

# Characteristics of Quadratic Functions

Algebra 1 • Section 9.2

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 12

## Quick Review and Helpful Hints

Quadratic functions can be read through their zeros, vertex, axis of symmetry, and opening direction. Choose factoring, square roots, completing the square, or the quadratic formula based on the form you see.

**Q Example:** Solve  $x^2 - 5x + 6 = 0$ .

**Work:** Factor the quadratic:  $x^2 - 5x + 6 = (x - 2)(x - 3)$ . Set each factor equal to zero.

**Answer:**  $x = 2$  or  $x = 3$

## Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

- |   |       |   |       |
|---|-------|---|-------|
| 1. Find the vertex of $y = (x - 2)^2 + 5$ .         | _____ | 6. Find the vertex of $y = x^2 - 4x + 1$ .        | _____ |
| 2. Find the axis of $y = x^2 + 6x + 8$ .            | _____ | 7. Find the minimum of $y = (x + 1)^2 - 6$ .      | _____ |
| 3. Find the $y$ -intercept of $y = 2x^2 - 3x + 7$ . | _____ | 8. Find the maximum of $y = -2(x - 4)^2 + 10$ .   | _____ |
| 4. Does $y = -x^2 + 4$ open up or down?             | _____ | 9. Find the zeros of $y = x^2 - 5x + 6$ .         | _____ |
| 5. Find zeros of $y = x^2 - 9$ .                    | _____ | 10. Convert $y = (x - 3)^2 + 2$ to standard form. | _____ |

## Word Problems

11. A diver height is  $h = -t^2 + 4t + 5$ . Find the maximum time. \_\_\_\_\_
12. A profit model  $P = -x^2 + 14x - 45$  has zeros? \_\_\_\_\_



## Answer Keys

1.  $(2, 5)$

2.  $x = -3$

3.  $7$

4. Down

5.  $x = \pm 3$

6.  $(2, -3)$

7.  $-6$

8.  $10$

9.  $x = 2, 3$

10.  $y = x^2 - 6x + 11$

11.  $t = 2$

12.  $x = 5, 9$

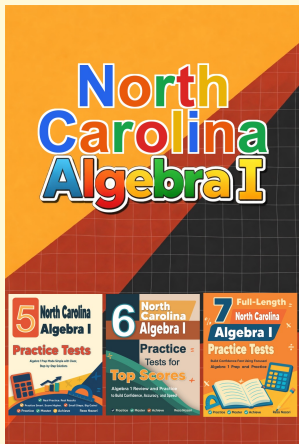
### Step-by-Step Explanations

1. Vertex form  $y = a(x - h)^2 + k$  gives vertex  $(h, k)$ .
2. Use  $x = -b/(2a) = -6/2 = -3$ .
3. The  $y$ -intercept happens at  $x = 0$ , leaving 7.
4. The coefficient of  $x^2$  is negative.
5. Set  $x^2 - 9 = 0$ , so  $x^2 = 9$ .
6. The axis is  $x = 2$ . Substitute to get  $4 - 8 + 1 = -3$ .

7. The square part is at least zero, so the lowest value is  $-6$ .
8. The parabola opens down, and the vertex output is 10.
9. Factor as  $(x - 2)(x - 3)$ .
10. Expand  $(x - 3)^2 = x^2 - 6x + 9$ , then add 2.
11. The vertex time is  $-b/(2a) = -4/(2(-1)) = 2$ .
12. Set to zero and factor  $x^2 - 14x + 45 = (x - 5)(x - 9)$ .



## Want Even More Algebra 1 Practice?



### North Carolina Algebra I Preparation Bundle

18 full-length practice tests across three books  
Fresh test practice, detailed explanations, and organized review



**18 Tests**  
**3 Books**  
**One Bundle**

**Important:** These Algebra 1 resources are made for extra practice after the worksheet. Use the QR code for the state or program bundle connected with this worksheet.

#### Skill Review

- ✓ Strengthens equations, functions, systems, and modeling
- ✓ Supports steady review before tests
- ✓ Good for tutoring, homework, and independent practice

**Build the foundation.**

#### Test Practice

- ✓ Full-length practice tests for realistic pacing
- ✓ Detailed answer explanations for every test
- ✓ Useful after students finish topic worksheets

**Practice with purpose.**

#### Confidence

- ✓ Turns mistakes into targeted review
- ✓ Helps students see progress over time
- ✓ Keeps preparation organized and calm

**Move forward prepared.**