

2.4 In-class Practice

- State the vertex, opening, and equation of axis of symmetry (you may need to complete the square to do this.) Then graph it and state the domain and range, extreme point (maximum or minimum), and intervals on which the function is increasing or decreasing.

a) $f(x) = (x + 3)^2 - 4$

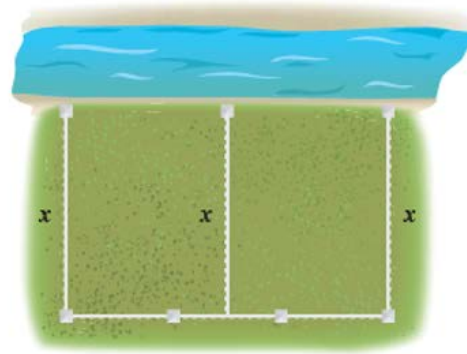
b) $f(x) = -\frac{1}{2}(x - 1)^2 + 3$

c) $f(x) = 2x^2 - 4x + 5$

d) $f(x) = -3x^2 + 24x - 46$

- Vertex and x -Intercepts** We know that the graph of the quadratic function $f(x) = (x - m)(x - n)$ is a parabola. Sketch a rough graph of what such a parabola would look like. What are the x -intercepts of the graph of f ? Can you tell from your graph the x -coordinate of the vertex in terms of m and n ?

- Area of a Rectangular Region** A farmer wishes to enclose a rectangular region bordering a river with fencing, as shown in the diagram. Suppose that x represents the length of each of the three parallel pieces of fencing. She has 600 ft of fencing available.



- What is the length of the remaining piece of fencing in terms of x ?
- Determine a function \mathcal{A} that represents the total area of the enclosed region. Give any restrictions on x .
- What dimensions for the total enclosed region would give an area of 22,500 ft²?
- What is the maximum area that can be enclosed?

- Making a Rain Gutter** A rain gutter is formed by bending up the sides of a 30-inch-wide rectangular metal sheet as shown in the figure.

- Find a function that models the cross-sectional area of the gutter in terms of x .
- Find the value of x that maximizes the cross-sectional area of the gutter.
- What is the maximum cross-sectional area for the gutter?

