

Grade 5/6



Micro:Bits

Any questions?
Reach out
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Micro:Bit Loops and Coordinates



Campers will learn about coordinate grids by navigating through their Micro:Bit display grid and explore loops as a tool to create animations and games with the Micro:bit.

Key Words

Coordinate system: a system that uses one or more numbers, or coordinates, to uniquely determine the position of a point.

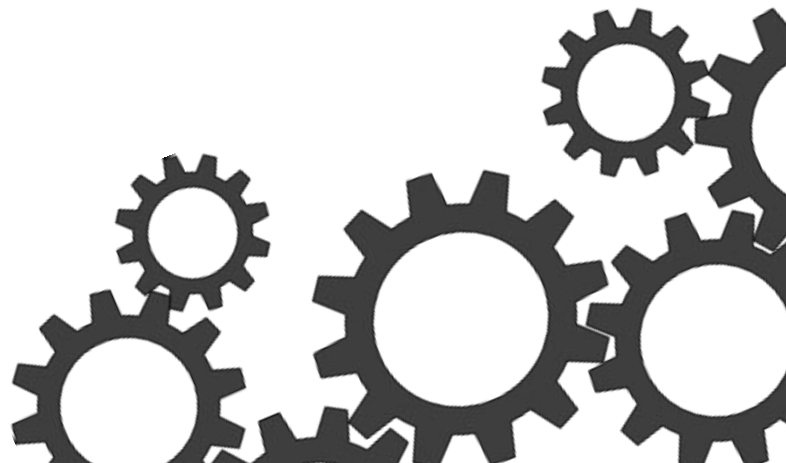
X-axis: the series of values listed along the horizontal of a cartesian coordinate system.

Y-axis: the series of value listed along the vertical of a cartesian coordinate system.

Loop: a programming structure that repeats a sequence of instructions until a specific condition is met.

Materials

- Micro:bit kit
 - 1 Micro:bit
 - 1 Battery pack
 - 1 Micro USB cable
- Optional: 1 Dongle adapter if using Mac



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It is very common for things in our everyday lives to have number associated with them to determine their qualities and/or location. For example, the University of Victoria has a longitude and latitude of 48.4634° N, 123.3117° W. Although this information seems hard to interpret, with the right tools we can use this to find the university's exact location in the world!

Can you think of any other examples of numbers used help humans describe the qualities or location of something?

- Parking garages (Eg. Floor 3 Area H, or Floor 3 spot 72)
- Floor and room number in a school
- Colour: RGB values
- Guitar: Which string and which fret

Number systems are all around us! Today we will explore how we can use them when programming our Micro:Bits.

Activity 1

With a partner (friend or family), practice getting comfortable using the coordinate system used by the Micro:Bit with a game of Battleship.

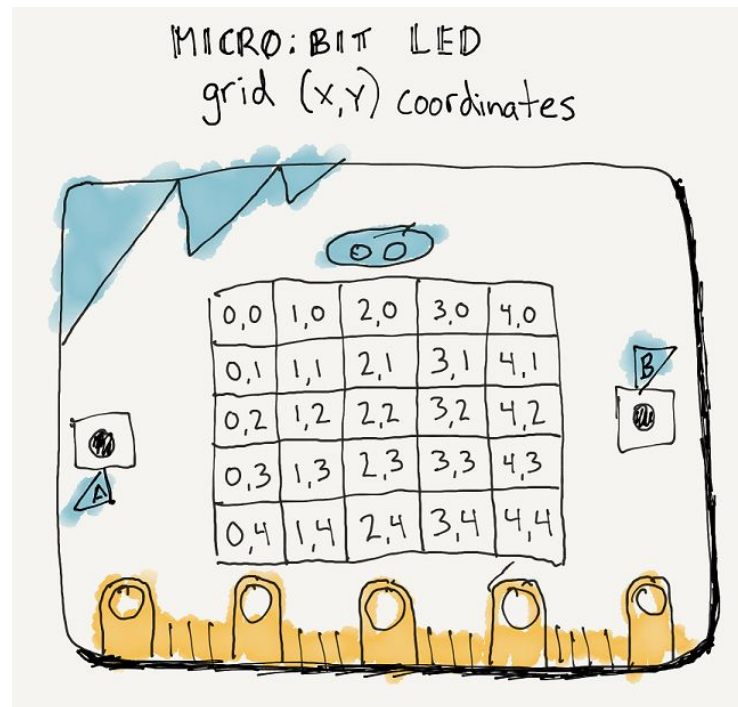
Take a look at the coordinate system laid out on the Micro:Bit on the next page, what do you notice that is different from your Micro:Bit?



