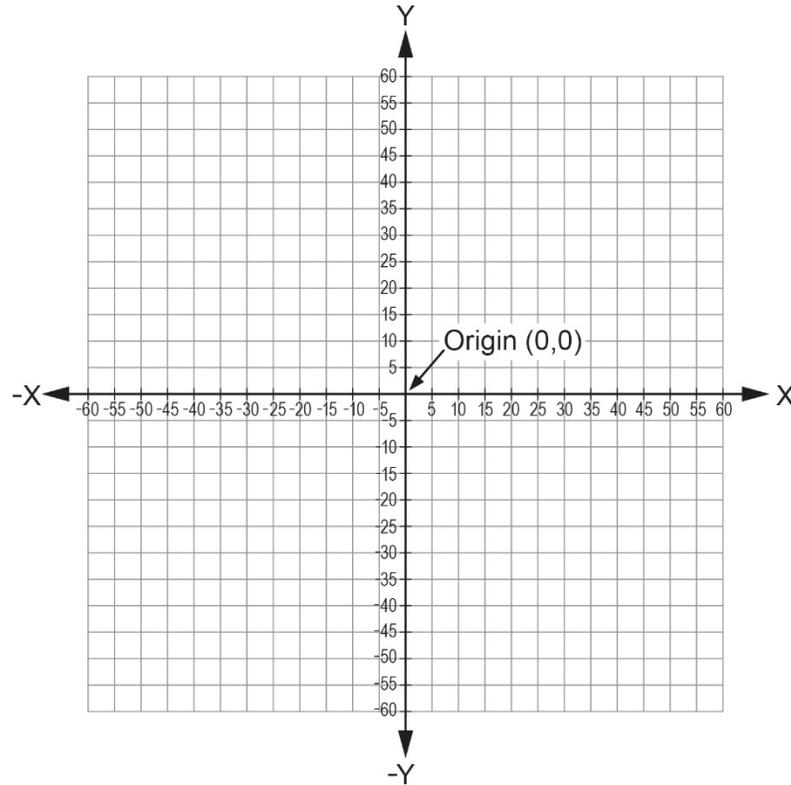
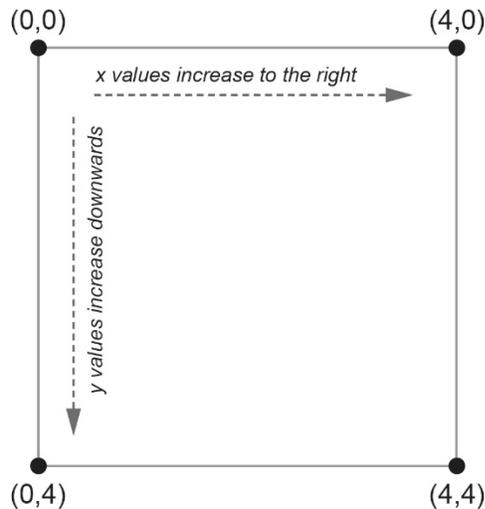


## 6. WHAT'S THE ORIGIN?

During your pre-algebra course you were likely introduced to a coordinate plane. A coordinate plane is a 2-dimensional number line where the vertical line is called the y-axis and horizontal line is called the x-axis. These lines are perpendicular and intersect at the zero points. This point is called the origin. A point on a coordinate plane is named by its ordered pair  $(x, y)$ .



The point of origin on a computer screen looks a bit different. In computer graphics coordinates start at the top left  $(0,0)$ . This can be referred to as the origin point. This is important when you want to program graphics. You can transfer your knowledge of plotting ordered pairs in mathematics over to programming once you gain an understanding of the layout of the grid.



## Objectives

- Incorporate existing code into original programs.
- Transfer knowledge of plotting ordered pairs from mathematics to computer programming.

## Materials and Equipment

- Data collection system
- //code.Node

## Safety

Follow your normal classroom safety procedures.

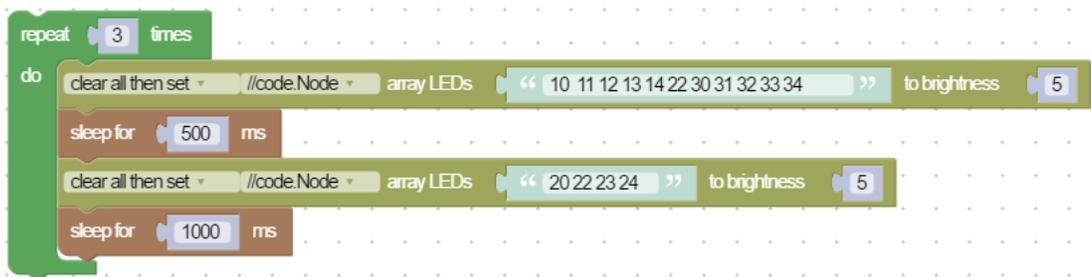
## Procedure

### *Part 1 – Replicate Initial Program*

1. Select Sensor Data in SPARKvue.
2. Connect your //code.Node to your device.
3. Choose the Digits display under templates.

4. Click on the Code icon .

4. Replicate the following program:



```
repeat 3 times
do
  clear all then set //code.Node array LEDs "10 11 12 13 14 22 30 31 32 33 34" to brightness 5
  sleep for 500 ms
  clear all then set //code.Node array LEDs "20 22 23 24" to brightness 5
  sleep for 1000 ms
```

5. Click Start. Your 5X5 LED array should illuminate with "Hi".

### *Part 2 – Modify Your Program*

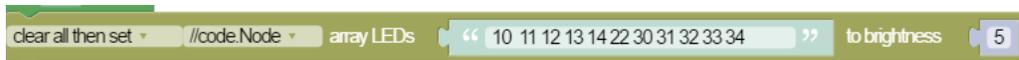
1. Now that you have replicated the program, it is time for you recreate your own using your name or a phrase.

2. The 5X5 LED array on the //code.Node is set up like a grid. The origin point of the grid (0,0) is found on the top left. X values increase as you move to the right. Y values increase as you move downwards. See Figure 1.

Figure 1: Origin visual of 5X5 LED array

0, 0	1, 0	2, 0	3, 0	4, 0
0, 1	1, 1	2, 1	3, 1	4, 1
0, 2	1, 2	2, 2	3, 2	4, 2
0, 3	1, 3	2, 3	3, 3	4, 3
0, 4	1, 4	2, 4	3, 4	4, 4

3. Look at the first hardware block in your initial program in Part 1.



4. In Figure 2, you see the grid that was used to create the letter "H". When you are creating a character in code, the ordered pair (1, 0) is typed as 10 in the code. The ordered pair (1, 1) is typed as 22 in the code. You should now see the pattern.

Figure 2: How to plot an "H"

0, 0	1, 0	2, 0	3, 0	4, 0
0, 1	1, 1	2, 1	3, 1	4, 1
0, 2	1, 2	2, 2	3, 2	4, 2
0, 3	1, 3	2, 3	3, 3	4, 3
0, 4	1, 4	2, 4	3, 4	4, 4

## Questions and Analysis

1. Why do you think sleep blocks were important additions to this code?
2. Was there another way for you to create your name or phrase that was easier than plotting ordered pairs?
3. What happens if you do not "clear all then set" when creating your characters in your program?
4. Did you make any other modifications to your code that made it unique?