

Computer Graphics

Color model types:-

- (1) RGB
- (2) CMY
- (3) CMYK
- (4) YIQ

Another class of color model:-

HSV - Hue saturation and value

HLS - Hue Lightness and saturation

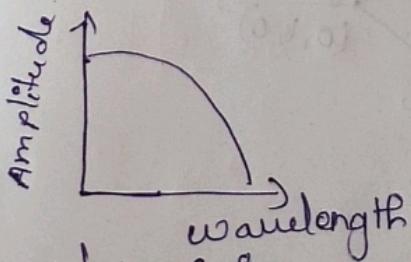
HVC

Physical properties of light:-

white light consists of a spectrum of all visible

colors.

what is the graph:-



Additive color mixing:-

- * Red ($\frac{2}{3}$)
- * Green ($\frac{2}{3}$)
- * Blue ($\frac{1}{3}$)

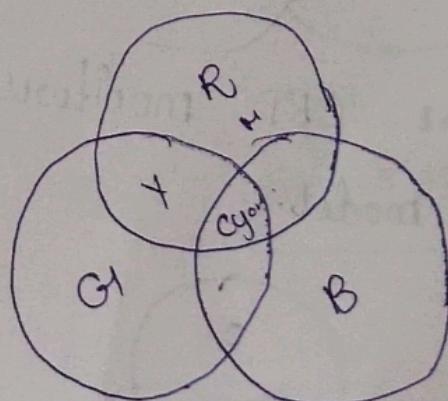
$$R + G = Y$$

$$R + B = \text{Magenta}$$

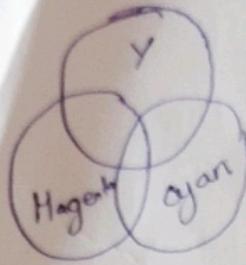
$$G + B = \text{Cyan}$$

$$R + G + B = W$$

$$\text{None} = \text{Black}$$



Subtractive color mixing



$$M + Y = R$$

$$M + C = B$$

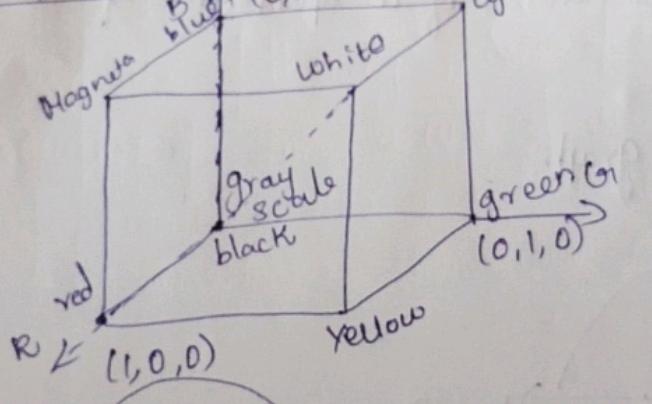
$$C + Y = G$$

$$M + C + Y = Black$$

None = White

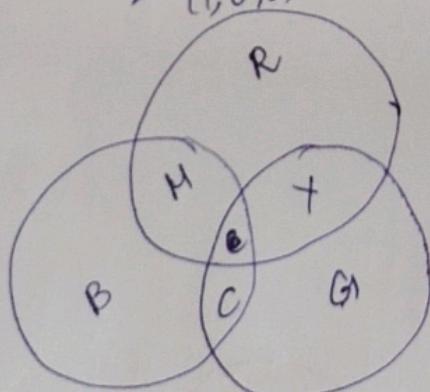


RGB (Red, Green, Blue) color model:



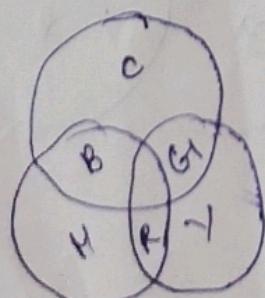
Y1a

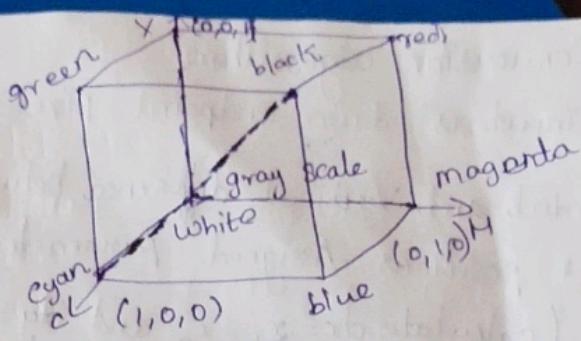
HSV



Applications: CRT monitors.

