**Barron’s Let’s Review Regents – Algebra I**

# Chapter 6: Graphing Solution Sets for Quadratic Equations

## 6.1 Graphing Solution Sets to Quadratic Equations

**Graphing Solution Sets to Quadratic Equations by Making a Table**

|  |  |
| --- | --- |
| **x** | **y** |
| -2 | 4 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |

A graph of a function

AI-generated content may be incorrect.

Graphing Solution Sets to Square Root Equations by Making a Table

|  |  |
| --- | --- |
| **x** | **y** |
| 0 | 2 |
| 1 | 3 |
| 4 | 4 |
| 9 | 5 |

A graph of a function

AI-generated content may be incorrect.

**The Axis of Symmetry and the Vertex of a Parabola**

Every parabola has an *axis of symmetry*, usually a vertical line that divides the parabola into two equal pieces. The axis of symmetry passes through the *vertex* of the parabola, which is the point where it changes from decreasing to increasing, or from increasing to decreasing.

A graph of a line with numbers

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**Using the Axis of Symmetry to Pick x-Values for a Table**

Rather than always use the five x-values -2, -1, 0, 1, and 2, it is better to use as the middle number the   
x-intercept of the axis of symmetry. To determine the x-intercept of the axis of symmetry, of a quadratic equation in the form , use the formula:  
A graph of a function

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Determining the Coordinates of the Vertex of the Parabola

Because the vertex is on the axis of symmetry, the   
x-coordinate of the parabola that is the graph of the solution set of is To determine the y-coordinate, substitute for the x value you get for into the equation .

Equation: , the x-coordinate of the vertex is .

A graph of a function

AI-generated content may be incorrect.

**Graphing Parabolas with the Vertex and Intercepts Method**

When a parabola has two x-intercepts, four points are very useful: the vertex, the y-intercept, and the two x-intercepts.

The y-intercept can be solved by substituting 0 for x: (0, 8).

The x-intercepts each have a y-coordinate of 0. To calculate them, substitute 0 for y and solve.

This is a quadratic equation covered in Chapter 3. This one can be solved by the factoring method.

So the two x-intercepts are (-4,0) and (-2,0).

**Graphing Solution Sets to Quadratic Equations on the Graphing Calculator**

Intervals When a Graph is increasing or Decreasing

A graph is increasing when as the x-coordinates increase, they y-coordinates increase too. Informally, the graph goes up as it moves right.

The graph of the line y = x is an example of a graph that is increasing everywhere.

Graphs of the solution sets of linear equations are always increasing or always decreasing, depending on whether the slope of the line is positive or negative.

Graphs that form parabolas will switch, at the vertex, from increasing to decreasing or from decreasing to increasing.

### Check Your Understanding of Section 6.1

1. Multiple-Choice
2. Which is a point on the graph of the solution set of   
   **(4) (3, 22)**
3. The parabola defined by the equation   
    has a y-intercept at  
   (y-axis-intercept)  
   **(2) (0, 12)**
4. Which is an x-intercept of the parabola defined by the equation ?  
   (x-axis-intercept => y = 0)  
   **(4) (5, 0)**
5. What are the coordinates of the vertex of the parabola defined by the equation   
   ? (a = 1, b = -4, c = -1)  
   **(4) (2, -5)**
6. What is the equation of the axis of symmetry of the parabola defined by the equation  
   ? (a = 1, b =-6, c = -2)  
   **(3) x = 3**
7. is the x-coordinate of the vertext for the parabola defined by which equation?  
   **(1)**  (a = 1, b = 8, c = 3)
8. What could be the equation that determines this parabola?  
   Vertex: (3, -1)  
   x-intercept: (2, 0), (4, 0)  
   y-intercept: (0, 8)  
   Plug in (2, 0) for each equation to see if it works.  
   **(2)**
9. The axis of symmetry of the parabola defined by the equation is  
   a = 3, b = 42, c = 8  
   **(1)**
10. Which is the graph of ?  
    a = -1, b = 2, c = 3  
    Vertex:   
    Vertex:   
    Vertex: (1, 4)  
    y-intercept:   
    y-intercept: (0, 3)  
    **(2)**
11. Based on this graph, what are the two solutions to the equation ?  
    **(3) x = 3 and x = -1**
12. Show how you arrived at your answers.
13. The graph of the parabola defined by the equation has an axis of symmetry at x = -3. Find possible values for b and c.  
    Multiply both sides by -2.

Completing the square:  
**b = 6, c = 9**

1. The graph of the parabola defined by the equation has x-intercepts at (1, 0) and (-4, 0). What are possible values for *b* and *c*?  
   **b = 3, c = -4**  
   Based on the x-intercepts, factors should be (x – 1) and (x + 4).  
   **(x – 1) (x + 4) = x2 + 4x - x - 4 = x2 + 3x – 4**
2. A portion of a parabola is graphed below. It will pass through the three points (1, 5), (6, 0), and vertex (4, -4). What are two other points on this parabola?  
     
   Each side of the parabola with respect to the vertex mirrors the other side. The mirror to   
   (6, 0) is **(2, 0).** The mirror to (1, 5) is **(7, 5).**
3. What are the coordinates of the vertex and the x-intercept(s) of the parabola defined by the equation   
     
   a = 1, b = -6, c = 9  
   vertex: (3, 0)  
   x-intercept: (3, 0)
4. Below is the graph of . What is the equation of the axis of symmetry of the graph of   
     
   a = 1, b = -6, c = 3  
   vertex: vertex: (3, -6)  
   equation of the axis of symmetry: x = 3