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Coordinates on the Micro:Bit are displayed in pairs, (x,y). The number in the 'x' spot tells you how far left or right the position is. The number in the 'y' spot tells you far up or down the position is.

Test your knowledge, what are the coordinates of the center most position?



Each player will select three regions of the Micro:Bit coordinates above to be their Battleships. Each ship is a different size and each ship has to be grouped together. Secretly write down your ship locations.

- One ship must be three blocks
- One ship must be two
- One ship must be one block

Take a look at our example here!



Once both players have chosen their ship locations, take turns calling out coordinates until one player has called out all of their ships' coordinates.

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Activity 2

Animations Using Loops

First, let's learn how to toggle our Micro:Bit's LED display.

- Using the 'show LEDs block, create your desired pattern and place it in 'on start'.
- With a 'on button press' block, insert 'toggle' blocks for all coordinates you have chosen for your display.

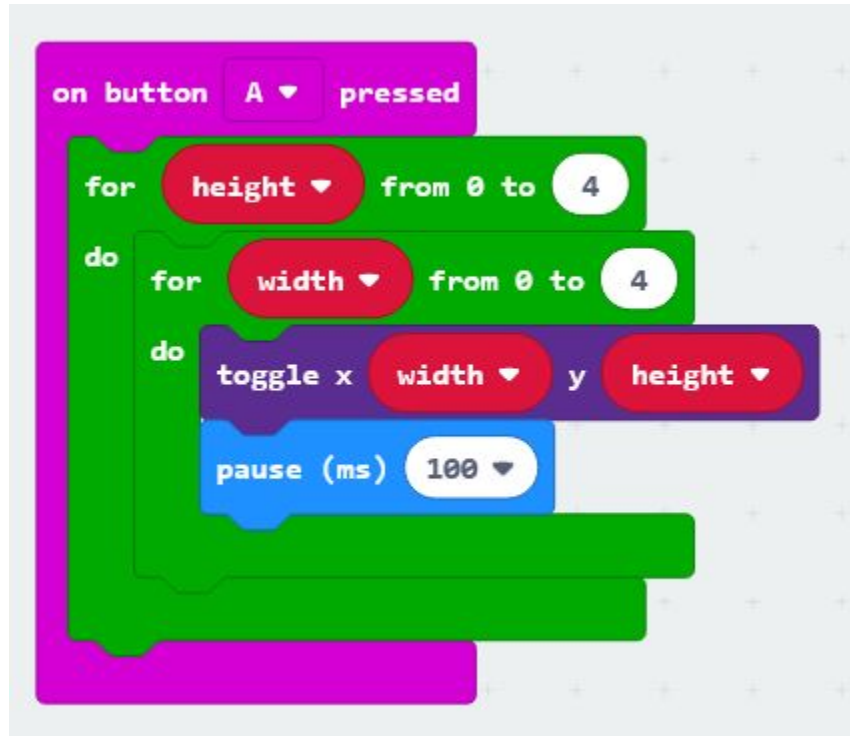
Example



Notice that for each LED selected on the 'show LED' block, we have added the corresponding coordinated to the 'on button press' block. Refer back to the Micro:Bit coordinate image on the previous page for a visualization of the coordinate system.

