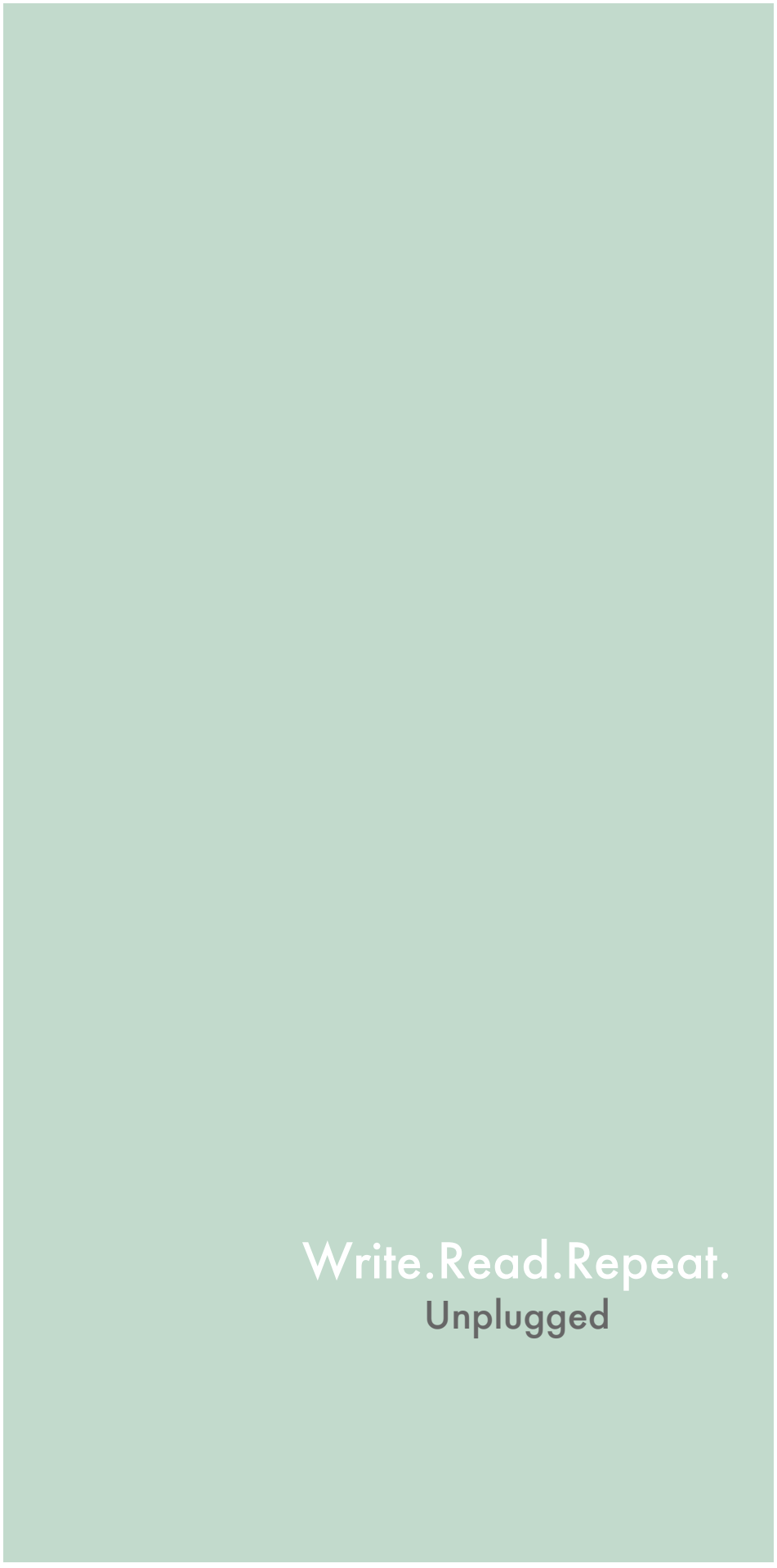
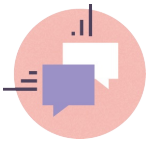

Write.Read.Repeat.
Unplugged



OVERVIEW

Students continue to solve pixel bot problems by playing Coders & Bots to read and write code.

