

# “Code-necting” the Dots Coordinate Art

## Project Goal:

Students will be creative and code their own artwork using motion and pen coding commands in Scratch! The goal is for them to practice with both positive and negative values, as well as points that are right on an axis.

## Standard:

### CCSS.MATH.CONTENT.5.G.A.1

Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

## Student Guide

### Teacher Guide:

You'll want to make sure students have a basic understanding of how Cartesian coordinates work before implementing this lesson. Make sure they understand why the code for the segment tasks work before letting them pick up printed graph paper linked below. From there just validate creativity and encourage them to use points from every quadrant and on the axis as well.

[Printable Graph Paper Link](#) to record “dots” to connect

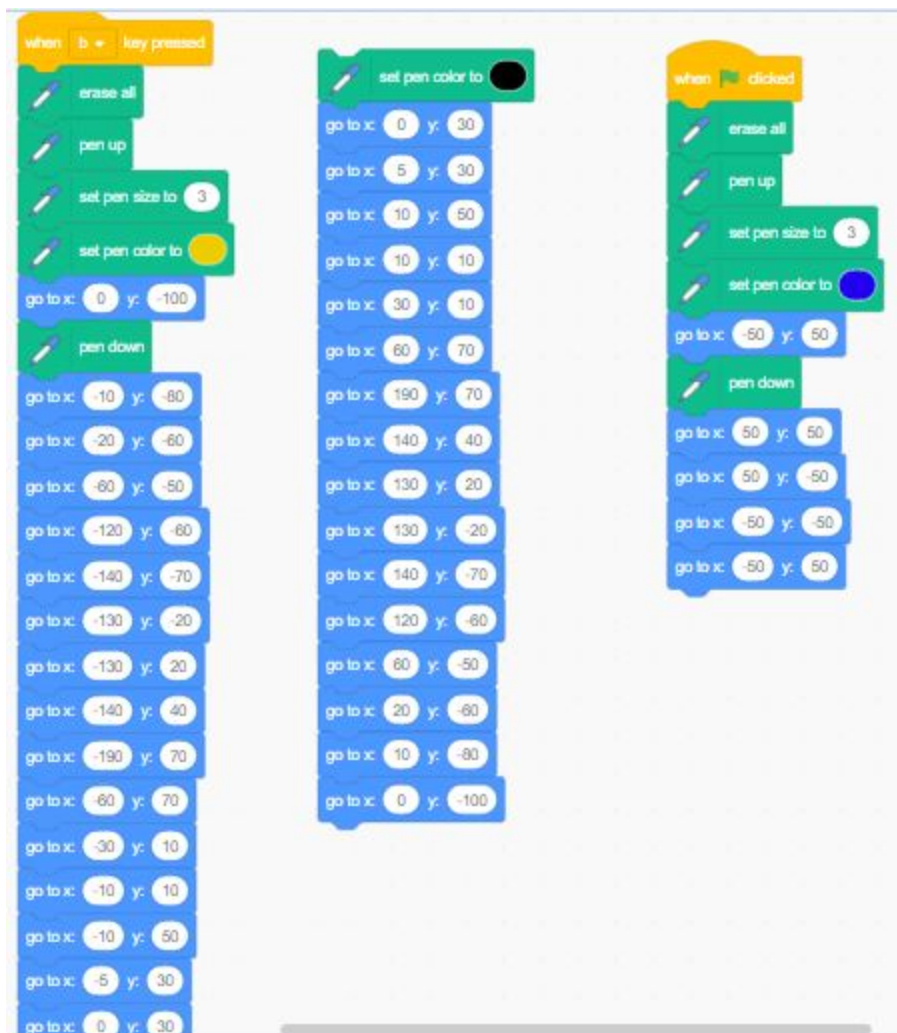
### Extension Possibility:

A later lesson, [The Math behind Animated Art](#), will explore how students can pass these points through functions to manipulate them. This may be a lot if you're an elementary teacher, but you may still want to consider showing students this [TED Talk from Pixar's Tony DeRose](#) that inspired the lesson.



### Solutions:

This is the code that created the Batman logo. Notice you would have to connect the set pen color to black block to the bottom of the code left of it. Also, it's an option to show students how to execute code with alternative commands such as the "when b key pressed" control block shown here. The code under the green flag is for the first extension to make a square.



```

when b key pressed
  erase all
  pen up
  set pen size to 3
  set pen color to yellow
  go to x: 0 y: -100
  pen down
  go to x: -10 y: -80
  go to x: -20 y: -60
  go to x: -60 y: -50
  go to x: -120 y: -60
  go to x: -140 y: -70
  go to x: -130 y: -20
  go to x: -140 y: 40
  go to x: -190 y: 70
  go to x: -60 y: 70
  go to x: -30 y: 10
  go to x: -10 y: 10
  go to x: -10 y: 50
  go to x: -5 y: 30
  go to x: 0 y: 30

set pen color to black
go to x: 0 y: 30
go to x: 5 y: 30
go to x: 10 y: 50
go to x: 10 y: 10
go to x: 30 y: 10
go to x: 60 y: 70
go to x: 190 y: 70
go to x: 140 y: 40
go to x: 130 y: 20
go to x: 130 y: -20
go to x: 140 y: -70
go to x: 120 y: -60
go to x: 60 y: -50
go to x: 20 y: -60
go to x: 10 y: -80
go to x: 0 y: -100

when green flag clicked
  erase all
  pen up
  set pen size to 3
  set pen color to blue
  go to x: -50 y: 50
  pen down
  go to x: 50 y: 50
  go to x: 50 y: -50
  go to x: -50 y: -50
  go to x: -50 y: 50
  
```



### Larger Batman Coordinates

$(0,-100)$  ,  $(-10,-80)$  ,  $(-20,-60)$  ,  $(-60,-50)$

$(-120,-60)$  ,  $(-140,-70)$  ,  $(-130,-20)$  ,  $(-130,20)$

$(-140,40)$  ,  $(-190,70)$  ,  $(-60,70)$  ,  $(-30,10)$

$(-10,10)$  ,  $(-10,50)$  ,  $(-5,30)$  ,  $(0,30)$

$(0,30)$  ,  $(5,30)$  ,  $(10,50)$  ,  $(10,10)$

$(30,10)$  ,  $(60,70)$  ,  $(190,70)$  ,  $(140,40)$

$(130,20)$  ,  $(130,-20)$  ,  $(140,-70)$  ,  $(120,-60)$

$(60,-50)$  ,  $(20,-60)$  ,  $(10,-80)$  ,  $(0,-100)$

