Algorithms and Pixel Art

What’s the point of this task? You will create a drawing algorithm for someone else so they can draw the intended picture. You will understand that instructions need to be very clear and that just because it’s clear to you, doesn’t mean it’s clear to the drawer, similar to when we made directions for the peanut butter and jelly sandwich.

First let talk about the rules with an example:

Let’s say we wanted the drawer to color in a 3 x 3 pixel grid as follows…

Our starting point will always be the top left square.

Why? If you recall, when programming, and with a monitor or TV, the top left coordinate is (0, 0), and as you go right in the x direction, the x value grows, and as you go down in the y direction, the value grows. For example, the bottom right square in the above grid would be assigned the coordinate (3, 3).

When changing rows, we will first go down, then back to the left, and proceed from right to left.

If I were to describe how to color it in with words, it might go like this:

- Starting in the top left square, go right one square.
- Color in the square
- Move one square to the right
- Move one square down
- Move two squares to the left
- Color in the square
- Move right two squares
- Color in the square
- Move one square down
- Move two squares to the left
- Move right one square
- Color in the square
As we learned with the sandwich directions, this could get messy, so let’s use shorthand symbols to represent our moves. Instead of the words up, down, left, and right, we will use arrows. When we want to color in the current square, we will use a squiggly line. Key below.

![Programming Key]

Don’t worry about the color change just yet.

Going back to the previous grid:

![Grid]

The solution to this would look like…

→ ▽ → ▽
← ←
▽ → → ▽ ▽
← ←
→ ▽ →

We could made it even shorter by combining more than one arrow together. For example, instead of → → , we could say → 2. It wouldn’t save much here, but on bigger grids, getting to the next row could shorten to ← 6 (or however many back you’d need to go).
ASSIGNMENT 1:

Using the example above, I want you to create an algorithm, using the above key, to draw the following pictures on a pixel grid.

1.

2.

3.
ASSIGNMENT 2:  
Using lined paper (or any paper to create a grid, lined makes it easier) you will create a 7 x 7 grid or use the grid below.  
Following the below algorithm I made, fill in the blocks as stated. Take your best guess as to what the image is (does not matter if the guess is incorrect).
DAY 3

Putting it together

**ASSIGNMENT 3:**

Using lined paper (or any paper to create a grid, lined makes it easier) you will create a 9 x 9 grid or use the one below.

On this grid I want you to color the boxes (or ‘pixels’) that you want, creating an original picture made by you. After this is created, you will then create an algorithm like the ones above that I can use to recreate your picture without seeing it. If possible, I would like you to have a friend or sibling attempt to follow your algorithm and see what happens (if you cannot find someone just provide your picture with the algorithm).