CMY color model:





RGB vs CMY

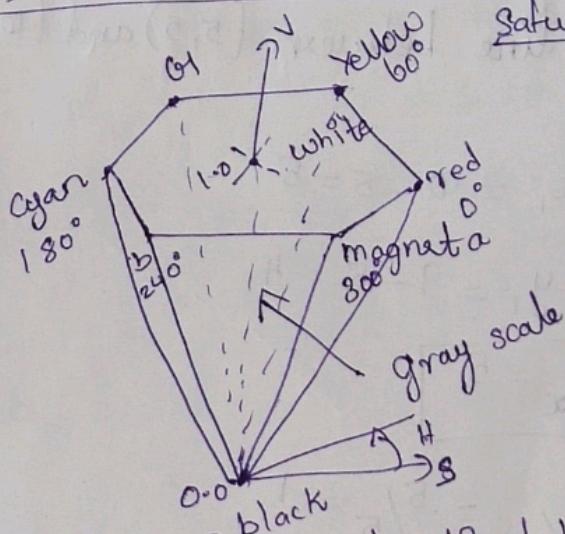
$$\begin{pmatrix} c \\ M \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} - \begin{pmatrix} r \\ g \\ b \end{pmatrix}$$

YIQ (Luminance, Inphase, Quadrature) color model:

Inphase = Red - Yellow

Quadrature = Blue - Yellow

HSV (Hue, Saturation, Value) & HLS (Hue, Lightness, Saturation) color model.



Hue $0 - 360^\circ$. The wavelength of Hue is 128 black

Saturation - 0-1 - white is 130

Value - 0-1 - Black Color is 23.

- 1) DDA Scan Conversion algorithm:
- Step 1: Accept input as two endpoint pixel positions.
- Step 2: Horizontal and vertical difference between the endpoints positions. Assigned parameters dx and dy (calculate $dx = x_b - x_a$ and $dy = y_b - y_a$)
- Step 3: The difference with the greater magnitude determine the value of parameter steps.
- Step 4: Starting with pixel position (x_a, y_a) determine the offset needed at each step to generate the next pixel position along the line path.

Step 5: Loop the following process for steps number of times a unit of increment or decrementation in the x and y direction if x_a is less than x_b the value of increment.

Ques 1. Draw the line between $(5, 5)$ and $(10, 9)$ using DDA algorithm

$$d_{xc} = x_2 - x_1 = 10 - 5 = 5$$

$$dy = y_2 - y_1 = 9 - 5 = 4$$

$$\boxed{k = d_{xc} = 5}$$

$$\Delta_{xc} = \frac{d_{xc}}{k} = 5/5 = 1$$

$$\Delta y = \frac{dy}{k} = 4/5 = 0.8$$

positions.

on the
 Δx

($y_b - y_a$)

nitide

ops.

determine
the
th.

DIV

of
b

ent.

Q) Consider a line from $(0, 0)$ to $(4, 6)$ use the simple DDA algorithm to rasterize this line.

