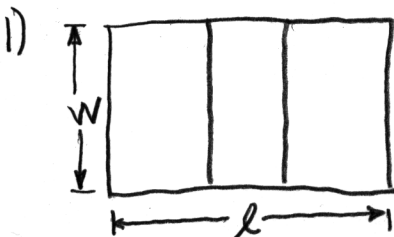


Name: ANSWER KEY

Score: \_\_\_\_\_

Solve the following problem. Show all steps in your work.

A farmer wishes to put a fence around a rectangular field and then divide the field into three rectangular plots by placing two fences parallel to one of the sides. If the farmer can afford only 1000 yards of fencing, what dimensions will give the maximum rectangular area?



2) Total fencing =  $4w + 2l$  from figure.

Total fencing = 1000 from problem statement.

$$\therefore 4w + 2l = 1000 \Rightarrow 2w + l = 500 \Rightarrow l = 500 - 2w$$

3) Area  $A = lw = (500 - 2w)w = -2w^2 + 500w$

4) To maximize  $A$ .

$A$  is a quadratic function of  $w$ . The graph of  $A$  as a function of  $w$  is a parabola that opens downward (coefficient of  $w$  is  $-4$ ).

$$\therefore A \text{ attains a maximum at } w = -\frac{b}{2a} = -\frac{500}{2(-2)} = 125$$

5) Dimensions that give maximum area are  $w = 125, l = 250$