Ratio
and
Proportion

An added dimension to

the visual and plastic arts

Ratio and Proportion

- A ratio is a comparison of two numbers with the same units

- A proportion is a statement that two ratios are equal

$$\frac{a}{b} = \frac{c}{d}$$

- In a proportion $ad = bc$

Ratio and Proportion

$$\text{Example } \frac{64}{12} = \frac{16}{3}$$

You may recognize this from working with fractions

Sometimes the division indicated by the fraction bar is performed to get a value

$$\frac{16}{3} = 5.333333333333.........$$

The Golden Ratio

- The golden ratio is a special number approximately equal to 1.61803398874989484820.

- We use the Greek letter Phi to refer to this ratio. Like Pi, the digits of the Golden Ratio go on forever without repeating.

- It is often better to use its exact value:

$$\frac{1+\sqrt{5}}{2} = \phi$$

The Golden Rectangle

- A Golden Rectangle is a rectangle in which the ratio of the length to the width is the Golden Ratio. In other words, if one side of a Golden Rectangle is 2 ft. long, the other side will be approximately equal to 2 x 1.62 = 3.24.

The Golden Rectangle

- Now that you know a little about the Golden Ratio and the Golden Rectangle, let's look a little deeper. Take a line segment and label its two endpoints A and C. Now put a point B between A and C so that the ratio of the short part of the segment (AB) to the long part (BC) equals the ratio of the long part (BC) to the entire segment (AC):

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- A   B   C

- The ratio of the lengths of the two parts of this segment is the Golden Ratio.

Golden Rectangle

- In an equation, we have $\dfrac{AB}{BC} = \dfrac{BC}{AC}$

- The Golden Ratio is the ratio of BC to AB. If we set the value of AB to be 1, and use x to represent the length of BC, then $\dfrac{1}{x} = \dfrac{x}{x+1}$

- If we solve this equation for x, we'll find that it is the value given above, $\dfrac{1+\sqrt{5}}{2}$, which is about 1.62.

Golden Ratio

- If you have a Golden Rectangle and you cut a square off it so that what remains is a rectangle, that remaining rectangle will also be a Golden Rectangle.

- You can keep cutting these squares off and getting smaller and smaller Golden Rectangles.