

Similarity

Similarity is the concept used in geometry to describe two geometric figures that have the same shape but not necessarily the same size. This idea is illustrated by the real-world example of enlarging a photograph. The shape of an image does not change when you enlarge it (or when you shrink it).

For two plane figures to be similar, they must satisfy these two conditions of similarity:

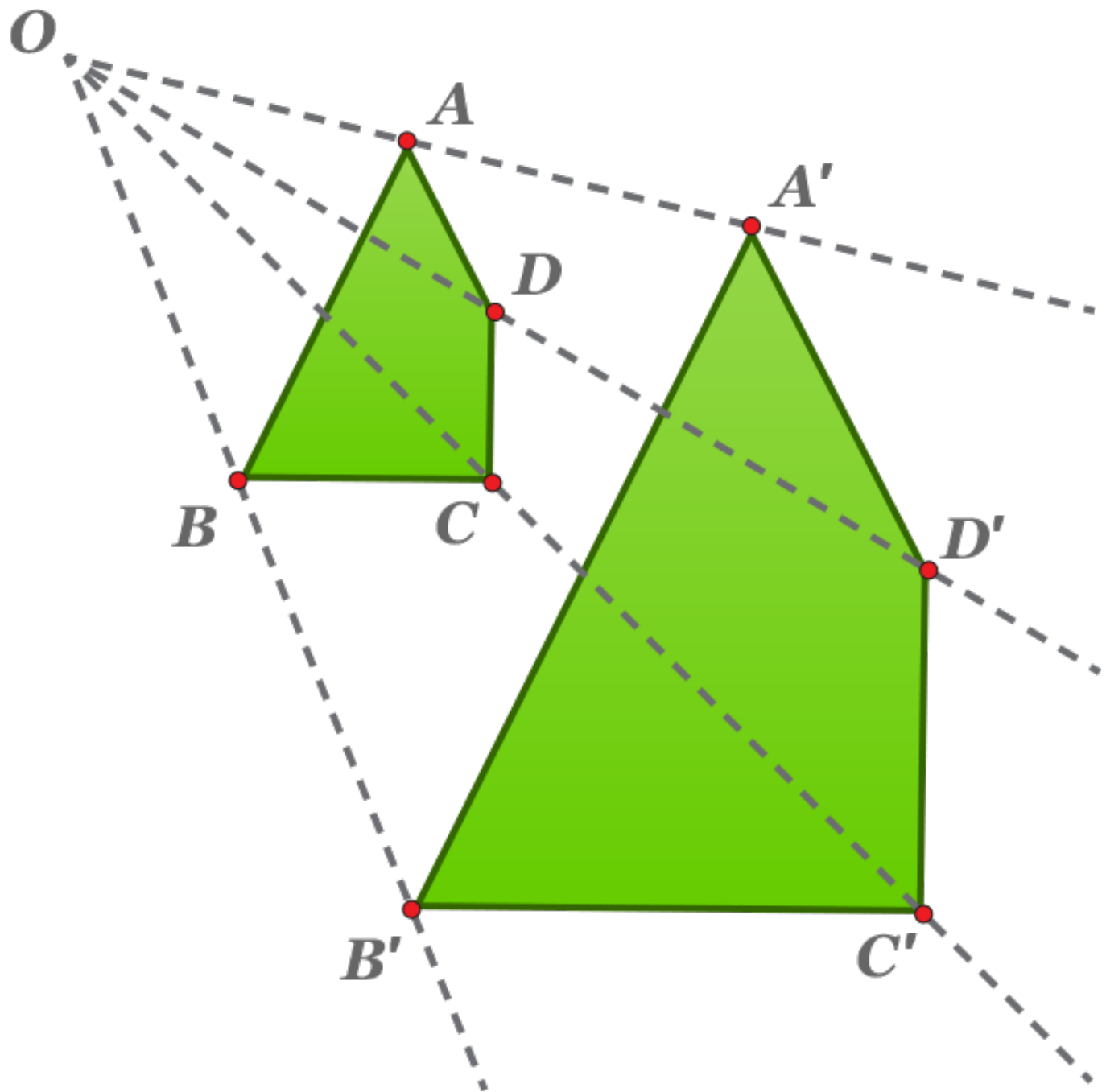
1. The measures of corresponding angles are equal.
2. The ratios of the lengths of every pair of corresponding sides are equal.

