# Advanced Algebra

## Unit 5 – Solving Equations and Inequalities

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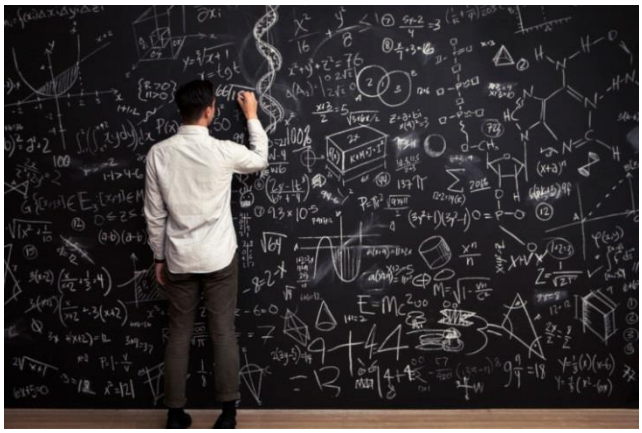


**During this unit we will review**

- Solving quadratic equations
- Solving literal equations for specific variables

**During this unit we will learn**

- Solving absolute value equations and inequalities
- Solving quadratic inequalities
- Completing the Square
- Solving radical equations
- More in-depth study of quadratic functions.

# Key things to remember during this unit

1. SHOW ALL WORK
2. Always write the original equation or inequality down first before doing anything to it.
3. Pay attention to when checks are required. When they are not required, you should be doing them in your head or calculator at least! If a check is not required, you are welcome to do it anyway!
4. Pay attention to how your answer is to be represented. Follow directions!
5. One equal or inequality sign per line!
6. Work vertically!
7. Do only one step at a time. Do only one thing to an equation/inequality in each line!

8. When writing a compound inequality, always use (less than) or (less than or equal to) symbols.

**Unit 5 Quiz and Homework dates**

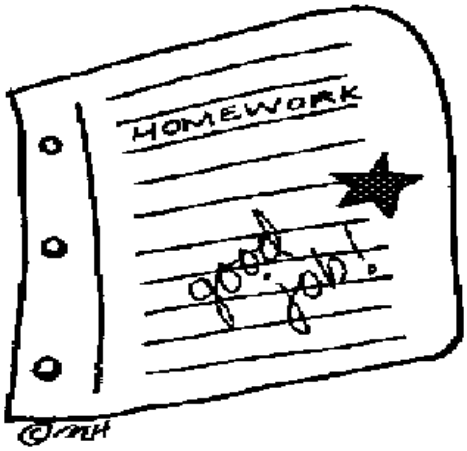
| Quiz | On pages | Date |
|---|---|---|
| 5.1 | | |
| 5.2 | | |
| 5.3 | | |
| 5.4 | | |
| 5.5 | | |
| 5.6 | | |
| 5.7 | | |
| 5.8 | | |
| 5.9 | | |
| 5.10 | | |

| Assignment | Date due |
|---|---|
| 5.1 | |
| 5.2 | |
| 5.3 | |
| 5.4 | |
| 5.5 | |
| 5.6 | |
| 5.7 | |
| 5.8 | |
| 5.9 | |
| 5.10 | |
| 5.11 | |

Don't forget to formally check all absolute value equations and radical equations!!!

I strongly recommend that you informally check other equations, but it is not required!


THIS IS A BIG, FAT WASTE OF MY TIME!


HOMEWORK

# Solving Literal Equations

A literal equation is basically what you think of as a formula such as:

These equations are called literal because they contain several variables (letters).

The letters that do not represent your desired variable move to the other side of the equal sign so that the one variable you are solving for stands **alone**.

Even though there are more letters in these equations, the methods used to solve these equations are the same as the methods you use to solve all equations.

When solving a literal equation, you will be asked to solve for a specific variable.

1. Solve $d = rt \ \ for \ \ r.$

2. Solve $R = \frac{cs}{d} \ \ for \ \ C.$

3. Solve $V = \ lwh \ \ for \ \ w.$

4. Solve $ax + by = c \ \ \ for \ \ y.$

5. Solve $F = \frac{gm_1m_2}{d_2} \ \ \ for \ \ g.$

6. Solve $K = \frac{1}{2}mv^2 \ \ \ for \ \ v^2.$

7. Solve $m = \frac{y_2 - y_1}{x_2 - x_1} \quad for \ y_2.$

8. Solve $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \quad for \ R.$

9. Solve $S = R - rR \quad for \ R.$

10. Solve $C = \frac{5}{9}(F - 32) \quad for \ F.$

11. Solve $V = \frac{1}{3}\pi h^2(3r - h) \quad for \ r.$

12. Solve $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \quad for \ T_1.$

13. Solve $S = 2(lw + lh + wh) \quad for \ w.$

# Solving Absolute Value Equations

Absolute Value:

Distance is always _____!

$|5| =$ $|-5| =$

If $|x| = 7$, then what could $\boldsymbol{x}$ equal? If $|x| = -7$, then what could $\boldsymbol{x}$ equal?

**To solve an absolute value equation:**

Step 1: _____ the Absolute Value expression!

Step 2: Rewrite the equation _____.

Both _____ the absolute value brackets.

The second time, _____.

Step 3: _____ both equations

Step 4: _____ both answers!!!

_____ answers that do not check!

Checks are _____ for absolute value equations!

| | |
|---|---|
| 1. $\|2x - 3\| = 5$ | 2. $2x - \|x + 2\| = 11$ |
| 3. $\|2x + 1\| = -3$ | 4. $\|8x + 20\| = 7x + 10$ |

## Solving Absolute Value Inequalities

The Trichotomy Postulate:

So, if you have two values, $|x-4|\ \ and\ \ 3,$ there are three possible relationships between the two.

Case 1:

Case 2:

Case 3:

**To find the solution set of an absolute value inequality:**

**Step 1:** _____ the absolute value.

**Step 2:** Rewrite _____.

**Step 3:** _____ the equation.

**Step 4:** _____the two points on a number line as either _____ as appropriate.

**Step 5:** _____ numbers in _____ in the _____. Shade in the regions that work (smiley faces!) ☺

| | |
|---|---|
| 1. $\|2x-1\| < 7$ | 2. $\|2x-1\| \geq 7$ |
| 3. $\|x-20\| > 5$ | 4. $\|x-3\| \leq 4$ |

| | |
|---|---|
| 5. $\|3 + x\| - 4 < 0$ | 6. $\|x + 4\| + 3 > 0$ |
| 7. $\|x + 1\| + 6 < 0$ | 8. $7\left\|\frac{n}{3}\right\| - 9 < 12$ |
| 9. $\|-8a - 3\| - 11 \geq 0$ | 10. $9\|m - 8\| - 10 \leq 26$ |

## Review: Solving Quadratic Equations by Factoring

**Step 1:** Move all terms to _____. Be sure the quadratic term is _____!

**Step 2:** _____!

**Step 3:** Set each factor _____.

**Step 4:** Solve each subsequent equation. Formal check is NOT required. However doing a mental or calculator check is recommended.

