

Pixel Programming: Packet 0

Setting up

Before starting any pixel program, we want to do a few things.

1. Look for the text “current pixel” on your Pixel Program sheet, and punch out / cut out the little square to its left. You'll use this little hole to look at your graph paper one square at a time. (Strictly speaking, you don't need to do this to follow the Pixel Program instructions, but it does help many people keep track of which square they're looking at. Also, this is similar to how a computer program works. It only “looks” at the current instruction and the current spot in memory. It has no idea what it's accomplished or what its ultimate goal is, which is why it's important that each step in the algorithm it's using is correct.)
2. Take a sheet of graph paper and set it down in front of you in landscape orientation (that is, horizontally). You'll use your pixel program sheet to create a drawing on this graph paper.
3. Position your Pixel Program sheet over your graph paper so that the current pixel hole is over a square in the middle of your graph paper. (Approximately in the middle is fine. But if you want to be ultra-specific—good for you, you're thinking like a computer programmer!—you can place the hole over the square that is 22 squares from the left edge and 17 squares from the top edge.
4. Now you're ready to run a pixel program! Flip to the other side to learn about basic pixel programming commands!

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Basic commands

Learn these three basic Pixel Programming commands so you can get started!

1. `set [VARIABLE] to [VALUE]`

In a Pixel Program (and in a computer program), a variable is the name for a value that might change. At the top of your Pixel Program, to the right of the current pixel indicator, there's a header called “list of variables” and a few lines under it such as

```
COLOR = _____
```

COLOR and the other names listed up there are the variables used in the current program. You'll notice they start empty. That'll change shortly!

In a Pixel Program, the `set` command means to change a variable. So this instruction

```
set COLOR to BLUE
```

means that you need to fill in BLUE in the blank line to right of COLOR. If there's already something in that blank, erase it before entering the new value in the blank.

If you find an instruction in your Pixel Program that refers to a variable, look up to the list of variables to see what the value of that variable is! You won't be doing that too much at this point, but this will be a really powerful technique later.

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Basic commands

Learn these three basic Pixel Programming commands so you can get started!

2. **MARK**

When you see this instruction, use your Pixel Program sheet like a stencil, and fill in the graph paper square underneath the `current pixel` hole with the color in the `COLOR` variable. If `COLOR` is currently `RED`, fill it in with red! If it's `BLACK`, use black!

(We could have called this instruction `MARK with COLOR`, which is more specific, and reminds you that you're checking the variable. But shortcuts are helpful in programming, which is why so many programming languages have useful built-in shortcuts not too different from this one.)

3. **move [DIRECTION]**

When you see this command, you should slide your Pixel Program sheet in the direction indicated, i.e. `UP` or `DOWN` or `LEFT` or `RIGHT`, so that the current pixel moves by just one graph paper square.

Get (pixel) programming! Before too long, we'll introduce some more advanced commands.

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Pixel Programming Codename EMO

=====

current pixel

list of variables:

COLOR == _____

=====

set COLOR to BLACK

move LEFT
MARK
move UP
MARK

move RIGHT

move RIGHT
MARK
move DOWN
MARK

move RIGHT
move DOWN
move DOWN
MARK

move DOWN
move LEFT
MARK
move LEFT
MARK
move LEFT
MARK

move LEFT
move UP
MARK

Pixel Programming: Packet 0

Pixel Programming Codename WILDCARD

=====

list of variables:

current pixel

COLOR == _____

=====

set COLOR to GRAY

MARK	move LEFT	move LEFT
	move UP	move DOWN
move RIGHT	MARK	MARK
MARK	move UP	move DOWN
move RIGHT	MARK	MARK
MARK	move LEFT	move LEFT
move RIGHT	move UP	move DOWN
MARK	MARK	MARK
move RIGHT	move UP	move DOWN
MARK	move	MARK
move LEFT	move DOWN	move UP
move LEFT	move DOWN	move UP
move LEFT	move RIGHT	move RIGHT
move LEFT	move DOWN	move UP
	move DOWN	move UP
move RIGHT	move RIGHT	move RIGHT
move UP		
MARK	move LEFT	move RIGHT
move UP	MARK	move DOWN
MARK	move LEFT	MARK
move RIGHT	MARK	move DOWN
move UP	move LEFT	MARK
MARK	MARK	move RIGHT
move UP	move LEFT	move DOWN
MARK	MARK	MARK
		Move DOWN
		MARK
move DOWN	move RIGHT	
move DOWN	move RIGHT	
move LEFT	move RIGHT	move UP
move DOWN	move RIGHT	move UP
move DOWN		move LEFT
move LEFT		move UP
		move UP
		move UP
		move LEFT

Pixel Programming: Packet 0

Pixel Programming Codename GALLIFREY

=====

current pixel

list of variables:

COLOR == _____

=====

set COLOR to RED

move RIGHT	move DOWN	move DOWN
MARK		
move RIGHT	MARK	move RIGHT
MARK	move RIGHT	MARK
move RIGHT	MARK	move RIGHT
	move RIGHT	MARK
move RIGHT	MARK	move RIGHT
MARK	move RIGHT	move
move RIGHT	MARK	
MARK	move RIGHT	move DOWN
move RIGHT	MARK	
move DOWN	move RIGHT	move LEFT
	MARK	MARK
		move DOWN
MARK	move DOWN	
move LEFT		set COLOR to BLACK
MARK	move LEFT	
move LEFT	MARK	MARK
MARK	move LEFT	move UP
move LEFT	MARK	move RIGHT
MARK	move LEFT	MARK
move LEFT	MARK	move UP
MARK	move LEFT	move RIGHT
move LEFT	MARK	MARK
MARK	move LEFT	move UP
move LEFT	move	move RIGHT
MARK		MARK
		move UP
		move RIGHT
		MARK

