What you will learn about:
Similar and Congruent Figures

Similar Figures:

1) Corresponding Angles are $\cong$.

2) Corresponding Sides are in the Same Ratio (Proportional)

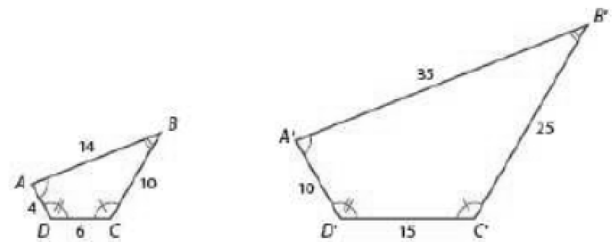
Scale Factor (K)

Ratio of Sides

$K > 1$ Enlargement

$K < 1$ Reducing

Two polygons with the same number of sides are **similar** provided that their corresponding angles have the same measure and the corresponding sides are in the same ratio or proportion.



A' – A prime

A'' – A Double Prime

In the above diagram *quadrilateral* A'B'C'D' ~*quadrilateral* ABCD.

1. List the pairs of congruent angles.

$\angle A \cong \angle A'$ $\quad \angle C \cong \angle C'$

$\angle B \cong \angle B'$ $\quad \angle D \cong \angle D'$

2. Find the ratio of the corresponding sides.

$$\frac{AD}{A'D'} = \frac{AB}{A'B'} = \frac{BC}{B'C'} = \frac{CD}{C'D'}$$

$$\frac{4}{10} = \frac{14}{35} = \frac{10}{25} = \frac{6}{15}$$

3. If two pentagons are similar, describe how to find the scale factor from the larger pentagon to the smaller pentagon? How would you find the scale factor from the smaller pentagon to the larger pentagon?

Larger $\rightarrow$ smaller $(K<1)$

$$\frac{\text{Smaller}}{\text{Bigger}} = \frac{4}{10} = \frac{2}{5}$$

Smaller $\rightarrow$ larger $(K>1)$

$$\frac{\text{Bigger}}{\text{Smaller}} = \frac{10}{4} = \frac{5}{2} = 2.5$$

$a^2+b^2=c^2$

$x^2+x^2=2^2$

$\frac{2x^2}{2}=\frac{4}{2}$

$x^2=2$

$x=\sqrt{2}$

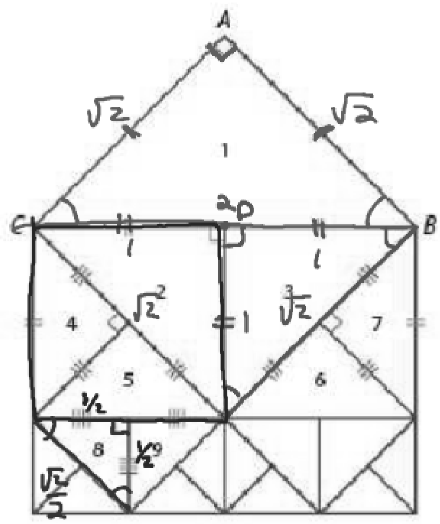
$1^2+1^2=c^2$

$1+1=c^2$

$2=c^2$

$c=\sqrt{2}$

4. The diagram below is a framework for Eshcer's artwork that you examinied in the think about this situation. Recall that ΔABC is an isoscles right triangle. Assume that BC = 2 units.



Determine if each statement is correct. If so give the scale factor from the first triangle to the second. If it fasle explain why.

a. $\Delta1\sim\Delta3$

$\frac{1}{\sqrt{2}}=\frac{1}{\sqrt{2}}=\frac{\sqrt{2}}{2}$

$k=\frac{1}{\sqrt{2}}$

$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$2 \overset{?}{=} (\sqrt{2})(\sqrt{2})$

$2=\sqrt{4}$

$2=2$

b. $\Delta2\sim\Delta6$

c. $\Delta4\sim\Delta6$

d. $\Delta8\sim\Delta3$

$\frac{1}{\frac{1}{2}}=\frac{1}{\frac{1}{2}}=\frac{\sqrt{2}}{\frac{\sqrt{2}}{2}}$

