# Lesson 18

Glencoe Geometry Chapter 7.1, 7.2

## Similarity & Proportionality

Recall from algebra the idea of a ratio:

A **ratio** is a comparison of two numbers or expressions *a* and *b*. It can be expressed as a quotient of the two numbers.

Ratios are useful to compare relative lengths, to establish a scale factor, or, when given units (such as $\frac{a \text{ miles}}{b \text{ gallons}}$ or $\frac{a \text{ dollars}}{b \text{ pounds}}$), to **express a rate**.

**Example:**

What is the ratio of 15 to 5?

Sometimes it is convenient to write a ratio in simplified format, or with the denominator as a one.

**Example:**

The ratio of 5 to 2 can be written as . . .

**When two ratios are set equal to each other, a _________________ is obtained.**

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

A proportion is useful in finding missing values when a scale factor is involved. The equation can be solved by ______________________.

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

$$ad = bc$$

**Example:**

What is 38% of 178?

**Example:**

Solve the proportion $\frac{2x+1}{6}=\frac{7}{9}$.

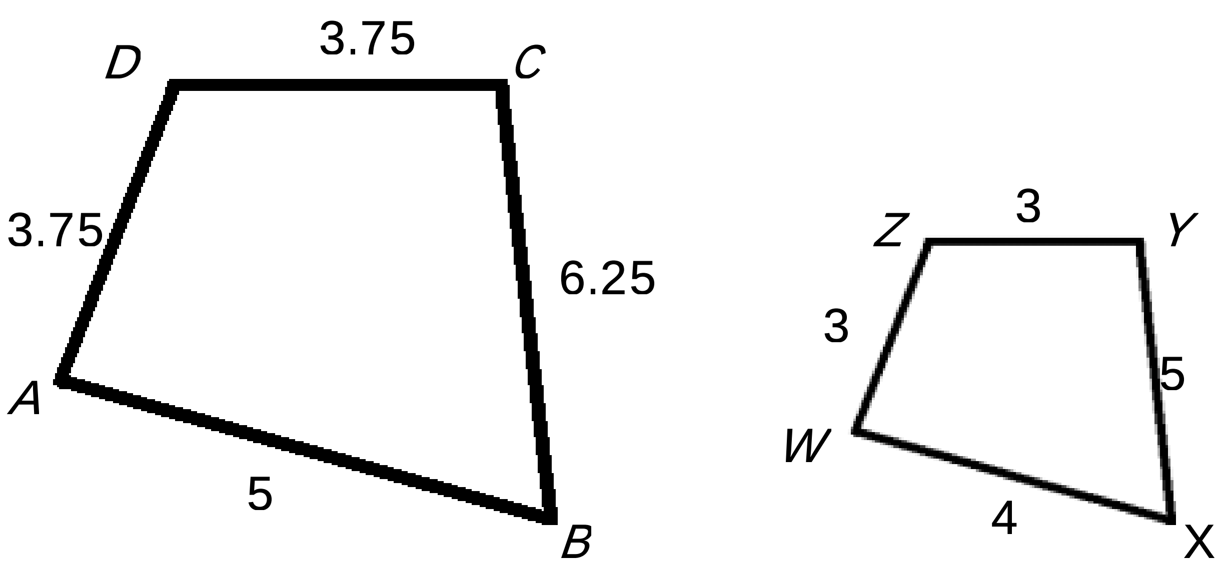
So where does the geometry come in?

Two polygons are similar **if and only if** their corresponding angles are congruent and the measures of their corresponding sides are proportional. **They have the same SHAPE but different SIZES.**

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

**Example:**

Quadrilateral *ABCD* is similar to quadrilateral *WXYZ* (***ABCD* ~ *WXYZ***). Find the scale factor of quadrilateral *ABCD* **to** quadrilateral *WXYZ*.

