**Complete the following problems upon entering Honors Algebra II/Trig. The first day of school will be spent discussing solutions to these problems and you will be expected to participate. Some of these problems are explorations and do not have an "answer".**

1. A triangle is formed by the intersections of the lines $3x + 2y = 1$, $y = x - 2$, and $-4x + 9y = 22$. Is the triangle isosceles? How do you know?

2. A bug moves linearly with constant speed across my graph paper. I first notice the bug when it is at (3,4). It reaches (9,8) after two seconds and (15,12) after four seconds (from when I first notice the bug).
a) Predict the position of the bug after six seconds; after nine seconds; after t seconds?
b) Is there a time when the bug is equidistant from the x- and y-axis? If so, where is it (are they)?

3. Golf balls cost $.90 each at Jerzy's Club, which has an annual $25 membership fee. At Rick and Tom's sporting-goods store, the price is $1.35 per ball for the same brand. Where you buy your golf balls depends on how many you wish to buy. Explain, and illustrate your reasoning with a graph.

4. Suppose that numbers a, b, and c fit the equation $a^2 + b^2 = c^2$, with $a = b$. Express c in terms of a. Draw a good picture of such a triangle. What can be said about the angles of the triangle?

5. In baseball, the bases are placed at the corners of a square whose sides are 90 feet long. Home plate and second base are at opposite corners. To the nearest eighth of an inch, how far is it from home plate to second base?

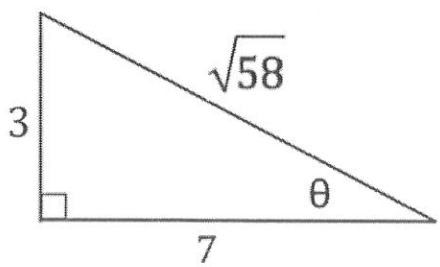
6. Tracy and Kelly are running laps on the indoor track – at steady speeds, but in opposite directions. They meet every 20 seconds. It takes Tracy 45 seconds to complete each lap. How many seconds does it take for each of Kelly's laps? Explain your solution.

7. A circular Harkness table is placed in a corner of a room so that it touches both walls. A mark is made on the edge of the table - exactly 18 inches from one wall and 25 inches from the other. What is the radius of the table? (Hint – there are two possible answers)

8. The equation $y - 5 = m(x - 2)$ represents a line, no matter what value m has.
a) What do all these lines have in common? (regardless of the value of m)
b) When $m = -2$, what are the x- and y-intercepts of the line?
c) When $m = -1/3$, what are the x- and y-intercepts of the line?
d) When $m = 2$, what are the x- and y-intercepts of the line?
e) For what values of m are the axis intercepts both positive?

9. The lines $3x + 4y = 12$ and $3x + 4y = 72$ are parallel. Explain why. Find the distance that separates these lines. You will have to decide what "distance" means in this context.

10. The line drawn tangent to the circle $x^2 + y^2 = 169$ at (12,5) meets the y-axis at what value?

11. Evaluate the $\sin(\theta)$, $\cos(\theta)$, and $\tan(\theta)$ given the figure to the right.

12. The $\csc(\theta)$ (cosectant of theta) is defined as the reciprocal of $\sin(\theta)$.
The $\sec(\theta)$ (secant of theta) is defined as the reciprocal of $\cos(\theta)$.
The $\cot(\theta)$ (cotangent of theta) is defined as the reciprocal of $\tan(\theta)$.
Evaluate the $\csc(\theta)$, $\sec(\theta)$, and $\cot(\theta)$ given the same figure to the right.