$k=2$

e. $\Delta9\sim\Delta1$

$\frac{1}{\frac{1}{2}}=\frac{\sqrt{2}}{\frac{\sqrt{2}}{2}}$

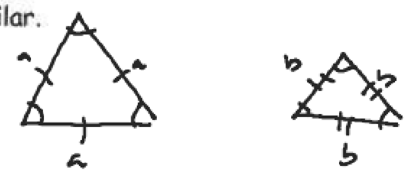
$\frac{\sqrt{2}}{2}=\frac{\sqrt{2}}{2}$

$\frac{\sqrt{2}}{1}\left(\frac{1}{2}\right)$

5. Based on their work in Problem 4, several students at Black River High School made conjectures about families of polygons. Each student tried to outdo the previous student. For each claim, explain as precisley as you can why it is true or give a counterexample to show why it is false.

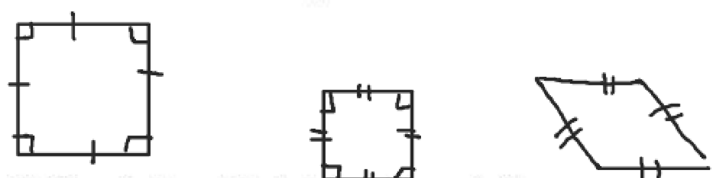
a. Monisha conjectured that all isosceles right triangles are similar.

b. Ahmed conjectured that all equilateral tirangles are similar.



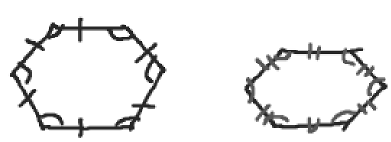
$\frac{a}{b} = \frac{a}{b} = \frac{a}{b}$

c. Loreen claimed that all squares are similar.



d. Jeff conjectured that all rhombi are similar.

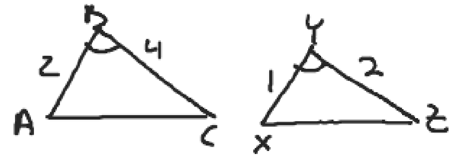
e. Amy claimed that all regular Hexagons are similar.



Ways to prove Triangles Similar

Side-Angle-Side (SAS)

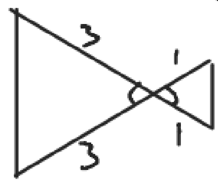
2 pairs of corrisponding Sides proportional and the included angle ≅.



$$\frac{AB}{XY} = \frac{BC}{YZ}$$

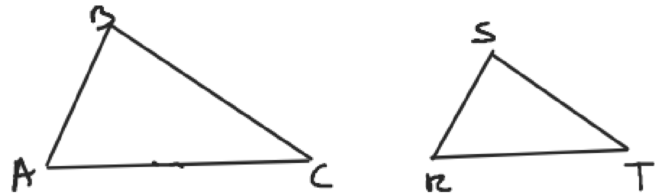
$\angle B \cong \angle Y$

$\triangle ABC \sim \triangle XYZ$



Side-Side-Side (SSS)

3 pairs of Corresponding Sides in the same Ratio.



$$\frac{AB}{RS} = \frac{BC}{ST} = \frac{AC}{RT}$$

$\triangle ABC \sim \triangle RST$

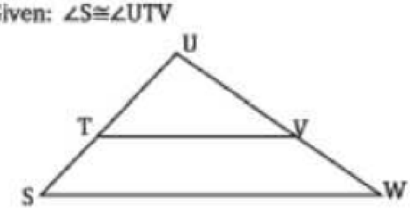
SSS

Angle-Angle (AA)

2 Pairs of Corresponding Angles ≅.

Proving Triangles Similar

6. Given: $\angle S \cong \angle UTV$



Prove: $\triangle SUW \sim \triangle TUV$