Similarity - Lesson 8-2

Here's the warmup for today…you might need to remember the quadratic formula to solve it! Remember how you "couldn't wait" to get back to more algebra-like material?!

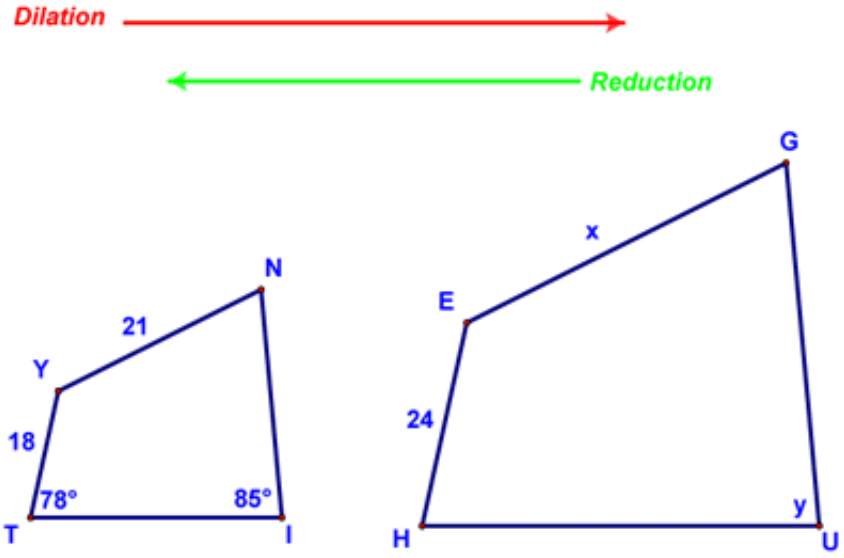
Solve for x:

$$\frac{x+1}{x} = \frac{x}{1}$$

Today, we're going to begin discussing similar polygons. First, we defined what these were:

Two polygons are *similar polygons* if and only if the corresponding angles are congruent and the ratios of the measure of corresponding sides are equal.

TINY ~ HUGE. Find the side labeled x and the angle labeled y.



Looking at the example above and understanding that corresponding sides are proportional helps us to set up the following equation to find side *x*.

$$\frac{TY}{HE} = \frac{YN}{EG}$$

$$\Rightarrow \frac{18}{24} = \frac{21}{x}$$

$$\Rightarrow 18x = 504$$

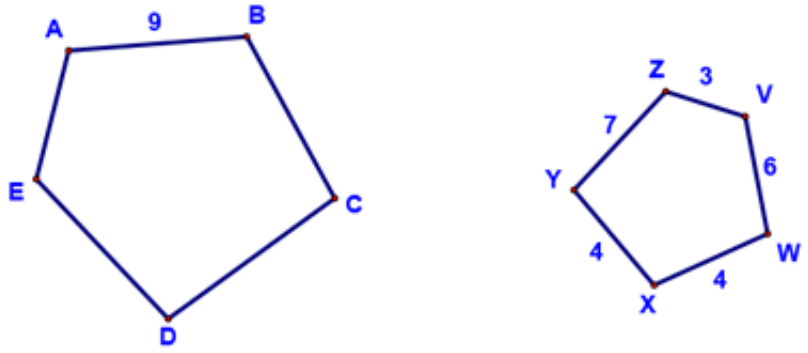
$$\Rightarrow x = 28$$

y is easy to find assuming that you understand that corresponding angles of similar polygons are congruent. ∠U corresponds to ∠I (you should know this from the order of the letters in the statement of similarity (*TINY ~ HUGE*), so ∠U, or *y*, must be the same as ∠I, or 85°.

Next, let's talk about a useful theorem - it relates the ratio of the sides to the ratio of the perimeters of similar polygons:

Theorem 60: **The ratio of the perimeters of two similar polygons equals the ratio of any pair of corresponding sides.**

ABCDE ~ VWXYZ
Find the perimeter of ABCDE



For this problem, you should first note that side AB corresponds to side VW, so the ratio of the sides is 9/6 or 3/2. Therefore, we can calculate the perimeter of ABCDE in the following manner:

Finally, we should talk about how to find the 1st, 2nd, 3rd, or 4th proportional of three given numbers:

To find the 1st, 2nd, 3rd, or 4th proportional of a set of numbers:

1. **Order the numbers from least to greatest**
2. **Set up a proportion with x in the position you're trying to find based on the following:**

$$\frac{1^{st}}{2^{nd}} = \frac{3^{rd}}{4^{th}}$$

e.g., to find the 3rd proportional of 12, 1, and 5, set up the following proportion and solve: