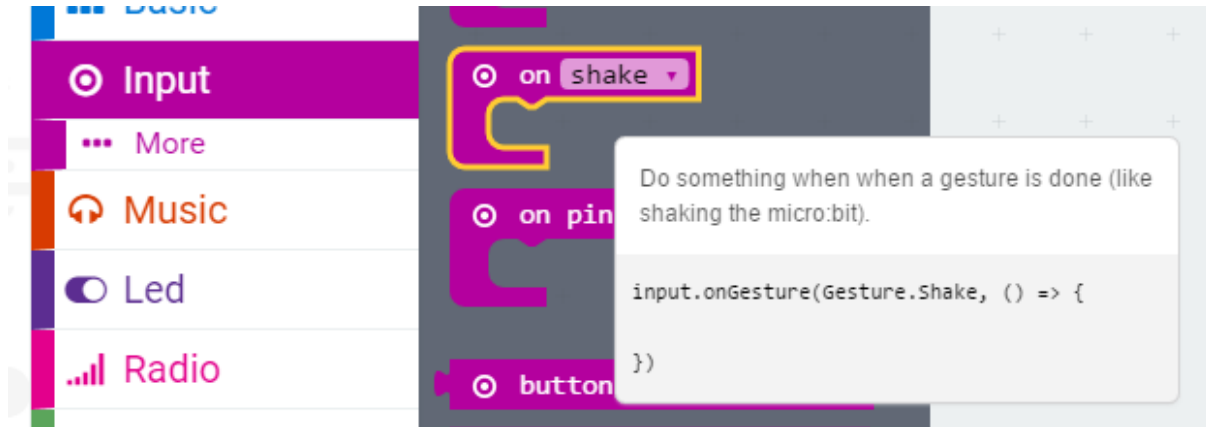


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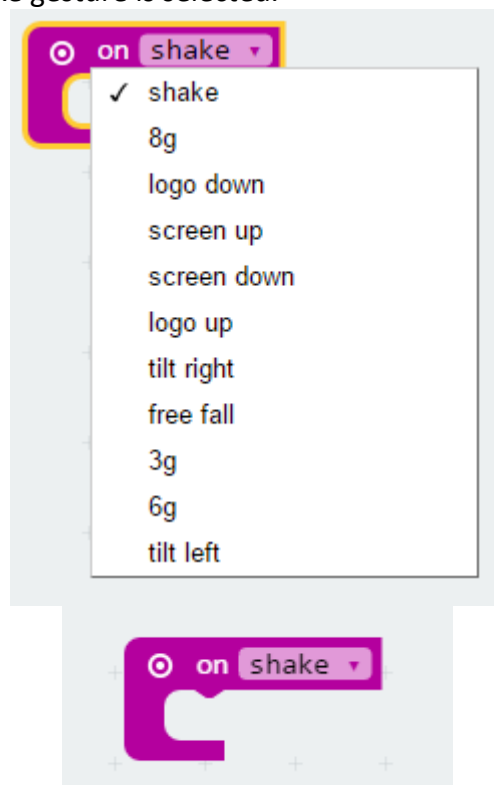
Step by Step

This is a program that allows the user to shake the micro:bit to show a die face.

On the JavaScript Blocks editor select the input blocks from the block menu and select the “shake” block.



Once on the worksheet the “on” block can be changed to a number of gestures, such as tilt left or right. For this project the shake gesture is selected.

