

Quadratic Functions Worksheet

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Part 1: Building a Foundation

What is the standard form of a quadratic function?

Hint: Think about the general equation of a quadratic function.

- A) $ax^2 + bx + c$
- B) $a(x-h)^2 + k$
- C) $ax + b$
- D) $a(x-p)(x-q)$

Which of the following are forms of a quadratic function? (Select all that apply)

Hint: Consider the different ways a quadratic function can be expressed.

- A) Standard form
- B) Vertex form
- C) Linear form
- D) Intercept form

Explain what the discriminant of a quadratic equation tells us about the roots of the equation.

Hint: Consider how the discriminant relates to the nature of the roots.

List the key features of a parabola formed by a quadratic function.

Hint: Think about the characteristics that define the shape of a parabola.

1. What is the vertex?

2. What is the axis of symmetry?

3. What does it mean if the parabola opens upwards?

Part 2: Understanding and Interpretation

If a quadratic function opens upwards, what can be said about the coefficient a ?

Hint: Consider the sign of the coefficient in the quadratic function.

- A) $a < 0$
- B) $a = 0$
- C) $a > 0$
- D) a can be any value

Which of the following statements are true about the vertex of a parabola? (Select all that apply)

Hint: Think about the properties of the vertex in relation to the parabola.

- A) It is the highest or lowest point on the graph.
- B) It is always located at the origin.
- C) It lies on the axis of symmetry.
- D) It is the midpoint of the x-intercepts.

Describe how the value of a affects the width of a parabola.

Hint: Consider how changing ' a ' changes the shape of the graph.

Part 3: Application and Analysis

Given the quadratic function $f(x) = 2x^2 - 4x + 1$, what is the y-intercept?

Hint: Evaluate the function at $x = 0$ to find the y-intercept.

- A) 1
- B) -4
- C) 2
- D) 0

Which methods can be used to find the roots of the quadratic equation $x^2 - 5x + 6 = 0$? (Select all that apply)

Hint: Consider the different techniques for solving quadratic equations.

- A) Factoring
- B) Completing the square
- C) Using the quadratic formula
- D) Graphing

Convert the quadratic function $f(x) = x^2 + 6x + 8$ into vertex form.

Hint: Use the method of completing the square to convert the function.

What is the axis of symmetry for the quadratic function $f(x) = 3x^2 + 6x + 2$?

Hint: Use the formula $x = -\frac{b}{2a}$ to find the axis of symmetry.

- A) $x = -1$
- B) $x = -2$
- C) $x = 1$
- D) $x = 2$

For the quadratic function $f(x) = -x^2 + 4x - 3$, which of the following are true? (Select all that apply)

Hint: Analyze the function to determine its properties.

- A) The parabola opens upwards.
- B) The vertex is a maximum point.
- C) The axis of symmetry is $x = 2$.
- D) The y-intercept is -3 .

Analyze the quadratic function $f(x) = x^2 - 4x + 4$ and describe its graph in terms of vertex, axis of symmetry, and intercepts.

Hint: Consider the characteristics of the graph based on the function's form.

Part 4: Evaluation and Creation

Which of the following quadratic functions has no real roots?

Hint: Consider the discriminant to determine the nature of the roots.

- A) $x^2 + 4x + 4$
- B) $x^2 - 4x + 5$
- C) $x^2 - 2x + 1$
- D) $x^2 + 2x - 3$

Evaluate the following statements about the quadratic function $f(x) = 2(x-3)^2 + 5$. Which are correct? (Select all that apply)

Hint: Analyze the function to determine its properties.

- A) The vertex is at (3, 5).
- B) The parabola opens downwards.
- C) The axis of symmetry is $x = 3$.
- D) The minimum value of the function is 5.

Create a real-world scenario where a quadratic function could be used to model a situation. Describe the scenario and the role of the quadratic function.

Hint: Think about situations involving projectile motion or area optimization.