| | |
|---|---|
| 1. $x(x-8)=-15$ | 2. $x^2=-4x$ |
| 3. $2x^3+5x^2-32x-80=0$ | 4. $24x+6=30x^2$ |
| 5. $2x^2+5=11x$ | 6. $3x-5=-2x^2$ |

## Solving Quadratic Inequalities

**Step 1:** Move all terms to _____ with a _____.

**Step 2:** Change to an _____ and _____ using steps from solving quadratic equations by factoring.

**Step 3:** _____ solutions on a number line with the appropriate _____.

**Step 4:** _____ numbers in each interval in the _____ to determine which intervals are in your solution. _____ in the solution set. (Smiley Faces ☺ )

| | |
|---|---|
| 1. $x^2 - 5x - 6 > 0$ | 2. $x^2 - 5x - 6 < 0$ |
| 3. $x^2 - 3x \geq 0$ | 4. $2x^2 < 3x + 2$ |

# Solving Quadratic Equations with Irrational or Complex Roots

**The Quadratic Formula:** $\boldsymbol{x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$ $\boldsymbol{when}$ $\boldsymbol{ax^2 + bx + c = 0}$

To solve a quadratic equation using the quadratic formula:

**Step 1:** Write the equation in the form $\boldsymbol{ax^2 + bx + c = 0.}$

**Step 2:** Plug a, b, and c into the quadratic formula.

**Step 3:** Simplify.

**Step 4:** Express answers in the form indicated (rounded decimal, simplest radical form or $a + bi$ form).

Solve each equation using the quadratic formula. Leave all answers first in simplest radical form. Then express each irrational answer as a decimal to the nearest $10^{th}$, and each complex answer in a+bi form.

| | |
|---|---|
| 1. $x^2 - 4x + 3 = 0$ | 2. $x^2 + 2x = -6$ |

| | |
|---|---|
| 3. $3x^2 = 6x - 1$ | 4. $(x + 3)(x - 2) = 1$ |

When showing your work with the quadratic formula:

1. Write the formula.
2. Plug in the numbers. (Be careful with the $b^2$, either use parentheses, or square the number before writing).
3. Then simplify carefully, radical first. Be really careful with negative signs inside the radical.
4. If you are dividing to put your answer into lowest terms, be sure to divide out of both terms in the numerator.

# Completing the Square

This is a perfect square trinomial: $x^2 + 10x + 25$ How can we recognize that it is a perfect square?

Factor $x^2 + 10x + 25$

What constant would need to be added to each expression to make it a perfect square trinomial?

1. $x^2 + 6x$
2. $x^2 - 12x$
3. $x^2 + 18x$
4. $x^2 - 22x$
5. $x^2 + 7x$
6. $x^2 - \frac{1}{2}x$
7. $x^2 - 19x$
8. $x^2 + \frac{4}{5}x$

Go back and factor each. Write your factors in exponential form.

**To solve a Quadratic equation by Completing the Square:**

**** Use these steps only when $a = 1$.**

Step 1: Write the equation in the form _____.

Step 2: Find _____. _____ it. _____ it to both sides.

Step 3: _____ the left side and write in _____form.

Step 4: _____ both sides. ***Don't forget the $\pm$ on the right side.

Step 5: _____ for x.

Step 6: _____ if necessary.

Solve each equation by completing the square. Leave all answers first in simplest radical form. Then express each irrational answer as a decimal to the nearest $10^{th}$, and each complex answer in a+bi form.

| | |
|---|---|
| 1. $x^2 + 2x - 3 = 0$ | 2. $x^2 + 8 = 12x$ |
| 3. $x^2 - 14x + 60 = 0$ | 4. $x^2 = 6x - 25$ |

## What do we do if $a \neq 1$?

**To solve a Quadratic equation by Completing the Square when $a \neq 1$:**

Step 1: Write equation in the form _____

Step 2: Factor out ____. _____

Step 3: _____inside the parentheses. Add the number inside the parentheses on the left, and _____to the right side.

Step 4: _____ the left side and write in _____ form.

Step 5: _____ both sides by ____.

Step 6: _____ both sides.

Step 7: _____ for _____.

Step 8: _____ if necessary.

Solve each equation by completing the square. Leave all answers first in simplest radical form. Then express each irrational answer as a decimal to the nearest $10^{th}$, and each complex answer in a+bi form.

| | |
|---|---|
| 1. $4x^2 + 6x - 9 = 0$ | 2. $5x^2 - 8 = 6x$ |

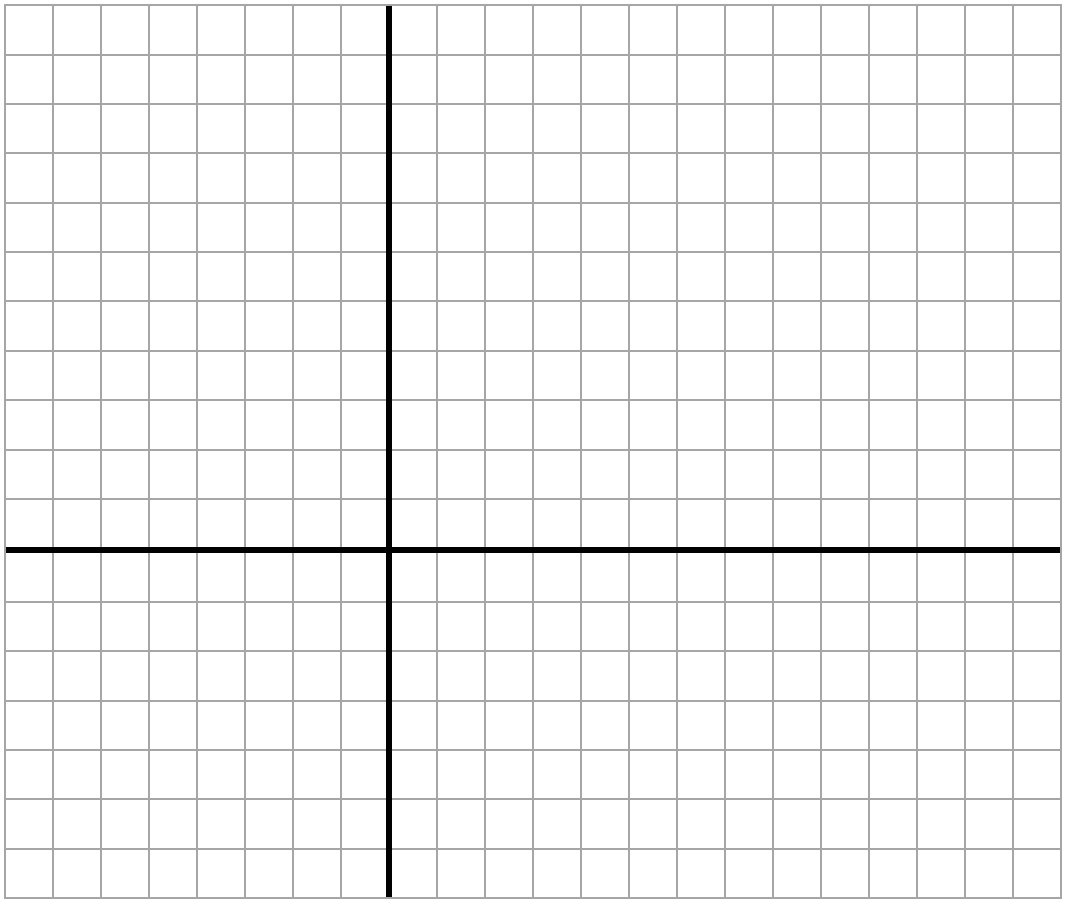
3. $2x^2 + 6x - 3 = 0$

4. $ax^2 + bx + c = 0$

5. $x^4 - 18x^2 + 17 = 0$

# Graphing the Quadratic Function

Graph $y = x^2 - 6x + 8$



| x | y |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |

What does it mean when we solve an equation?

