

Arecibo Message Pixel Puzzle

Find the picture in this radio message transmitted to the stars

Pictures can be stored in a computer as a string or grid of numbers. Each number gives the colour of that small area or pixel. This is also the way digital images are stored and represented on a screen and the way that images can be sent between computers or from very distant cameras on satellites in space that are sending photographs back to Earth. As long as you know how to rearrange the string of numbers you can uncover the pattern within them.

In this simple colour-by-number pixel puzzle you can recreate the picture by colouring each pixel as given by its number. You can look up the colour for each number in the key to the right (for example, colour the pixels marked 0 in black and the ones with a 6 in purple). Or use any three different colours that you like (but use the same colour for each number).

[illegible]

Think like a computer scientist!

What *algorithm* did you use to colour the picture? Here are three ways:

- 1) Work along the rows colouring each pixel in turn before moving to the next row.
- 2) Pick a colour then work along the rows, colouring pixels of only that colour. When you get to the end of the grid, pick the next colour and start again. Repeat this until you run out of colours.
- 3) Pick an uncoloured square and colour it, then colour all pixels around it that are the same number, moving outwards until there are no more adjacent pixels with that number. Then pick a new uncoloured square and repeat until the whole picture is done.

What's in the picture?

This is part of a picture (originally in black and white) sent in 1974 by a very large radio telescope at the Arecibo Observatory in Puerto Rico. The message was sent to planets that are thousands of light years away from Earth, in the hope that *if* there's intelligent life there they might be able to decode the message. It is still travelling to the planets so it will be quite a long time before any aliens (if they exist!) might get our message, and even longer for people on Earth to get a reply from them. At the top of the message in yellow (if you chose yellow for '3') you can see the Sun on the left and all the planets in our Solar System (Q: why are there *nine* in this picture?). Below that is a curved shape that represents the Arecibo radio telescope which sent the message.