

Lesson 7: Sprites

Overview

Question of the Day: How can we use sprites to help us keep track of lots of information in our programs?

In order to create more interesting and detailed images, students are introduced to the sprite object. The lesson starts with a discussion of the various information that programs must keep track of, then presents sprites as a way to keep track of that information. Students then learn how to assign each sprite an image, which will greatly increase the complexity of what they can draw on the screen.

Purpose

Keeping track of many shapes and the different variables that control aspects of those shapes can get very complex. There will be lots of variables with different variable names. Instead, computer scientists created something called an **object** which allows for one variable name to control both the shape and all its aspects. In Game Lab we use a certain type of object called a **sprite**. A sprite is just a rectangle with **properties** for controlling its look. Properties are the variables that are attached to a sprite. You can access them through **dot notation**.

Using the Animation Tab, students can create or import images to be used with their sprites. Later on, these sprites will become a useful tool for creating animations, as their properties can be changed and updated throughout the course of a program.

Assessment Opportunities

1. Create and use a sprite

See levels 10 and 11 on Code Studio.

2. Use dot notation to update a sprite's properties

See level 11 on Code Studio.

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

- **AP** - Algorithms & Programming

Objectives

Students will be able to:

- Create and use a sprite

Preparation

- (Optional) Print a copy of the activity guide for each student

Links

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

For the teachers

- **Animation Tab** - Resource
- **CSD Unit 3 - Interactive Animations and Games** - Slides
- **Sprites** - Resource

For the students

- **Introduction to Sprites** - Video (**Download**)
- **The Animation Tab** - Video (**Download**)

Vocabulary

- **Dot notation** - the way that sprites' properties are used in Game Lab, by connecting the sprite and property with a dot.
- **Property** - A label for a characteristic of a sprite, such as its location and appearance
- **Sprite** - A character on the screen with properties that describe its location, movement, and look.

Introduced Code

- `drawSprites`

Agenda

Lesson Modifications

Warm Up (5 minutes)

How Much Information?

Activity (35 minutes)

Introduction to Sprites

Skill Building

Practice

Assessment

Challenges

Wrap Up (5 minutes)

Journal

- `var sprite = createSprite(x, y)`

Teaching Guide

Lesson Modifications



Attention, teachers! If you are teaching virtually or in a socially-distanced

classroom, please **click here** to access modifications that can be used during this lesson.

Warm Up (5 minutes)

How Much Information?

Review: So far we've written programs that put simple shapes on the screen. List of all of the different pieces of information that you have used to control *how* these shapes are drawn.

Prompt: If you wanted to create programs with more detailed images, maybe even characters that you could interact with, what other pieces of information might you need in your code?

Share: Allow students to share out their lists.

Discussion Goal

The goal here is to get students thinking about all of the different values that go into drawing a single shape on the screen, and how many more values they may need to control a more detailed character in a program. If students are struggling to come up with ideas, you might use some of the following prompts:

- How do you tell a shape where to go on the screen?
- How do you tell a shape what size it needs to be?
- How do you tell a shape what color it should be? What about its outline?
- What if you wanted to change any of those values during your program, or control other things like rotation?

Remarks

Today we'll learn how to create characters in our animations called **sprites**. These sprites will help us

Today we'll learn how to create characters in our animations called **sprites**. These sprites will help us keep track of all of the information that we need in our programs.

Question of the Day: How can we use sprites to help us keep track of lots of information in our programs?

Activity (35 minutes)

Introduction to Sprites

Transition: Send students to Code Studio



Exploration

Questions to Consider with Video:

- What is a sprite?
- What are properties?
- What problem do sprites solve?



Video: Introduction to Sprites

Discussion Goal

Key Vocabulary:

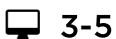
- **Sprite** - A character on the screen with properties that describe its location, movement, and look.
- **Property** - A label for a characteristic of a sprite, such as its location and appearance.
- **Dot Notation** - the way that sprites' properties are used in Game Lab, by connecting the sprite and property with a dot.

Sprites are a very complex concept, and students may have difficulty understanding exactly what they are. The most important aspect for students to understand is that sprites allow them to organize a lot of information about something that they want to draw to the screen.

Students should make the connection between properties and variables, that both hold information that their program needs to run. Properties are accessed through their sprites, and Game Lab sprites already have specific properties that are automatically created when students create each sprite, such as x position, height, and rotation.

Sprites solve the problem of organizing a lot of information about how something should be drawn to a screen. Rather than creating new variables to hold all of that information, sprites use properties to hold all of the information about one thing that is drawn to the screen.

Content Corner: The sprite is a type of data called an object. While we aren't yet explicitly introducing the concept of objects, students do need to understand that a sprite is a different type of value from the ones we've seen before, one that can hold references to many more values.



Skill Building

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Questions to Consider with Video:

- What are the steps to adding an image to a sprite?
- What are the different ways to get an image?



Video: The Animation Tab

Discussion Goal

Make sure students understand that they will need to both create the image (or animation) in the Animation Tab and then add the animation to the sprite using the `setAnimation` block. Students may be confused by the use of the word "animation" for single images, but in Game Lab, still images are considered "animations" with only one frame.

Students can use an animation already in the animation tab library, upload one from their computer, or create their own using the provided drawing tools. Additionally, students can use the drawing tools to modify the images they have chosen from the library or uploaded.

Misconception Alert! Many students may now confuse the concepts of a sprite, its animation, and the image that it draws to the screen. In the next few lessons, watch out for this misconception, and reinforce the idea that a sprite's animation is just one of its properties, the one that controls what image is drawn to the screen. Remind students that a single sprite may have different animations throughout the course of the program, just as other properties can change, and that two or more sprites might share the same animation.

Skill Building



Skill Building

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Practice



Practice

Assessment



Assessment

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

Challenges



11

Challenges

💡 Teaching Tip

Level 11e - Finding an Image Online: Because we can't know which sites might be blocked in your district, we've avoided pointing students to a specific search engine. Not all search engines make it easy to set Creative Commons filters - some of the easiest include:

- **Creative Commons Search**
- **Google Image Advanced Search**
- **Wikimedia Commons**
- **Flickr Creative Commons**

Wrap Up (5 minutes)

Key Vocabulary:

- **Sprite** - A character on the screen with properties that describe its location, movement, and look.
- **Property** - A label for a characteristic of a sprite, such as its location and appearance.
- **Dot Notation** - the way that sprites' properties are used in Game Lab, by connecting the sprite and property with a dot.

Journal

Question of the Day: How can we use sprites to help us keep track of lots of information in our programs?

Prompt: So far we've been able to change a sprite's location and image. What else might you want to change about your sprites?

Share: Allow students to share out their ideas.

💬 Discussion Goal

This discussion prompts students to think about the different properties that a sprite might have, and prepares them for the next lesson, which explicitly covers sprite properties.