Lesson 2: Designing Screens with Code

Overview

In Unit 4 students learned a very simple approach to app development in App Lab that required a separate screen for most interactions. To expand the kinds of apps that students can make, and to encourage them to think in new ways about how users interact with apps, we introduce the `setProperty()` block. This command can be used to set the content and properties of various UI elements, allowing students to write programs that update information on a single screen, instead of manually creating duplicate screens. In this lesson students build up simple apps that only require a single screen, the content of which is changed using `setProperty()`.

Purpose

This lesson allows students some time to get back into programming with App Lab before introducing the Circuit Playground, but also introduces the useful concept of a *setter*. In Unit 4, students primarily used `setScreen()` to make their apps respond to user interaction. While this is a simple and useful technique, it can lead to a lot of duplication of content across multiple screens. By using *setters*, and later *getters*, students can write apps that actually change the content on a single screen, by showing and hiding or changing the content or look of various elements.

Once students have learned about using getters and setters with UI elements, encourage them to think critically about when to use a separate screen in the design phase of an app. If screens are more alike than different, it might be more effective to just change the elements on screen in reaction to input instead of duplicating content across multiple screens. While students are only introduced to `setProperty()` right now, they will later learn the partner command `getProperty()`.

Assessment Opportunities

1. **Set the properties of UI elements using code**

   Code Studio: See rubric on bubble 3

2. **Respond to user input using an event handler**

   Code Studio: See rubric on bubble 7

Objectives

Students will be able to:

- Respond to user input using an event handler
- Set the properties of UI elements using code
- Write programs that change multiple elements on a single screen instead of changing screens

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the teachers

- **CSD Unit 6 - Physical Computing** - Slides
- **Designing Screens with Code** - Resource
- **Random Numbers** - Resource
- **Responding to User Input** - Resource

Introduced Code

- `setProperty(id, property, value)`

3. **Write programs that change multiple elements on a single screen instead of changing screens**

   Code Studio: See rubric on bubble 12

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

▶ **AP** - Algorithms & Programming

Agenda

Warm Up (5 minutes)
UI Element Properties Refresher

Activity (80 minutes)
Designing with setProperty()

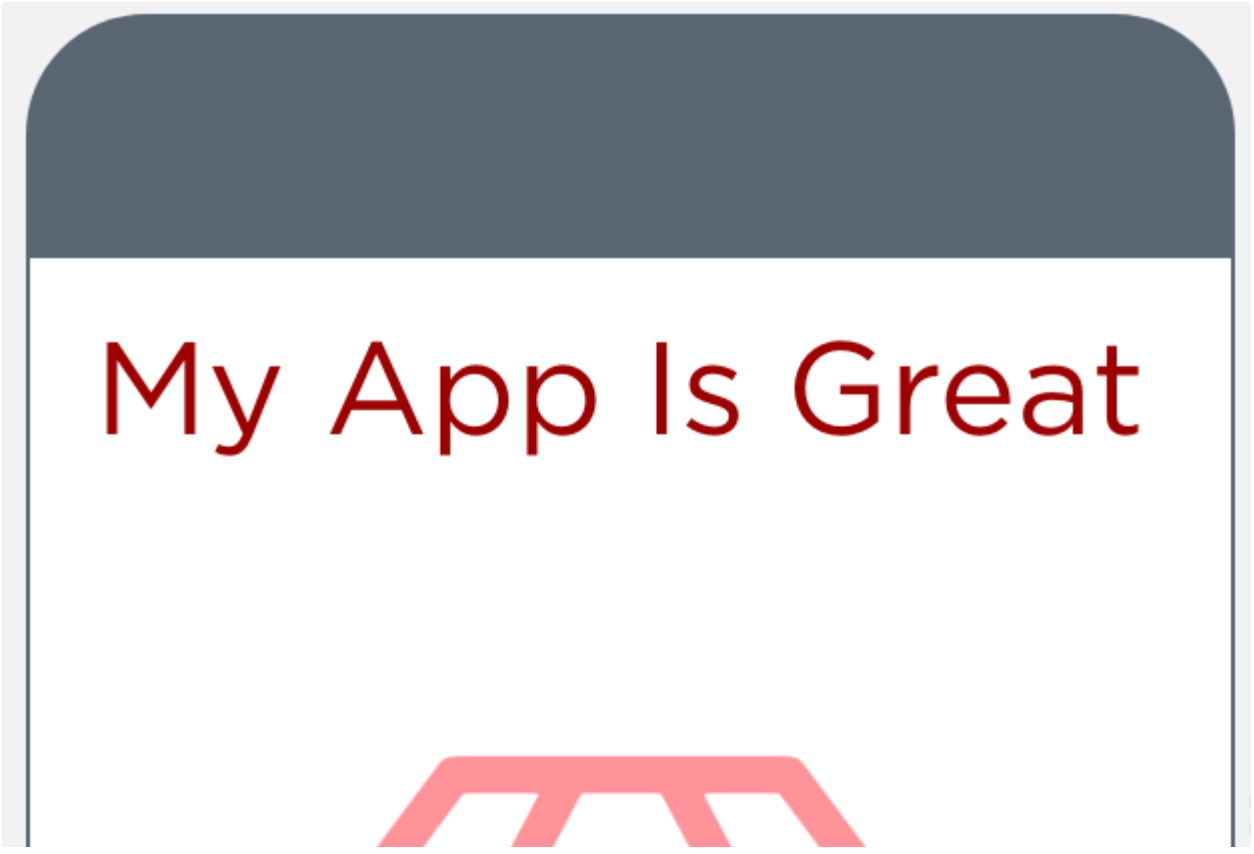
Wrap Up (5 minutes)
Reflecting on Unit 4