**Roots = Solutions = Zeros = x-intercepts** These words all mean the same thing!

On the graph, indicate the locations that represent the solutions of $x^2 - 6x + 8 = 0$.

The above parabola has nice roots. We call them integral because they are integers.

Not all roots are so nice! We have solved equations with roots such as

$$x = -\frac{3}{2}, \frac{5}{2} \qquad x = 2 \pm \sqrt{3} \quad and\ x = 2 \pm 3i$$

I wonder what these parabolas might look like?

**On the graph on the previous page:**

1. Write both solutions of $x = 2 \pm \sqrt{3}$ as a decimal rounded to the nearest 10th.
    a. On the previous page, draw a parabola that has those two roots. Label it A.
2. Draw a parabola that has only one root, -3. Label it B. This parabola is said to have 2 equal roots.
3. Draw a parabola that has no roots. Label it C. This parabola is said to have imaginary roots.

**Review:**

4. How can you tell if a parabola will open up or down from its equation?

5. How do you get the axis of symmetry of a parabola?
    a. Find the axis of symmetry of $y = x^2 - 6x + 8$.

    b. On the previous page, draw in and label the axis of symmetry with its equation and name.

6. How do you get the y-intercept of a parabola?
    a. Find the y-intercept of $y = x^2 - 6x + 8$.

7. What is the name of the point where the parabola changes direction?
    a. How can you find the coordinates of that point?
    b. Label that point on your parabola with both its name and coordinates.

8. If a parabola opens up, it will have a _____ point.
9. If a parabola opens down, it will have a _____ point.
10. Draw examples below:

## The Discriminant and the Nature of the Roots of a Quadratic Equation

Possibilities for the locations of the roots of a quadratic equation:

| Picture | Description of roots |
|---|---|
| | |
| | |
| | |

**The Discriminant:**

If the Discriminant is

- **Negative** then the roots are

  And the graph

- **Zero** then the roots are

  And the graph is

- **Positive, perfect square** then the roots are

  And the graph

- **Positive, non-perfect square** then the roots are

  And the graph

1. If the discriminant is 37, describe the roots of the quadratic equation.

2. If the discriminant is -2, describe the roots of the quadratic equation.

3. If the discriminant is 100, describe the roots of the quadratic equation.

4. If the discriminant is 0, describe the roots of the quadratic equation.

i. Find the discriminant of each of the following quadratic equations.
ii. Then, describe the nature of the roots as one of the following:
   a) Real, rational, and unequal
   b) Real, irrational, and unequal
   c) Real, rational and equal
   d) Imaginary
iii. Then, write the equation of the related parabola function. Does it open up or down as written?
iv. Then, use the discriminant to determine whether each parabola
   a) Is tangent to the x-axis
   b) Intersects the x-axis twice
   c) Lies entirely above the x-axis
   d) Lies entirely below the x-axis

1. $x^2 + x + 1 = 0$

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

3. $x^2 + 2x + 1 = 0$

4. $x^2 - 9 = 0$

5. $2x^2 + 3x + 2 = 0$

6. $10 - x^2 = 0$

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

8. $2x^2 = 5$

## Word Problems involving the Discriminant.

**Step 1:** Determine whether the discriminant should

A. Equal zero

B. Be greater than zero

C. Be greater than or equal to zero

D. Be less than zero.

**Step 2:** Write the appropriate equation or inequality.

**Step 3:** Solve and check that you answer the question asked.

1. Find the value of $\boldsymbol{c}$ for which the roots of the equation $x^2 + 8x + c = 0$ will be equal.

2. Find the values of $\boldsymbol{a}$ for which the roots of the equation $ax^2 + 4x + 2 = 0$ are real, but not equal.

3. Find the value of $b$ for which the roots of $x^2 + bx + 3 = 0$ will be equal.

4. Find the values of $b$ for which the roots of $x^2 + bx + 2 = 0$ will be imaginary.

5. What is the positive value of $m$ in the equation $4x^2 + mx + 9 = 0$ that makes the roots equal?

6. If the equation $9x^2 - 12x + k = 0$ has imaginary roots, find the value of $k$.

7. What value of $k$ will make the roots of $2x^2 - 8x + k = 0$ be equal?

8. Find the largest integral value of $k$ in the equation $kx^2 - 5x + 3 = 0$ that will make its roots real.

9. Find the largest integral value of $c$ for which the roots of $3x^2 - 8x + c = 0$ are real.

10. Find the smallest integral value of $c$ for which the roots of $x^2 - 7x + c = 0$ are imaginary.

## Sum and Product of the Roots of a Quadratic Equation

Example 1: Solve $x^2 - 3x - 10 = 0$

Find the sum of the roots of $x^2 - 3x - 10 = 0$. Where in the equation do you see your answer?

Find the product of the roots of $x^2 - 3x - 10 = 0$. Where in the equation do you see your answer?

Example 2: Solve $2x^2 - 5x + 3 = 0$

Find the sum of the roots of $2x^2 - 5x + 3 = 0$. Where in the equation do you see your answer?

Find the product of the roots of $2x^2 - 5x + 3 = 0$. Where in the equation do you see your answer?

Develop a formula to find the sum of the roots of the equation $ax^2 + bx + c = 0$.

Develop a formula to find the product of the roots of the equation $ax^2 + bx + c = 0$.

