

ALGEBRA I

Unit 8

The collage features several overlapping worksheet pages:

- STANDARD FORM:** Includes sections for 'Main Ideas/Questions', 'Notes/Examples', and 'Types of Parabolas'. A handwritten equation $y = x^2 + 2x -$ is visible.
- VERTEX FORM:** Titled 'VERTEX FORM of a Quadratic Equation', it includes a 'Directions' section: 'Directions: Give the axis of symmetry. 1. $y = (x+4)^2 - 2$ '. It also has fields for 'Axis of Symmetry' and 'Vertex'.
- NUMBER OF SOLUTIONS:** Includes an 'EXAMPLES' section with the equation $1. y = x^2 + 4x - 5$ and a coordinate grid.
- WARM-UP: Perfect Square Trinomials:** Contains equations like $x^2 + 8x + 16 =$ and $x^2 + 2x + 1 =$. It explains that these are perfect square trinomials and provides directions for factoring them.
- THE QUADRATIC FORMULA:** Shows the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ and includes steps: 1. Make sure the equation is set equal to 0 and written in standard form. 2. Identify a, b, and c. 3. Substitute these values into the formula and SIMPLIFY! An example equation $x^2 - 5x - 36 = 0$ is provided.
- SOLVING QUADRATICS by Square Roots:** Includes steps: 1. Isolate x^2 . 2. Take the SQUARE ROOT. A reminder says 'REMEMBER THAT A POSITIVE'.

QUADRATIC EQUATIONS

NOTES • HOMEWORK • QUIZZES • TEST

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Unit 8 - Quadratic Equations: Sample Unit Outline

| | TOPIC | HOMEWORK |
|---------------|---|----------------|
| DAY 1 | Introduction to Quadratic Equations: Standard Form, Axis of Symmetry, Vertex, Minimum, Maximum | HW #1 |
| DAY 2 | Graphing Quadratic Equations | HW #2 |
| DAY 3 | Vertex Form of a Quadratic Equation; Transformations | HW #3 |
| DAY 4 | Quiz 8-1 | None |
| DAY 5 | Quadratic Roots and the Discriminant | HW #4 |
| DAY 6 | Solving Quadratics by Factoring (Day 1) | HW #5 |
| DAY 7 | Solving Quadratics by Factoring (Day 2) | HW #6 |
| DAY 8 | Compare Vertex Form, Standard Form, and Factored Form | Study for Quiz |
| DAY 9 | Quiz 8-2 | None |
| DAY 10 | Solving Quadratics by Square Roots (includes rational and irrational solutions) | HW #7 |
| DAY 11 | Solving Quadratics by Completing the Square (Day 1 - $a = 1$, includes rational and irrational solutions) | HW #8 |
| DAY 12 | Solving Quadratics by Completing the Square (Day 2 - $a > 1$, includes rational and irrational solutions) | HW #9 |
| DAY 13 | Quiz 8-3 | None |
| DAY 14 | Solving Quadratics by the Quadratic Formula | HW #10 |
| DAY 15 | Solving Quadratics Review | HW #11 |
| DAY 16 | Methods Comparison; Choosing the Best Method | HW #12 |
| DAY 17 | Quiz 8-4 | None |
| DAY 18 | Applications: Area and Consecutive Integer Problems | HW #13 |
| DAY 19 | Applications: Projectile Motion | HW #14 |
| DAY 20 | Linear vs. Quadratic Regression | HW #15 |
| DAY 21 | Unit 8 Review | Study for Test |
| DAY 22 | UNIT 8 TEST | None |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples |
|---------------------------|---|
| Standard Form | Standard Form of _____ |
| Graph | When graphed, a quadratic equation is a U-shaped curve called a parabola. |
| Types of Parabolas | Use your graphing calculator to graph the following quadratic equations. |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples |
|--|--|
| VERTEX FORM of a Quadratic Equation | <ul style="list-style-type: none"> Vertex Form of a Quadratic Equation: $y = a(x-h)^2 + k$ (h, k) is the vertex; $x = h$ is the axis of symmetry. |
| | Directions: Give the axis of symmetry and vertex of each equation. |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples | | |
|----------------------------|---|-------------|------------|
| QUADRATIC ROOTS | also called... _____ | | |
| NUMBER OF SOLUTIONS | <table border="1"> <tr> <td>2 SOLUTIONS</td> <td>1 SOLUTION</td> </tr> </table> | 2 SOLUTIONS | 1 SOLUTION |
| 2 SOLUTIONS | 1 SOLUTION | | |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples |
|---------------------------|--|
| SOLVING QUADRATICS | <p>In many cases, we can find the solutions (or roots, zero, x-intercepts) of a quadratic equation by factoring, rather than graphing. Follow the steps below to find the solutions of the given equation by factoring.</p> <p>1. Set the quadratic equation equal to 0. Given: $y = x^2 + 3x - 10$</p> |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples |
|---|--|
| WARM-UP: Perfect Square Trinomials | <p>Factor the following trinomials:</p> <ul style="list-style-type: none"> $x^2 + 8x + 16 = (x + 4)^2$ $x^2 + 2x + 1 = (x + 1)^2$ <p>These are called perfect square trinomial. If you have a perfect square trinomial, you can solve the quadratic equation by factoring.</p> |
| EXAMPLES | <p>Directions: Factor the perfect square trinomial and solve for x. Remember a positive number you must solve for both cases.</p> <ol style="list-style-type: none"> $x^2 + 4x + 4 = 25$ $x^2 - 10x + 25 = 16$ |