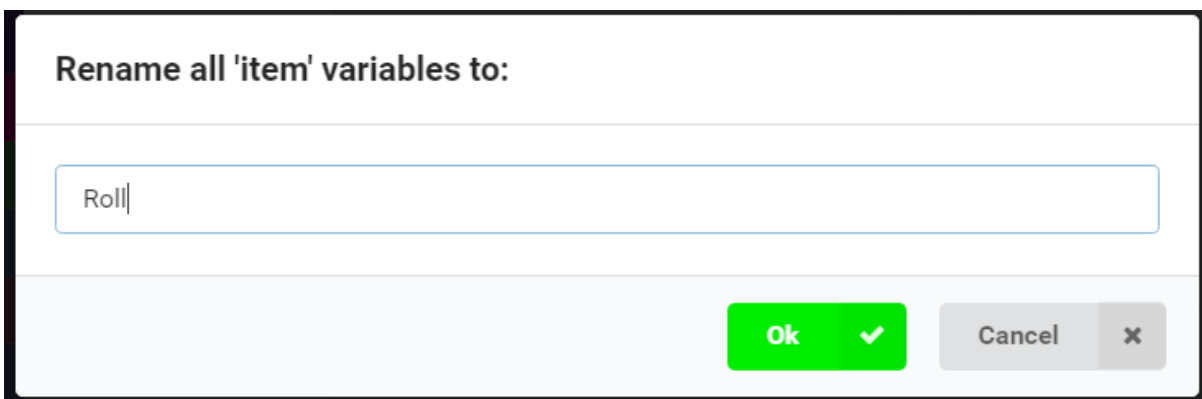
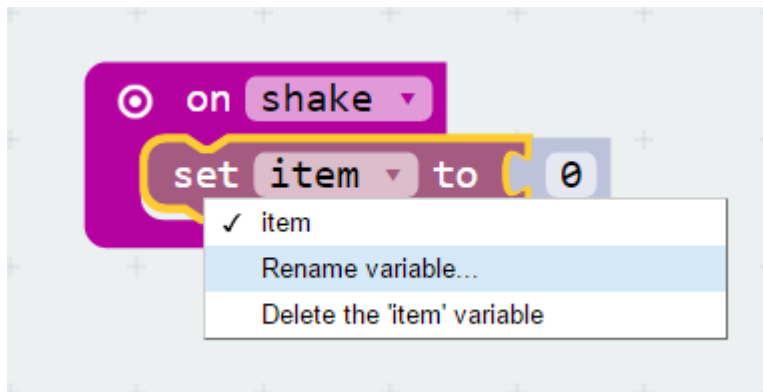


Now your program will react to the shake input gesture, we need to program what it does.

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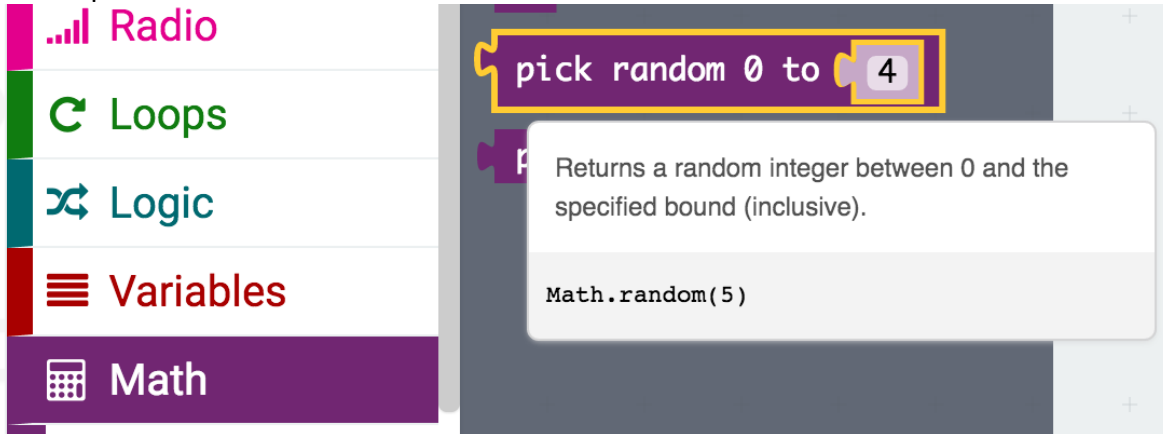


Rename the variable to something more suitable, such as “Roll”. A popup box will allow you to change the variable name.

