Algebra 2

3-01 Complex Numbers (3.2)

Imaginary Number (imaginary unit) *i*

- i = _______________
- i^2 = _______________

Complex Number

- $a + bi$
- a is _______________part
- bi is _______________part
- Any number with _______________i is called imaginary

$\sqrt{-9}$

$\sqrt{-12}$

Adding and Subtracting Complex Numbers

- _______________ like terms

Simplify $(-1 + 2i) + (3 + 3i)$

$(2 - 3i) - (3 - 7i)$

$2i - (3 + i) + (2 - 3i)$

Multiplying complex numbers

- ___________
- Remember ____________

Multiply $-i(3 + i)$

$(2 + 3i)(-6 - 2i)$

$(1 + 2i)(1 - 2i)$

Complex conjugate

- _________ numbers just _________________ sign on the imaginary part
- When you multiply complex conjugates, the product is ____________

Dividing Complex Numbers

- To divide, _________________ the numerator and denominator by the __________________________ of the denominator
- No imaginary numbers are allowed in the ___________________________ when simplified

Divide $\frac{2-7i}{1+i}$ $\frac{2i}{2-i}$

105 #1, 3, 5, 7, 17, 19, 21, 23, 25, 29, 31, 33, 35, 37, 39, 43, 49, 51 and division and mixed review = 25

Algebra 2

3-02 Solve Quadratic Equations by Factoring (3.1)

Factoring

- Factoring is the opposite of __________________
- Factoring undoes ____________________
- $(x + 2)(x + 5) = x^2 + 7x + 10$
- $x + 2$ called _______________
- $x^2 + 7x + 10$ called ________________

Factor a Quadratic in the form of $ax^2 + bx + c$,

1. Factor out any ___________________________ first, then factor what's left
2. Write two sets of ______________________ like ( )( ).
3. Guess: Find two expressions whose product is ___________ and put them at the beginning of each set of parentheses.
4. Guess: Find two expressions whose product is ___________ and put them at the end of each set of parentheses. Pay attention + and – signs.
5. Check: Calculate the ___________ + ___________ and compare it to the middle ________.
    a. If the outers + inners = bx, then the factoring is __________.
    b. If the outers + inners = $-bx$ (the correct number but wrong sign), then change the signs in the parentheses. Otherwise, ___________ with new guesses.

Factor

$x^2 - 3x - 18$

$n^2 - 3n + 9$

$r^2 + 2r - 63$

$14x^2 + 2x - 12$

$3x^2 - 18x$

$2x^2 - 32$

Zero Product Property

- If $a \cdot b = 0$, then either a or b is ________.

Solve a Quadratic Equation by Factoring

1. Make the quadratic expression equal ____________.
2. ___________ the quadratic expression.
3. Set each factor equal to __________ as two separate equations.
4. ___________ each equation.
5. ___________ your solutions

Solve

$x^2 - x - 42 = 0$

$9t^2 - 12t + 4 = 0$

$3x - 6 = x^2 - 10$

95 #21, 23, 25, 27, 29, 30, 31, 36, 39, 41, 43, 45, 47, 59, 61, Mixed Review = 20

Algebra 2

3-03 Solve Quadratic Equations by Graphing and Finding Square Roots (3.1)

Solving Quadratic Equations by

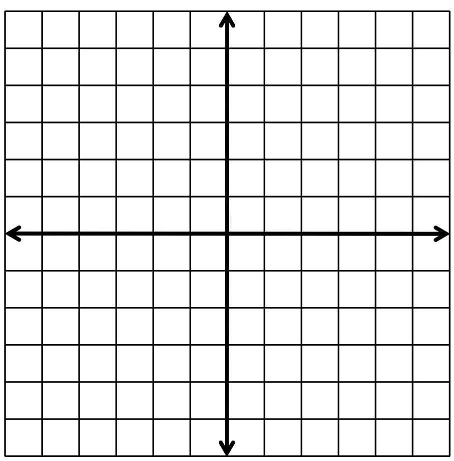
Graphing

1. Make the equation equal ___________.
2. ___________ the equation.
3. Find the x-values of the _____________.

Square Roots

1. Solve for the _____________ expression.
2. Take a _________________________ . Remember to put _____.
3. Finish _______________ for x.
4. ____________ your solutions.

