

9.1 Representing data on images and with sound

Year 8 data recap

1. Bit
2. Nibble
3. Byte
4. Kilobyte
5. Megabyte
6. Gigabyte
7. Terabyte
8. Petabyte

Each 1 or 0 is a bit. Short for **binary digit**.

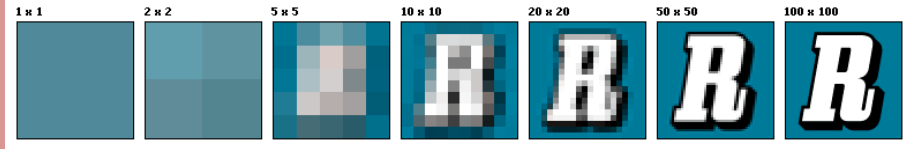
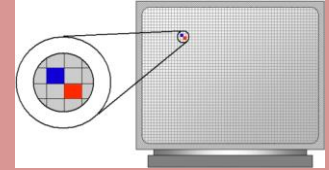
There are **8 bits in a byte**
Then **1000** of each smaller unit in each bigger unit.



| | | | | | | | |
|-----|----|----|----|---|---|---|---|
| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|-----|----|----|----|---|---|---|---|

Representing images

Images are made up of **pixels** (picture elements). Typically a tiny dot that can normally only be seen when zoomed in



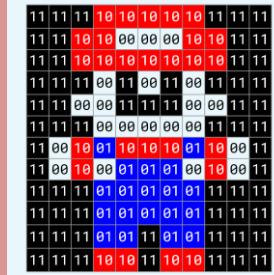
The total number of pixels (row * columns) equates to the image **resolution**. A higher **resolution** will mean increase in quality but will also require higher storage space

Representing sound

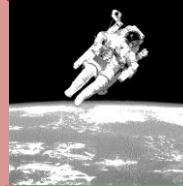
Analogue signals are converted to digital signals so that they can be processed by a computer.
This process is called **sampling**.



The colour of each pixel is represented by a binary code.
More colours = more bits (longer binary code)



Colour depth: the number of bits used for each pixel.
MORE COLOURS = BETTER QUALITY BUT LARGER FILE.



1 bit colour depth = 2 colours



2 bit colour depth = 4 colours



24 bit colour (RGB) depth = 16 million

File size = resolution (columns * rows) * colour depth

| Sample intervals | Sample rate | Sample size | Representation size |
|--|--|---|--|
| The time gap between taking a sample .e.g sampled every 5 milliseconds | How many samples are taken in a second. 44.1khz means 44,100 are taken per second | How many bits are recorded for each measurement | sampling rate * Sample size * duration of clip |

Increasing any of the above will lead to greater quality but a higher file size.

Manipulation is to use various techniques to alter and adjust an image



| Image | |
|-----------------------|------------|
| Image ID | |
| Dimensions | 563 x 302 |
| Width | 563 pixels |
| Height | 302 pixels |
| Horizontal resolution | 96 dpi |
| Vertical resolution | 96 dpi |

Metadata is the data stored in an image file which helps the computer recreate the image on screen. *File format, height, width, colour-depth and resolution, time/date/location image was taken.*
WITHOUT METADATA, DEVICES WOULD NOT BE ABLE TO DISPLAY IMAGES.

9.1 Data Representation

What I need to know:

| | | | |
|--|--|--|--|
| Data sizes | | | |
| Define the term bit. | | | |
| How many bits are in a byte? | | | |
| Order the binary units from smallest to largest. | | | |
| Representing images | | | |
| Explain how images are represented on a computer system using the terms colour depth and resolution. | | | |
| What is a pixel? | | | |
| What is image resolution | | | |
| What is colour depth? | | | |
| Define the term metadata. | | | |
| How do you calculate the file size of an image? | | | |
| Describe what happens to the image when resolution and/or colour depth is increased? | | | |
| Define image manipulation | | | |
| Representing sound | | | |
| What is sound (WAVE) | | | |
| Define Sample interval | | | |
| Define Sample frequency | | | |
| Define Sample size | | | |
| How do you calculate the file size of a sound clip? | | | |