Section Overview

Professional Development

Properties of Similar Triangles and Proportional Relationships

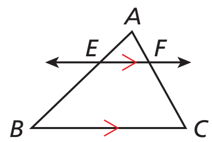
Lessons 7-4, 7-5

Why? Similarity and proportionality are used to make two-dimensional images appear three-dimensional. Proportional reasoning is also used in indirect measurement.

Triangle Proportionality Theorem

If $\overleftrightarrow{EF} \parallel \overleftrightarrow{BC}$,

then $\frac{AE}{EB} = \frac{AF}{FC}$.



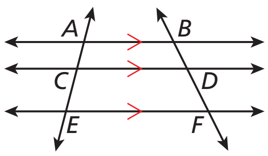
Converse:

If $\frac{AE}{EB} = \frac{AF}{FC}$, then $\overleftrightarrow{EF} \parallel \overleftrightarrow{BC}$.

Two-Transversal Proportionality

If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD} \parallel \overleftrightarrow{EF}$,

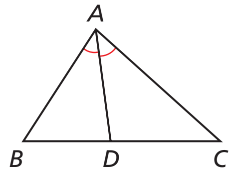
then $\frac{AC}{CE} = \frac{BD}{DF}$.



Triangle Angle Bisector Theorem

If $\angle BAD \cong \angle CAD$,

then $\frac{BD}{DC} = \frac{AB}{AC}$.



Given:
two similar figures

similarity ratio $= \frac{a}{b} \Rightarrow$

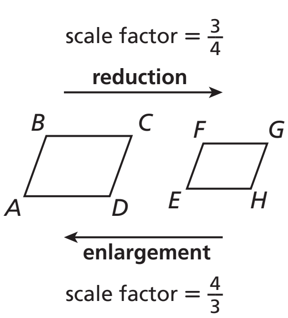
- Corresponding ratio of perimeters is $\frac{a}{b}$.
- Corresponding ratio of their areas is $\frac{a^2}{b^2}$, or $\left(\frac{a}{b}\right)^2$.

Similarity in the Coordinate Plane

Lessons 7-6

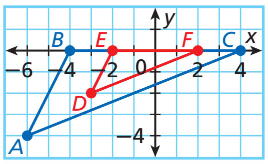
Why? Coordinates are used with computers to enlarge and reduce digital photographs and by graphic artists to design and modify images such as logos.

A **dilation** enlarges or reduces a figure proportionally by a **scale factor**.



Given: $A(-6, -4)$, $B(-4, 0)$, $C(4, 0)$, $D(-3, -2)$, $E(-2, 0)$, and $F(2, 0)$

Prove: $\triangle ABC \sim \triangle DEF$



Use the Distance Formula to find the side lengths of the two triangles.

$AB = \sqrt{20} = 2\sqrt{5}$	$DE = \sqrt{5}$	$\frac{AB}{DE} = 2$
$BC = 8$	$EF = 4$	$\frac{BC}{EF} = 2$
$AC = \sqrt{116} = 2\sqrt{29}$	$DF = \sqrt{29}$	$\frac{AC}{DF} = 2$

$\triangle ABC \sim \triangle DEF$ by the SSS Similarity Theorem.