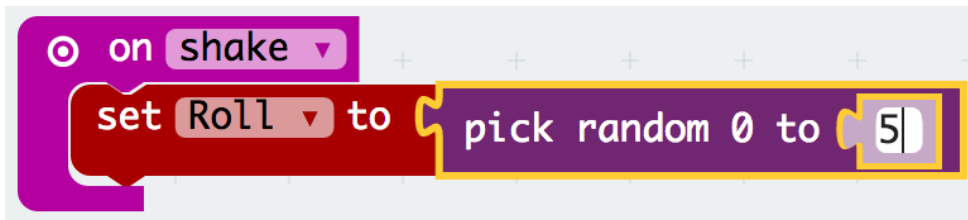


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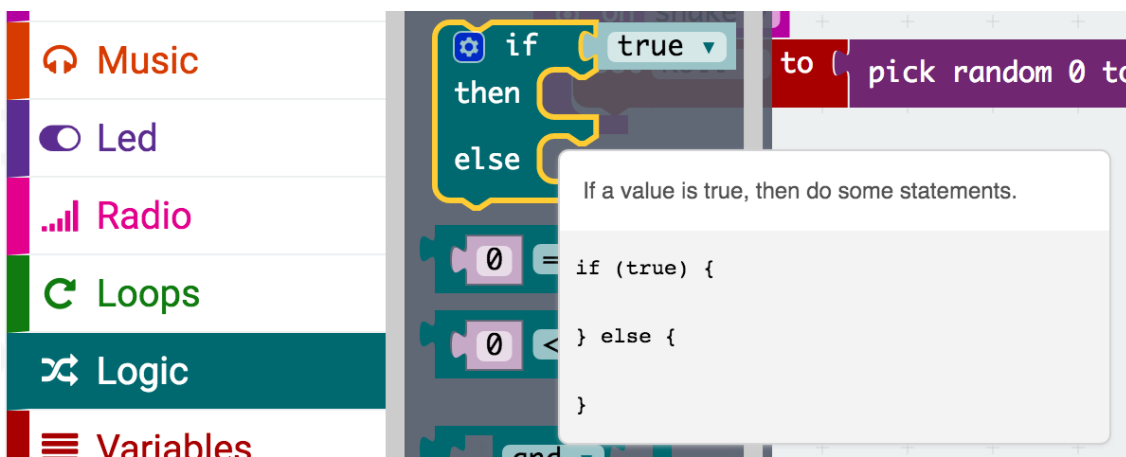
Now that a variable called “Roll” has been created we needed to pick a random number between 0 and 5. This is 6 different values in total. From the block menu select the “Math” option and select “pick random 0 to 4”



Drag the “pick random” block onto the workspace and connect it to the “Set variable” block replacing the “0”. Now the program will pick a random number between 0 to 5 every time the micro:bit is shaken. The number is stored in the variable “Roll”.

