RGB Color Space

RGB Cube:

Blue = 001 Cyan = 011

Magenta = 101 White = 111
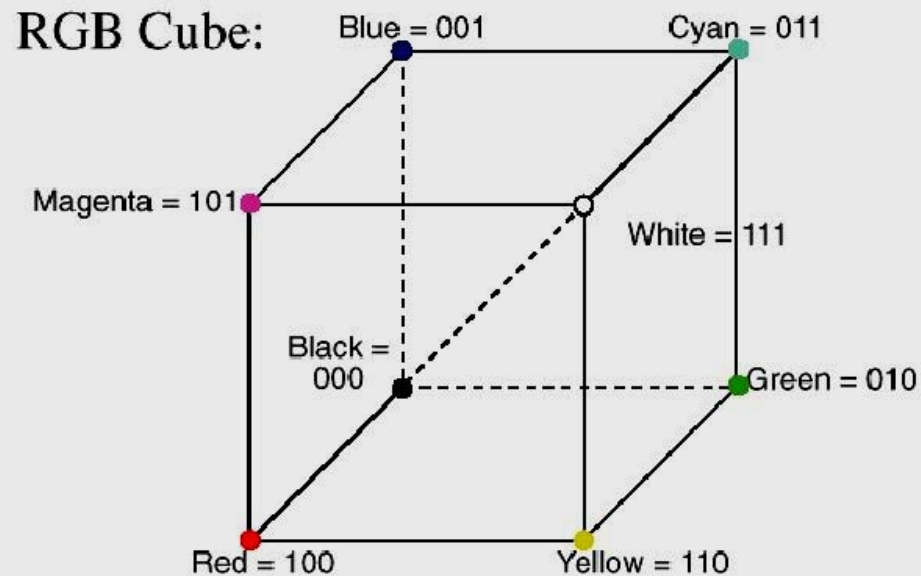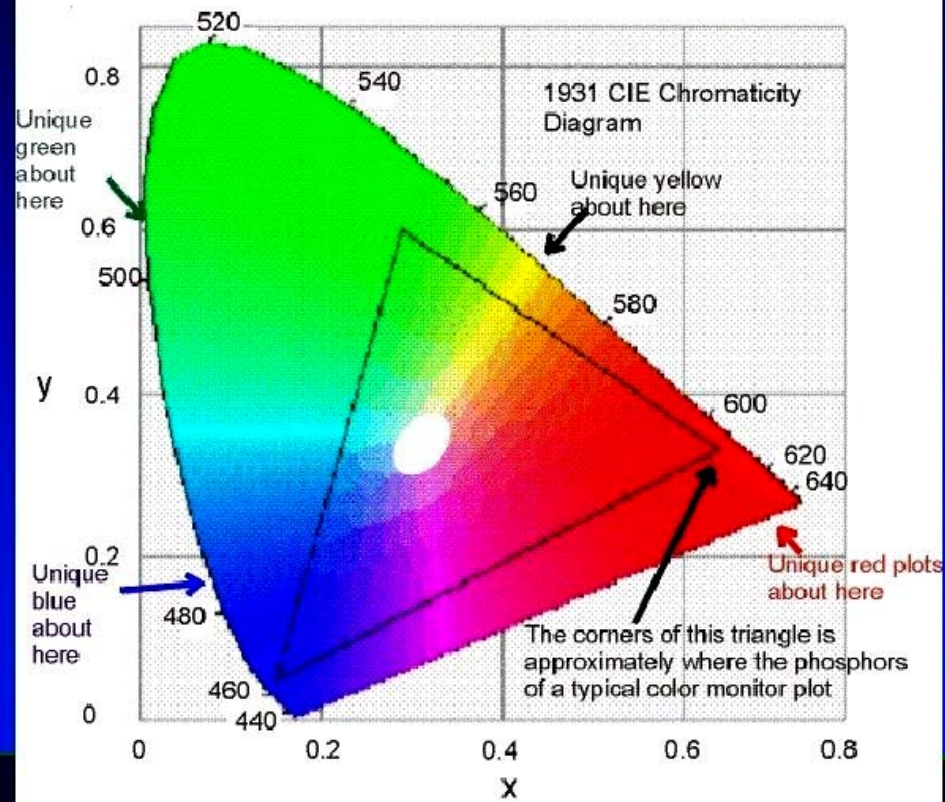
Black = 000 Green = 010

Red = 100 Yellow = 110

Grays are on dotted main diagonal.

