2.2 Answer Key
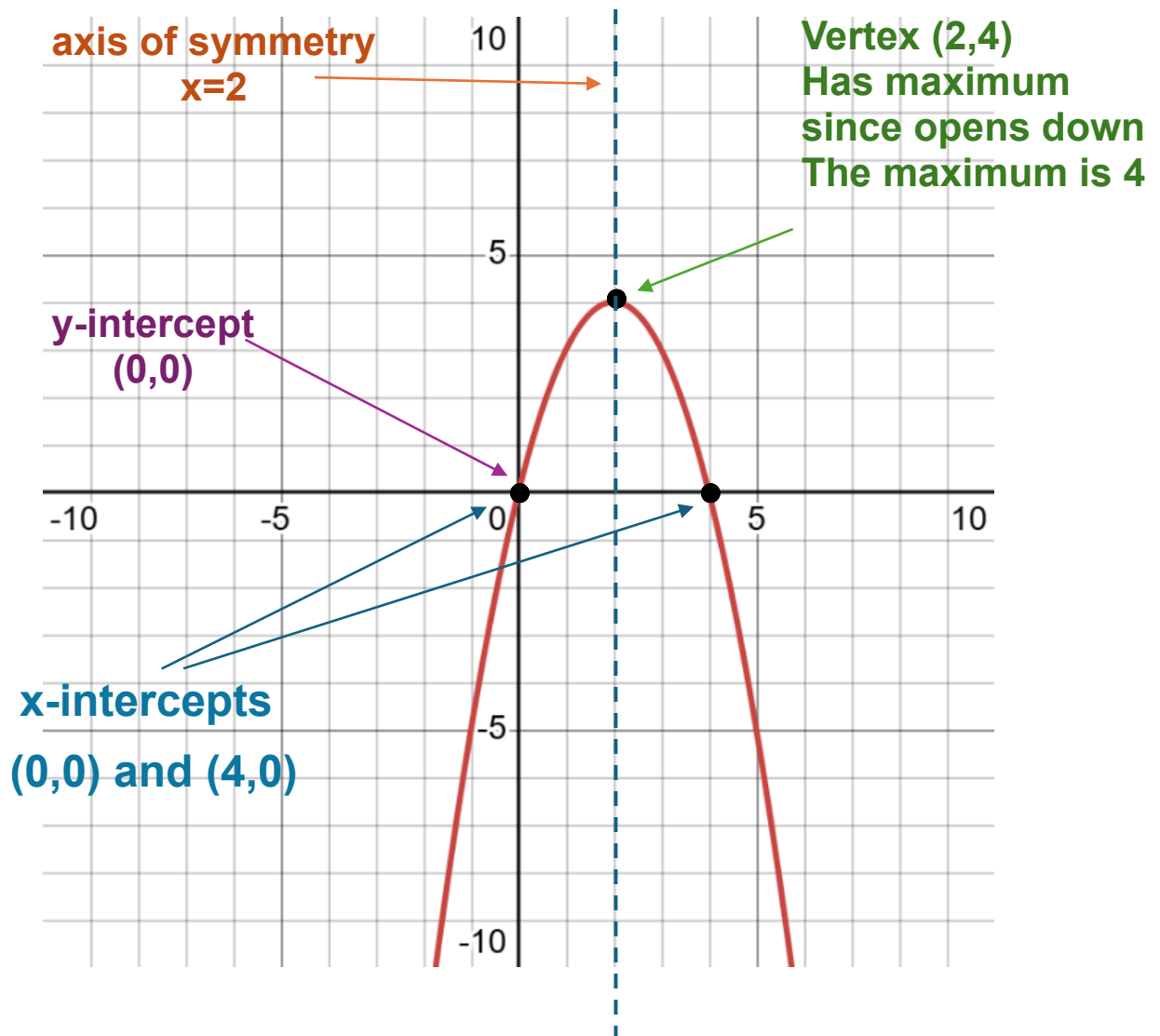
Practice 2.2-2-1:

Find information on the graph.

Is the quadratic **a value** positive or negative

axis of symmetry x=2

Vertex (2,4) Has maximum since opens down The maximum is 4

y-intercept (0,0)

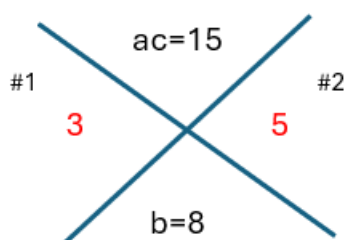**x-intercepts (0,0) and (4,0)**

Practice 2.2-2-1:

Graph $f(x) = x^2 + 8x + 15$

1. **Find the x-intercepts (if possible):**
   Set the quadratic equation equal to zero and solve for x. These are the points where the graph crosses the x-axis.

   $$x^2 + 8x + 15 = 0$$

   (AC graph)

   ```
        ac=15                      ac=15
   #1           #2                |ac|=15
      3       5                 ─────────────
                                 #1      #2
        b=8                       1       15
                                  3        5
   ```

   $$(x + 3)(x + 5) = 0$$

   $$x + 3 = 0 \qquad\qquad x + 5 = 0$$

   $$x_1 = -3 \qquad\qquad x_2 = -5$$

   x-intercepts(-3,0), (-5,0)

2. **Find the y-intercept:**
   Substitute x=0 into the equation to find the y-intercept. This is where the graph crosses the y-axis.

   $$f(0) = (0)^2 + 8(0) + 15 = 15$$

   y-intercept $(0, 15)$

3. **Find the vertex:**
   Use the formula $x = \frac{-b}{2a}$ to find the x-coordinate of the vertex. Then substitute this value into the equation to find the corresponding y-coordinate.
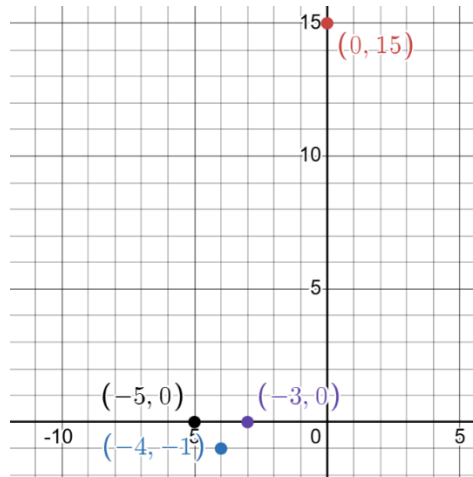
   $$x = \frac{-(8)}{2(1)} = -4$$

   $$y = f(-4) = (-4)^2 + 8(-4) + 15 = -1$$

> **Vertex (-4,-1)**

4. **Plot the key points:**
   Plot the x-intercepts, y-intercept, and the vertex on the coordinate plane.

5. **Identify the axis of symmetry:**
   Draw a vertical dashed line through the vertex. This line is the axis of symmetry and helps ensure the graph is balanced.

> **X=-4**

6. **If needed, find additional points:**
   If you cannot find the x- or y-intercepts, or if you need more detail for accuracy, choose one or two additional x-values that haven't been used, substitute them into the equation, and plot those points.

   We have all the points: x-intercepts, y-intercept, and vertex.

7. **Sketch the parabola:**
   Connect all the plotted points smoothly in a U-shaped curve. Extend the curve on both sides, following the general shape and direction of a parabola (opening upward or downward based on the sign of a).