

Color by Numbers (Image Representation)

Open to all categories (please go to "What is a Looney Challenge" to learn more about categories).

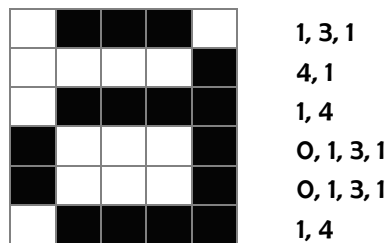
COLOR BY NUMBERS* - 8 points

How does a computer store pictures when they can only use numbers? This activity, Color by Numbers, will show you how drawings, photographs, and other pictures are stored using only numbers.

Computer screens are divided up into a grid of small dots call *pixels* (picture elements).

In a black and white picture, each pixel is either black or white.

When a computer stores a picture, all that it needs to store is which pixels are black or white. For example, look at the picture of the "a" below, it shows us how a picture can be represented by numbers. The first row consists of one white pixel, then three black, then one white. The first row is represented as 1, 3, 1.



The first number always relates to the number of white pixels (for example, row 1). If the first pixel is black the row will begin with a zero (for example row 4).

The Challenge Directions

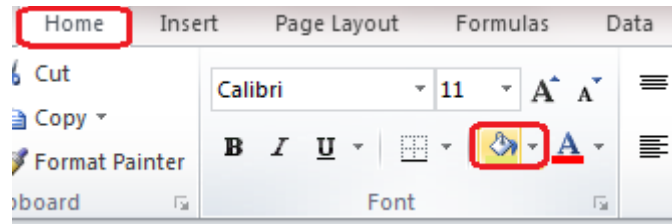
You may choose one of two options to complete the Challenge

1. Option 1:

- Download the Color by Numbers worksheet. Please go to the Looney Challenges Archives page, http://ou.montana.edu/csoutreach/previous_looney-challenges.html, to find the "Color by Numbers Activity Sheet."
- Print hard copies for your student and color in the pixels using a black marker, pen or pencil.
- Each grid has a picture, complete as many grids as you like.
- See the "How to Earn Points" directions at the bottom of the page.

2. Spreadsheet Option:

- If your students have access to a desktop, they can open the Excel **Color by Numbers worksheet** onto a computer. Go to the Looney Challenges Archive page to upload the Excel file. If you have difficulty downloading the file, please contact Sharlyn at looneychallenges@gmail.com to request a copy.
- After opening the Excel spreadsheet, fill in the grids by highlighting each pixel with black. Remember to follow the directions, described above to figure out which pixels are black and which pixels are white.
- To fill the pixel, go to the "Fill Color" icon. This is what the "Fill Color" icon looks like (circled in red):



From: <http://www.itechmindz.com/>

- After your students have completed as many pictures as they wish you will need to save a copy to your computer or print a copy for your records.
- Please follow the “How to Earn Points” directions below.

*This activity has been adapted from Computer Science Unplugged, www.unplugged.canterbury.ac.nz (2002).

How to earn points:

- 1) If you haven't registered your class, please go to cs.montana.edu/looney-challenge and click on the “Register for Looney Challenges” link.
- 2) Discuss with your class the difficulty of the activity. What did they learn? How difficult was the activity? Do they understand the concept?
- 3) Briefly, in a couple of sentences, describe in your email what happened during the activity? Did your students understand the concept(s)? Email your description to looneychallenges@gmail.com
- 4) Please attach two or three examples, photographs of students working, or video of student's outcomes, please send them as an attachment.
- 5) We will send you a confirmation and provide you your point total for the activity and your total points for Looney Challenges. All Looney Challenges can be completed at any time during the 2015-2016 school year.

All Challenges are due, June 30, 2015.

Questions? Please send an email to looneychallenges@gmail.com or call Sharlyn Izurieta at (406) 994-4794.

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