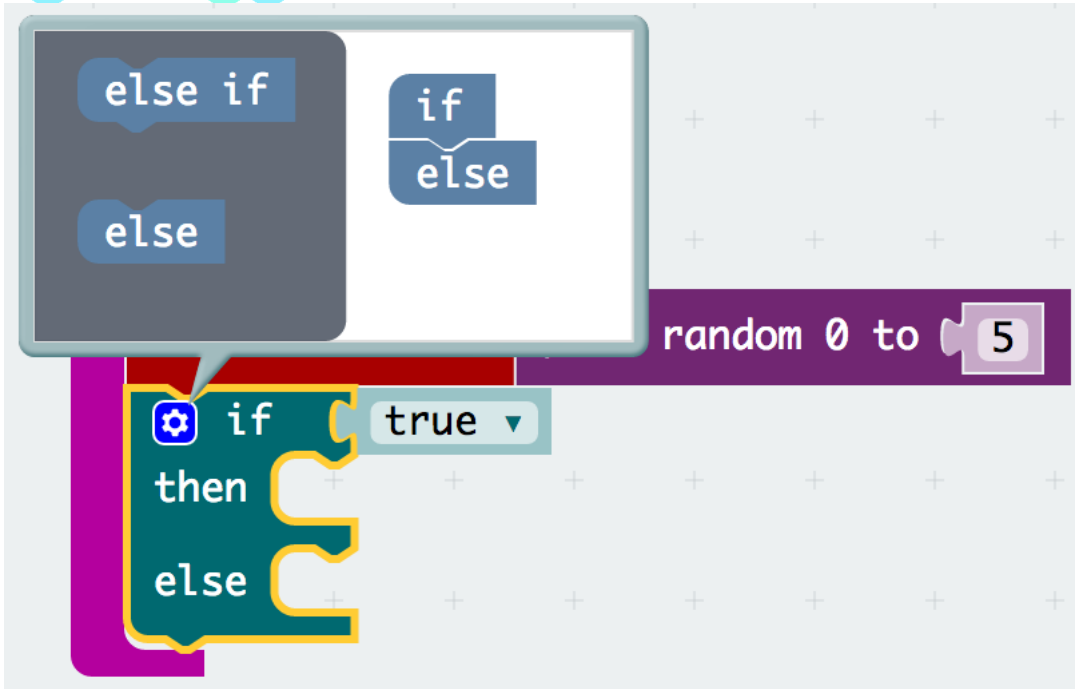


Now the micro:bit needs to display a difference result based upon the “roll” variable. This is known as selection. In this case we will be using the IF...THEN...ELSE section. To add selection to the micro:bit it can be found on the block menu under the Logic option.

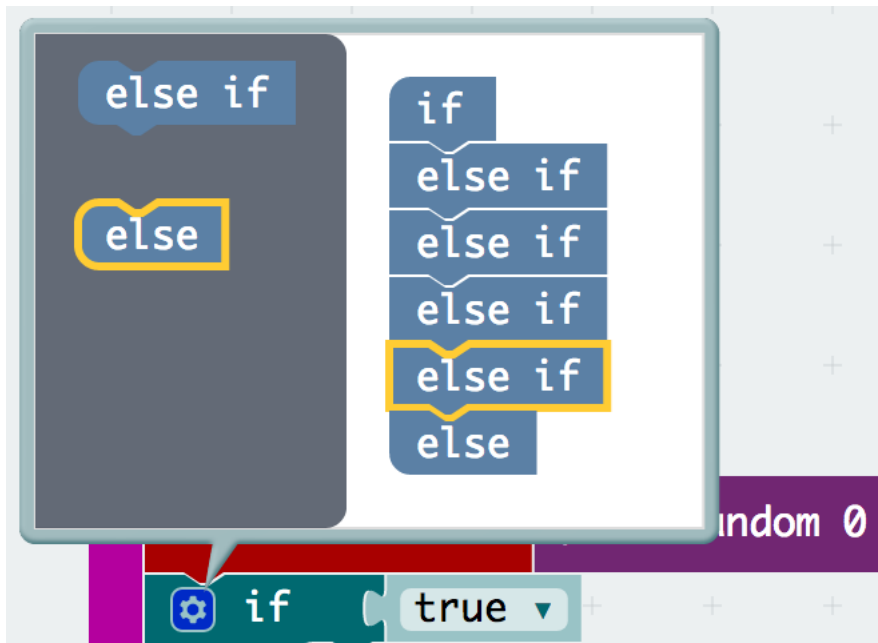


Add a logic statement of “IF THEN ELSE” and use the cog to edit the logic to have multiple conditions.

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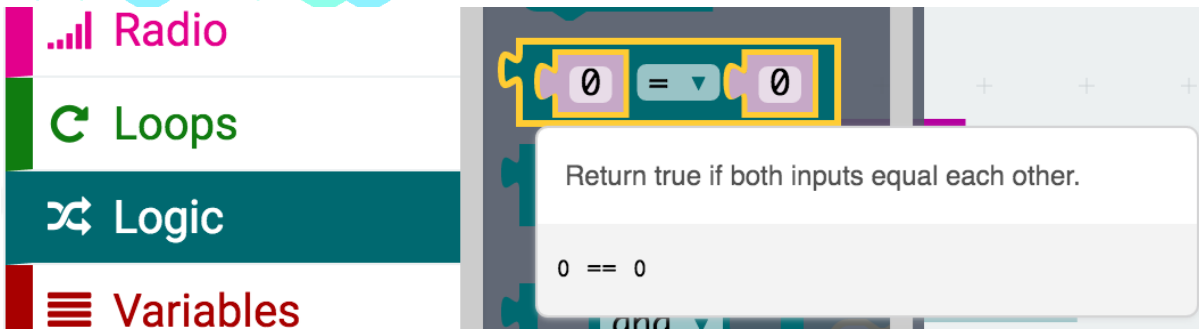


As there is 6 possible options, 4 “else if” statements need to be added. Since there is the first “if” statement followed by 4 “else if” statements and the final “else” statement, that covers 6 options in total.

