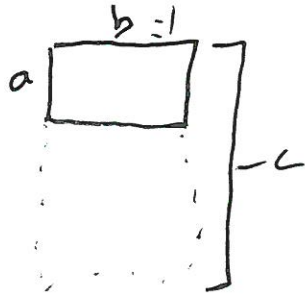


# Golden Ratio



$$\frac{a}{b} = \frac{b}{c} = \text{Golden Ratio}$$

$$\frac{a}{b} = \frac{b}{a+b} \rightarrow a^2 + ab = b^2$$

$$a^2 + ab - b^2 = 0$$

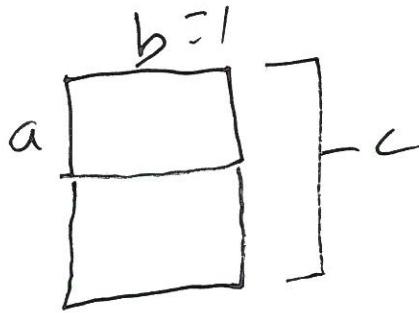
$$a^2 + a - 1 = 0 \rightarrow \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{5}}{2}$$

$$\frac{\sqrt{5} - 1}{2} = 1.618$$

$$\begin{aligned} a &= 1 \\ b &= 1 \\ c &= -1 \end{aligned}$$

A Paper



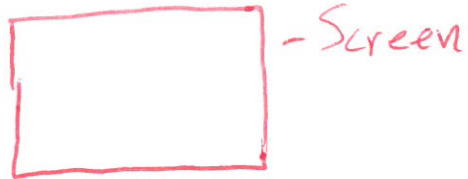
$$\frac{1}{\sqrt{2}} \quad \frac{\sqrt{2}}{1}$$

$$\frac{a}{b} = \frac{b}{2a}$$

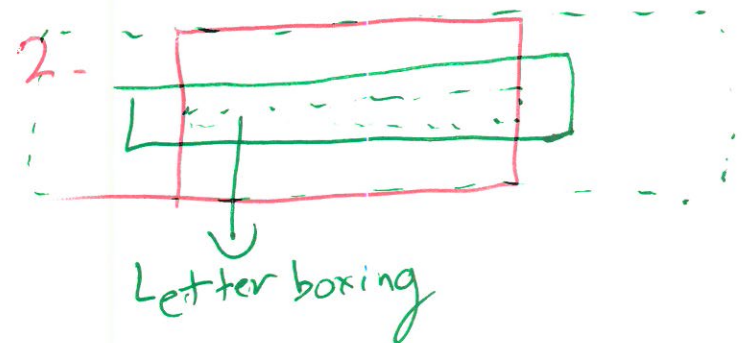
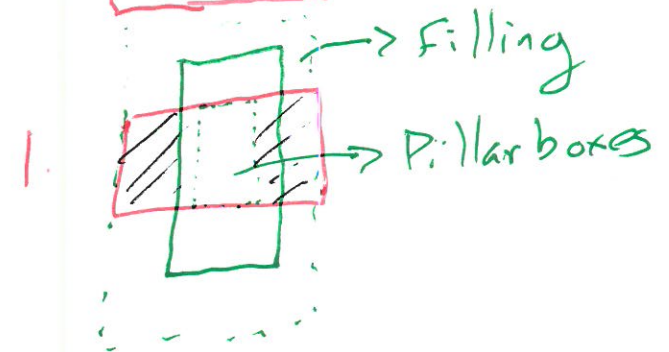
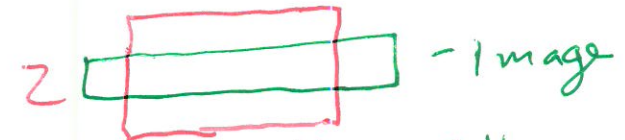
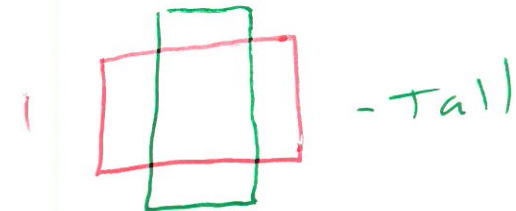
$$2a^2 = b^2$$

$$2a^2 - 1 = 0$$

## fit an image

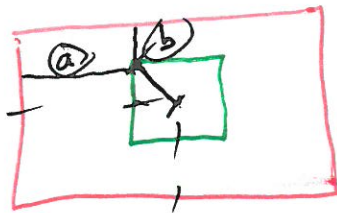
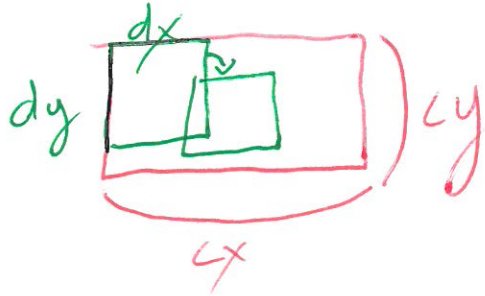


1. Image exactly matches the screen resolution
2. Image exact match of aspect ratio but not resolution.
3. Image is taller
4. Image is fatter



## Remap with Center

Decision: where should 0,0 be?

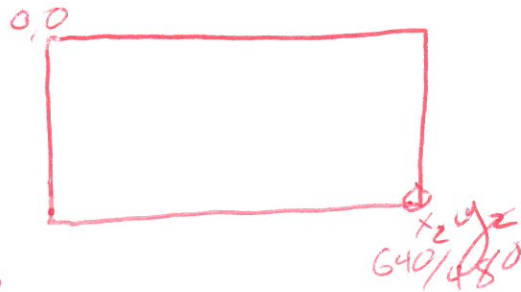
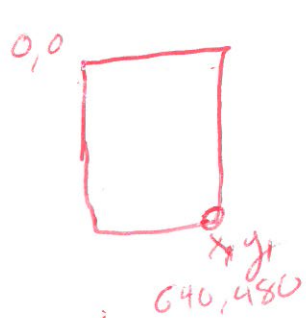
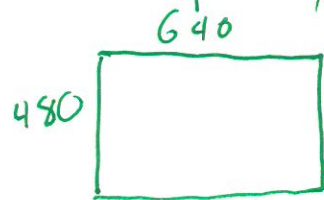


$$\frac{cx}{2} \quad \frac{cy}{2} \quad \frac{dx}{2} \quad \frac{dy}{2}$$

$$a = \frac{cx}{2} - \frac{dx}{2}$$

$$b = \frac{cy}{2} - \frac{dy}{2}$$

## Remap w/ Scaling



$P_x, P_y$



$\frac{P_x}{x_1} \quad \frac{P_y}{y_1}$

↓

↓

$\%x$

↓

$\%x \cdot 640$

↓

↓

$\%y$

↓

$\%y \cdot 480$