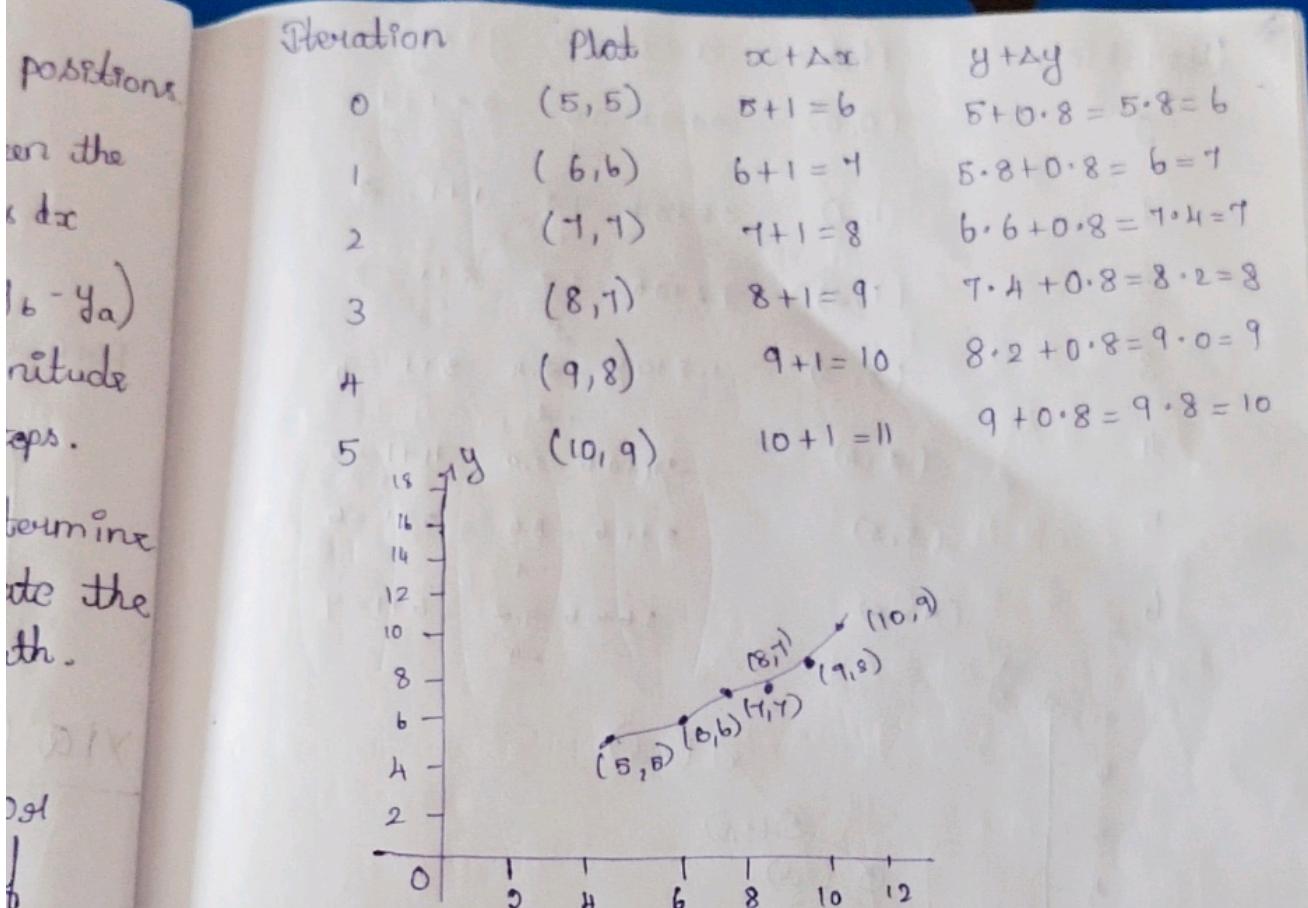
$$d_x = x_2 - x_1 = 4 - 0 = 4$$

$$d_y = y_2 - y_1 = 6 - 0 = 6$$

$$\boxed{k = d_y = 6}$$

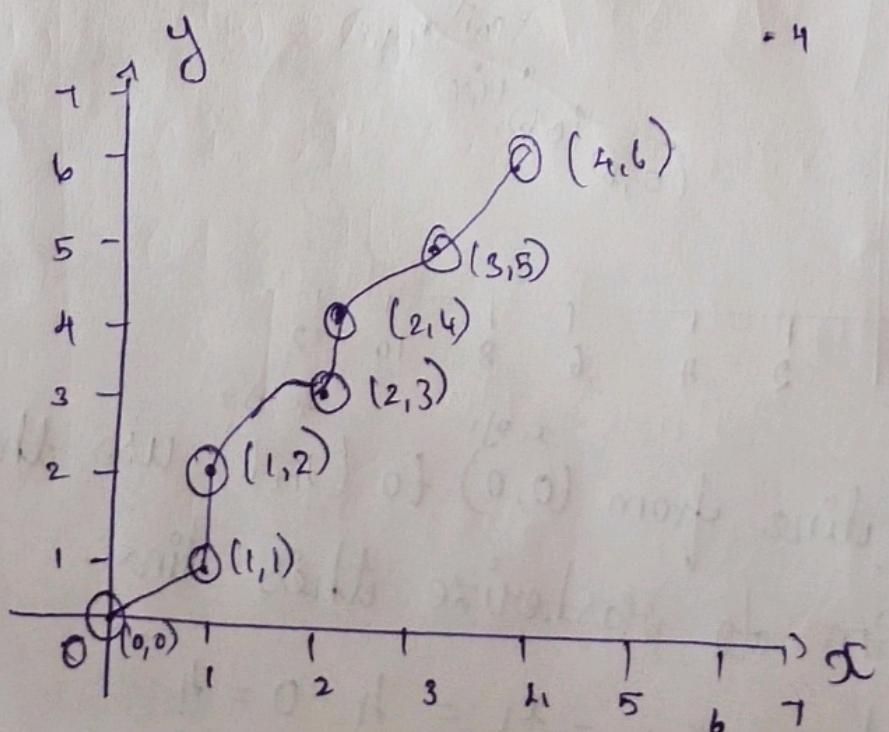
$$\Delta x_c = d_x/k = 4/6 = 0.66$$

$$\Delta y_c = d_y/k = 6/6 = 1$$



Iteration

	Plot	$x + \Delta x$	$y + \Delta y$
0	(0, 0)	$0 + 0.6 = 0.6$ = 1	$0 + 1 = 1$
1	(1, 1)	$0.6 + 0.6 = 1.2$ = 1	$1 + 1 = 2$
2	(1, 2)	$1.2 + 0.6 = 1.8$ = 2	$2 + 1 = 3$
3	(2, 3)	$1.8 + 0.6 = 2.4$ = 2	$3 + 1 = 4$
4	(2, 4)	$2.4 + 0.6 = 3.0$ = 2	$4 + 1 = 5$
5	(3, 5)	$3.0 + 0.6 = 3.6$ = 4	$5 + 1 = 6$
6	(4, 6)	$3.6 + 0.6 = 4.2$ = 4	$6 + 1 = 7$



Decision parameter P_K

$$P_K > 0 \quad \text{Positive formula} \\ P_{K+1} = P_K + 2\Delta_y - 2\Delta_x$$

$$P_K < 0 \\ P_{K+1} = P_K + 2\Delta_y$$