

## Exploring Similar Triangles: Designing a Wedding Cake



**Materials:** Copy of Peggy's Cakes for all Occasions problem (1 per group), markers, rulers, compasses, paper to work problem, and Sticky poster size paper to put answers on.

**Explore:** Read The Peggy's Cake Fiasco to the students aloud. The following is Peggy's Cake Fiasco:

*"Peggy owns a cake store where she decorates all kinds of cakes. Today she was running late for work. She forgot to bring a pencil and pad with her to the store. The first customers of the day are a couple who are getting married in three weeks. Both are Math professors. They have decided that they want a cake that has **five** tiers (levels) each level is to be the shape of a triangle all of the triangles must be the same shape. Each triangle cannot be the exact same size because the couple wants to have the measurements and angles shown for each triangle written in the space on top of the triangle in frosting as part of the decor. There are no pillars on the cake to separate the triangles so there has to be space around the edge of each triangle for measurements.*

*The couple gives all of the measurements for the cake to Peggy. Peggy has forgotten most of them by the time the couple leaves. She has found a scrap piece of paper and can remember that the top tier of the cake has the following lengths for its sides 4in, 7in, 9in. She however does not remember any of the degrees for the angles of the triangles. Please help Peggy figure out the lengths as well as degrees that she needs to complete her cake. How can you get the triangles to be the same shape but different sizes?*

*As a group, record your solution on the large paper. Draw a labeled to-scale diagram of your cake tiers on the large paper. You will be required to use a compass to draw your top tier of the cake. The process on how you came up with the solution should be included. You will also need to give a formula that supports your solution."*

This activity was designed by students in Candace Walkington's Math 1351 class. All rights reserved to those students.

**Probing Questions:**

- 1) How can you construct a triangle given the measurements of 3 sides? How could we determine the angles? Is only one such triangle possible, or are there more possibilities?
- 2) How can you make a triangle that's the same shape but a different size?  
Anticipated response: I'll add the same number on to each side (this won't work. We'll let students try it and see it doesn't work). Why doesn't that work? (the relationship is multiplicative, not additive!) What could you try instead? Will the angles also change, or will they stay the same?
- 3) What do we call figures that have the same shape but different sizes? How can we mathematically represent the relationship between each cake tier using scale factors? Fractions? Percents? Ratios? Proportions?