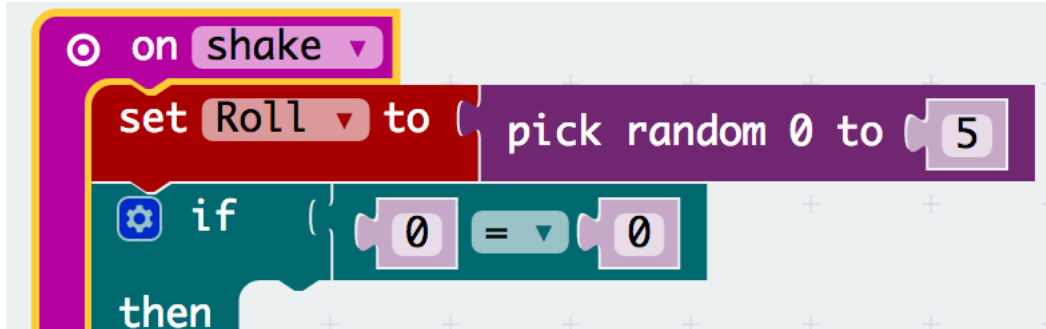


Next there we need to create a logical statement for the IF statement to be based upon to allow for selection. Again from the “logic” option on the block menu select the “equals” block.

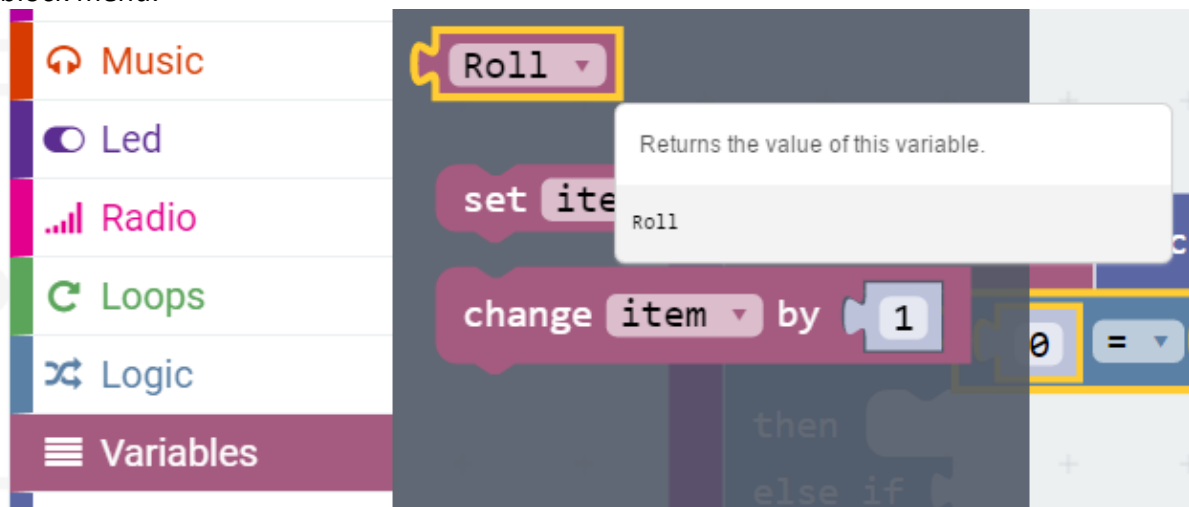
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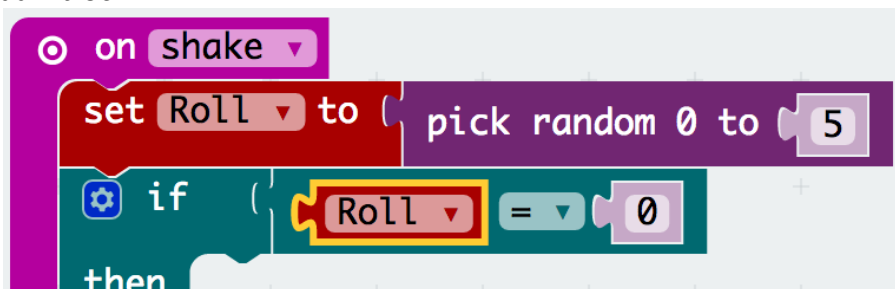
Once selected drag the “equals” block onto the “IF” statement block.