**Find the Sum**

$$\frac{-b+\sqrt{b^2-4ac}}{2a}+\frac{-b-\sqrt{b^2-4ac}}{2a}$$

**Find the Product**

$$\frac{-b+\sqrt{b^2-4ac}}{2a}\cdot\frac{-b-\sqrt{b^2-4ac}}{2a}$$

**Sum of the roots of a quadratic equation:**

**Product of the roots of a quadratic equation:**

**Problem Solving using the Sum and Product Formulas**

1. Find the sum and the product of the roots of the equation $-2x^2 + 3x + 8 = 0$.

2. Find the sum and the product of the roots of the equation $-x^2 = 3x + 4$.

3. For which equation does the sum of the roots equal the product of the roots?
   a. $x^2 - 2x + 3 = 0$
   b. $x^2 - 13x + 13 = 0$
   c. $4x^2 - 4x + 1 = 0$
   d. $5x^2 - 5x = 0$

4. If the sum of the roots of $x^2 + kx - 3 = 0$ is equal to the product of the roots, find the value of k.

5. What is the value of c if $x^2 - 4x + c = 0$ and the roots of the equation are $(2 + i)\ and\ (2 - i)$?

6. If $(1 + i)\ and\ (1 - i)$ are the roots of $x^2 + bx + c = 0$, find the values of b and c.

7. Write a quadratic equation whose roots are:
   a. $3\ and\ -4$

   b. $\frac{1}{2}\ and\ \frac{-5}{2}$

   c. $\pm 5i$

   d. $2 \pm 3i$

   e. $3 \pm \sqrt{5}$

   f. $\frac{1}{2}\ and\ \frac{2}{3}$

8. If one root of $3x^2 - 5x + k = 0$ is -2, find the other root.

9. If one root of $6x^2 + x - 2 = 0$ is $\frac{1}{2}$, find the other root.

10. Write an quadratic equation with integer coefficients with the given sum and product of the roots:
    a) $Sum = -\frac{1}{2}, Product = -\frac{1}{3}$

    b) $Sum = 0, Product = \frac{1}{2}$

# Solving Radical Equations

To Solve a Radical Equation

Step 1: _____ the radical expression.

Step 2: _____ both sides. (Or raise to the appropriate power.)

Step 3: _____ the resulting equation.

Step 4: _____ your solutions formally. This is **REQUIRED** for radical equations!

Step 5: _____ any extraneous roots.

| | |
|---|---|
| 1. $\sqrt{2x+1}-1=4$ | 2. $\sqrt{4x^2-11}=x+8$ |

| | |
|---|---|
| 3. $x = 1 + \sqrt{15 - 7x}$ | 4. $\sqrt[3]{4 - 2a} = -2$ |
| 5. $\sqrt[5]{2x + 1} = -3$ | 6. $\sqrt{x + 12} - \sqrt{x} = 2$ |

## Advanced Algebra Unit 5 Worksheet 1

**Solve for the indicated variable in the parenthesis.**

1) $P = IRT$ *(T)*

2) $A = 2(L + W)$ *(W)*

3) $2x - 3y = 8$ *(y)*

4) $\frac{x+y}{3} = 5x$ *(x)*

5) $ay + by = c$ *(y)*

6) $A = \frac{1}{2}h(b + c)$ *(b)*

7) $A = 4\pi r^2$ *($r^2$)*

8) $V = \pi r^2 h$ *(h)*

9) $7x - xy = 14$ *(x)*

10) $\frac{1}{A} = \frac{2}{x} + \frac{2}{y}$ *(A)*

11) $R = \frac{E}{I} + \frac{2}{E}$ *(I)*

12) $A = \frac{ab + cb + ac}{3}$ *(b)*

**Answer Key**

1) $T = \frac{P}{IR}$

2) $W = \frac{A - 2L}{2}$

3) $y = \frac{8 - 2x}{-3}$

4) $x = \frac{y}{14}$

5) $y = \frac{c}{a+b}$

6) $b = \frac{2A}{h} - C$

7) $r^2 = \frac{A}{4\pi}$

8) $h = \frac{V}{\pi r^2}$

9) $x = \frac{14}{7+y}$

10) $A = \frac{xy}{2y+2x}$

11) $I = \frac{E^2}{RE-2}$

12) $b = \frac{3A-ac}{a+c}$

## Advanced Algebra Unit 5 Worksheet 2

Show all work on separate paper. This is not a quiz…find the page in your notes and follow the steps. Talk to your group, ask questions!

Solve by factoring.

1. $5x^2 - 30x = 0$
2. $4x^2 - 49 = 0$
3. $12x^2 - 8x = 15$
4. $3x^3 + 4x^2 - 27x - 36 = 0$

Solve each using the quadratic formula.

5. $-3m^2 - 2m - 3 = 0$
6. $2x^2 - 7 = 0$
7. $14x^2 = -5x$

Solve by completing the square.

8. $x^2 - 12x + 42 = 0$
9. $x^2 + 8x - 34 = 0$
10. $3x^2 - 20x + 36 = 0$
11. $2x^2 + 5x - 3 = 0$
12. $4x^2 + 12x + 1 = 0$

Solve, graph and write in interval notation.

13. $x^2 - 5x - 36 \leq 0$
14. $5x^2 - 180 > 0$

Solve and check each equation.

15. $\sqrt{2x + 3} - x = 0$
16. $\sqrt[4]{x^2 + 24x} = 3$
17. $-n + \sqrt{6n + 19} = 2$
18. $\sqrt{2x + 9} - \sqrt{x + 1} = \sqrt{x + 4}$
19. $\sqrt[3]{x^3 - 3x^2} + 1 = x$

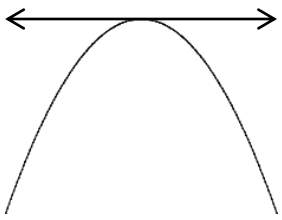
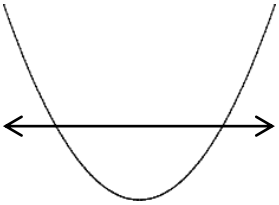
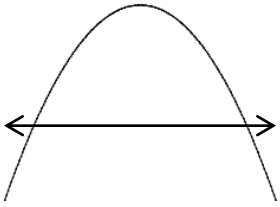
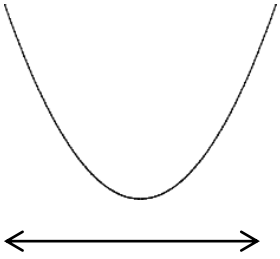
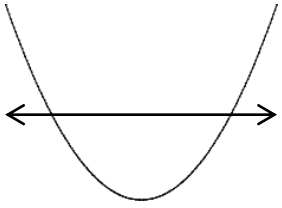
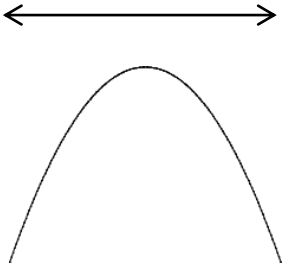
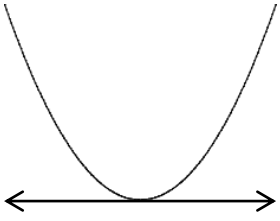
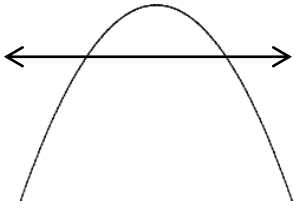
## Advanced Algebra Unit 5 Worksheet 3

Name _____

Match the equations with the graph that best indicates the x-intercepts and opening direction of the parabola.

1. $y = -x^2 + 6x - 8$
3. $y = -x^2 + 2x - 5$
5. $y = 4x^2 + 8x - 5$
7. $y = -4x^2 + 12x - 9$

2. $y = 5x^2 - x - 13$
4. $y = x^2 - 6x + 9$
6. $y = x^2 + 7$
8. $y = -2x^2 + 3x + 7$

| | | | |
|---|---|---|---|
| A.  | B. Roots are at rational #'s  | C. Roots are at irrational #'s  | D.  |
| E. Roots are at irrational #'s  | F.  | G.  | H. Roots are at rational #'s  |

## Advanced Algebra Unit 5 Worksheet 4

Name _____

Find the discriminant to determine the number and nature of the roots of the equation.