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MARK	move LEFT	move DOWN
move UP	move UP	MARK
MARK	MARK	
move UP	move LEFT	move RIGHT
	MARK	move DOWN
move LEFT		MARK
MARK	move LEFT	move RIGHT
move UP	move DOWN	move DOWN
move LEFT	MARK	MARK
MARK	move LEFT	move RIGHT
move LEFT	move DOWN	move DOWN
MARK	MARK	MARK
move LEFT		
move DOWN		
MARK		

Pixel Programming: Packet 0

Pixel Programming Codename HERO

=====

current pixel

list of variables:

COLOR == _____

=====

set COLOR to BLACK

MARK	move RIGHT	move RIGHT
	move DOWN	move UP
move RIGHT	MARK	MARK
move DOWN	move DOWN	move UP
MARK	MARK	MARK
move DOWN		move RIGHT
MARK	move RIGHT	move UP
	move DOWN	MARK
move RIGHT	MARK	move UP
move DOWN	move DOWN	MARK
MARK	MARK	
move DOWN		move UP
MARK	move LEFT	MARK
	MARK	
move RIGHT	move LEFT	move LEFT
move DOWN	MARK	MARK
MARK	move LEFT	move LEFT
move DOWN	MARK	MARK
MARK	move LEFT	move LEFT
	MARK	MARK
move RIGHT	move LEFT	move LEFT
move DOWN	MARK	MARK
MARK	move LEFT	
move DOWN	MARK	move DOWN
MARK	move UP	MARK
	MARK	move DOWN
		MARK

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move RIGHT
move DOWN
MARK
move DOWN
MARK

move RIGHT
move UP
MARK
move UP
MARK

move RIGHT
move UP
MARK
move UP
MARK

move DOWN
move DOWN
MARK

move RIGHT
move UP
MARK
move UP
MARK

move RIGHT
move UP
MARK
move UP
MARK

move LEFT
MARK

move LEFT
MARK
move LEFT
MARK
move LEFT
MARK

move RIGHT
move UP
MARK
move UP
MARK

move RIGHT
move UP
MARK
move UP
MARK

move UP
MARK

move RIGHT
move UP

Pixel Programming: Packet 0

Pixel Programming Codename GO

=====

list of variables:

current pixel

COLOR == _____

=====

set COLOR to BLACK

MARK	MARK	move RIGHT
move DOWN	move UP	
MARK	MARK	move DOWN
move DOWN	move LEFT	MARK
		move DOWN
move LEFT	move UP	MARK
MARK	MARK	
move DOWN	move UP	move RIGHT
MARK	MARK	MARK
move DOWN		move RIGHT
	move RIGHT	MARK
move LEFT	MARK	move RIGHT
MARK	move DOWN	move UP
move LEFT		MARK
MARK	move RIGHT	move RIGHT
move DOWN	MARK	
	move RIGHT	move UP
move LEFT	MARK	MARK
MARK	move RIGHT	move UP
move LEFT	MARK	MARK
MARK		move LEFT
	move UP	
move LEFT	MARK	move UP
MARK		MARK
move LEFT	move UP	move UP
MARK	move RIGHT	MARK
move UP	MARK	move UP
move LEFT	move DOWN	
MARK	move DOWN	move LEFT
move LEFT	MARK	MARK
MARK	move RIGHT	move LEFT
move LEFT	MARK	MARK
	move RIGHT	move UP
move UP	MARK	
	move UP	

move UP

MARK

Pixel Programming: Packet 0

move LEFT	move UP	MARK
MARK		move LEFT
move LEFT	MARK	MARK
MARK	move LEFT	move LEFT
move LEFT	MARK	MARK
MARK	move LEFT	move LEFT
move LEFT	MARK	MARK
MARK	move LEFT	move LEFT
move DOWN	MARK	MARK
		move LEFT
move LEFT	move LEFT	MARK
MARK	move LEFT	move LEFT
move LEFT	move LEFT	MARK
MARK		move LEFT
move LEFT	MARK	MARK
	move LEFT	
move DOWN	MARK	move UP
MARK	move LEFT	
move DOWN	MARK	MARK
MARK	move LEFT	move RIGHT
move LEFT	MARK	MARK
		Move RIGHT
move DOWN	move UP	MARK
MARK		move RIGHT
move DOWN	MARK	MARK
MARK	move RIGHT	move RIGHT
	MARK	MARK
set COLOR to RED	move RIGHT	move RIGHT
	MARK	MARK
move DOWN	move RIGHT	move RIGHT
move RIGHT	MARK	MARK
move RIGHT	move RIGHT	move RIGHT
	MARK	MARK
MARK	move RIGHT	
move RIGHT	MARK	move UP
MARK	move RIGHT	move LEFT
	MARK	move LEFT
move RIGHT	move RIGHT	
move RIGHT	MARK	MARK
move RIGHT	move RIGHT	move LEFT
move RIGHT	MARK	MARK
move RIGHT		move LEFT
	move UP	MARK
MARK	move LEFT	move LEFT
move RIGHT		MARK
MARK		
move RIGHT		