



DIY ACTIVITY

MAKE A PIXELATED IMAGE GRADES 3-5

OBJECTIVES

- Use computational thinking to transfer information from a color photograph to a pixelated version using a code made from 1s and 0s.
- Decode 1s and 0s to determine which “pixels” should be filled in and which color they should be, and which should be left blank.

PROCEDURE

WATCH THE GENERATION GENIUS INFORMATION TRANSFER VIDEO AS A GROUP.

1. Choose a color photo that you would like to pixelate. It works best to start with a photo with only a few colors. Place the photo next to you for reference.
2. Place a piece of graph paper next to the photo. The graph paper represents the screen of an electronic device and each square represents a pixel.
3. Working back and forth between the photo and the graph paper, write a 1 in any of the squares that will contain a portion of the image. Normally a 0 would be placed in squares that should be left blank, but you can also leave these blank to save time.
4. When all the 1s have been written into appropriate squares, you should be able to see the shape of the image. However, if you were to color this image in now, it would only be in black and white (because 1 represents black).
5. To code the graph paper for a color image, additional information is needed. Using only 1s, create a code for the other colors. For example,
 - a. 1 means color the square black
 - b. 11 means color the square pink
 - c. 111 means color the square yellowUse the code you create to add 1s accordingly to the squares you want to be colored.
6. You have now created a pattern of information, just like electronic devices use to transfer information for pictures. You just need to turn your pixels on by coloring them in according to your code. You could trade your coded picture with a classmate and follow the code to color in the pixels.
7. See the colored image emerge!

MATERIALS NEEDED

- A color copy of a photo of what you want to pixelate (works best to start with a photo with only 3 colors)
- Graph paper
- At least three different colored markers (it may be helpful to have markers that match up to the three colors on the photo to help make the task easier for students to follow)
- A pencil with a good eraser

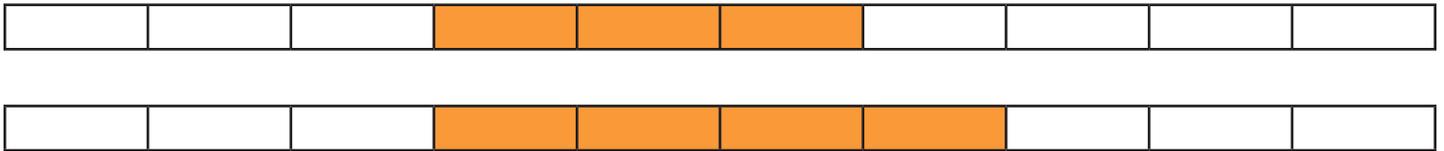
WHAT IS GOING ON HERE?

Information is transferred digitally by coding it using 1s and 0s. This is called binary (two number) coding. When a photo is taken with a digital camera, the picture is stored as coded information in a series of 1s and 0s. On a digital screen, the series of 1s and 0s correspond to whether or not a light is turned on (1 for on, 0 for off), and the number of 1s corresponds to the color the square should be. Sound and text is also transferred digitally as a series of 1s and 0s, just like images.

FURTHER EXPLORATION

Now that you understand how images are transferred using patterns of 1s and 0s, you can try experimenting with pixel size and resolution. Try using graph paper with smaller squares, or repeat the activity above but first divide each graph paper square into 4 small squares. Decide which of the smaller squares should be which color based on the original image. Does your new pixelated image look more or less like the original photo than the one with the larger squares?

You've now coded an image you have seen. Can you decode a black and white image you haven't seen? Each student should create a line of code for each row of their image. For example, the following 2 rows from the graph paper would have a code that looks like this:



In this case, stick to using 1 to represent squares that are filled in and 0 for those that aren't. Trade codes with a partner and on a clean sheet of graph paper try to recreate their drawing in black and white from the code! Check each other to make sure the code is both accurately written and decoded!