1. $x^2 + 6x + 4 = 0$
2. $x^2 - 5x + 4 = 0$
3. $3x^2 - 6x + 3 = 0$
4. $3x + 7 = -5x^2 - 4$

Find the discriminant to determine the number of x-intercepts of the function. Does the parabola open up or down?

5. $f(x) = 3x^2 - 4x - 2$
6. $f(x) = -2x^2 + 6x - 8$
7. $f(x) = x^2 - 7x + 6$
8. $f(x) = 9x^2 + 24x + 16$
9. $f(x) = x^2 - 3x + 4$
10. $f(x) = -4x^2 + 28x - 49$

11. Find all values of $\boldsymbol{a}$ such that $ax^2 + 3x + 5 = 0$ has two real roots.

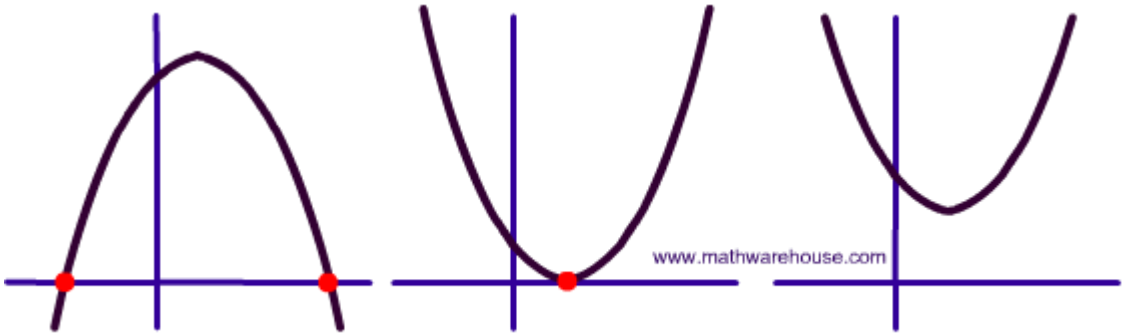
12. Find all values of $\boldsymbol{a}$ such that $ax^2 + 48x + 64 = 0$ has one real root.

13. Find all values of $\boldsymbol{a}$ such that $ax^2 + 3x - 6 = 0$ has two imaginary roots.

14. Find all values of $\boldsymbol{c}$ such that $2x^2 - 6x + c = 0$ has two imaginary roots.

15. Find all values of $\boldsymbol{c}$ such that $-4x^2 + 8x + c = 0$ has two real roots.

16. For each graph below, answer each question:
    a. The sign of a.
    b. Is the discriminant less than zero, zero, or greater than zero?
    c. The number of roots.
    d. To the best of your ability, determine the nature of the roots. You have no way of determining rational or irrational in situations with two roots.



Absolute value inequalities

**http://www.mathworksheets4kids.com/inequalities/absolute-value/solve-two-step1.pdf**

more absolute value inequalities

**http://www.mathworksheets4kids.com/inequalities/absolute-value/solve-graph-two-step1.pdf**

absolute value equations

**http://cdn.kutasoftware.com/Worksheets/Alg2/Solving%20Absolute%20Value%20Equations.pdf**

## **Assignment 5.1** - Solving Literal Equations Name _____

Solve each literal equation for the variable indicated. Show all work one step at a time.

1. Solve $P = a + b + c \ \ for \ \ b.$

2. Solve $E = IR \ \ for \ \ I.$

3. Solve $5t - 2r = 25 \ \ for \ \ t.$

4. Solve $I = prt \ \ for \ \ r.$

5. Solve $A = \frac{1}{2}nal \ \ for \ \ n.$

6. Solve $ax + b = c \ \ for \ \ a.$

7. Solve $D = \frac{11}{5}(P - 15)\ for\ P.$

8. Solve $\frac{1}{f} = \frac{1}{a} + \frac{1}{b}\ for\ f.$

9. Solve $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}\ for\ P_2.$

10. Solve $y - y_1 = m(x - x_1)\ for\ x.$

11. Solve $V = xy - zy\ for\ y.$

12. Solve $A = S(1 - DN)\ for\ N.$

**Assignment 5.2** - Solving Absolute Value Equations Name _____

Solve and CHECK each equation

1. $|5b - 10| = 25$

2. $|-4 + 5x| = 16$

3. $|35 - 5x| - 3x = 7x$

4. $3 - |8x - 6| = 3$

5. $|x - 5| = 5x - 19$

6. $\frac{|8p+4|}{8} = 3p$

**Assignment 5.3** - Solving Absolute Value Inequalities Name _____

Solve and graph each absolute value inequality. Show all work as we did in class.

1. $|5x| \leq 10$

2. $|m| - 2 > 0$

3. $|x - 2| - 5 < -2$

4. $|1 - 4k| \geq -11$

5. $9|x + 8| + 10 < 55$

6. $7 + |6v + 7| \leq 60$

8. $4|6 - 2a| + 8 \leq 24$

7. $2|10b + 7| - 1 > 73$

9. $9|r - 2| - 10 < -73$

**Assignment 5.4** Solving Quadratic Equations and Inequalities Name _____

Solve each quadratic equation by factoring.

1. $(4k + 5)(k + 1) = 0$

2. $x^2 - 11x + 19 = -5$

3. $7r^2 - 14r = -7$

4. $5x^2 - 80 = 0$

5. $6x^2 = -12x$

6. $x^3 + 5x^2 - x - 5 = 0$

Solve and Graph each quadratic inequality.

7. $x^2 - 6x + 8 > 0$

8. $x^2 + 2x + 1 \geq 0$

9. $7x^2 + 21x - 28 < 0$

10. $4x^2 - 16 \geq 0$

11. $4x^2 - 4x + 1 \leq 0$

12. $x^2 + 12x - 64 < 0$

## **Assignment 5.5** - Quad Formula and Completing the Square Name _____

**Questions 1-3:** Solve each quadratic equation with the quadratic formula. Leave your answer in simplest radical or a+bi form where appropriate. **Questions 4-9:** Solve each quadratic equation by completing the square.