In mathematics, the concept of enlarging or shrinking is made precise through a type of transformation called a *dilation*.

Dilations and Similarity

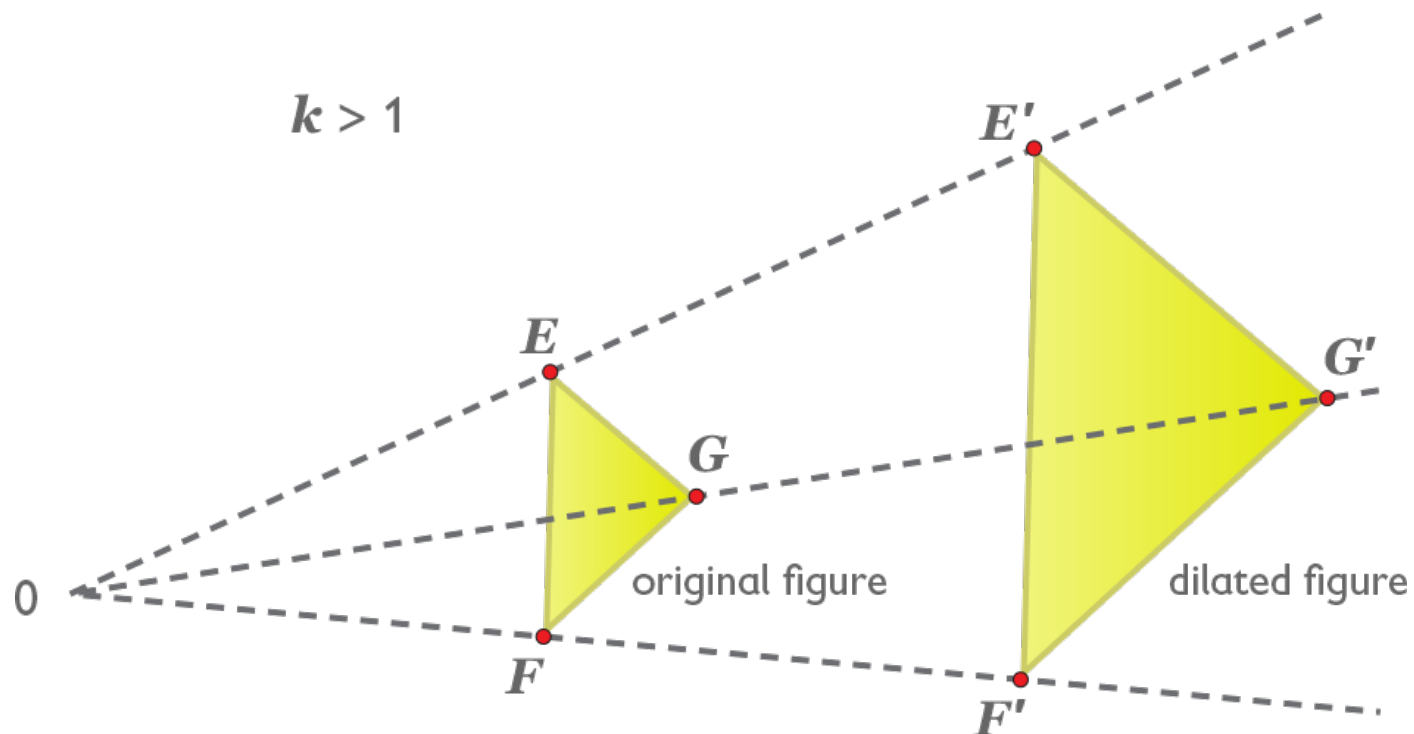
A *dilation* is a transformation that enlarges or shrinks a figure. A *dilated figure* is a figure that is enlarged (or reduced) by multiplying the lengths of the original figure by a scale factor. In order to dilate a figure, you must know the scale factor and the center of dilation. Figures are similar under dilation and congruent in the case of a scale factor of 1.

Consider this diagram:



This diagram shows two similar quadrilaterals that have been moved into positions of similarity, with the center of dilation at point O .

A scale factor greater than 1 will produce an enlargement of the original figure, while a scale factor, k , less than 1 and greater than 0, will produce a reduction of the original figure:



A negative scale factor, k , will move the dilated figure to the opposite side of the center of dilation:

