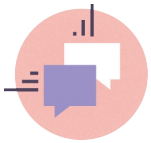
Sequencing Pixels
Unplugged



OVERVIEW

Students program Pixel Bots to paint, focusing on sequence.

OBJECTIVES

- Students will learn that computers run code in a sequence.
- Students will learn how to read, write, and execute code in a sequence.

AGENDA

Length: 45 minutes

1. Welcome to coding (10 minutes)
2. Predict pixel bot JS (15 minutes)
3. Explain sequence (10 minutes)
4. Read pixel bot sequence (10 minutes)

VOCAB

- Sequence - The idea that statements must be performed in the order they are written.
- Function call - A programming element that tells the computer to do something. In the beginning, most function calls will cause the computer to perform an action.

MATERIALS

1. Lesson 1 | Warm-up Worksheet
2. Worksheet 1: Page 1 & Page 2
3. Small pixel bot cutout for each student
4. Magnetic pixel bot
5. Scratch paper grids
6. Pencils
7. Whiteboard

WELCOME TO CODING

Length: 10 minutes

Introduce students to the world of coding and get them excited about its endless possibilities.

Prep: Queue up video http://tinyurl.com/q966xd5

Teacher Actions	Student Actions
1 Lead a discussion about coding and what it means to be a coder. Suggested script: Starting with this class you are now coders. What do you think it means to be a coder? Where is code used in our world?	1 Students raise their hands to give responses to the questions.
2 Chart student responses on the board.	
3 Fill in additional interesting uses for code on the board, such as autonomous cars, streetlights, music, etc.	
4 Watch video: A day in the life of a software engineer.	

PREDICT PIXEL BOT JS

Length: 15 minutes

Students individually predict the outcome of sequences and then regroup to discuss findings.

Prep: Distribute Lesson 1 | Warm-up Worksheet

Teacher Actions	Student Actions
1 Tell students: Before we can write code, we need to learn how to read code	
2 Discuss the elements at the top of Lesson 1 | Warm-up Worksheet and ask students to speculate about what they mean. Answer: • up() - move up one square • down() - move down one square • right() - move to the right one square • left() - move to the left one square • paint() - paint the square that the pixel bot is on top of	2 Students raise their hands to give answers.

3 Individual Work: Tell students to read the elements on the worksheet and paint (color in) the correct square. While students are working on the worksheet, recreate the problems on the board.	3 Students work individually on their worksheet.
4 After they are finished, discuss the answers and how the students got to those answers. What is the difference between the two problems? Does the order of the elements matter?	4 Students raise their hands to give answers.
5 Students write in what each element means on their worksheets.	5 Students write in what each element means on their worksheet.

EXPLAIN SEQUENCE

Length: 10 minutes

Demonstrate how to read code by reading and stepping through three or four example programs.

Prep:

1. Draw a blank 3x3 grid on the whiteboard
2. Write a short (3 line) program on the whiteboard

Teacher Actions	Student Actions
1 Explain that when a computer executes code, it runs it in the order that it is written. This is called sequence.	
2 Explain that these programming elements are part of JavaScript. These particular programming elements are all function calls and that we know they are function calls because they have an open and closed parenthesis after the name.	
3	3 Students raise their hands to answer questions.

Point to the program on the whiteboard and ask students, "What is the first line of code?" After they answer, put a number 1 next to the corresponding line. Move the pixel bot according to the line of code just numbered.	
4 Continue reading and stepping one line at a time. Trace the path of the pixel bot as it moves and shade in the squares whenever it paints.	
5 Show students three new examples (design these problems on the fly, making them interesting and complex enough), reading and stepping together as a class.	5 Students follow along and offer answer for what each action does.

READ PIXEL BOT ICONS

Length: 5 minutes

Students individually practice reading code.

Prep: Distribute Worksheet 1: Page 1 & Page 2

Teacher Actions	Student Actions
1 Individual Work: Leave the worked example from the previous activity on the whiteboard. Ask students to individually fill out the worksheet. Remind students to trace the path of the pixel bot and to shade in squares whenever the pixel bot paints.	1 Students read the code, trace the pathway of the pixel bot, and paint the correct blocks on the worksheet.