1. $x^2 + 4x + 20 = 0$

2. $8x^2 + 6x = -5$

3. $y^2 - 26y = 11$

4. $a^2 - 12a + 23 = 0$

5. $x^2 - 4x + 1 = -5$

6. $y^2 - 4y - 87 = 7$

7. $3x^2 + 8x + 25 = 5$

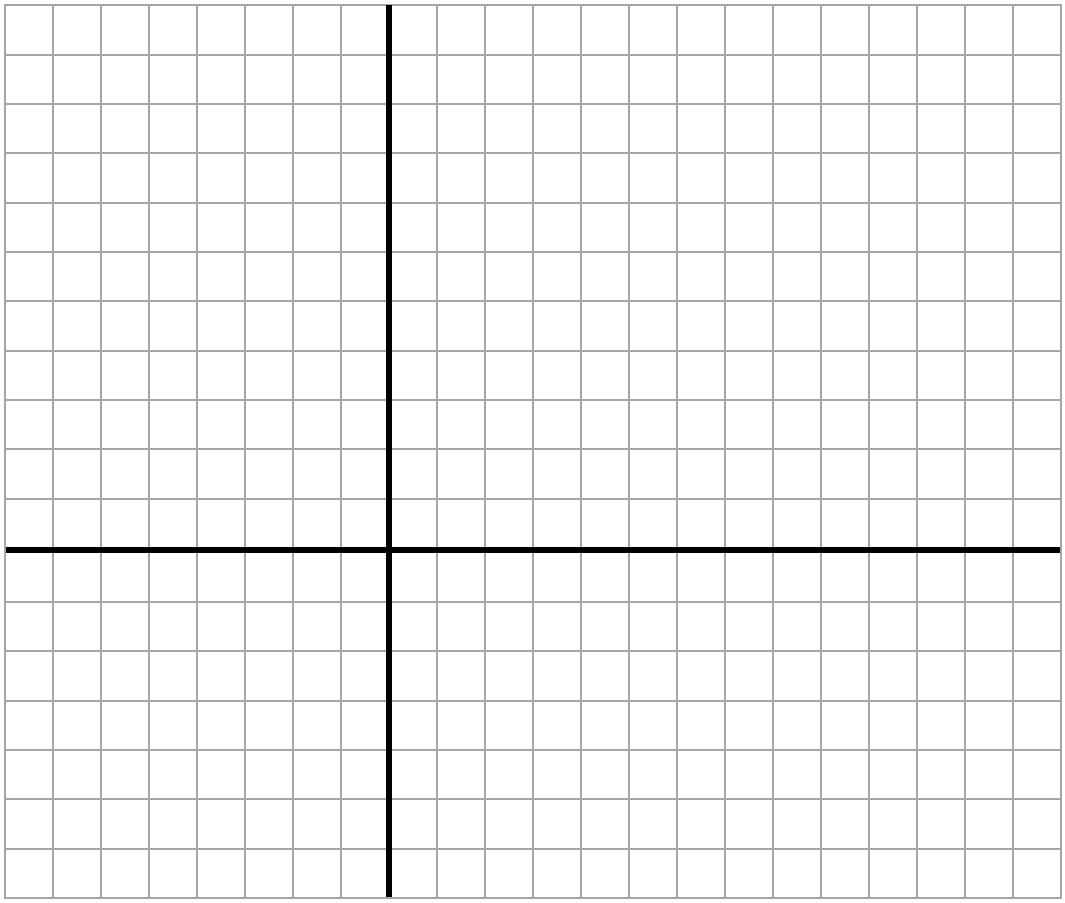
8. $7x^2 - 28x = -37$

9. $x^4 + 20x^2 - 44 = 0$

**Assignment 5.6** - Graphing the Quadratic Function Name _____

$$y = x^2 - 4x - 5$$

1. Does the parabola open up or down? What is the y-intercept? Plot it.
2. Factor to find the roots of the equation. Plot and label them on the graph.
3. Find the axis of symmetry. Draw it on your graph as a dashed line and label with its equation.
4. Find the vertex of the parabola. Graph it and label it with its coordinates.
5. Sketch the rest of the parabola.



For the function $y = 2x^2 + 8x + 8$, **DO NOT GRAPH**, just find the information algebraically.

Does the parabola open up or down? What is the y-intercept?

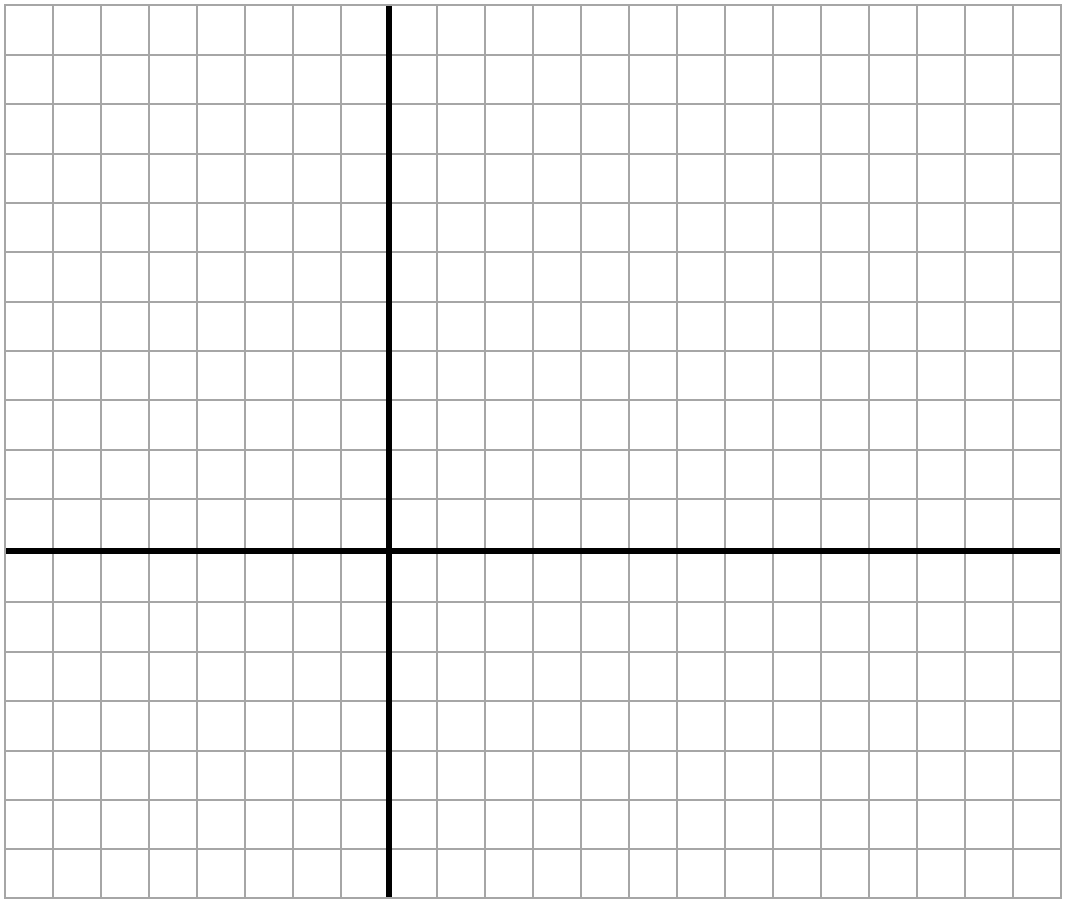
What is the equation of the axis of symmetry?

What are the coordinates of the vertex?

What are the roots?

$$y = -x^2 + 4$$

1. Does the parabola open up or down? What is the y-intercept? Plot it.
2. Factor to find the roots of the equation. Hint: factor out a GCF of negative one first. Plot and label them on the graph.
3. Find the axis of symmetry. Draw it on your graph as a dashed line and label with its equation.
4. Find the vertex of the parabola. Graph it and label it with its coordinates.
5. Sketch the rest of the parabola.



