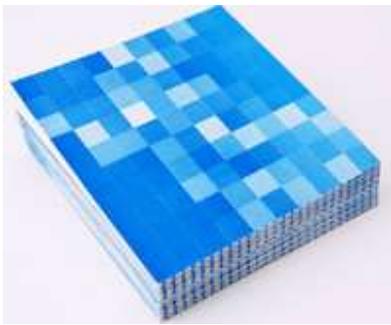
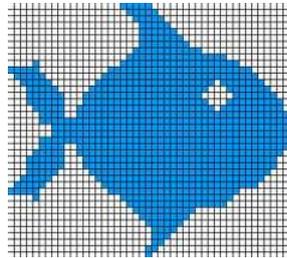


## Pixel

**Pixel** or Picture element is the term used to describe a single point in a **Raster image**. The Raster image, also called **Bitmap** is the **data structure** that represents a rectangular grid of pixels or points of colour that can be viewed in a monitor. The number of pixels in the image represents its resolution. The pixel can be considered as the smallest portion of the digital image. It also denotes the unit of measurement of the resolution such as 1200 pixels.

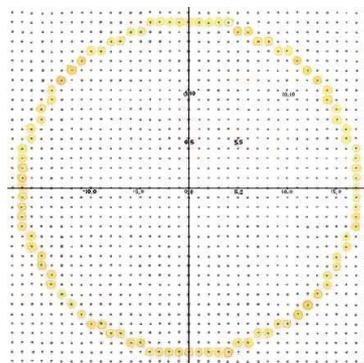


**Pixel**



**Raster image**

Pixel is the smallest **addressable point** in the screen that can be controlled. Each pixel is the sample of the original image having its own address. The address of the pixel corresponds to its coordinates. The pixels are arranged in a two dimensional grid using dots or squares. The intensity of the pixel is variable and in colour systems, each colour is represented by three or more colour components such as red, green, blue or cyan, magenta, yellow, black etc. This colour samples in the form of pixels form digital images such as JPEG image. In computer terminology, a pixel image is known as **bit mapped** image or raster image.



**Pixel**

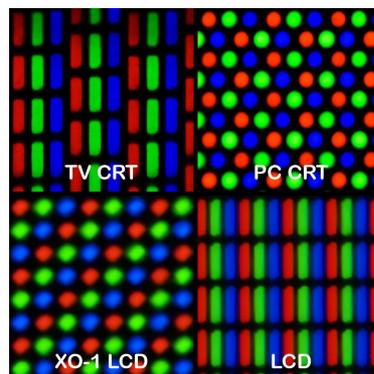
## How it is produced?

In a computer, the pixels are normally square types having equal horizontal and vertical sampling pitches. Other digital systems use rectangular pixels having unequal horizontal and vertical sampling pitches. The resolution of the image on the monitor is called **display resolution** which depends on the video card. In LCD monitors, uses pixel display having native resolution. Each pixel in LCD monitor is composed of **Triads** which determines the screen resolution. If the selected resolution is less than the native resolution of the monitor, it displays the image in selected resolution with a black border around the edges.

## Colour in pixels

The number of colours represented by the pixel depends on the number of **Bits per Pixel** or **bpp**. For example. 1 bpp image uses 1 bit for each pixel. As a result each pixel can be either on or off. With an additional bit, the course can be doubled. For example a 2 bpp image can display four colors and a 3 bpp image eight colors and so on. 8 bpp ( $2^8$ ) gives 256 colours. 16 bpp ( $2^{16}$ ) gives 65,356 colors. This is known as **high colour**. **True colour** is produced when the bpp increases to 24bpp ( $2^{24}$ ). This gives 16.8 million colors.

The **depth of the colour** is the sum of bits allocated to each red, green and blue component. For example the 16 bpp high colour, has five bits for red and blue, six bits for green. Green colour has 6 bits since the green colour is most sensitive to human eye. Errors in green colour can be easily noticed. The 24 bit depth allows 8 bits per component. In 32 bit system, the 24 bit pixel has an extra 8 bit component to control its opacity.



The pixel grid in the monitor is divided into single colour regions to display the colour when viewed at a distance. This compensates the inability of the display system to sense the different color channels at the same site. In LCD, LED and Plasma displays, the single colour regions have separate addressable elements known as **Sub pixels**. In LCD monitor, each pixel is divided horizontally into three sub pixels. The square pixel is divided into rectangular sub pixels. Mega pixel or MP / Mpx is the one million pixels. This represents the number of pixels in the image or the number of image sensor element in the digital device such as digital camera or the number of elements in the digital display. For example, a digital camera having 3.1 mega pixels has 2048x1536 sensor elements. That is  $2048 \times 1536 = 3,145,728$  pixels or 3.1 mega pixel. The mega pixel value represents the quality of the image in the display. The display resolution is the number of distinct pixels in each dimension that can be displayed.

Some related words are **Texel** or texture element and **Luxel** or lux element. These are words used to describe a pixel when it is used in specific context .A **Voxel** is a volume element, the 3D analogue of a 2D pixel. **Surfels** or surface elements have the same naming pattern as pixels, but share more similarities with shrunken triangles than expanded pixels.

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