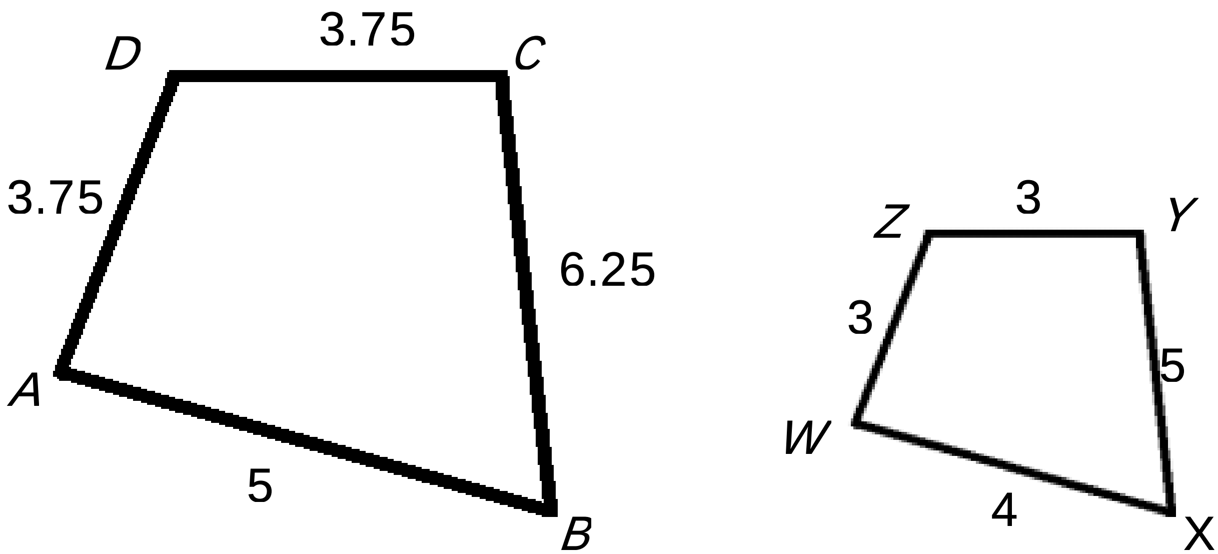



Observe the following relationships:

$$\angle A \cong \angle W,\ \angle B \cong \angle X,\ \angle C \cong Y,\ \angle D \cong \angle Z$$

AND

$$\overline{AB} \sim \overline{WX},\ \overline{BC} \sim \overline{XY},\ \overline{CD} \sim \overline{YZ},\ \overline{DA} \sim \overline{ZW}$$

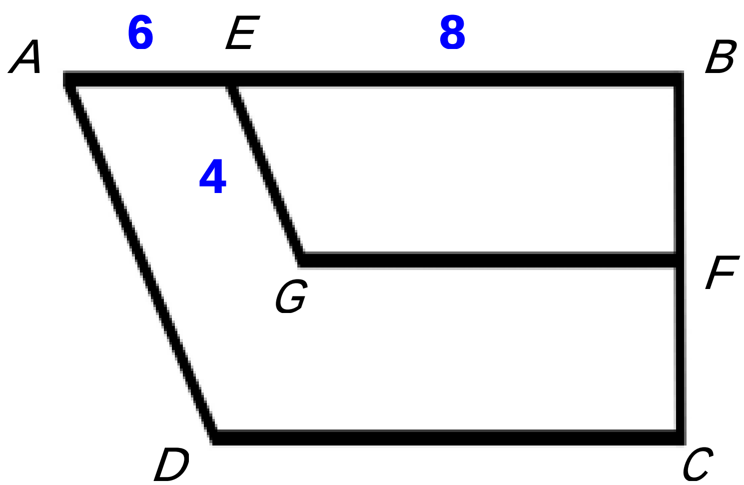



To find the scale factor, we must find the ratio of the measure of a side of *ABCD* **to** the measure of the corresponding side of *WXYZ*.

(In this example, because we have numeric measures on all sides, any pair of corresponding sides will work.)

# Example:

Trapezoid *ABCD* ~ trapezoid *EBFG*. Find *AD*.



# Say What??!!

## Map Link

On the map of France shown, 2.5 centimeters represents 200 miles.
Find the actual distance from Cherbourg to Lyon if the map distance is 4.8 centimeters.


**Use a proportion to find the actual distance.**