For the function $y = -x^2 + 4x - 3$, **DO NOT GRAPH**, just find the information algebraically.

Does the parabola open up or down? What is the y-intercept?

What is the equation of the axis of symmetry?

What are the coordinates of the vertex?

What are the roots? (again, factor out a -1 first)

## **Assignment 5.7** - The Discriminant Name _____

A quadratic equation and related quadratic function are given. The roots can be described in one of the following ways: imaginary, real rational equal, real rational unequal, real irrational unequal. The parabola can be described in one of the following ways: opens up and intersects the x-axis twice, opens down and intersects the x-axis twice, opens up tangent to x-axis, opens down tangent to x-axis, lies entirely above the x-axis, lies entirely below the x-axis.

**A.** $2x^2 + 6x + 5 = 0$ $y = 2x^2 + 6x + 5$

1. Find the value of the discriminant.

2. Describe the roots of the equation.

**3.** Describe the related parabola.

**B.** $x^2 - 6x + 9 = 0$ $y = x^2 - 6x + 9$

1. Find the value of the discriminant.

2. Describe the roots of the equation.

**3.** Describe the related parabola.

**C.** $-2x^2 + 1 = 0$ $y = -2x^2 + 1$

1. Find the value of the discriminant.

2. Describe the roots of the equation.

**3.** Describe the related parabola.

**D.** $3x^2 - 10x + 3 = 0$ $y = 3x^2 - 10x + 3$

1. Find the value of the discriminant.

2. Describe the roots of the equation.

**3.** Describe the related parabola.

**E.** $-2x^2 - 5x = 0$ $y = -2x^2 - 5x$

1. Find the value of the discriminant.

2. Describe the roots of the equation.

**3.** Describe the related parabola.

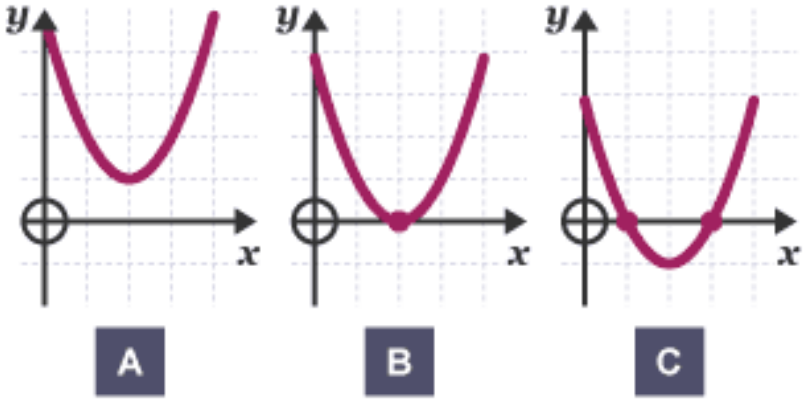
**F.** $3x^2 + 12 = 0$ $y = 3x^2 + 12$

1. Find the value of the discriminant.

2. Describe the roots of the equation.

**3.** Describe the related parabola.

G: For each parabola below, do the best you can to describe the possible values of the discriminant of the function that created the graph.



**Assignment 5.8** - Discriminant Word Problems Name _____

1. The roots of $x^2 - 4x + c = 0$ are real. Find the value(s) of ***c*** that make this true.

2. If the roots of $x^2 + 3x + c = 0$ are imaginary. Find the value(s) of ***c*** that make this true.

3. Find the value(s) of ***c*** that make the roots of $x^2 + 14x + c = 0$ equal.

4. The roots of $3x^2 - 10x + c = 0$ are real but not equal. Find the value(s) of ***c*** that make this true.

5. If the roots of $64x^2 - bx + 1 = 0$ are equal. Find the value(s) of ***b*** that make this true.

6. Find the value(s) of ***b*** that make the roots of $x^2 + bx + 9 = 0$ imaginary.

7. If the roots of $ax^2 - x - 13 = 0$ are real, find the smallest integral value of $\boldsymbol{a}$ that makes this true.

8. The roots of $ax^2 + 3x - 7 = 0$ are imaginary. Find the largest integral value of $\boldsymbol{a}$ that makes this true.

**Assignment 5.9** - sum and product of roots Name _____

1. Find the sum and product of the roots of the given quadratic equation.
   a) $3x^2 + 5x + 6 = 0$ b) $4x^2 - 6x + 15 = 0$

2. Use the sum and product rule to determine if the two given values are the roots of the quadratic equation.

a) Are $\frac{4}{3}$ $and$ $-2$ the roots of $3x^2 + 2x - 5 = 0$?

b) Are 7 and 2 the roots of $x^2 - 5x - 14 = 0$?

c) Are $2 \pm \sqrt{3}$ the roots of $x^2 - 4x + 1 = 0$?

d) Are $3 \pm i$ the roots of $x^2 + 6x + 10 = 0$?

3. Find a quadratic equation whose roots have a
   a. sum of 3 and a product of $\frac{5}{4}$.
   b. sum of $-\frac{8}{9}$ and a product of $-\frac{5}{3}$.

4. Find a quadratic equation for the given roots.
   a) 5 and -14
   b) $\frac{2}{5}$ $and$ $\frac{3}{4}$
   c) $-5 \pm 2i$
   d) $2 \pm \sqrt{5}$

5. Find the missing root of
   a) $x^2 + 10x + c = 0$ given that -6 is a root.
   b) $x^2 + 15x + c = 0$, if one root is -5.
   c) $x^2 + bx - 35 = 0$ given that 7 is a root.
   d) $2x^2 + bx - 6 = 0$, if one root is 6.

**Assignment 5.10** – solving radical equations Name _____

Solve and Check each equation. Be sure to reject extraneous roots.

1. $3 = \sqrt{b-1}$

2. $2 = \sqrt{\frac{x}{2}}$

3. $\sqrt{-8-2a} = 0$

4. $\sqrt{2m-6} = \sqrt{3m-14}$

5. $\sqrt{8k} = k$

6. $\sqrt{20-a} = a$

7. $\sqrt{-10+7p} = p$

8. $\sqrt{2y-7} = y-3$

9. $-3 = \sqrt{37 - 3n} - n$

10. $x = 5 + \sqrt{3x - 11}$

11. $\sqrt{6x + 7} - 2x = -1$

12. $\sqrt[3]{y} = -3$

13. $\sqrt[4]{\frac{1}{2}k} = 3$

14. $\sqrt[3]{2a + 3} = -2$

15. $\sqrt[4]{x + 6} = 1$

16. $\sqrt[4]{2x + 4} = 2$

## Discriminant Summary Sheet name _____

| If the discriminant is | Then the roots are | And the graph looks like<br>+a | <br>-a |
|---|---|---|---|
| **Negative** | | | |
| **Zero** | | | |
| **Positive perfect square** | | | |
| **Positive non-perfect square** | | | |

## Unit 5 Worksheet _____ Name _____

## Discriminant Word Problems

Show all work on separate paper. Even the multiple choice questions require all work!

1. For the equation $x^2 + 2x + c = 0$, find each of the following:
   a) The value of c that will make the roots equal.
   b) The values of c that will make the roots real.
   c) The values of c that will make the roots imaginary.

