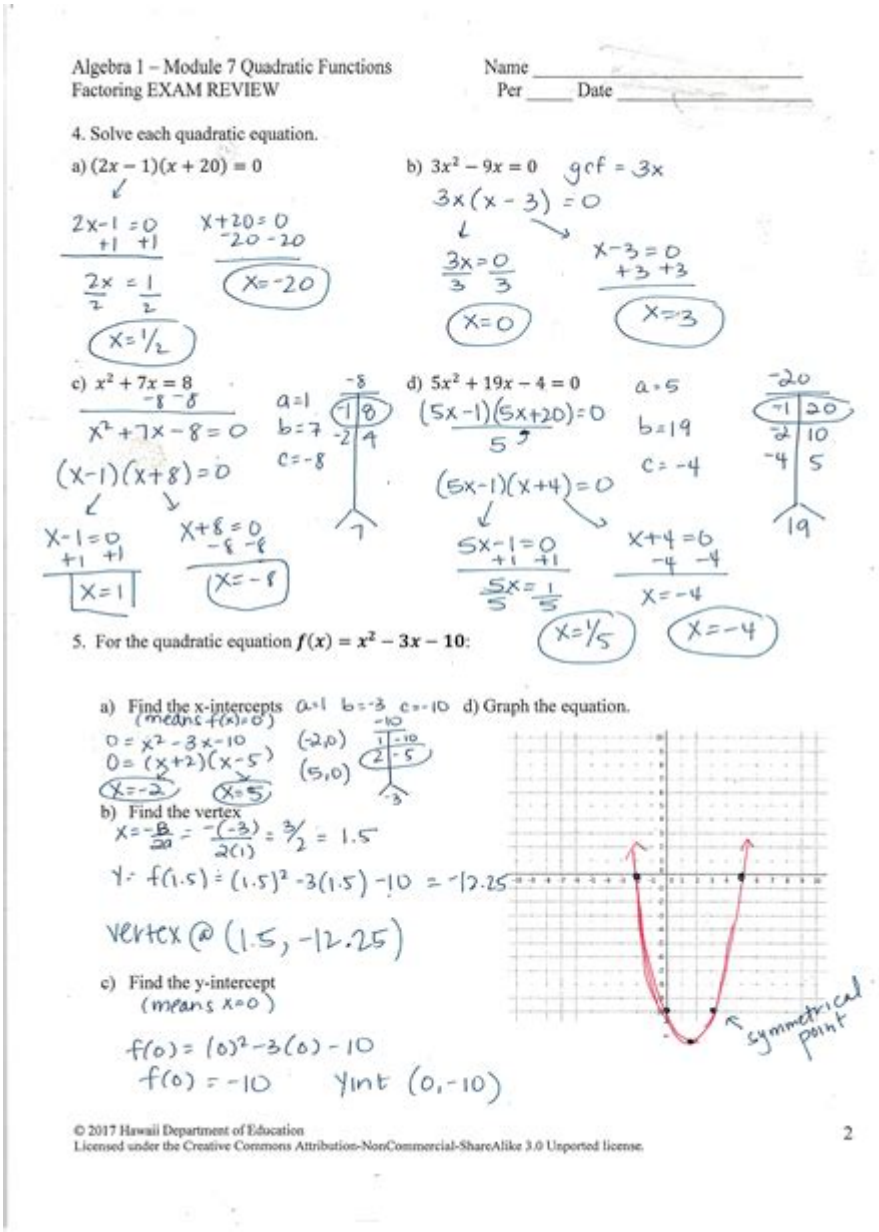
Worksheet Graphing Quadratics From Standard Form Answer Key