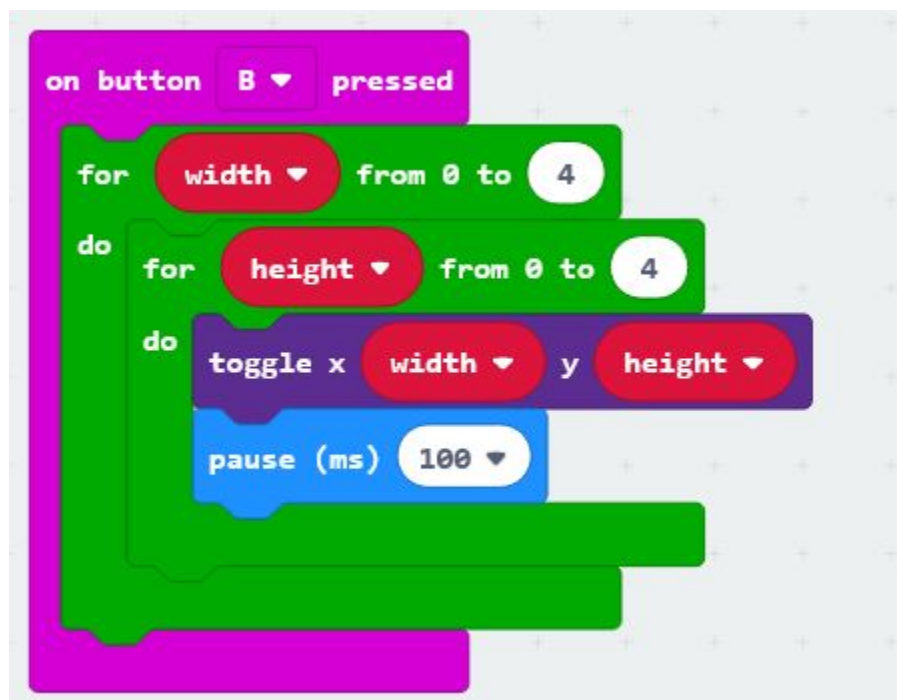
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Let's now combine the toggle block with a for loop. We will also need to start with two variables: width and height. We could also call these x and y if we want.



```
on button A pressed
  for height from 0 to 4
  do
    for width from 0 to 4
    do
      toggle x width y height
      pause (ms) 100
```

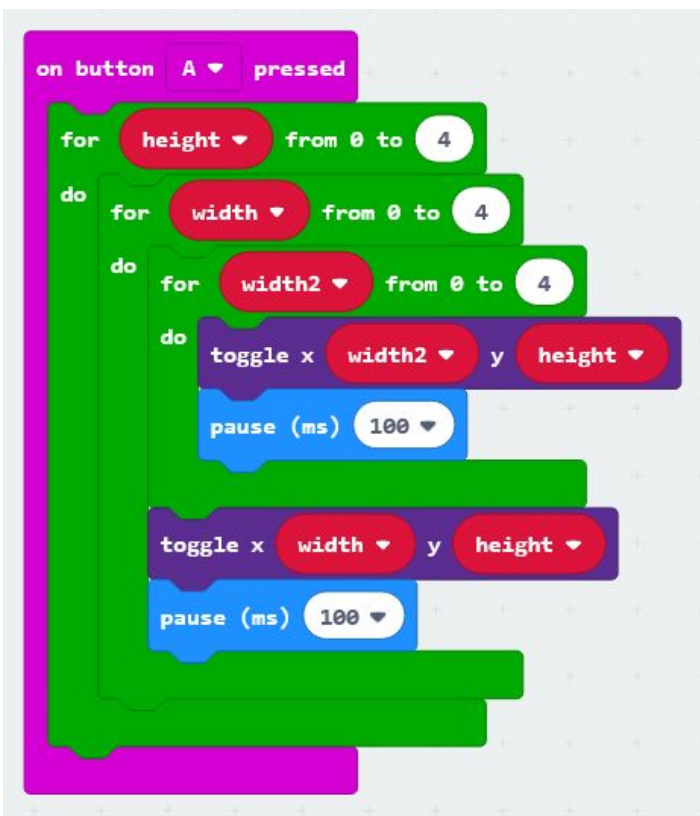
Now do the same thing on button B pressed, but switch height and width in the for loops.



