Hour of Code: Teacher Guide

Before the Hour of Code:

- Make sure student computers have an up-to-date browser (Chrome, Safari, or Firefox).
- Read through teacher notes in this document. Download notes to have exercise solutions ready.

During the Hour of Code:

1. Direct students to **codehs.com/hoc_pixels**
2. Allow students to work through Hour of Code at their own pace, providing encouragement and support when needed. See tips below for handling student questions.
3. Tweet pictures or stories at @CodeHS #ReadWriteCode #HourOfCode!
4. If time allows at the end of the period, facilitate a discussion around the Hour of Code using the following guiding questions:
   - Before today, what did you think about programming or coding?
   - Did any of these ideas change during the Hour of Code?
   - What was your favorite part of the Hour of Code?
   - Did any parts of the Hour of Code challenge you? How?

Hour of Code Tips:

If students get stuck or have questions, it is okay if you don't have the answer! Ask questions to activate their problem-solving skills such as:

- What can we try differently?
- What do you want the program to do? What are you telling the program to do?
- How can we break this problem into smaller steps?

Thank you for your dedication to Computer Science Education!

Interested in going beyond the Hour of Code?
Reach out to us at hello@codehs.com.

Digital Art Teacher Notes

In this Hour of Code, students will learn how computers break down images into concrete values that can be stored. Students will learn how images are represented digitally using pixels.

Objective
Students will be able to...
- Describe how computers encode images as data
- Create color and black-and-white images by encoding pixels with hexadecimal and binary color values

Link to Activity: codehs.com/hoc_pixels

Discussion Questions
- How are images displayed and stored on computers?
- What is binary? How is binary used to create digital images?

Exercise Solutions

Checkerboard	
Description	Using the pixel tool, type out the binary encoding for a black and white checkerboard.
Motivation	Students learn how to use the pixel tool to type our binary encoding for visuals.

Solution	`01010101`
	`10101010`
	`01010101`
	`10101010`
	`01010101`
	`10101010`
	`01010101`
	`10101010`

Common	**Where is the pixel picker?**

Digital Art Teacher Notes

Questions	On the left-hand side of the screen.

Ladder	
Description	In this exercise, create an image of a ladder that has a height of 20 and a width of 5.
Motivation	Students practice using the pixel tool to type out binary encoding for visuals.
| **Solution** | ```
01110
01110
00000
01110
01110
00000
01110
01110
00000
01110
01110
00000
01110
01110
00000
01110
01110
00000
01110
01110
``` |
| **Common Questions** | **Where is the pixel picker?**
The left-hand-side of the screen.

Students don't know where to start |

Digital Art Teacher Notes

	Students can start typing binary digits (0 or 1) into the editor. The display will change on the right depending on the digit.

Create an Image	
Description	You have a blank canvas, create whatever image you'd like! Play around with the width and height as well, not all images need to be square.
Motivation	Students practice using the pixel tool to type out binary encoding for visuals.
Solution	Varies
Common Questions	**Where is the pixel picker?** The left-hand-side of the screen.

Exploring RGB	
Description	Try adding a blue pixel to the screen
Motivation	Students learn about representing colors in hexadecimal.
Solution	`0000ff`
Common Questions	**The key isn't changing** Besides dragging the bar on the side to change the colors in the square, you must also drag the little black dot on the square so that the key displays the RGB value.

Making Yellow	
Description	Your challenge in this problem is to make the color yellow. Which color channels are turned "on" and which are turned "off" to represent yellow?

Digital Art Teacher Notes

	Why do you think that's the case?
Motivation	Students learn about representing colors in hexadecimal.
Solution	`FFFF00`
Common Questions	**The key isn't changing** Besides dragging the bar on the side to change the colors in the square, you must also drag the little black dot on the square so that the key displays the RGB value.

Rainbow	
Description	The goal of this exercise is to make a pixel rainbow. For an extra challenge, try to make a full rainbow arc.
Motivation	This exercise allows students to explore using for loops by starting with a familiar problem. Students must find the pattern in building a staircase so they can put the right code in the for loop.
| **Solution** | ```
ffffff ffffff ffffff ffffff ffffff ffffff ffffff ffffff
ffffff ffffff ffffff ffffff ffffff ff0000 ff0000 ff0000
ff0000 ffffff ffffff ffffff ffffff ffffff ff0000 ff8000
ff8000 ff8000 ff8000 ff0000 ffffff ffffff ffffff ff0000
ff8000 ffff00 ffff00 ffff00 ffff00 ff8000 ff0000 ffffff
ff0000 ff8000 ffff00 00ff00 00ff00 00ff00 00ff00 ffff00
ff8000 ff0000 ff8000 ffff00 00ff00 0000ff 0000ff 0000ff
0000ff 00ff00 ffff00 ff8000 ffff00 00ff00 0000ff 8000ff
8000ff 8000ff 8000ff 0000ff 00ff00 ffff00 00ff00 0000ff
8000ff ffffff ffffff ffffff ffffff 8000ff 0000ff 00ff00
0000ff 8000ff ffffff ffffff ffffff ffffff ffffff ffffff
8000ff 0000ff 8000ff ffffff ffffff ffffff ffffff ffffff
ffffff ffffff ffffff 8000ff
``` |
| **Common Questions** | **The key isn't changing**
Besides dragging the bar on the side to change the colors in the square, you must also drag the little black dot on the square so that the key displays the RGB value. |

Digital Art Teacher Notes

Create a Color Image!	
Description	Now that you can encode color images with binary and/or hexadecimal, type out the pixel encoding for any image you wish! You have a blank canvas to create whatever you'd like.
Motivation	Students use what they have learned about encoding color images to express their creativity.
Solution	Varies
Common Questions	**The color key isn't changing** Besides dragging the bar on the side to change the colors in the square, you must also drag the little black dot on the square so that the key displays the RGB value.