Algebra 1 – Module 7 Quadratic Functions
Factoring EXAM REVIEW

Name _____
Per ____ Date _____

4. Solve each quadratic equation.

a) $(2x - 1)(x + 20) = 0$

$2x - 1 = 0$ $\quad +1 \ +1$

$\frac{2x}{2} = \frac{1}{2}$

$x = \frac{1}{2}$

$x + 20 = 0$ $\quad -20 \ -20$

$x = -20$

b) $3x^2 - 9x = 0$ GCF = $3x$

$3x(x - 3) = 0$

$\frac{3x}{3} = \frac{0}{3}$

$x = 0$

$x - 3 = 0$ $\quad +3 \ +3$

$x = 3$

c) $x^2 + 7x = 8$ $\quad -8 \ -8$

$x^2 + 7x - 8 = 0$

$(x - 1)(x + 8) = 0$

$x - 1 = 0$ $\quad +1 \ +1$

$x = 1$

$x + 8 = 0$ $\quad -8 \ -8$

$x = -8$

$a = 1$, $b = 7$, $c = -8$

-1	-8
-2	7

d) $5x^2 + 19x - 4 = 0$

$(5x - 1)(5x + 20) = 0$

5

$(5x - 1)(x + 4) = 0$

$5x - 1 = 0$ $\quad +1 \ +1$

$\frac{5x}{5} = \frac{1}{5}$

$x = \frac{1}{5}$

$x + 4 = 0$ $\quad -4 \ -4$

$x = -4$

$a = 5$, $b = 19$, $c = -4$

-1	20
-2	10
-4	5
	19

5. For the quadratic equation $f(x) = x^2 - 3x - 10$:

a) Find the x-intercepts (means $f(x) = 0$) $a = 1$ $b = -3$ $c = -10$

$0 = x^2 - 3x - 10$

$0 = (x + 2)(x - 5)$

$x = -2$ $\quad x = 5$

(-2, 0) (5, 0)

-10	
1	-10
2	-5
	-3

b) Find the vertex

$x = \frac{-b}{2a} = \frac{-(-3)}{2(1)} = \frac{3}{2} = 1.5$

$y = f(1.5) = (1.5)^2 - 3(1.5) - 10 = -12.25$

vertex @ $(1.5, -12.25)$

c) Find the y-intercept (means $x = 0$)

$f(0) = (0)^2 - 3(0) - 10$

$f(0) = -10$ y int $(0, -10)$

d) Graph the equation.

Worksheet graphing quadratics from standard form answer key is an essential tool for both students and educators in the field of mathematics, particularly in algebra. Quadratic equations, represented in standard form as \(ax^2 + bx + c = 0 \), play a significant role in various applications, from physics to finance. Understanding how to graph these equations and interpret their properties is vital for mastering higher-level math concepts. This article will guide you through the process of graphing quadratics from standard form, provide examples, and offer a sample answer key for practice worksheets.

Understanding Quadratic Functions

Quadratic functions are polynomial functions of degree two. The general form of a quadratic function is given by:

$$
f(x) = ax^2 + bx + c
$$

where:
- a determines the direction of the parabola (upward if $a > 0$, downward if $a < 0$),
- b affects the position of the vertex and the axis of symmetry,
- c represents the y-intercept of the graph.

Key Features of Quadratic Graphs

When graphing quadratics, there are several key features to consider:

1. Vertex: The highest or lowest point of the parabola, depending on the value of a.
2. Axis of Symmetry: A vertical line that divides the parabola into two mirror-image halves.
3. Y-Intercept: The point where the graph intersects the y-axis, given by the value of c.
4. X-Intercepts (Roots): The points where the graph intersects the x-axis, found by solving the equation $ax^2 + bx + c = 0$.

Graphing Quadratics from Standard Form

Graphing a quadratic function involves several steps that help visualize the parabola accurately. Here’s a structured approach:

Step 1: Identify Coefficients

Start by identifying the coefficients a, b, and c from the standard form of the quadratic equation.

For example, consider the quadratic function:

$$
f(x) = 2x^2 - 4x + 1
$$

Here, $a = 2$, $b = -4$, and $c = 1$.

Step 2: Find the Vertex

The vertex (h, k) of the parabola can be found using the formula:

$$
h = -\frac{b}{2a}
$$

Substituting our values:

$$
h = -\frac{-4}{2 \cdot 2} = 1
$$

Next, substitute h back into the function to find k:

$$
k = f(1) = 2(1)^2 - 4(1) + 1 = 2 - 4 + 1 = -1
$$

Thus, the vertex of the parabola is $(1, -1)$.

Step 3: Determine the Axis of Symmetry

The axis of symmetry is a vertical line that passes through the vertex:

$$
x = h
$$

For our example, the axis of symmetry is:

$$
x = 1
$$

Step 4: Find the Y-Intercept

The y-intercept is found by evaluating $f(0)$:

$$
f(0) = 2(0)^2 - 4(0) + 1 = 1
$$

Thus, the y-intercept is $(0, 1)$.