Representing QUADRATIC EQUATIONS

Quadratic equations can be represented in vertex form, standard form, or graph form. Complete each row of the chart below with the given information.

| | GRAPH | VERTEX FORM | STANDARD FORM |
|----------|-------|-------------|---------------|
| 1. _____ | | | |
| 2. _____ | | | |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples |
|------------------------------|---|
| THE QUADRATIC FORMULA | <p>The quadratic formula is another method to use to solve a quadratic equation. Solve the equation below using the quadratic formula.</p> <p>Steps:</p> <ol style="list-style-type: none"> Make sure the equation is set equal to 0 and written in standard form. Identify a, b, and c. Substitute these values into the formula and SIMPLIFY! <p>Example: $x^2 - 5x - 36 = 0$</p> <p>Directions: Solve each equation using the quadratic formula.</p> <ol style="list-style-type: none"> $x^2 - 8x = 20$ $2x^2 + 7x + 3 = 12$ $3x^2 - 12 = 0$ |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples |
|---------------------------|--|
| SOLVING QUADRATICS | <p>Factor the following quadratic equations by factoring.</p> <ol style="list-style-type: none"> $x^2 + 11x + 24 = 0$ $x^2 + 6x - 27 = 0$ $x^2 - x - 20 = 0$ |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples | | | | | | | | | | |
|---------------------------------|--|--------|--|-------------|--|--------------|--|-----------------------|--|-------------------|--|
| Choosing the BEST METHOD | <table border="1"> <tr><td>METHOD</td><td></td></tr> <tr><td>FACTORIZING</td><td></td></tr> <tr><td>SQUARE ROOTS</td><td></td></tr> <tr><td>COMPLETING THE SQUARE</td><td></td></tr> <tr><td>QUADRATIC FORMULA</td><td></td></tr> </table> | METHOD | | FACTORIZING | | SQUARE ROOTS | | COMPLETING THE SQUARE | | QUADRATIC FORMULA | |
| METHOD | | | | | | | | | | | |
| FACTORIZING | | | | | | | | | | | |
| SQUARE ROOTS | | | | | | | | | | | |
| COMPLETING THE SQUARE | | | | | | | | | | | |
| QUADRATIC FORMULA | | | | | | | | | | | |
| When is it FACTORABLE? | | | | | | | | | | | |
| EXAMPLES | <p>Directions: Choose a method and solve each equation.</p> <ol style="list-style-type: none"> $x^2 - 4x + 7 = 12$ $8x^2 + 14x = 15$ | | | | | | | | | | |

Name: _____ Date: _____

Topic: _____

| Main Ideas/Questions | Notes/Examples |
|----------------------|---|
| AREA Problems | <p>1. Given the diagram below, find the value of x if the area of the rectangle is 78 square meters.</p> <p>2. Given the diagram below, find the dimensions of the square.</p> <p>3. Find the dimensions of the rectangle below if the area is 128 square feet.</p> <p>4. The dimensions of a square are given by $x^2 - 10x + 25 = 16$. Find the side length of the square.</p> <p>5. The length of a rectangular garden is 4 meters more than its width. The area of the rectangle is 60 meters. Find the dimensions of the rectangle.</p> <p>6. The length of a rectangular garden is 4 meters more than its width. The area of the rectangle is 60 meters. Find the dimensions of the rectangle.</p> |

Unit 8 Test Study Guide (Quadratic Equations)

Name: _____ Date: _____

Topic: _____

Topic 1: Graphing Quadratic Equations (from Standard Form and Vertex Form)

Graph each equation using a table of values. Identify all key characteristics.

| | | | |
|-----------------------|--|--------------------------|--|
| 1. $y = x^2 - 2x - 5$ | | 2. $y = -x^2 + 10x - 28$ | |
| 3. $y = 2x^2 + 4x$ | | 4. $y = -x^2 + 7$ | |
| 5. $y = (x+3)^2 - 8$ | | 6. $y = -3(x-1)^2$ | |

Name: _____ Date: _____

Per: _____

Algebra I Unit 8 Test Quadratic Equations

Find the axis of symmetry and vertex for the following equations.

| | |
|------------------------|-------------------|
| 1. $y = -x^2 - 4x + 1$ | 2. $y = 2x^2 + 8$ |
|------------------------|-------------------|

Complete each part using the given graph.

| | |
|----|--|
| 3. | <p>Axis of Sym: _____</p> <p>Vertex: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Zeros: _____</p> <p>Equation: A. $y = x^2 + 2x + 3$ C. $y = -x^2 + 2x + 3$ B. $y = x^2 - 2x + 3$ D. $y = -x^2 - 2x + 3$</p> |
| 4. | <p>Axis of Sym: _____</p> <p>Vertex: _____</p> <p>Domain: _____</p> <p>Range: _____</p> <p>Zeros: _____</p> <p>Equation: A. $y = (x-1)^2 - 9$ C. $y = (x-9)^2 + 1$ B. $y = (x+1)^2 - 9$ D. $y = (x+9)^2 + 1$</p> |

5. The graph of the function $y = x^2$ is reflected across the x-axis, then translated two units left and six units down, then translated two units left and six units down, write an equation to represent the new function.

6. If the graph of the function $y = x^2$ is translated so its vertex is now at the point (0, -3), which equation represents the new function?

A. $y = (x-3)^2$
B. $y = (x+3)^2$
C. $y = x^2 - 3$
D. $y = x^2 + 3$