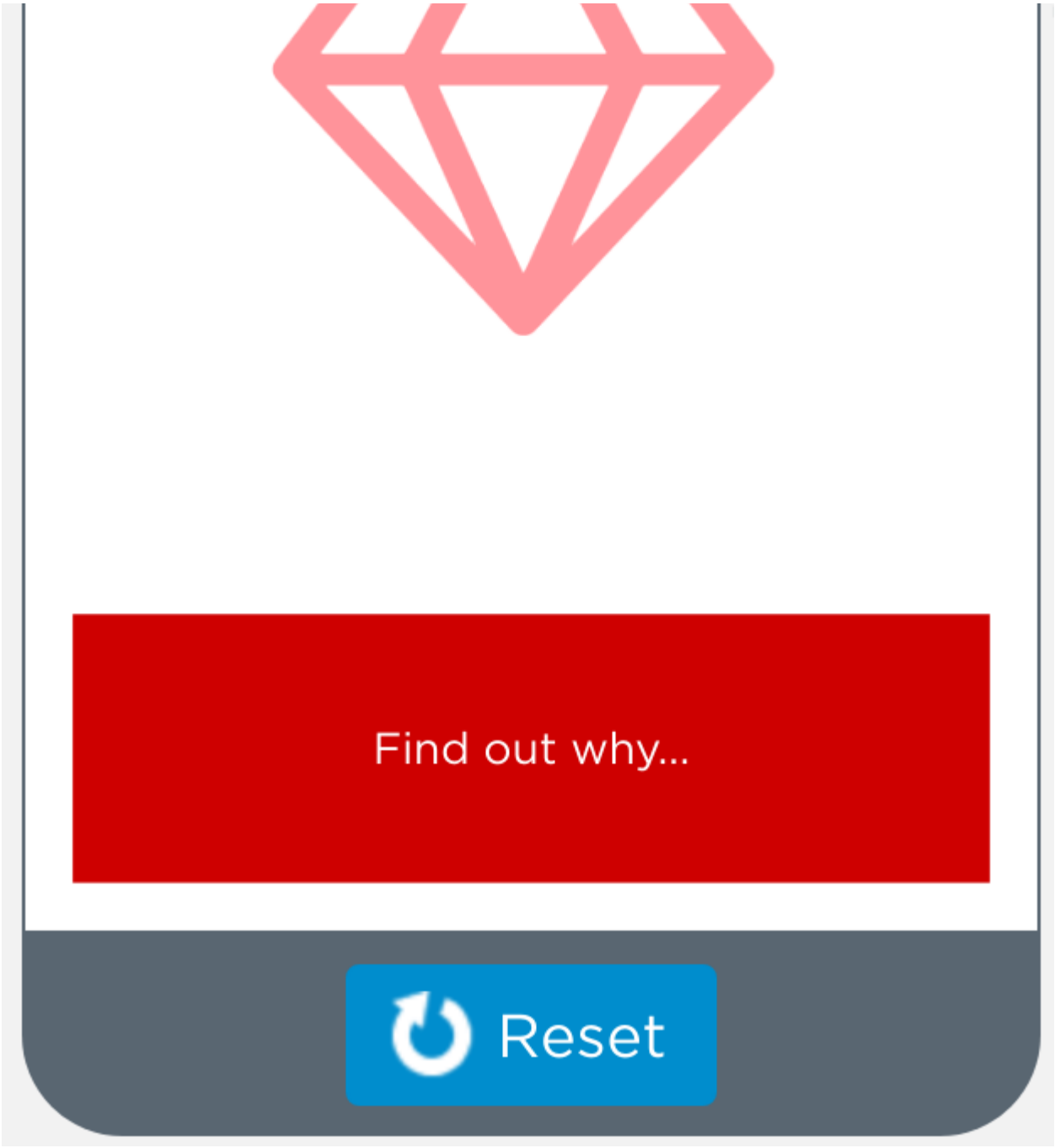
Teaching Guide

Warm Up (5 minutes)

UI Element Properties Refresher

Display: Show students this example image





Discuss: How would you describe to somebody else how to recreate this screen? What specific details would they need to know about each design element?

Discussion Goal

The goal of this disucssion is to prime students to think about the *properties* of various design elements, which they will learn to change with code later in this lesson. You might ask students to think back to a similar discussion we had in Unit 2 when trying to describe what a web page looks like, or to the properties of a sprite from Unit 3

Activity (80 minutes)

Designing with setProperty()

Transition: Head to Code Studio

1-3 **Setting Properties**

1 2 3

Assessment Opportunity

You can use this level as a formative assessment for students. Click inside the level to view a rubric and leave feedback to your students

4-7 **Events and Properties**

4 5 6 7

Assessment Opportunity

You can use this level as a formative assessment for students. Click inside the level to view a rubric and leave feedback to your students

8 **Emotion Machine Example**

9-12 **Building an App**

9 10 11 12

Share: The final level in this lesson allows students to customize and submit an "Emotion Machine" app. If time, allow students to share their programs.

Assessment Opportunity

You can use this level as a formative assessment for students. Click inside the level to view a rubric and leave feedback to your students

Wrap Up (5 minutes)

Reflecting on Unit 4

Prompt: Think back to the app you prototyped in Unit 4. Knowing what you know about using `setProperty()` to change UI elements, how might you change your app prototype?

Discuss: Have the class share the kinds of things they came up with. See if the class can come up with some broad types of features that weren't possible, or were cumbersome, to do with screens alone.

Discussion Goal

Goal: This discussion is intended to clarify for students *why* we are changing UI elements with code, and how it might actually allow them to solve problems that came up in Unit 4. From this point on students will need to make reasoned choices about when to use separate screens in a program and when to update elements with code.