CIE Chromaticity Diagram

YIQ – TV broadcasting

Recording of RGB for

- transmission efficiency and
- downward compatibility with B&W TV.

Recoded signal is transmitted using NTSC standard

$$\begin{bmatrix} Y \\ I \\ Q \end{bmatrix} = \begin{bmatrix} 0.299 & 0.587 & 0.114 \\ 0.596 & -0.275 & -0.321 \\ 0.212 & -0.528 & 0.311 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

- Y = Luminance
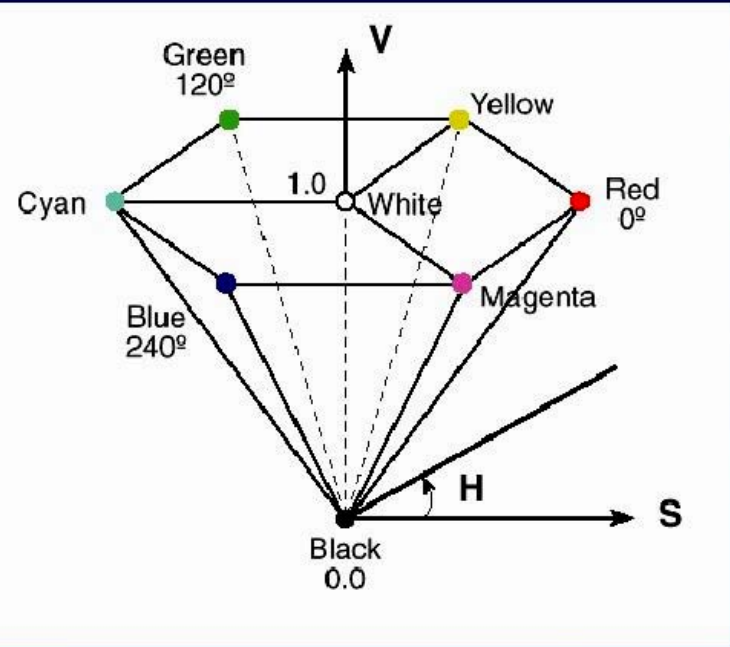 - (only one shown in B&W TV)
- I = Chromaticity

HSV Color Space

User Oriented

H = hue

- measured by angle around verticle axis with red at 8º, green at 120º, etc. . .

S = saturation

- ranging from 0 to 1

V = Value

Other color models and their relationships

CMY: Cyan, Magenta and Yellow

Cyan   = White - Red
= Blue + Green;

Magenta = White - Green
= Red + Blue;

Yellow   = White - Blue
= Red + Green

$$\begin{bmatrix} C \\ M \\ Y \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} - \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

and

$$\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} - \begin{bmatrix} C \\ M \\ Y \end{bmatrix}$$

YIQ:

$$\begin{bmatrix} Y \\ I \\ Q \end{bmatrix} = \begin{bmatrix} 0.299 & 0.587 & 0.114 \\ 0.596 & -0.275 & -0.321 \\ 0.212 & -0.523 & 0.311 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

Y component of YIQ is luminance, same as CIE Y primary. Only the Y component of a color TV signal is shown on B/W TVs. The chromaticity is encoded in I and Q.

Other models: HLS (Hue. Lightness, Saturation);
LAB and LUV (Munsell Color Space)