Making Game Images

Students practice using a new function alongside previously-learned functions to choose images for their game.

Prerequisites	Defining Values
Relevant Standards CC-Math	*Select one or more standards from the menu on the left (⌘-click on Mac, Ctrl-click elsewhere).*
Lesson Goals	Students will be able to: • Apply previous knowledge of *functions* to new situations • Use reasoning skills to select appropriate functions and combine their effects
Student-Facing Lesson Goals	• I can use different functions to transform *images*. • I can write definitions for my transformed images.
Materials	• Lesson slides (Google Slides) • Blank Game template (Pyret) • Linking Images Guide (PDF) • Saving Images Guide (PDF)
Preparation	• Make sure all materials have been gathered • Decide how students will be grouped in pairs
Supplemental Resources	
Key Points for the Facilitator	• Discuss copyright and fair use guidelines with your students. • Instructional time may vary based on students' experience with using Google Image Search. • Check beforehand for any issues the school Internet security blocker might cause with searching for images. • There are two ways of importing images: linking directly to the image on the web or downloading the image to Google Drive and then using the "Insert" button. See the "Linking Images Guide" below for more information on linking directly. • Encourage students to focus on finding and scaling each image as needed before moving on to the next one.

For a textbook-like version of materials similar to these, you may wish to see the prior unit-based version.

Glossary

define :: to associate a descriptive name with a value

function :: a mathematical object that consumes inputs and produces an output

Image :: a type of data for pictures

interactions area :: the right-most text box in the Editor, where expressions are entered to evaluate

String :: a data type for any sequence of characters between quotation marks (examples: "hello", "42", "this is a string!")

Warmup

Students should have their workbook, pencil, and be logged into code.pyret.org and have their completed "Game Design" worksheet.

The Game Template   15 minutes

Overview

This activity is primarily about *review and reading comprehension* , in which students open a large and unfamiliar file and must make sense of it using what they've seen before.

Launch

By now you've learned about defining values, composing functions, and reading contracts. Taken together, that's a lot of code you're now able to understand! It's time to flex your reading skills, and look at the file you'll be working with to build your video game.

This file has code you haven't seen before! And that's ok! For now, see what parts you recognize, and make sure you understand them.

Investigate

With their partner, students should load the Blank Game Template.

<div style="border:2px solid purple; padding:1em;">

Notice and Wonder

As students investigate the Game Template file with their partner, ask students to record what they Notice, and then what they Wonder.

</div>

Synthesize

- **What familiar things did you see in the Game Template file?**

- **What were some unfamiliar things? Any idea what they might do?** *Answers vary: new functions, comments, images*

- **What datatype is `GAME-TITLE` ? What datatype is `BACKGROUND` ?** *`GAME-TITLE` is a String, `BACKGROUND` is an Image*

- **What does `SCREENSHOT` return in the *Interactions area*?** *An image of the `BACKGROUND` , `PLAYER` , `TARGET` , and `DANGER` all together*

- **Did anyone try pressing "Run"? What happens when you press "Run"?** *Allow students to discuss what they see and what connections they see with the code*

  - **What do you think `image-url` does?** *Answers vary: It consumes a String, which is a URL (an image location on the Internet) and produces the Image inside our program*

<div style="border:2px solid #2a6ebb; padding:1em;">

What is SCREENSHOT?

The Game Template defines several image values, such as `BACKGROUND` , `PLAYER` , etc. These definitions are using the running game, which appears when you click "Run". `SCREENSHOT` is defined as a fixed composition of the game images, placing each of them on top of the background at various (x,y) coordinates. It is used to give students a chance to see their characters onscreen before they've gotten them moving, and to give teachers an opportunity to reviw coordinates. It is *not* in any way connected to the running game, so changes made to `SCREENSHOT` will not impact the game that appears when clicking "Run".

</div>

Finding Your Game Images   flexible

Overview

This activity is all about finding the right images for students' games. Since the internet never has *exactly* the right image,

students' need to get their games **just right** motivates them to confront the need for dilation, rotation, and reflection of the images they find. This, in turn feeds back into their understanding of Contracts and Function Composition.

Launch

Copyright and Fair Use

The students will be using images from the Internet for their game, and while this falls entirely under the "Educational Use" umbrella of Fair Use Guidelines, it is still important to make sure students of all ages understand the purpose of copyright law and the differences between educational and commercial purposes.

Fair Use

- Small portion of original material used.
- Commercial value of original is not diminished.
- New work is critique, satire, or education.
- New work is predominantly original product of user.
- Benefit to user is predominantly other than commercial.

Fair Use

Guide the students through finding an image, saving it to their Drive, importing it into their program, and defining the image value as `PLAYER`. *Students will change this image later on their own, this is just for teaching purposes.*

How to find and save images to Google Drive....

In your favorite search engine (we recommend DuckDuckGo), search for an image and then click "Images". Click "All Types" and select "Transparent" (In Google Image Search, it's under "Color -> Transparent"). This will filter and display images that have a transparent background, appearing as a light white/grey checkerboard pattern behind the character.
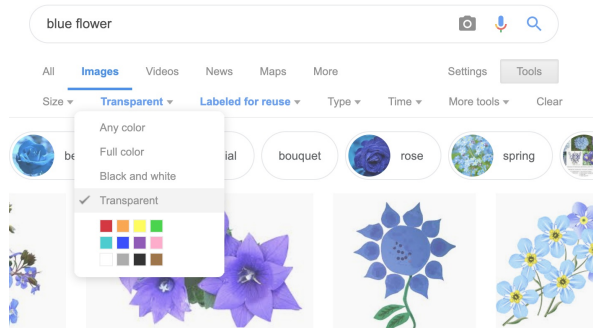
Once an image has been selected, click it to expand and save the image to Google Drive. For file management, students may want to create a folder to store their game images.

- If using a Chromebook, this is done by right-clicking and selecting "Google Drive" on the left for the save location.
- On a PC or Mac, follow this quick guide.

Once the image is saved to Google Drive, it can be brought into the program by using the "Insert" button. This will automatically bring in the image using the `image-url` function, and students can run the code to see the image.

Investigate

What happens if the image we find needs to be made bigger or smaller? What if it needs to be rotated, or flipped?

Students can define the image as a value and make changes to it with the image manipulation functions `scale`, `rotate`, `flip-horizontal`, and `flip-vertical`.

Strategies for English Language Learners

MLR 8 - Discussion Supports: As students discuss, rephrase responses as questions and encourage precision in the words being used to reinforce the meanings behind some of the functions, such as `scale` and `flip-horizontal`.

With their partner, students search the Internet for images to use in their game. They will need 4 images, one for each visual element of their game:

- `BACKGROUND`
- `PLAYER`
- `DANGER`
- `TARGET`

Students should:

- Save the chosen images to their Drive
- Bring them into the programming environment
- *Define* the images as values
- Plan out how to resize and reorient them in their game
- Make sure the final version of each image is defined as either `BACKGROUND`, `TARGET`, `DANGER`, or `PLAYER`

When finished, students should be able to type `SCREENSHOT` in the interactions window and see all four of their images appropriately sized and oriented.