

**LessonTitle: Flagpole Proportions****Alg 3.5****Utah State Core Standard and Indicators** Algebra Standards 2-4 Process Standards 1-5**Summary**

In this lesson, students experience proportional relationships using similar figures. They apply three methods using similar triangles to find the height of a flagpole. Then they solve the proportion equations

**Enduring Understanding**

- Because similar figures are proportional, we can use proportion equations to find missing measurements.
- A regular equation relates two equal values, whereas a proportion equation relates two equal relationships (ratios).
- Proportion equations are especially helpful in finding missing information of all kinds, geometric, rates, percentage problems, etc.

**Essential Questions**

How is a proportion equation different from a regular equation? How can we use equivalent relationship or proportion equations to help us solve problems?

**Skill Focus**

Using similar figures and proportion to find missing measurements.

**Vocabulary Focus****Assessment**

**Materials:** Calculators, Measuring tools, Catalogues(see below), Books from the library(see below)

**Launch ideas:**

“Most of us didn’t launch like we planned to and it made a difference in the understanding. We decided we didn’t take enough time to launch.” “We need to use our launch ideas more! AHA!”

**Explore ideas:**

“We let students work through a couple of problems with us and then work on their own to figure out how to set up proportions.”

**Summarize ideas:**

“We decided that with proportion and ratios, it is hard to know where to start and what to use to summarize. We will use some of our original launch ideas to summarize. As long as we keep going over and going over the ideas, you have to jump in somewhere and they all tie in together.”

**Application ideas:**

“Have students do scale models of their rooms. In my class we scaled a real skateboard to a tech deck size. The kids liked this!”

**Directions:** Even though students have studied ratio and proportion in previous courses, they probably don't have a sound understanding of the concept. The following approaches will enable them to make good connections and build deeper understandings.

1) Help students understand the difference between equations which relate equal values (red = pink + white,  $4 = 3 + 1$ ) and equations which relate equivalent relationships ("night is to day as black is to white" or night/day = black/white or 1 is to 2 as 3 is to?)

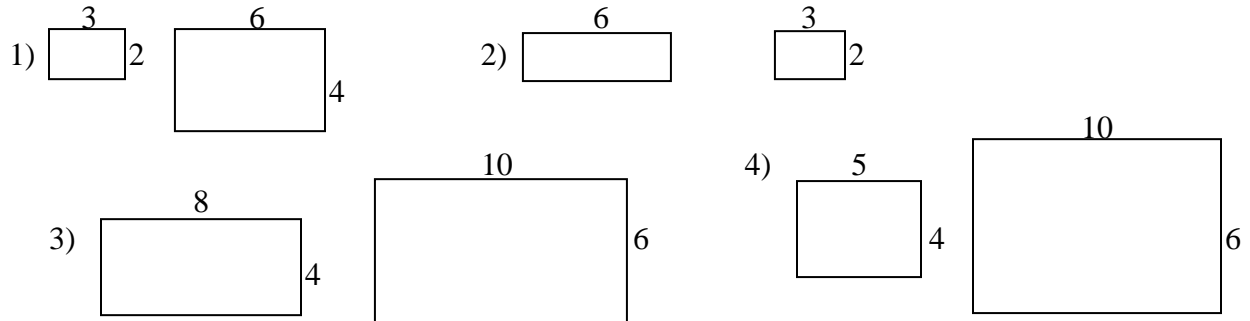
Have students come up with some equivalent relationships using words, like the night and day example. Then switch to numbers--Make up several examples.

2) The Flagpole activity below helps students understand the equivalent relationships by using the concept of similarity.

