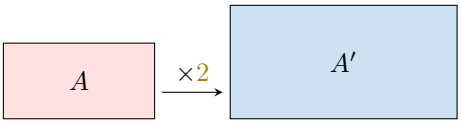
SIMILARITY

A DEFINITIONS

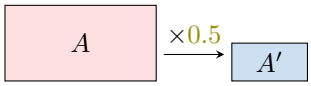
Definition Similarity and Enlargement/Reduction

A **similarity** is a transformation that multiplies all distances by a scale factor $k > 0$.

- If $k \geq 1$, the similarity is an **enlargement**.



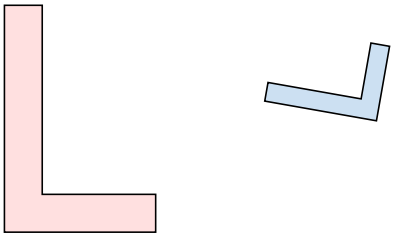
- If $0 < k < 1$, the similarity is a **reduction**.



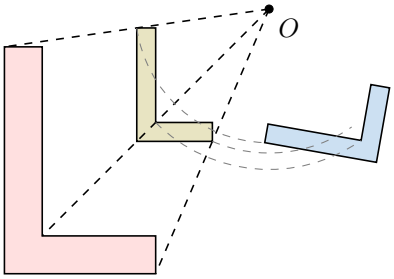
Theorem Fundamental Transformations Similarity Theorem

A similarity is the composition of one or more fundamental transformations (reflection, translation, rotation, and homothety).

Ex: The blue L is similar (by reduction) to the red L.



The blue L is the image of the red L through a homothety ($L \to L'$) followed by a rotation ($L' \to L$).



B SIMILAR FIGURES

Definition Similar Figures

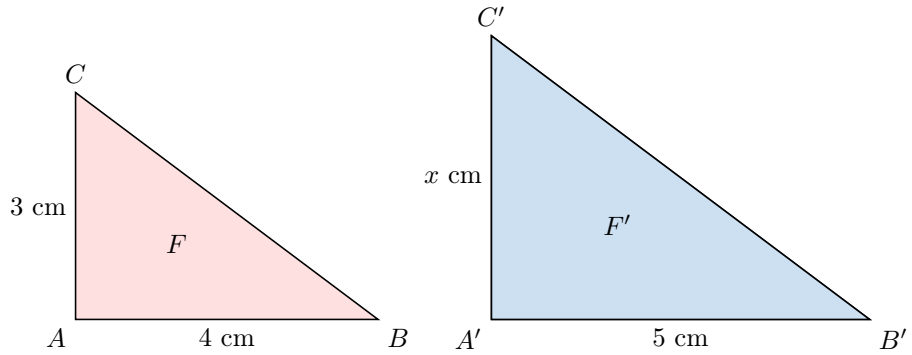
Two figures are **similar** if one is an enlargement or reduction of the other.

Proposition Properties of Similar Figures

For similar figures:

- The ratios of the corresponding sides are equal to the scale factor.
- The corresponding angles are equal.

Ex: The figures F and F' are similar. Find x.



Answer: The ratios of the corresponding sides are equal:

$$\begin{aligned}
\frac{A'C'}{AC} &= \frac{A'B'}{AB} \\
\frac{x}{3} &= \frac{5}{4} \\
x &= 3 \times \frac{5}{4} \\
x &= 3.75
\end{aligned}$$