

Lesson 4: Encoding Color Images

Adapted from Code.org curriculum



Objectives: You will be able too...



- Use the Pixelation Tool to encode small color images with varying bits-per-pixel settings.
- Explain the color encoding scheme for digital images.
- Use the Pixelation Tool to encode an image of your design
- Explain the benefits of using hexadecimal numbers for representing long streams of bits.



Getting Started: How might you encode colors?



- In the previous lesson we came up with a simple encoding scheme for B&W images. What if we wanted to have color?
- Devise an encoding scheme for color in an image file. How would you represent color for each pixel?
- How many different colors could you represent? Do you have a particular order to the colors?



Color in Pixelation



- The way color is represented in a computer is different from the ways we represented text or numbers
- With text, we just made a list of characters and assigned a number to each one.
- With color, we actually use binary to encode the physical phenomenon of LIGHT.
- Note: You saw this a little bit with the previous lesson, but today we will see how to make colors by mixing different amounts of colored light.

+ A little bit about pixels...

- Video - A Little Bit about Pixels
- We will fill out the video guide

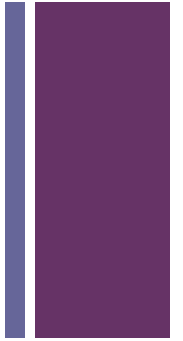


+ A little bit about pixels...



- Image sharing services are a universal and powerful way of communicating all over the world.
- Digital images are just data (lots of data) composed of layers of abstraction: pixels, RGB, binary.
- The RGB color scheme is composed of red, green, and blue components that have a range of intensities from 0 to 255
- Screen resolution is the number of pixels and how they are arranged vertically and horizontally, and density is the number of pixels per a given area.
- Digital photo filters are not magic! Math is applied to RGB values to create new ones

+ Color Pixelation Widget



- We will use the “Encoding Color Images – Activity Guide”
- Code Studio: Stage 4
- Step 1: 3-bit color
- Step 2: 6-bit color
- Step 3: 12-bit color and Hex



RGB Color Model – Additive Light



- Computer screens emit light, so when you mix RGB colors, you are really mixing light together.
- How to make black and white with paint vs. light
 - To make black: with paint, mix a full spectrum of colors together; with light, turn off all the lights
 - To make white: with paint, don't use any paint (assuming the canvas is white); with light, turn on all lights for a full spectrum of color
- This can making mixing colors a little bizarre too...
 - With paint, mix full red and full blue to make purple
 - With light, mix full red and full blue to make pink

+ Hexadecimal Numbers



- Base-16 number system
- 16 unique symbols that can appear in each place value
- 0-9, A, B, C, D, E, and F
- Misconception: hexadecimals DO aid humans in reading longer strings of bits, they DO NOT change the underlying data being represented.
 - Instead, they allow use to read 4 bits at a time rather than 1 → so we can more easily parse binary info
 - Hexadecimal is NOT a form of compression

+ Personal Favicon Project



- We will use the “Personal Favicon Project – Activity Guide”
- We will complete this for homework by _____
- Requirements:
 - The icon must be 16x16 pixels
 - You must use the Pixelation Widget to encode the bits of color information
 - The image must be encoded with at least 12 bits per pixel

+ Wrap-up



- Submit a .png version of your favicon, blown up to a larger size
- Submit the bits that make up the image