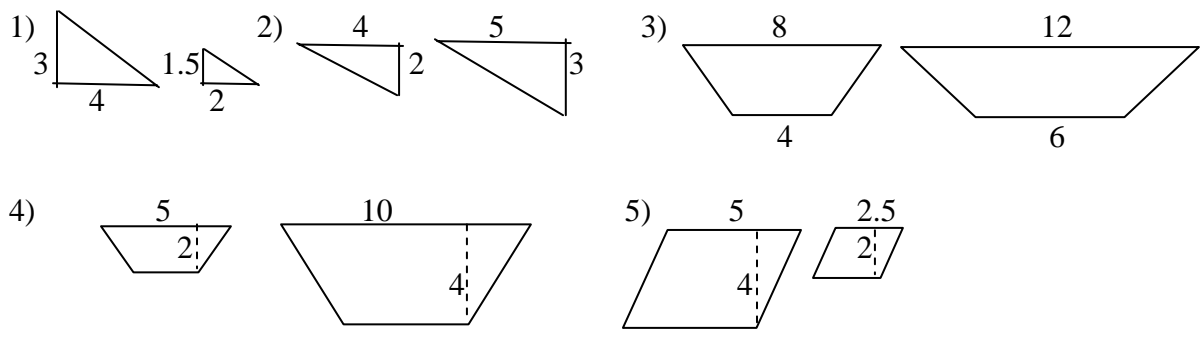
### Alg 3.5

### How Tall is the Flagpole

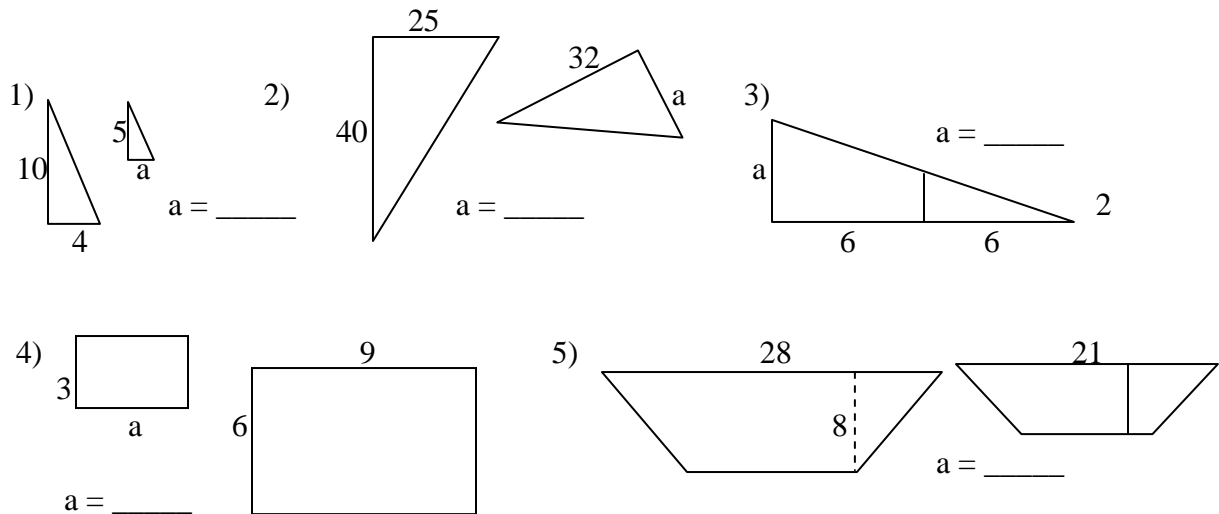
I. When figures are stretched proportionally, that is they grow by the same scale factor in every dimension, they are said to be similar. Without measuring, which pairs of rectangles below are similar? \_\_\_\_\_