To ensure the micro:bit bases the IF statement on the random number, the value stored in the variable “Roll” needs to be checked. The “Roll” variable can be found from the variable option in the block menu.

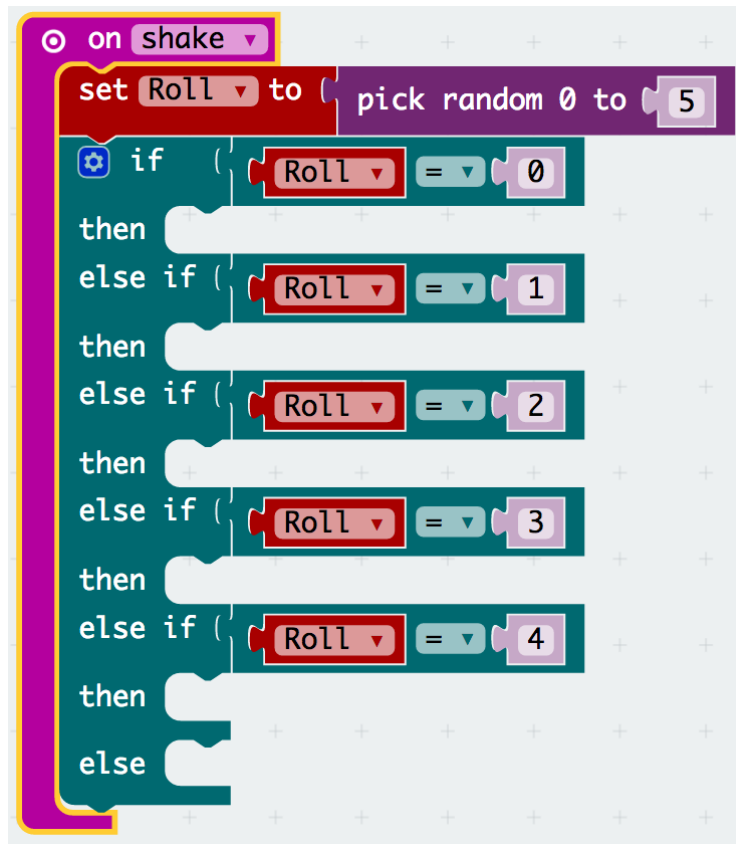
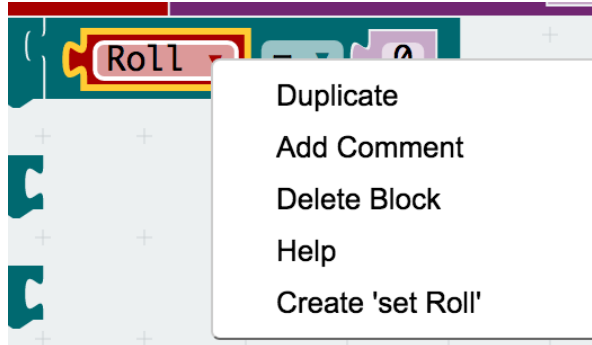


The first of the 6 checks to carry out is if the variable “Roll” contains 0. Place the “Roll” variable within the “equal” block.



