

# How Close Is Close Enough? - Acceptance Ranges

## Recall:

When working with a System of Proportions and a lot of measurements, it is easier to find **Acceptance Ranges** for the ratios in the System of Proportions, and check each ratio of measured lengths against those ranges, than it is to find a range for each ratio of measured lengths.

## Recall:

- ▶ If 2 measurements are accurate to within 2%, then their ratio is accurate to within 4%.
- ▶ In other words, it must be true that:

$$0.96(\text{measured ratio}) \leq \text{actual ratio} \leq 1.04(\text{measured ratio})$$

- ▶ **If** a ratio in our system of proportions (for example,  $\frac{1}{\sqrt{2}}$ ) falls within this range, then it is possible that the artist or architect designed the work in such a way that this ratio was intended.
- ▶ Equivalently, **if** **measured ratio** falls within the **Acceptance Range** for a ratio in our System of Proportion, for instance

$$0.96\left(\frac{1}{\sqrt{2}}\right) \leq \text{measured ratio} \leq 1.04\left(\frac{1}{\sqrt{2}}\right)$$

then the actual ratio must also fall within that range, and so it is possible that the ratio  $\frac{1}{\sqrt{2}}$  was intended.

## Recall Example: Acceptance Range for $\frac{1}{\sqrt{2}}$

▶  $0.96 \left( \frac{1}{\sqrt{2}} \right) \approx 0.679$

▶  $1.04 \left( \frac{1}{\sqrt{2}} \right) \approx 0.735$

▶ Thus the **Acceptance Range** for  $\frac{1}{\sqrt{2}}$  is

$$0.679 \leq \text{measured ratio} \leq 0.735$$

▶ In the Garden Houses of Ostia, the measured lengths 41 and 58 have a **measured ratio** of

$$\frac{41}{58} \approx 0.707$$

▶ Since this falls within the **Acceptance Range** for  $\frac{1}{\sqrt{2}}$ , it is entirely possible that the architects intended for the ratio of the measured lengths to be  $\frac{1}{\sqrt{2}}$ .