4.

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

$a + b + b = 1559 \implies a = 1559 - 2b$

Now find the area:

$\text{area} = a \times b = (l - 2b)b = 1559\, b - 2\, b^2$

Notice the Parabolic formula, find the vertex:

$\text{vertex} = (\frac{1559}{4} \text{ yards} , \frac{2\,430\,481}{8} \text{ yards}^2)$

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