## 4.5 Exercises

1. Find the dimensions of a rectangle with a perimeter of 100 ft that has the largest possible area.

2. Find the dimensions of a rectangle of area 144 ft^2 that has the smallest possible perimeter.

3. **ENCLOSING THE LARGEST AREA** The owner of the Rancho Los Feliz has 3000 yd of fencing with which to enclose a rectangular piece of grazing land along the straight portion of a river. If fencing is not required along the river, what are the dimensions of the largest area that he can enclose? What is this area?

4. **ENCLOSING THE LARGEST AREA** Refer to Exercise 3. As an alternative plan, the owner of the Rancho Los Feliz might use the 3000 yd of fencing to enclose the rectangular piece of grazing land along the straight portion of the river and then subdivide it by means of a fence running parallel to the sides. Again, no fencing is required along the river. What are the dimensions of the largest area that can be enclosed? What is this area? (See the accompanying figure.)
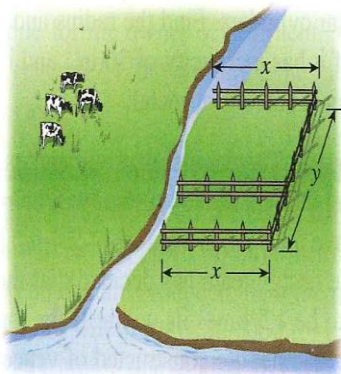
5. **MINIMIZING CONSTRUCTION COSTS** The management of the UNICO department store has decided to enclose an 800-ft^2 area outside the building for displaying potted plants and flowers. One side will be formed by the external wall of the store, two sides will be constructed of pine boards, and the fourth side will be made of galvanized steel fencing. If the pine board fencing costs $6/running foot and the steel fencing costs $3/running foot, determine the dimensions of the enclosure that can be erected at minimum cost.

6. **PACKAGING** By cutting away identical squares from each corner of a rectangular piece of cardboard and folding up the resulting flaps, an open box may be made. If the cardboard is 15 in. long and 8 in. wide, find the dimensions of the box that will yield the maximum volume.

7. **METAL FABRICATION** If an open box is made from a tin sheet 8 in. square by cutting out identical squares from each corner and bending up the resulting flaps, determine the dimensions of the largest box that can be made.

8. **MINIMIZING PACKAGING COSTS** If an open box has a square base and a volume of 108 in.^{3} and is constructed from a tin sheet, find the dimensions of the box, assuming that a minimum amount of material is used in its construction.

9. **MINIMIZING COSTS** A pencil cup with a capacity of 36 in.^{3} is to be constructed in the shape of a rectangular box with a square base and an open top. If the material for the sides costs 15¢/in.^{2} and the material for the base costs 40¢/in.^{2}, what should the dimensions of the cup be to minimize the construction cost?