Step 5: Find the X-Intercepts

To find the x-intercepts, set $f(x) = 0$:

$$
2x^2 - 4x + 1 = 0
$$

Using the quadratic formula:

$$
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
$$

Substituting in our coefficients:

$$
x = \frac{4 \pm \sqrt{(-4)^2 - 4(2)(1)}}{2(2)} = \frac{4 \pm \sqrt{16 - 8}}{4} = \frac{4 \pm \sqrt{8}}{4} = \frac{4 \pm 2\sqrt{2}}{4} = 1 \pm \frac{\sqrt{2}}{2}
$$

Thus, the x-intercepts are:

$$
\left(1 + \frac{\sqrt{2}}{2}, 0\right) \quad \text{and} \quad \left(1 - \frac{\sqrt{2}}{2}, 0\right)
$$

Step 6: Plot the Points and Sketch the Graph

Now that we have the vertex, axis of symmetry, y-intercept, and x-intercepts, we can plot these points on a coordinate plane:

- Vertex: $(1, -1)$
- Y-Intercept: $(0, 1)$
- X-Intercepts: $\left(1 + \frac{\sqrt{2}}{2}, 0\right)$ and $\left(1 - \frac{\sqrt{2}}{2}, 0\right)$

Draw a smooth curve through these points, ensuring that the parabola opens upward due to $a = 2$.

Sample Worksheet: Graphing Quadratics from Standard Form

To help students practice graphing quadratics from standard form, here is a sample worksheet.

Worksheet Problems:

1. Graph the quadratic function $f(x) = -x^2 + 4x - 3$.
2. Graph the quadratic function $f(x) = 3x^2 - 6x + 2$.
3. Graph the quadratic function $f(x) = 2x^2 + 8x + 6$.

Answer Key:

1. For $f(x) = -x^2 + 4x - 3$:
- Vertex: $(2, 1)$
- Axis of Symmetry: $x = 2$
- Y-Intercept: $(0, -3)$
- X-Intercepts: $(1, 0)$ and $(3, 0)$

2. For $f(x) = 3x^2 - 6x + 2$:
- Vertex: $(1, -1)$
- Axis of Symmetry: $x = 1$
- Y-Intercept: $(0, 2)$
- X-Intercepts: $(1 + \frac{1}{\sqrt{3}}, 0)$ and $(1 - \frac{1}{\sqrt{3}}, 0)$

3. For $f(x) = 2x^2 + 8x + 6$:
- Vertex: $(-2, -2)$
- Axis of Symmetry: $x = -2$
- Y-Intercept: $(0, 6)$
- X-Intercepts: $(-3, 0)$ and $(-1, 0)$

Conclusion

Understanding how to graph quadratics from standard form is crucial for students learning algebra. The process involves identifying key features such as the vertex, axis of symmetry, y-intercept, and x-intercepts. By practicing with worksheets and answering keys, students can enhance their skills and gain confidence in their ability to analyze quadratic functions. With consistent practice, they will find themselves better prepared for more advanced mathematical concepts in the future.

Frequently Asked Questions

What is the standard form of a quadratic equation?

The standard form of a quadratic equation is written as $y = ax^2 + bx + c$, where 'a', 'b', and 'c' are constants, and 'a' is not equal to zero.

How do you identify the vertex of a quadratic function in standard form?

The vertex of a quadratic function in standard form can be found using the formula $x = -b/(2a)$ to determine the x-coordinate, and then substituting this value back into the equation to find the y-coordinate.

What does the 'a' value in the standard form of a quadratic equation tell us?

'a' determines the direction of the parabola's opening: if 'a' is positive, the parabola opens upwards, and if 'a' is negative, it opens downwards. It also affects the width of the parabola.

How can you convert a quadratic equation from standard form to vertex form?

You can convert a quadratic equation from standard form (y = ax^2 + bx + c) to vertex form (y = a(x-h)^2 + k) by completing the square.

What should be included in an answer key for a worksheet on graphing quadratics?

An answer key for a worksheet on graphing quadratics should include the coordinates of the vertex, the x-intercepts (if any), the y-intercept, and a description of the parabola's direction and width.

Why is it important to understand the graphing of quadratics in standard form?

Understanding how to graph quadratics in standard form is important because it helps students visualize the behavior of quadratic functions, solve real-world problems, and prepares them for more advanced algebraic concepts.

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