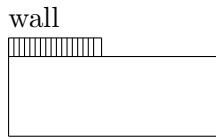
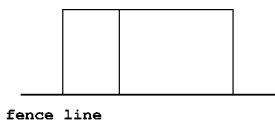


**Section 4.7: Additional Problems**

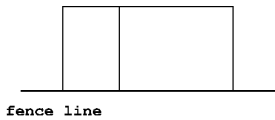
1. Starting with a 50-foot-long stone wall, a farmer would like to construct a rectangular enclosure by adding 500 feet of fencing as shown in the figure. Find the values of  $x$  and  $w$  that result in the greatest possible area.



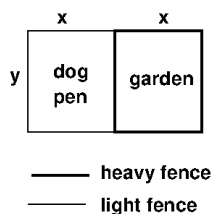
2. A rancher wants to create two rectangular pens, as shown in the figure, using an existing fence line as one side. If there are 645 feet of fence available, what dimension should be used to maximize the total area of the pens?



3. A rancher wants to create two rectangular pens, as shown in the figure, using an existing fence line as one side. The pens need to have a total area of 21,675 square feet. The materials for the fence cost \$10 per foot. Find the dimensions that should be used to minimize the cost of the fence.



4. Bob wants to create two pens, as shown in the figure. One pen is for a garden and it needs a heavy duty fence to keep out the critters. This heavy duty fence costs \$10 per foot. The dog pen shares a side with the garden and has a lighter weight fence on the other three sides that costs only \$ 6 per foot. If each pen is to have an area of 832, find the dimensions that would minimize the total cost of the fencing.



5. A manufacturer must produce a sturdy rectangular container with a square base and a volume of 45 cubic ft. The cost of the material for the top and 4 sides is \$3 per square foot while the cost of the material for the bottom is \$7 per square foot. Find the dimension of the box that will minimize the cost of the material.

**The remaining problems are easier using technology after you have them set up.**

6. Two vertical poles of length 6ft and 8ft stand on level ground, with their bases 10 ft apart. Approximate the minimal length of cable that can reach from the top of one pole to some point on the ground between the poles and then to the top of the other pole.
7. A refinery is located on the south bank of a straight river that is 2 km wide. A pipeline is to be constructed from the refinery to storage tanks located on the north bank of the river 6km to the east of the refinery. The cost of laying pipe is \$400,000/km over land and \$800,000/km under water. To minimize cost, how much of the pipeline should be constructed on land?

8. A person in a rowboat 2 miles from the nearest point, called P, on a straight shoreline wishes to reach a house 6 miles farther down the shore. If the person can row at a rate of 3 miles per hour and walk at a rate of 5 miles per hour, how far along the shore should the person walk in order to minimize the amount of time it takes to get to the house.