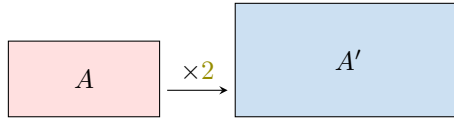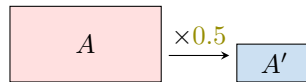# SIMILARITY

## A DEFINITIONS

> **Definition Similarity and Enlargement/Reduction**
>
> A **similarity** is a transformation that multiplies all distances by a scale factor $k > 0$.
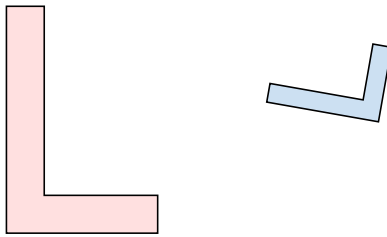>
> - If $k \geq 1$, the similarity is an **enlargement**.
>
> 
>
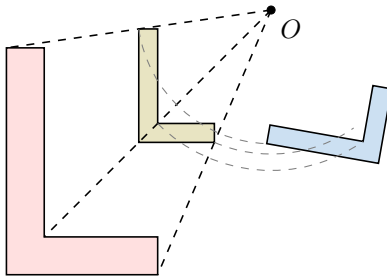> - If $0 < k < 1$, the similarity is a **reduction**.
>
> 

> **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 $(L' \to L)$.



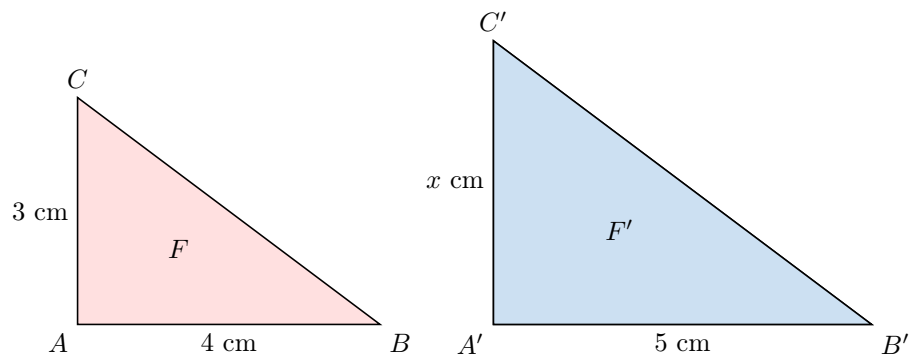## B SIMILAR FIGURES

> **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:

$$\frac{\color{blue}A'C'}{\color{red}AC} = \frac{\color{blue}A'B'}{\color{red}AB}$$

$$\frac{x}{3} = \frac{5}{4}$$

$$x = 3 \times \frac{5}{4}$$

$$x = 3.75$$