Please work with a partner! There's a second part to this exercise where you'll use calculus to optimize. But I want to see your solutions to this part before you move on to the optimizing phase.

**Scenario 1.** A sheep farmer wishes to construct a rectangular pen enclosing 500 square feet and subdivide it into two pens using a fence parallel to one of the sides. The fencing for the four outer sides of the pen must be heavy-duty (to keep out predators) and costs \$2 per foot. The interior (subdividing) fence costs \$1 per foot.

a. Make a clear, usable sketch of the scenario. Choose notation (variable names) for important quantities or measurements, and label the sketch accordingly.

b. Write a "primary" equation expressing the total cost of the fence as a function of your variables.

c. Write a "constraint" equation, using your variables, to express the condition that the area of the pen must be 500 square feet.

d. Use the constraint to eliminate one variable from your function in part (b), and express the total cost of the fence as a function of a single variable.

**Scenario 2** A rectangular page is to contain 36 square inches of print. The margins on the left and right sides are to be 1 inch each, and the margins at the top and bottom are to be $1\frac{1}{2}$ inches each.

a. Make a clear, usable sketch of the scenario. Choose notation (variable names) for important quantities or measurements, and label the sketch accordingly.

b. Write a "primary" equation expressing the total area of the page as a function of your variables.

c. Write a "constraint" equation, using your variables, to express the condition that the printed area must be 36 square inches.

d. Use the constraint to eliminate one variable from your function in part (b), and express the total area of the page as a function of a single variable.