Solve by graphing $x^2 - 2x - 3 = 0$



Solve by using square roots.

$2x^2 + 14 = 70$

$4x^2 + 20 = 16$

$\frac{3}{4}(x+1)^2 = 10$

$2x^2 = 5x^2 + 24$

A fruit stand charges \$3 per pound of apples and sells 20 pounds each day. They try dropping the price by \$0.50 and sell 5 more pounds a day. How much should the fruit stand charge to maximize their daily revenue? What is their maximum daily revenue?

95 #1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 20, 33, 35, 49, 50, Mixed Review = 20

Algebra 2

3-04 Solve Quadratic Equations by Completing the Square (3.3)

The Perfect Square

$(x+3)^2$

$$(x+k)^2 = x^2 + 2kx + k^2 = ax^2 + bx + c$$

In a perfect square,

$$c = \_\_\_\_\_\_\_\_\_\_\_\_$$

Complete the square and then factor.
$x^2 + 8x$

Solve by Completing the Square

1. ________________ the quadratic so x terms on ___________ side and _______________ on other.
2. If the ______________________________ is not 1, divide everything by it.
3. Complete the square: add _________ to both sides.
4. Rewrite the left-hand side as a _______________ (factor).
5. _______________________ both sides.

Solve $x^2 + 6x = 16$

Solve $x^2 - 18x + 5 = 0$

Solve $2x^2 - 11x + 12 = 0$

Writing quadratic functions in Standard Form

- $y = a(x - \mathrm{h})^2 + k$
- (h, k) is the ______________

1. Start with ______________________ form
2. ___________ the terms with the x
3. ___________ out any number in front of the x^2
4. Add _________ to both sides (inside the group on the right)
5. ___________ as a perfect square
6. ___________ to get the y by itself

Write in standard form $y = 2x^2 + 12x + 16$

114 #9, 11, 21, 23, 27, 31, 33, 35, 37, 39, 41, 43, 45, 51, 55, Mixed Review = 20

Algebra 2

3-05 Solve Quadratic Equations using the Quadratic Formula (3.4)

Work with a Partner: Solve $ax^2 + bx + c = 0$

Quadratic Formula

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

- ______________ works for quadratic equations.

Discriminant

- The part under the square root, _________________________, tells you what kind of solutions you are going to have.
- $b^2 - 4ac > 0$ → ________ distinct _________ solutions
- $b^2 - 4ac = 0$ → exactly _______ __________ solution (a double solution)
- $b^2 - 4ac < 0$ → ________ distinct ______________ solutions

What types of solutions to $5x^2 + 3x - 4 = 0$?

Solve $5x^2 + 3x = 4$

Solve $4x^2 - 6x + 3 = 0$

Find a possible pair of integer values for a and c so that the equation $ax^2 - 12x + c = 0$ has the given number and type of solution(s). Then write the equation.

a. one real solution

b. two imaginary solutions

Real life problems

- The _____________ of an object that is hit or thrown up or down can be modeled by

$$h(t) = -16t^2 + v_0 t + s_0$$

- where v_0 is the initial ______________ (up +, down −), and s_0 is the initial ______________

123 #1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 23, 25, 27, 39, 61, Mixed Review = 20

Algebra 2

3-06 Solving Quadratic Equations by Any Method (Review)

Choose the Best Method to Solve a Quadratic Equation

To most ____________________ solve a quadratic equation,

1. If x appears only ________ and it is _______________—either x^2 or $(x-k)^2$— solve by ________________.
2. If _________ x^2 and x appear, make the equation equal to __________ and…
   a. Try solving by ______________.
   b. If it cannot be factored quickly, solve by completing the square or the ______________________________.
   c. Graphing is usually only as a __________ resort for ___________________________ problems.

