Math 191 Fundamentals of Mathematics II
12.3: Areas of Triangles
February 10, 2014

Areas of Triangles

The formula for the area of a triangle is

Today, we want to explore understanding this formula and why it is true in as many ways as possible.

First, let's determine the areas of some triangles in some simple (and less simple) ways. It is important to be able to understand the problem in varying levels of sophistication for the various levels of your students' experience and the different ways they come to understand the material.

1. Look at the separate sheet with triangles on graph paper. Use the moving and additivity principles to find the areas of the two triangles in three different ways:

- by moving small pieces and relying directly on the definition of area
- by moving larger chunks to create a rectangle
- by viewing the triangle as part of a bigger rectangle.

Next, we need to understand what the formula for the area of a triangle means and how to use it.

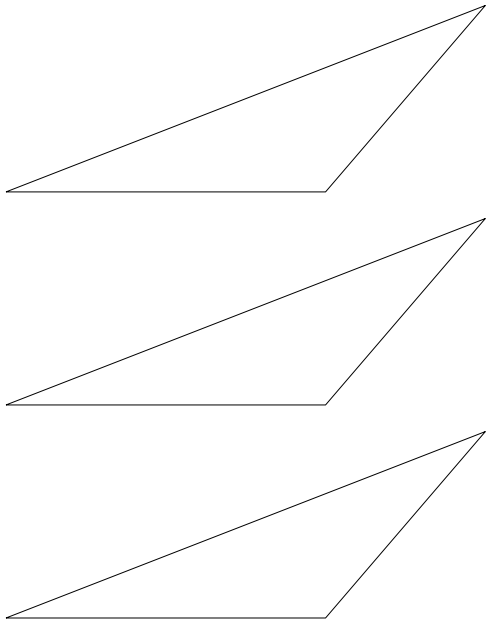
The *base* is

The b in the formula represents _____.

Once you choose a base, the *height* is

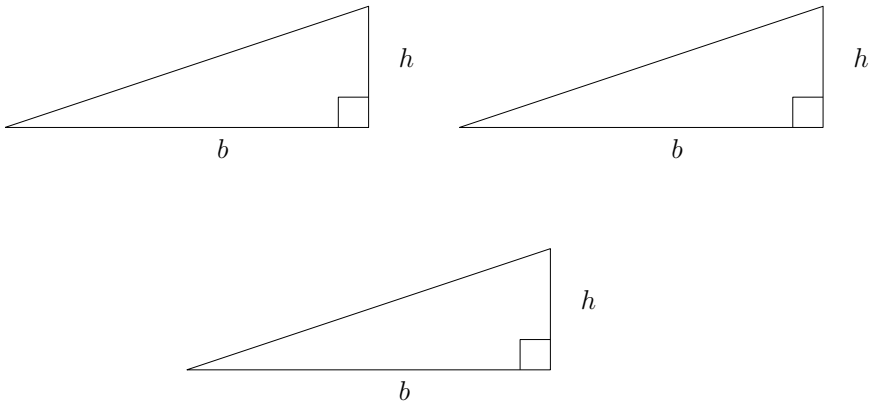
The h in the formula represents _____.

2. Look at the figure below. Show all three possible choices of base and height for the triangle given.

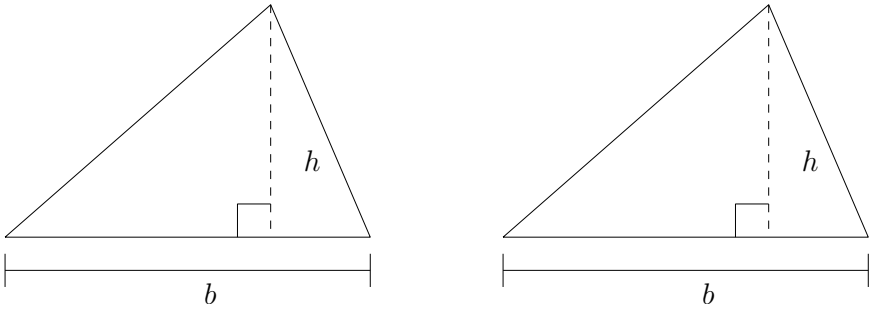


Why is our formula valid? We'll look at three examples.

3. Use the moving and additivity principles to explain in three ways why the triangle below has area $\frac{1}{2}(b \cdot h)$ square units for the given choices of b and h. One explanation should fit naturally with the expression $\frac{1}{2}(b \cdot h)$, another explanation should fit naturally with the expression $(\frac{1}{2}b) \cdot h$, and a third explanation should fit naturally with the expression $b \cdot (\frac{1}{2}h)$. Why is it valid to describe the area with any one of these three expressions?



4. Use the moving and additivity principles to explain in two ways why the triangle below has area $\frac{1}{2}(b \cdot h)$ square units for the given choices of b and h. One explanation should fit naturally with the expression $b \cdot (\frac{1}{2}h)$ and the other should fit naturally with the expression $\frac{1}{2}(b \cdot h)$.



5. Finally, explain why the triangle below has area $\frac{1}{2}(b \cdot h)$ square units for the given choice of b and h. (Suggestion: Let a be the length from B to E.)