

3.

3. Since the fences enclose a rectangular plot without one side, two sides have length b and one side has length a :

$$a + b + b = 4078 \implies a = 4078 - 2b$$

the area:

$$\text{area} = a \times b = (4078 - 2b)b = 4078b - 2b^2$$

Note that the function is for parabola. Now compute the vertex:

$$\text{vertex} = \left(\frac{2039}{2} \text{ yards}, \frac{4157521}{2} \text{ yards}^2 \right)$$

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