

These pages are from the G4 "Patterns Can Transfer Information" Journal.

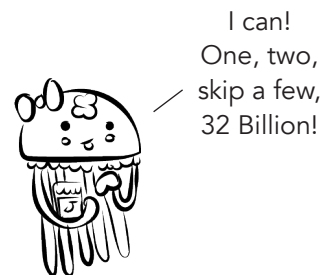
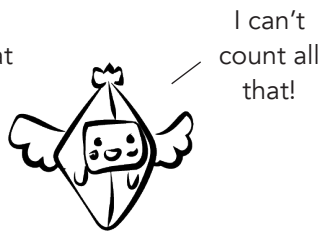


It takes many bits to store data

Since we can store information such as words, pictures and music on a computer, you might think that computers can remember more than just numbers. It certainly looks like that to us, but from the computer's perspective, everything your computer remembers is just a binary pattern. Digital technology really only uses the numbers 0 and 1! Digital information is made of many small bits put together.

| How many bits do you need to make ...? | Number of bits | How long it would take to count to that number |
|--|----------------|--|
| A single letter | 8 | 8 seconds |
| A sentence | 560 | 9 minutes and 20 seconds |
| A paragraph | 8,000 | 2 Hours and 13 Minutes |
| A photo | 240,000 | 2 Days and 18 Hours |
| One minute of MP3 music | 8,000,000 | 13 Weeks and 1 Day |
| One minute of video | 40,000,000 | 1 Year and 3 Months |
| One CD of music | 5,600,000,000 | 177 Years and 6 Months |
| One DVD video | 32,000,000,000 | 1014 Years and 8 Months |

Count to 32 billion!



Decode the bits to make a photo

Let's pretend that a computer program tells the computer that these bits are storing information about a picture that is 12 squares wide and 11 squares tall. The program then specifies these color codes for the file;

- "11" means the color white
- "01" means the color gray
- "00" means the color black.

With these instructions, the computer uses the information stored in the bits and creates a picture.

Decode the image of Great Grandpa!

| | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|
| 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| 11 | 11 | 11 | 11 | 01 | 01 | 01 | 01 | 11 | 11 | 11 | 11 |
| 11 | 11 | 11 | 01 | 01 | 01 | 01 | 01 | 01 | 11 | 11 | 11 |
| 11 | 11 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 11 | 11 |
| 11 | 01 | 01 | 00 | 00 | 00 | 00 | 00 | 00 | 01 | 01 | 11 |
| 11 | 01 | 01 | 01 | 00 | 01 | 01 | 00 | 01 | 01 | 01 | 11 |
| 11 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 01 | 11 |
| 11 | 01 | 01 | 00 | 01 | 01 | 01 | 01 | 00 | 01 | 01 | 11 |
| 11 | 11 | 01 | 00 | 00 | 00 | 00 | 00 | 00 | 01 | 11 | 11 |
| 11 | 11 | 11 | 01 | 01 | 01 | 01 | 01 | 01 | 11 | 11 | 11 |
| 11 | 11 | 11 | 11 | 01 | 01 | 01 | 01 | 11 | 11 | 11 | 11 |



Use the color code above to render the picture.

It's a picture of my great grandpa!

You can see where I got my cuteness from.

