Note: this is a custom version of the lesson plan for D.1. It has been designed to fit into the Intro workshop time constraints and slides, and is based on the lesson plan from the curriculum [link]

Model Unplugged: D.1 - Graph Paper Programming

(10 minutes) Set Up

(1 minute) First Lesson Slide

- Say: Today we're going to do an activity that uses these commands. What type of thing do you think we can do with these commands?
    - Pause. Get some responses from the group.
    - Click slide (animation to show image)
- Say: There are probably a lot of things we could do with these commands, but today we're going to use these commands to make drawings, like this dog, on graph paper.

(2 minutes) Second Lesson Slide

- Say: Let's practice using these commands together to make sure we all understand how they work. We'll start by talking through how we can use these instructions to instruct a friend (who is pretending to be a drawing machine) to color their blank grid so that it looks like this image
    - Click (animation to fill in some squares)
    - Click (animation makes the squares less dark and puts red outline around "robot" and shows the commands)
- Say: Given our commands, what command do we need to use first?
    - Pause. Wait for someone to say "move right one square".
    - Click (animation puts red outline around square)
- Say: Now which command?
    - Pause. Wait for group to say "fill in square with color".
    - Click (animation fills in one square)
- Say: Now what?
    - Pause.
    - Answers could be "move one square down" or "move right one square"
    - Wait for someone to say "move right one square".
        - Say: Yes! Either of these would work, but i already wrote things down, and here i said 'move right one square'
    - Click (animation puts red outline around next square to the right)
- Say: Anybody want to fill in the rest from here?
    - Pause. Wait for someone to say the steps, and click the slide to animate along with them.

(2 minutes) Third Lesson Slide

- Say: Okay, now we've got a more complicated drawing. Do you think we can use our same commands for this?
    - Pause. Wait for a yes.
- Say: Anybody want to offer to write down all the commands? Just kidding, I actually already wrote them down. You can see that it's a lot of writing…
    - Click (animation shows all of the written commands to the right)

    - Pause.
- Say: To make this easier we're going to do away with those long written commands and replace them with these symbols to represent each command.
    - Click (animation shows symbols at the bottom and table next to the grid)
- Say: Now we have a set of symbols that represent each of our written commands. Can i get a volunteer to trace out the instructions that are shown here with symbols?
    - Pause. Have a volunteer come up and read/trace out instructions

(5 minutes) Fourth Lesson Slide

- Say: Now let's try these symbols out on your own. Use scratch paper to write instructions for making this drawing, assuming you're starting in the top-left corner.
    - Pause. Give 1-2 minutes for everyone to write their instructions. Circulate as they write
- Say: Partner up with someone next to you, or your elbow partner" and compare your instructions.
    - Pause. Give 1 minutes to compare.
- **Prompt:** Did you all have the same approach to solving the problem? Was there a "right" answer?
    - **Goal:** People could have very different answers and still end up with something that gets the job done. That's totally fine!
    - Some people make line breaks at the end of each row (so they're effectively writing in a grid) other's write everything in a long line. Both of these options are totally fine as long as the 'robot' knows how to read the instructions.

(6 minutes) Activity

(1 minutes) Fifth Lesson Slide

- Get into the main activity.
- Say: Now that we know how to use these commands, you're going to make instructions for the drawing of your choice. Use these examples as a guide for what you might make — the biggest rule is that what you make needs to fit on a 4x4 grid like those on the screen right now. You can also assume that we're starting in the top-left corner of the grid. Write your instructions on a post-it note and make them so another person could read them. When you're done you'll trade instructions with someone else and try drawing them.

- Once participants have started working on their own instructions, circulate the room.

(3 minutes) participants write their instructions

- Observe the instructions people are writing.
    - Is there anything interesting or worth calling out?
- As people finish with their instructions, have them switch with another person. They should now follow the instructions and try to make the original drawing

(2 minutes) Swap Instructions

- Say: If you haven't already, please swap instructions with another person and try to recreate their drawing by following their instructions. To make the drawing, take a new post-it note and create a 4x4 grid.
    - Participants follow another person's instructions to create a drawing. They check in with the author of the instructions to make sure the drawing is correct. When

finished, discuss approach to coming up with instructions until it's time to come together to discuss

(4 minutes) Sense making

(2 minutes) Share out

- Were you able to successfully follow another person's instructions?
- Did you approach writing your own instructions in the same way as the other people at your table?

(2 minutes) Sixth Lesson Slide

- Say: Today we explored two important computer science concepts -- algorithms and programs.
    - An algorithm is a list of steps that you can follow to finish a task (like making a drawing).
    - A program is an algorithm that has been coded into something that can be run by a machine (like the drawing machine you pretended to be today while following instructions to create your drawing, or like a computer).
- **Prompt:** Can someone use our two new vocabulary words to describe what we did today?"
- Say: When we do CS Fundamentals activities, we'll create a lot of algorithms that run in programs so we can create fun and interesting things. Next time we'll try out making some programs and writing algorithms on the computer!