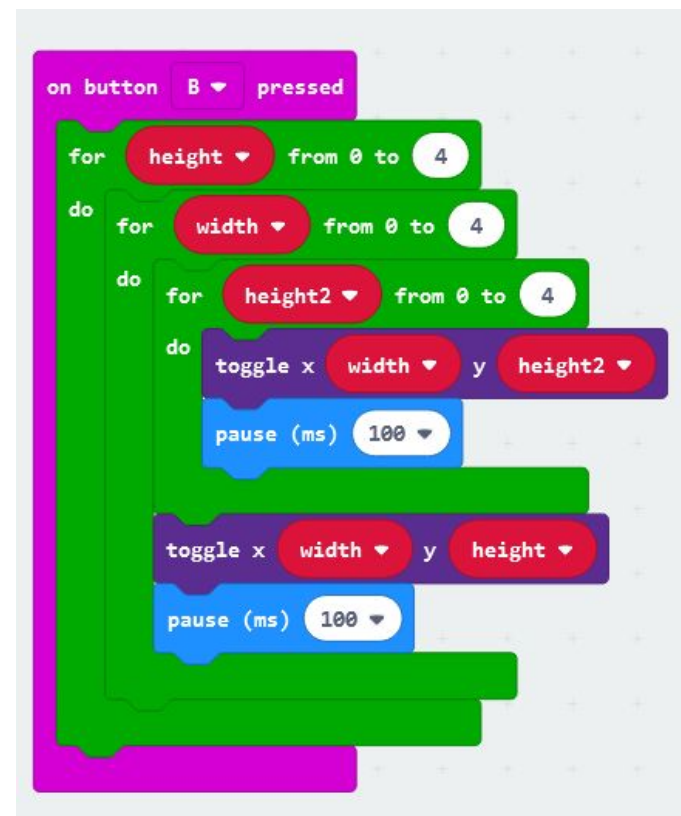
```
on button B pressed
  for width from 0 to 4
  do
    for height from 0 to 4
    do
      toggle x width y height
      pause (ms) 100
```

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If you're looking to challenge yourself, try adding in a variable using the information from the previous day's lesson resources. Here is an example of how you may incorporate a variable into this program.



```
on button A pressed
  for height from 0 to 4
  do
    for width from 0 to 4
    do
      for width2 from 0 to 4
      do
        toggle x width2 y height
        pause (ms) 100
      do
        toggle x width y height
        pause (ms) 100
    do
  do
```



```
on button B pressed
  for height from 0 to 4
  do
    for width from 0 to 4
    do
      for height2 from 0 to 4
      do
        toggle x width y height2
        pause (ms) 100
      do
        toggle x width y height
        pause (ms) 100
    do
  do
```

Once you have successfully run your program on your Micro:Bit, experiment and test our different ways of writing your program. Change values, variables and display configurations to practice becoming comfortable with using loops and coordinate system in your programs.

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Additional Activities

Here are two additional activities to try on your own.

<https://makecode.microbit.org/courses/csintro/coordinates/project>

Screensavers

These programs will act just like a screensaver for your computer. Follow through the steps to program an animation using the LED display that will loop forever. Get creative with your designs!

Dodgeball

Dodgeball on the Micro:Bit is a simple game that uses the Micro:Bit's LED display to simulate an object coming towards your character. Use the buttons on your device to move out of the way of the incoming dodgeball.