2.

2. There are 3 sides to fence, two sides with length b and one side with length a:

$a + b + b = 1513 \implies a = 1513 - 2b$

Now compute the area:

$\text{area} = a \times b = (l - 2b)b = 1513\,b - 2\,b^2$

Notice the Parabolic formula, compute the vertex:

$\text{vertex} = (\frac{1513}{4} \text{ yards } , \frac{2\,289\,169}{8} \text{ yards}^2)$

Square the unit for vertex's vertical coordinate since it is a quadratic.