Scale Factor: The ratio of a side in one figure compared to the corresponding side in the other figure.
- Usually a single number.
- In a ratio, it is compared to 1.
  \[
  \text{ex. } 1:500
  \]

**Ex. #1**
- Tissue dimensions 9 cm x 10 cm.
- A company wants to increase the dimensions by 1.7.
- What are the new dimensions?

  \[
  \begin{align*}
  \text{length: } 10 \text{ cm} \times 1.7 &= 17 \text{ cm} \\
  \text{width: } 9 \text{ cm} \times 1.7 &= 15.3 \text{ cm}
  \end{align*}
  \]

Scale factors are also used on maps to represent a certain actual distance on the ground. 
  \[\text{ex. } 1 \text{ cm represents 5 km}\]

**Ex. #2** The scale on a map shows that 1 cm on the map represents an actual distance of 2.5 km.

(a) On the map, Waltham Street has a length of 14 cm.

\[
14 \text{ cm} \times 2.5 = 35 \text{ km}
\]

(b) Central Street has an actual length of 25 km.

\[
25 \text{ km} \div 2.5 = 10 \text{ cm}
\]
Calculating Scale Factor \((1 : x)\)

Ex. #3 - On a scale drawing, the height of a stair-step is 0.5 cm. Actual height of the stair step is 20 cm. What scale factor?

\[
\frac{\text{drawing}}{\text{actual}} \Rightarrow \frac{0.5 \text{ cm}}{20 \text{ cm}} = \frac{1}{x} \quad \# \text{ make sure its the same units!!} \# \\
0.5 x = 20 \\
0.5 \quad 0.5 \\
x = 40
\]

\[1 : 40\]

Ex. #4 - Diagram of a bedroom, the longest wall is 8.5 in. Actual measure is 12.7 ft. What scale factor?

Recall: 1 ft = 12 in

\[12.7 \text{ ft} \times \frac{12 \text{ in}}{1 \text{ ft}} = 153 \text{ in} \]

\[
\frac{\text{drawing}}{\text{actual}} = \frac{8.5 \text{ in}}{153 \text{ in}} = \frac{1}{x} \]

\[8.5x = 153 \]
\[\frac{8.5}{8.5} \quad \frac{153}{8.5} \]

\[x = 18\]

\[1 : 18\]