Solve $x^2+6x+5=0$

$3x^2-12=5x$

$4x^2=375-x^2$

$x^2+5x-7=0$

$3x^2=54x$

Worksheet = 20

Name: ______________

Algebra 2

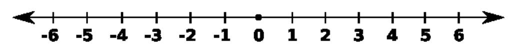
3-07 Solve Quadratic Inequalities (3.6)

Solve inequalities in one variable.

Using a number line

1. Make ____________
2. ____________ or use the ___________________________ to find the zeros
3. ____________ the zeros on a ____________________________ (notice it cuts the line into three parts)
4. Pick a ___________ in each of the three parts as _________ points
5. Test the points in the ____________ inequality to see true or false
6. Write inequalities for the regions that were __________

Solve $p^2 - 4p \leq 5$



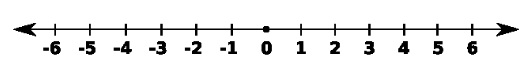
Solve $x^2 - 4x > 45$

Using a graph

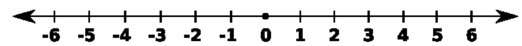
Or you could also solve the quadratic inequality in one variable by _______________ the quadratic

1. Make the inequality ______________
2. Plot points on _________________
3. Quick ________
   a. When the graph is below the x-axis; __________ 0
   b. When the graph is above the x-axis; __________ 0

Solve using a graph. $x^2 + x - 20 > 0$



Solve using a graph. $-2x^2 - 9x - 4 \geq 0$



140 #27, 29, 31, 33, 35, 37, 39, 41, 43, 49, Mixed Review = 15

Algebra 2

3-Review

Take this test as you would take a test in class. When you are finished, check your work against the answers.

3-01

Evaluate.

1. $\sqrt{-75}$

Simplify.

2. $(2+3i)-(3-i)$
3. $(2+3i)(3-i)$

3-02

Factor.

4. $2x^2+x-1$
5. $6x^2+x-12$

Solve by factoring.

6. $x^2-5x+4=0$

3-03

Solve by graphing.

7. $x^2-2x-15=0$

Solve using square roots.

8. $3x^2+48=0$

3-04

Solve by completing the square.

9. $x^2-6x+4=0$

Rewrite in standard form.

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

3-05

Use the descriminant to classify the types of solutions.

11. $0=2x^2-3x+5$
12. $x^2+4x-4=0$

Solve by using the quadratic formula.

13. $2x^2-3x-2=0$

3-06

Determine most efficient method to solve.

14. $2x^2+36=0$
15. $2x^2+11x+5=0$
16. $x^2-4x-3=0$

Solve by any method.

17. $3x^2-4=2x^2-28$
18. $2x^2+4=9x$
19. A hot-air balloon is 20 feet above the ground while taking place in a competition. The pilot drops a weighted bag and a team member on the ground is supposed to catch it before it hits the ground. The model $h=-16t^2+h_0$ gives the height of the bag t seconds after being dropped from the initial height h_0. How much time does the team member on the ground have to catch the bag?

3-07

Solve.

20. $x^2-4x+3\le 0$
21. $\mathbf{3x^2>27}$

Answers

1. $5\sqrt{3}i$
2. $-1 + 4i$
3. $9 + 7i$
4. $(2x - 1)(x + 1)$
5. $(2x + 3)(3x - 4)$
6. 1, 4
7. -3, 5
8. $\pm 4i$
9. $3 \pm \sqrt{5}$
10. $y = (x + 1)^2 - 3$
11. -31; two imaginary solutions
12. 32; two real solutions
13. $-\frac{1}{2}$, 2
14. square roots
15. factoring or quadratic formula
16. quadratic formula
17. $\pm 2\sqrt{6}i$
18. $\frac{1}{2}$, 4
19. 1.12 s
20. $1 \leq x \leq 3$
21. $x < -3$ or $x > 3$