School District: **Teacher's Name:**

Class Grade Level: 6

Lesson Name: Coordinate Planes in Scratch

CODERS module #3: Intro. To programming in Scratch.

Accommodations: Students may work in pairs or small groups when using Scratch. To extend the lesson, students may add a point, line or ray on their created X and Y coordinate plane.

Material(s): 1 laptop with internet access per student or per pair, 1 copy of each handout per student (Do Now, Activity, Homework) (Do Nows are 2 per page), laptop & projector for teacher

Time allotment: 50 min. (For a longer period, allow more time for student exploration of Scratch.)

MLS Standards:
- Solve problems involving ratios and rates.
- a.   Create tables of equivalent ratios, find missing values in the tables and plot the pairs of values on the Cartesian coordinate plane

Solve problems by graphing points in all four quadrants of the Cartesian coordinate plane.

- Understand signs of numbers in ordered pairs as indicating locations in quadrants of the Cartesian coordinate plane
- Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
- Find distances between points with the same first coordinate or the same second coordinate.
- Construct polygons in the Cartesian coordinate plane.

Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.

Learning Goal(s): The student will know how to draw a coordinate plane in Scratch.

Objective(s): The student will create event scripts of an X and Y coordinate plane using Scratch.

Background information and/or Activate Prior Knowledge:

Introduction/Anticipatory Set/Engage:
- **Do Now: (5 min.)** Coordinate Plane Warm-up - reviews the basics of the coordinate plane and asks students to identify the location of a few points

Frame Lesson: (3 min.)
- Ask students if they know what computer programmers do. Take 1-2 ideas, quickly. Explain that computer programmers write instructions for computers to follow, to make

programs that people use. Give some examples of programs - apps, MS Word, websites, games, etc.

- Explain that today they will learn how to do some beginning computer programming using a language called Scratch. One thing that computer programmers sometimes do is to use computer programs to help figure out problems. You will be writing programs to solve problems related to geometry.

Go over Do Now: (5 min.)
- Review (x, y) coordinate pairs.
- Review the origin (0, 0).
- Review how to find a point in Quadrant I (pos, pos). [You need not use language of quadrants in this lesson.]
- Review how to find a point in the other quadrants.

Teaching (I do): 2 mins
- Show students how to create an account in Scratch. Students have the instructions on their handout. Alternatively, you could create accounts for the students ahead of time and give them their log-in info.
- You may want to give them pointers for creating usernames that are NOT their full names. Edit the handout to reflect this.
- Have students write down their username and password in a safe, secret place, such as inside their agendas/homework books.
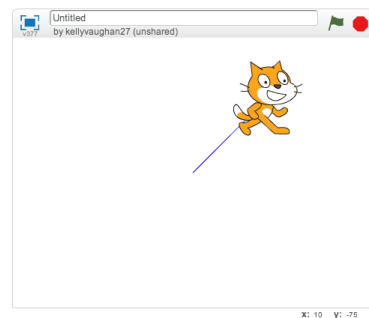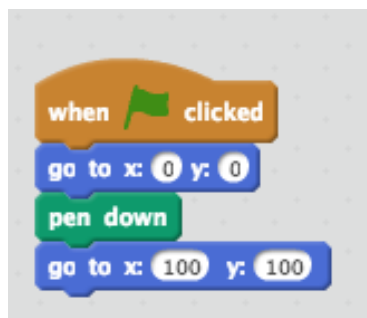
Guided Practice (We do):
Students Do: (5 min.)
- Students open up the laptops, open Scratch, and create an account, following the directions on their handout and modeled by you.

Group/Independent Practice (You do):
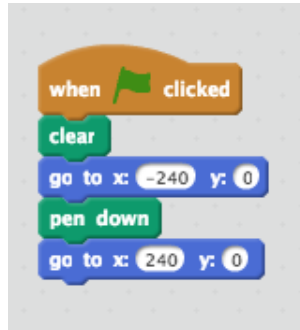**You Do: (10 min.)**
- Model for students how to explore the canvas coordinates. Have them label the drawing on their handout. [x-axis goes from -240 to 240, y-axis goes from -180 to 180]
- Model for students how to create event scripts in Scratch. Create a script that draws a line between two points, (0, 0) and (100, 100).
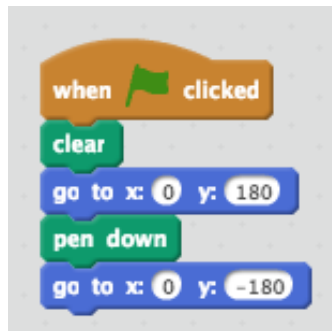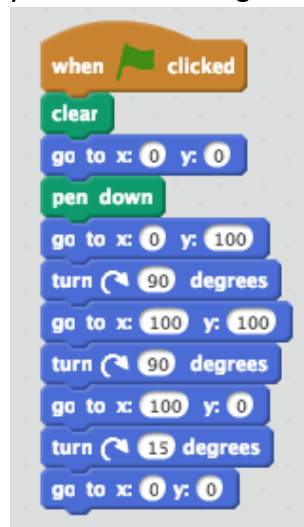-

- With student participation, ask how you would draw a line representing the x-axis:
  - start at (-240, 0) and draw line to (240, 0)

```
when [flag] clicked
clear
go to x: -240  y: 0
pen down
go to x: 240  y: 0
```

- Repeat for y-axis.
  - start at (0, 180) and draw line to (0, -180)

```
when [flag] clicked
clear
go to x: 0  y: 180
pen down
go to x: 0  y: -180
```

- What if we wanted to draw a square starting from (0, 0) with sides of length 100?
  - Two ways are shown at right. Other solutions are possible.

```
when [flag] clicked
clear
go to x: 0  y: 0
pen down
go to x: 0  y: 100
turn ↻ 90 degrees
go to x: 100  y: 100
turn ↻ 90 degrees
go to x: 100  y: 0
turn ↻ 15 degrees
go to x: 0  y: 0
```

```
when [flag] clicked
clear
go to x: 0  y: 0
pen down
change y by 100
change x by 100
change y by -100
change x by -100
```

- Model how to calculate distance between two points (problem 6).

Students Do: (15 min.)
- When students appear to be getting it and eager to start, allow them to start exploring the Challenges.
- Circulate & assist students.

Assessment (Formative or Summative)
Closure: (5 min.)
- Celebrate students who completed the final challenge. If technology & time permit, show off their programs (on projector or by having students cluster around that student).
- Point out that students can play around with Scratch more on their own, creating animations, games, and more!

Questions/questioning strategies:

Notes, Reflections, Attachments

https://scratched.gse.harvard.edu/resources/hour-code-scratch-ccss-6th-grade-math-coordinate-plane.html