OBJECTIVES

- Students will perform the Coder & Bots roles of Writer, Navigator, Reader, and Stepper
- Students will collaborate in small groups to write and read code
- Students will become more proficient at writing code

AGENDA

Length: 45 minutes

1. Pixel Bots: Write Code Warm-up
2. Pixel Bots: Coders and Bots
3. Pixel Bots: Write Code Exit Ticket

VOCAB

- Programming Element - A command the computer understands.
- Action - An observable event that the code produces
- Error - The program fails to run because the computer cannot execute the code

MATERIALS

1. Lesson 3 | Warm-up Worksheet
2. Lesson 3 | Worksheet 1
3. Lesson 3 | Worksheet 2
4. Lesson 3 | Worksheet 3
5. Lesson 3 | Worksheet 4
6. Lesson 3 | Exit Ticket Worksheet
7. Scratch paper grids
8. Small pixel bot cutout for each student
9. Magnetic pixel bot
10. Scratch paper grids
11. Pencils
12. Whiteboard

CLASSROOM SETUP

Pods of four.

PIXEL BOTS: WRITE CODE WARM-UP

Length: 15 minutes

Students write code for a simple pixel bot image.

Prep: Hand out Lesson 3 | Warm-up.

Teacher Actions	Student Actions
1 Individual Work: Ask students to solve the problem on [Lesson 3 | Warm-up Worksheet][warm-up].	1 Students individually solve the problem on the worksheet.
2 As students attempt the problem, draw the problem on the whiteboard.	
3 Code the solution to the problem as a whole class. Call on students at random to provide each next line of code. Each student should walk up to the board and write the	3 If called on, students walk up to the board to write in (or read) the next line of code.

	next line of code. With each new line of code, you should play the role of Navigator, moving the turtle. Call out the roles of Writer and Navigator to make them explicit. On occasion, pick a Reader and Stepper to walk up to the board to test the code starting from line one.	

PIXEL BOTS: CODERS AND BOTS

Length: 30 minutes

Students work in groups to write and read code to produce two pixel bot images.

Prep: Consider having paper bags for each group. Each paper bags contains the four roles (Writer, Navigator, Reader, Stepper).

Teacher Actions	Student Actions
1 Teacher breaks students into groups of four and randomly assigns roles for the Programming Team and the Computer Team. (Consider handing each group a paper bag with the four roles inside – students reach into the bag and grab a role.) In this first round, groups either get [Lesson 3 | Worksheet 1] [worksheet1] or [Lesson 3 | Worksheet 2] [worksheet2] (alternate between groups). Bots should always help the Coders during	1 Students enact their Coders and Bots roles. They write code to create the pixel bot image.

	the code writing phase of the activity.	
2	Follow the Coders and Bots Protocol by having the Bot Team switch to a new group when it comes time to check the code. Make sure that the Coders fold back their paper to hide the provided pixel bot image before the Bots arrive (ensuring that the Bots are not biased in their reading). The Bots should test the code on an empty scratch paper grid. Ask students, "What do you think the computer does when it cannot understand the code or the code forces the turtle to break the rules (go outside the grid)?" Answer: An error! If the Bots notice this happening, they should report the error to the programming team and tell them what line the error happened on.	2 The Bots switch to a new group to assess code. If the Bots find an error, report it to the Coders and tell them what happened and the line number the error happened on.

3 After one round, pass out [Lesson 3 | Worksheet 3] [worksheet3] or [Lesson 3 | Worksheet 4] [worksheet4] to the groups (alternate again) and repeat the Coders and Bots Protocol.	3 Students repeat the above process with new coding challenges.
4 In whole class mode, ask students to share out any disagreements they had in the write and read process. Use this as an occasion to firm up any misconceptions. Also use this time to introduce and define Elements and Actions (see vocabulary section above).	4 Students summarize and describe the disagreements they could not resolve.

PIXEL BOTS: WRITE CODE EXIT TICKET

Length: 5 minutes

Time permitting, students individually fill out an exit ticket to check for understanding.

Prep: Hand out Lesson 3 | Exit Ticket Worksheet

Teacher Actions	Student Actions
1 Ask students to individually work on completing the [Lesson 3 | Exit Ticket Worksheet] [wrap-up].	1 Students work individually on the [Lesson 3 | Exit Ticket Worksheet] [wrap-up].