SIMILAR POLYGONS

Similar Figures - have the same shape but not necessarily the same size. The symbol for similar is $\sim$

Similar Polygons - Two figures are similar if corresponding angles are congruent and corresponding sides are proportional.

$ABCD \sim GHIJ$ This is also called the similarity statement.

$\angle A \cong \angle G$
$\angle B \cong \angle H$
$\angle C \cong \angle I$
$\angle D \cong \angle J$

\[
\frac{AB}{GH} = \frac{BC}{HI} = \frac{CD}{IJ} = \frac{AD}{GJ}
\]
This is an extended proportion. An extended proportion is when you can write three or more ratios that are equal.

\[
\frac{AB}{GH} = \frac{BC}{HI} = \frac{CD}{IJ} = \frac{AD}{GJ}
\]

**Scale Factor** - the ratio of corresponding linear measurements of two similar figures.

\[\triangle ABC \sim \triangle XYZ\]

The ratio of all the corresponding sides is \(\triangle ABC\) to \(\triangle XYZ\) is \(\frac{5}{2}\).

\[
\frac{15}{6} = \frac{25}{10} = \frac{20}{8} = \frac{5}{2}
\]

So, the scale factor of
\( \triangle MNP \sim \triangle SRT \)

a. What are the pairs of corresponding angles?

b. What is the extended Proportion for the ratios of corresponding sides?

\[ \angle M \cong \angle S \]
\[ \angle N \cong \angle R \]
\[ \angle P \cong \angle T \]

\[ \frac{MN}{SR} = \frac{NP}{RT} = \frac{MP}{ST} \]
DEFG – TUVW

a. What are the pairs of corresponding angles?

b. What is the extended Proportion for the ratios of corresponding sides?

Are the polygons similar? If they are, write a similarity statement and give the scale factor.

JKLM and TUVW
Step 1: Identify pairs of congruent angles.

Step 2 Compare the ratios of the corresponding sides.

\[
\begin{align*}
\frac{JK}{TU} &= \frac{12}{6} = \frac{2}{1} & \frac{KL}{UV} &= \frac{24}{16} = \frac{3}{2} \\
\frac{LM}{VW} &= \frac{24}{14} = \frac{12}{7} & \frac{MJ}{WT} &= \frac{6}{6} = \frac{1}{1}
\end{align*}
\]

Even though the corresponding angles are congruent, the corresponding sides are not proportional, so the figures are not similar.
TRY: Are $\triangle ABC$ and $\triangle EFD$ similar?

Are the two figures similar?
Your class is making a rectangular poster for a rally. The poster's design is 6 in. high by 10 in wide. The space allowed for the poster is 4 ft. high by 10 ft. wide. What are the dimensions of the largest poster that will fit in the space?

**STEP 1:** Determine whether the length or the width will fill the space first.

Height: 4 ft = 48 in  
Width: 8 ft = 96 in

\[
\frac{48}{6} = 8 \quad \text{and} \quad \frac{96}{10} = 9.6
\]

Since the height ratio is smaller than the width ratio, the height will fill the space first.

**STEP 2:** 48 in will fill the height. Use proportions to find the width.

\[
\frac{6}{x} = \frac{10}{48} \quad \text{or} \quad 4 \text{ ft} \times \frac{2}{3} \text{ ft}
\]

\[
6x = 480 \quad \Rightarrow \quad x = 80
\]

**Diagram:**

\[
ABCD \sim EFGD
\]

Find x and y.
In a **scale drawing**, all the lengths are proportional to their corresponding actual lengths. The **scale** is the ratio that compares each length in the scale drawing to the actual length. A scale might be written as 1 cm = 50 km, 1 in = 100 miles, or 1 in = 10 ft. One of the most common uses is a map.

On page 443, the diagram shows a scale drawing of the Golden Gate Bridge in San Francisco. The distance between the two towers is the main span. What is the actual length of the main span of the bridge?

Measure the length of the diagram between the 2 towers using a ruler. 6.4 cm

Now set up a proportion using the scale in the diagram.

Using the same diagram, determine the height of the towers above the roadway.
P. 444  9 - 30, 32, 37, 38
39 - 42 (choose one), 43 - 46 all