II. Which figure pairs below are similar? \_\_\_\_\_



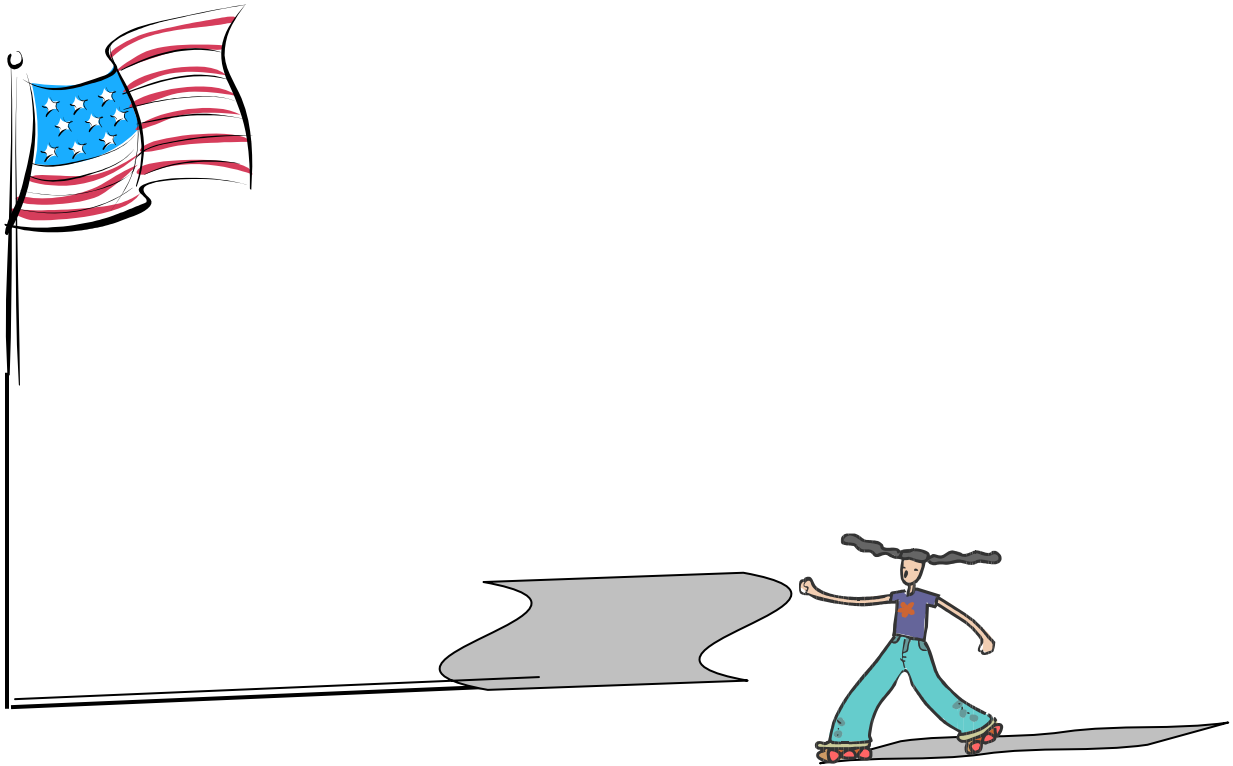
III Find the missing measurements



V. How Tall is the Flagpole? Use your knowledge of similarity and proportion to discover the height of the flagpole below.

The skater below is 1.6 meters tall. Her shadow is 2.1 meters long. The flagpole shadow is 3.9 meters long. How tall is the flagpole?

Explain or draw to show how you can use similarity to figure out how tall the flagpole is.

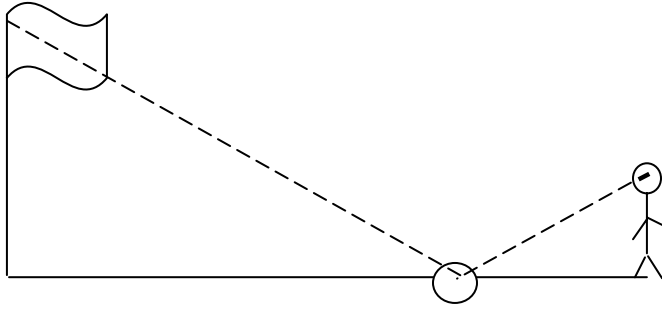


**Find the height of the flagpole in your school yard. *Label measurements and show all work below.***

Method 1: The Shadow Knows

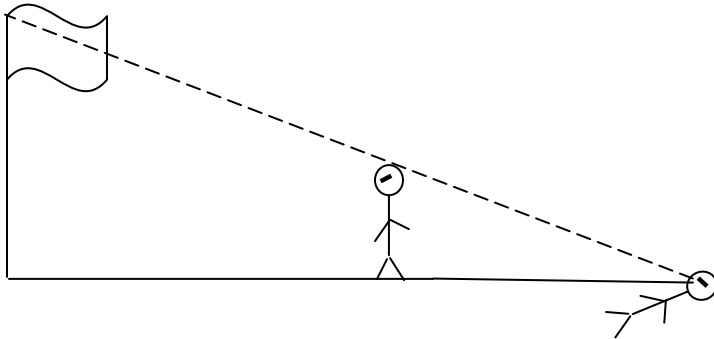


## Method 2: Mirror Secrets



Explain why this method works.

## Method 3: Vision Line



(This guy is laying down and telling guy 2 to move until the top of his head is in line with the top of the flagpole.)