

Congruent & Similar Polygons

Use a ruler and protractor to fill in the measurements in the table. Measure segment lengths in centimeters.

Measurements of ΔDEF			Measurements of $\triangle ABC$				
$m \angle D$		$m\overline{DE}$		$m \angle A$		$m \overline{AB}$	
$m \angle E$		$m\overline{EF}$		$m \angle B$		$m \overline{BC}$	
$m \angle F$		$m\overline{DF}$		$m \angle C$		$m\overline{AC}$	
N	leasurements	s of ΔG	GHJ				
$m \angle G$		mGH					
$m \angle H$		m HJ					
$m \angle J$		$m\overline{GJ}$					

What do you notice about the measurements of the different triangles?

Write ratios using the sides given.

Once you have set up the ratios find the quotient. If necessary use a calculator and round to the nearest hundredth.

Compare $\Delta ABC \& \Delta DEF$	$\frac{DE}{AB} =$	$\frac{EF}{BC} =$	$\frac{DF}{AC} =$
Compare $\Delta ABC \& \Delta GHJ$	$\frac{GH}{AB} =$	$\frac{HJ}{BC} =$	$\frac{GJ}{AC} =$

What do you notice about the ratios of the lengths of the segments comparing $\triangle ABC \& \triangle DEF$?

What do you notice about the ratios of the lengths of the segments comparing $\Delta ABC \& \Delta GHJ$?

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Lesson opener Activity

Have students work in pairs/groups. Materials needed -copy of page 1 (picture of 3 triangles) and page 2 (measurement tables) - protractor, ruler and calculator Review with students how to use protractor Students will measure the angles and segment lengths for each triangle and record it on their handout.

Debrief Activity.

The angle measurements will be the same for the corresponding angles $m \angle A = m \angle D = m \angle G$ $m \angle B = m \angle E = m \angle H$ $m \angle C = m \angle F = m \angle J$

Segment measurements for $\Delta DEF \& \Delta GHJ$ are the same

 $\therefore \Delta DEF \cong \Delta GHJ$

The ratios for the segments comparing $\Delta ABC \& \Delta DEF$ and $\Delta ABC \& \Delta GHJ$ are the same.

Lesson

Congruent Polygons

Geometric figures are congruent that have the same size and shape. When figures are congruent, all pairs of corresponding angles and corresponding sides are congruent (\cong).



 $ABCD \cong WXYZ$

indicates the vertices/angles
that correspond.
ABCD
!
WXYZ
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Corresponding Angles			
$\angle A, \ \angle W$	$\angle A \cong \angle W$		
$\angle B, \ \angle X$	$\angle B \cong \angle X$		
$\angle C, \angle Y$	$\angle C \cong \angle Y$		
$\angle D, \angle Z$	$\angle D \cong \angle Z$		

Congruent segments
$AB \cong WX$
$BC \cong XY$
$CD \cong YZ$
$AD \cong WZ$

Congruent & Similar Polygons

Similar Polygons

Polygons are similar if and only if their corresponding angles are congruent and the measures of their corresponding sides are proportional.

The symbol: means is similar to



Proportionality Statement:

$$\frac{AB}{RS} = \frac{BC}{ST} = \frac{CD}{TU} = \frac{DE}{UV} = \frac{AE}{RV}$$

The ratio of the lengths of two corresponding sides of two similar polygons is called the scale factor.





Corresponding & Congruent angles

Corresponding & Congruent sides

$\angle A \cong \angle K$	$\overline{AB} \cong \overline{KL}$
$\angle B \cong \angle L$	$\overline{RC} \simeq \overline{IM}$
$\angle C \cong \angle M$	$\overline{CD} = \overline{DM}$
$\angle D \cong \angle N$	$CD \cong MN$
	$AD \cong KN$

Ex 2) Determine whether the triangles are similar. If they are, write a proportionality statement and find the scale factor of *DEF* to *XYZ*.

DE	15	EF	12	DF	18
XY	25	YZ	$-\frac{1}{20}$	XZ	$=\frac{1}{30}$
_	5•3	_	3•4	_	3•6
=	5•5	-	4•5	=	= <u>5•6</u>
_	3	_	_ 3	_	3
=	= <u>-</u> 5	-	$-\frac{1}{5}$	=	$=\frac{1}{5}$

Since the ratios are equal $\Delta DEF : \Delta XYZ$

Proportionality Statement: $\frac{DE}{XY} = \frac{EF}{YZ} = \frac{DF}{XZ}$

The scale factor of *DEF* to *XYZ* is $\frac{3}{5}$



You Try!

Determine whether the polygons are similar. If they are, write a proportionality statement and find the scale factor of *ABCD* to *QRST*.



Since the ratios are equal *ABCD* : *QRST*

Proportionality Statement: $\frac{AB}{QR} = \frac{BC}{RS} = \frac{CD}{ST} = \frac{AD}{QT}$

The scale factor of *ABCD* to *QRST* is $\frac{2}{3}$