

§7.2 Similar Polygons

Similar polygons have the **same shape**, but **not the same size**.

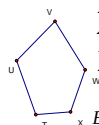
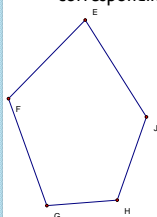
Definition:

Two polygons are similar if and only if their **corresponding angles are congruent** and their **corresponding sides are proportional**.

The ~ symbol is used to mean “is similar to”.

Writing Similarity Statements

Pentagon E J H G F ~ pentagon V W X T U. List the pairs of congruent angles, then write the ratios of corresponding sides in a statement of proportionality.



Congruent Angles

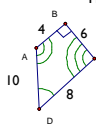
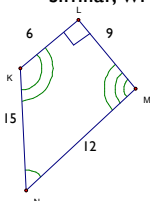
- $\angle E \cong \angle V$
- $\angle J \cong \angle W$
- $\angle H \cong \angle X$
- $\angle G \cong \angle T$
- $\angle F \cong \angle U$

Side Ratios

$$\frac{EJ}{VW} = \frac{JH}{WX} = \frac{HG}{TX} = \frac{GF}{TU} = \frac{FE}{UV}$$

Comparing Similar Polygons

Decide if the figures are similar. If they are similar, write a similarity statement.



The congruent angles seem to lead us to say yes, but to be sure, the sides have to be proportional...

$$\frac{LK}{BA} = \frac{LM}{BC}$$

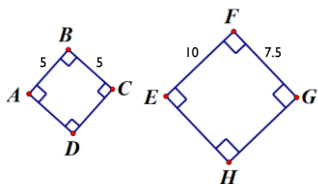
$$\frac{3}{2} \stackrel{?}{=} \frac{3}{2}$$

Similarity Statement:
LMNK ~ BCDA

Comparing Similar Polygons

Decide if the figures are similar. If they are, write a similarity statement.

The corresponding angles are congruent by the Right Angle Theorem, however corresponding sides are not proportional since $\frac{AB}{EF} \neq \frac{BC}{FG}$.



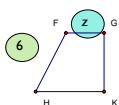
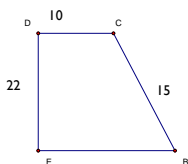
You try it.

List all pairs of congruent angles and write a statement of proportionality for the figures.

1. $\triangle STU \sim \triangle CDE$
2. $\triangle LMN \sim \triangle GHI$
3. quadrilateral QRST \sim quadrilateral ABCD

Use Similar Polygons

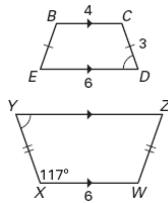
The quadrilateral BCDE is similar to quadrilateral HFGK. Find the value of z.



$$\frac{HF}{BE} = \frac{FG}{CD} \quad \frac{6}{22} = \frac{z}{15} \quad 5z = 20 \quad z = 4$$

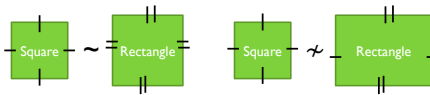
You try it.

Quadrilateral $BCDE \sim$ quadrilateral $WXYZ$.
Find XY . Find $m\angle D$.



Illustrating statements with pictures.

- For each statement, decide if it is *always true*, *sometimes true*, or *never true*. Draw figures to support your answer.
- A square is similar to a rectangle.
 - Sometimes.



Illustrating statements with pictures.

- For each statement, decide if it is *always true*, *sometimes true*, or *never true*. Draw figures to support your answer.
- A triangle is similar to a kite.
 - Never.

