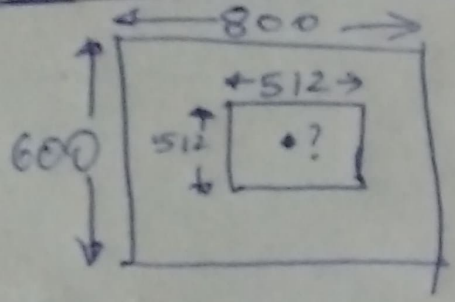
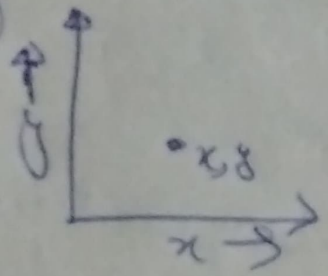
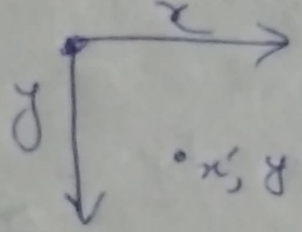



1.7 $\frac{(800-512)}{2}, \frac{(600-512)}{2}$

$= (144, 44)$

1.8




x remains same

$y' = max_y - y'$

as it is just reverted

---

① Screen resolution 8" x 10" with 100 pixels in each direction. If we want to store 6 bits per pixel in the frame buffer, how much storage in bytes do we need for the frame buffer? Calculate aspect ratio.

Resolution in pixels : $(8 \times 100) \times (10 \times 100)$ pixels

$= 800 \times 1000$ pixels

Required frame buffer size $= 800 \times 1000 \times 6$ bits

$= \frac{800 \times 1000 \times 6}{8}$ bytes

$= 6 \times 10^5$ bytes

Aspect Ratio $= \frac{\text{width}}{\text{height}} = \frac{800}{1000} = \frac{4}{5}$

$= 4:5$

(2) How long would it take to load a (640 x 480) frame buffer with 12-bits per pixels, if $10^5$ bits can be transferred per second? How long would it take to load a 24-bit per pixel frame buffer with a resolution of 1280 by 1024 using the same transfer rate?

size of frame buffer = 640 x 480 pixels
= 640 x 480 x 12 bits

[∵ 1 pixels ⇒ 12 bits]

∴ $10^5$ bits take 1 second to transfer
∴ Time needed to transfer 640 x 480 x 12 bits

$$= \frac{640 \times 480 \times 12}{10^5}$$

= 36.864 secs.

---

(3) Consider a raster system with resolution 640 x 480. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second. What is the access time per pixel?

Resolution: 640 x 480
∴ No. of pixels in one frame = 640 x 480 = 307200
∵ Controller can access 60 frames in 1 sec
∴ Total no. of pixels accessed = 60 x 307200
= 18432000 / sec

Access time per pixel = 1/total pixels accessed per sec.
= $5.4 \times 10^{-8}$ sec/pixel

---

(4) How much time is spent scanning across each row of pixels during screen refresh on a raster system with a resolution of 1280 by 1024 and a refresh rate of 60 frames per seconds?

Resolution = 1280 x 1024
∴ 1024 scan lines
Refresh Rate = 60 frames/sec
∵ 1 frame contains 1024 scan lines

60 frames takes 1 sec for refreshing

$\therefore$ 1 frame takes $\frac{1}{60}$ sec

1024 scan lines $= \frac{1}{60}$ sec

1 scan line $= \frac{1}{60} \times 1024$ sec

$= 58$ ms

---

(5) What is the resolution of a 2 x 2 inch image with a 512 x 512 pixels?

Image size = 2 x 2 inches

Pixels = 512 x 512 pixels

$\therefore$ Resolution $= \frac{512}{2} = 256$ pixels / inch

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(6) What is the size of a 640 x 480 image at 240 pixels per inch?

size of image $= \frac{640}{240}$ by $\frac{480}{240}$

$= \frac{8}{3} = 2\frac{2}{3}$ by 2 inches

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(7) An image has a height of 3 inches and an aspect ratio of 2.5. What is the width?

width $= 2.5 \times 3 = 7.5$ inches