# Worksheet Alpha

1. Copy the picture on the right onto the board. The dots in the graph represent the members of your group. (If your group has only 3 people, then eliminate one of the dots.) Your problem: label the points with your names, and label the axes, so that the graph is accurate. The axes can represent any attributes you want, as long as they are properties that are not visible to the naked eye.
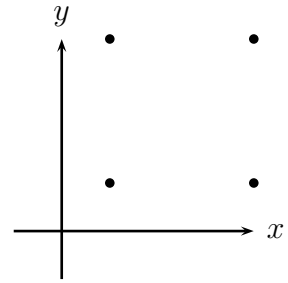
2. Find all the points where the graphs of $y = x^2$ and $y = 2^x$ intersect.

3. When 23-time Olympic gold medal winner and former UM student Michael Phelps gets out of the pool, he dries himself off with a towel. Only, the towel doesn't get him completely dry; rather, the water on his body spreads out evenly over the surface area of his body and of the towel. So some water stays on him when the towel is taken away.

   (a) Suppose Michael's body's surface area is $1\,\text{m}^2$, and it's covered by 1 liter of water. If the towel is also $1\,\text{m}^2$, how wet is he after towelling off?

   (b) Suppose instead that the towel is twice as big, $2\,\text{m}^2$. How wet is he now?

   (c) Can you think of a way to use the bigger towel to better effect?

4. Suppose you bake a square cake, 10 inches on a side and 2 inches high. You frost it on the top and all four sides (but not the bottom). How can 6 people divide up the cake so that each gets the same amount of cake and the same amount of frosting? How about 9 people? n people?

5. Celcius (°C) and Fahrenheit (°F) are two ways of measuring temperature. They are related by a linear equation.

   (a) Water freezes at 32°F and 0°C, and water boils at 212°F and 100°C. Use that information to write a formula for f, the temperature in Fahrenheit, in terms of c, the temperature in Celcius.

   (b) Imagine yourself in a cabin in the backwoods of northern Canada. You are very cold from a long day of skiing, and you need to know the temperature in Fahrenheit, so you can tell how much antifreeze to put into your car so that it will start in the morning. Unfortunately, this is Canada, so the only thermometer available is in Celcius, and you are too cold to multiply, so you can't use the formula you found in part (a). In the cabin with you are a roll of duct tape, a $33\frac{1}{3}$ RPM record player, a Beatles record from 1967, and a stopwatch, among other things. How can you compute the temperature in Fahrenheit without multiplying or dividing?

6. Suppose you need to dig a square hole in a plot of land shaped like the triangle below:
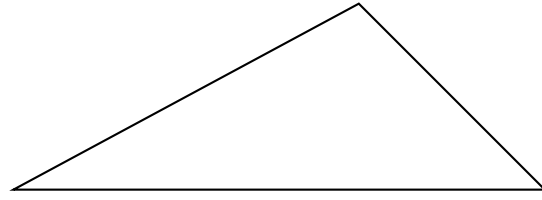
You would like all four corners of the square to be on the edges of the triangle. Can you do it? Explain why or why not.