**Task 1: What does the farmer want to keep in there?**

A farmer is building a rectangular pen using 100 feet of electric fencing and the side of a barn as one side of his pen. In addition to fencing, there will be a 4-foot gate also requiring the electric fencing on either side of the pen. The farmer wants to maximize the area of the pen. How long should he make each side of the fence in order to create the maximum area?

1) Draw a picture of this situation.

2) Write an expression to represent the length of one of the sides perpendicular to the side of the barn.

3) The length of the second side of the fence that is perpendicular to the barn will be the same length as the first.

4) What is a formula for the perimeter of this rectangle?

5) The total amount of fencing is 100 feet. The side that is parallel to the barn is whatever amount of fence is left over after creating the two perpendicular sides. Write an expression to represent this side of the pen.

6) What is the formula for the area of a rectangle?

7) Build the equation that describes the area of the pen.

8) Find the vertex of this function.

9) What does the x- and y-coordinate of the vertex represent?

10) How long should the farmer make each side of the pen in order to create the maximum area?