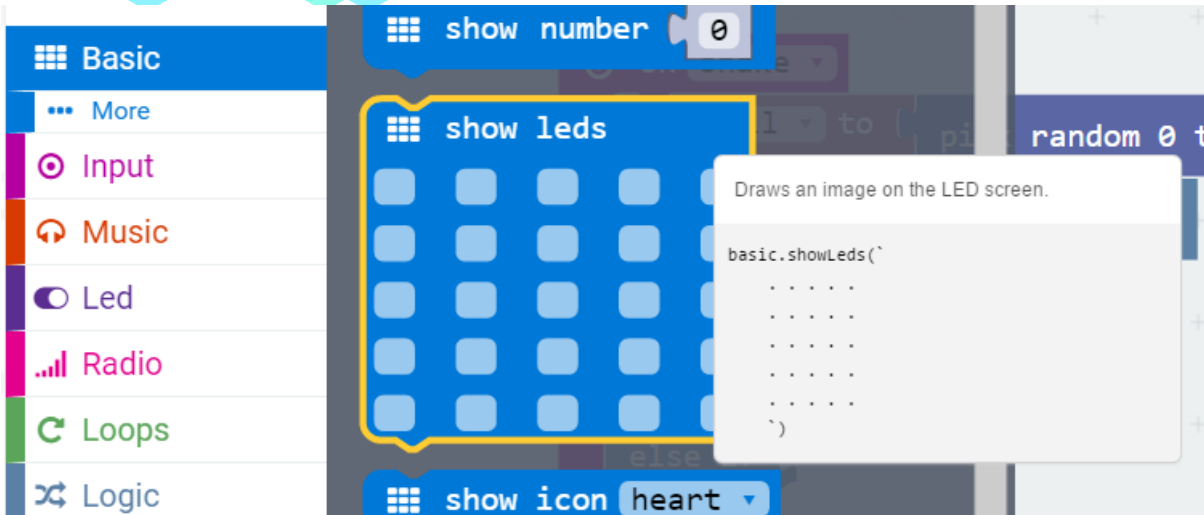
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Now this process needs to be repeated for the other 4 “else if” statements. By right clicking on the “equals” block it can be duplicated and modified for the different possible values.

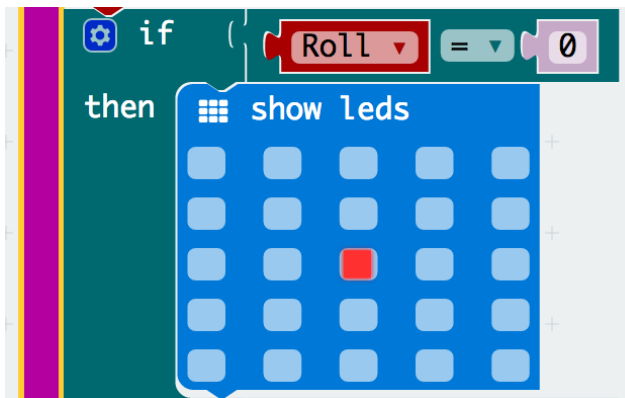


The final stage of the program is now to display a different pattern for the different die faces. From the basic option in the block menu, select the “show leds” block.

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Drag the “Show leds” block onto the workspace and place under the first “IF” statement. By clicking on the light blue coloured squares, you can create the die pattern required. For this example, the pattern for 1 is completed below.



This block again can be duplicated 5 times for the other die faces until all options have been completed. The final program is shown on the next page. Save the project and download to the micro:bit.

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```
on shake
  set Roll to pick random 0 to 5
  if Roll = 0
    then show leds
  else if Roll = 1
    then show leds
  else if Roll = 2
    then show leds
  else if Roll = 3
    then show leds
  else if Roll = 4
    then show leds
  else show leds
```

The image shows a sequence of JavaScript blocks in a Scratch-style environment. It starts with an 'on shake' event block, followed by a 'set Roll to pick random 0 to 5' block. Below this is a series of 'if' and 'else if' blocks, each followed by a 'then show leds' block. The 'if' blocks are for Roll values 0, 1, 2, 3, and 4. Each 'show leds' block is a 5x5 grid of blue squares with red squares indicating the die face: 0 (center), 1 (center and bottom-left), 2 (top-left and bottom-right), 3 (top-left, top-right, bottom-left, bottom-right), and 4 (top-left, top-right, bottom-left, bottom-right). The final 'else' block is followed by a 'show leds' block with four red squares in the bottom row.