## Solution 251

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Calling one side of the rectangle x and the other y, then if the partitions are parallel to x, the total length of the fencing $1200 = 6x + 2y$. Solving for y we get: $y = 600 - 3x$. The total area $A = xy$ and substituting for y, this becomes $A = 600x - 3x^2$. We want A to be a maximum so that $dA/dx = 600 - 6x = 0$.

1. Thus, $x = 100$ ft. the length of each partition.
2. Therefore, $y = 600 - 3x = 300$ ft.
3. Then the maximum area $A_{max} = xy = 30{,}000$ ft.$^2$

If there are n partitions, then the number of lengths of side x is $(n + 2)$. Therefore, the total length, $L = 2y + (n + 2)\,x$. Solving for y, yields $y = [L - (n + 2)x]/2$ and substituting into $A = xy$, we get $A = [xL - (n + 2)x^2]/2$. Taking its derivative with respect to x and setting the result equal to zero yields: $dA/dx = L/2 - (n + 2)x = 0$.

4. That gives us $x = L/(2(n + 2))$.
5. The solution for y is then: $y = [L - (n + 2)L/(2(n + 2)]2 =$ $L/2 - L/4 = L/4$ (y does not depend upon n).
6. Using these values for x and y, $A_{max} = xy = L^2/[8(n + 2)]$.