2. For the equation $x^2 + bx + 4 = 0$, find each of the following:
   a) The value of c that will make the roots equal.
   b) The values of c that will make the roots real.
   c) The values of c that will make the roots imaginary.

3. For what value of n will the roots of $x^2 + 4x + n = 0$ be real, rational and equal?

4. Given the equation $2x^2 - 2x + k = 0$, find the largest integral value of k for which the roots of the equation are real.

5. The roots of $x^2 + bx + 2 = 0$ are imaginary for what values of b?

6. Which equation has imaginary roots?
   a. $x^2 - 2x + 1 = 0$
   b. $x^2 - 2x + 5 = 0$
   c. $x^2 - 2x - 1 = 0$
   d. $x^2 - 2x - 5 = 0$

7. How many x-intercepts does the graph of $y = x^2 - 14x + 49$ have?

8. How many x-intercepts does the graph of $y = 3x^2 + 2x + 1$ have?

9. How many x-intercepts does the graph of $y = -2x^2 + 3x + 1$ have?

10. How many x-intercepts does the graph of $y = x^2 - 2x + 2$ have?

11. Given the equation $x^2 - 6x + 10 = 0$, which of the following is true?
    a) The equation has one real root.
    b) The equation has no real roots.
    c) The equation has two equal real roots
    d) The equation has two unequal real roots.

12. For which value of k will the roots of $2x^2 + kx + 1 = 0$ be irrational?
    a) 2 b) $\sqrt{8}$ c) 3 d) 4

**Unit 4 Worksheet 2** Name _____

**Advanced Algebra Quiz 5.1 – Literal Equations 2015** Name _____

1. Solve $\frac{D}{8} - J = 7 \quad for \ D.$

2. Solve $A = \frac{1}{2}(b_1 + b_2)h \quad for \ b_1.$

3. Solve $A = 2hb - 3h \quad for \ h.$

4. Solve $P = \frac{2}{a} + \frac{3}{c}$

Bonus: Solve $I = \frac{PN}{RN+A} \ for \ N.$

**Advanced Algebra Quiz 5.2a – Absolute Value - 2015** Name _____

1. Solve and check: $|2 - x| - 2x = -3$

2. Solve and graph: $|6 - 3x| - 5 \leq 4$ Express your answer in interval or set notation.

**Advanced Algebra Quiz 5.2b – Absolute Value - 2015** Name _____

1. Solve and check: $|5 - x| - 2x = 1$

2. Solve and graph: $|8 - 4x| - 7 \geq 9$ Express your answer in interval or set notation.

## Advanced Algebra Quiz 5.3a - 2015

Name _____

1. Solve by factoring: $2x^3 - 3x^2 - 50x + 75 = 0$

2. Solve, graph and write your solution in interval notation or set notation: $6x^2 + 7x - 20 = 0$

## Advanced Algebra Quiz 5.3b - 2015

Name _____

1. Solve by factoring: $3x^3 + 4x^2 - 48x - 64 = 0$

2. Solve, graph and write your solution in interval notation or set notation: $8x^2 - 18x - 5 = 0$

## Advanced Algebra Quiz 5.4a - 2015

Name _____

Solve using the quadratic formula. Please show work as explained in class.

1. $5x^2 + 2x + 34 = 0$

Solve each using completing the square. Please show work as explained in class.

2. $x^2 - 10x + 18 = 0$

3. $5x^2 + 2x + 34 = 0$

## Advanced Algebra Quiz 5.4b - 2015

Name _____

Solve using the quadratic formula. Please show work as explained in class.

1. $5x^2 + 2x + 58 = 0$

Solve each using completing the square. Please show work as explained in class.

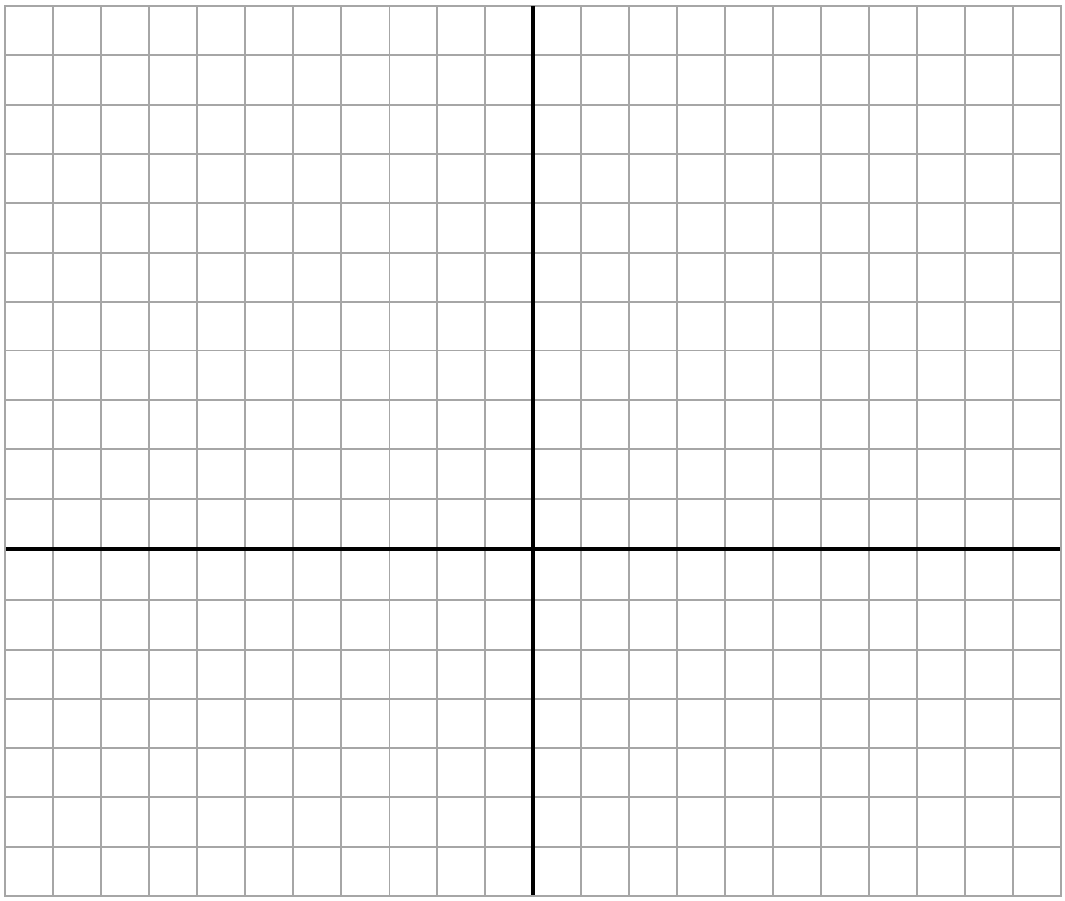
2. $x^2 - 10x + 18 = 0$

3. $5x^2 + 2x + 58 = 0$

**Advanced Algebra Quiz 5.5a - 2015** Name _____

$$y = -x^2 + 4x + 5$$

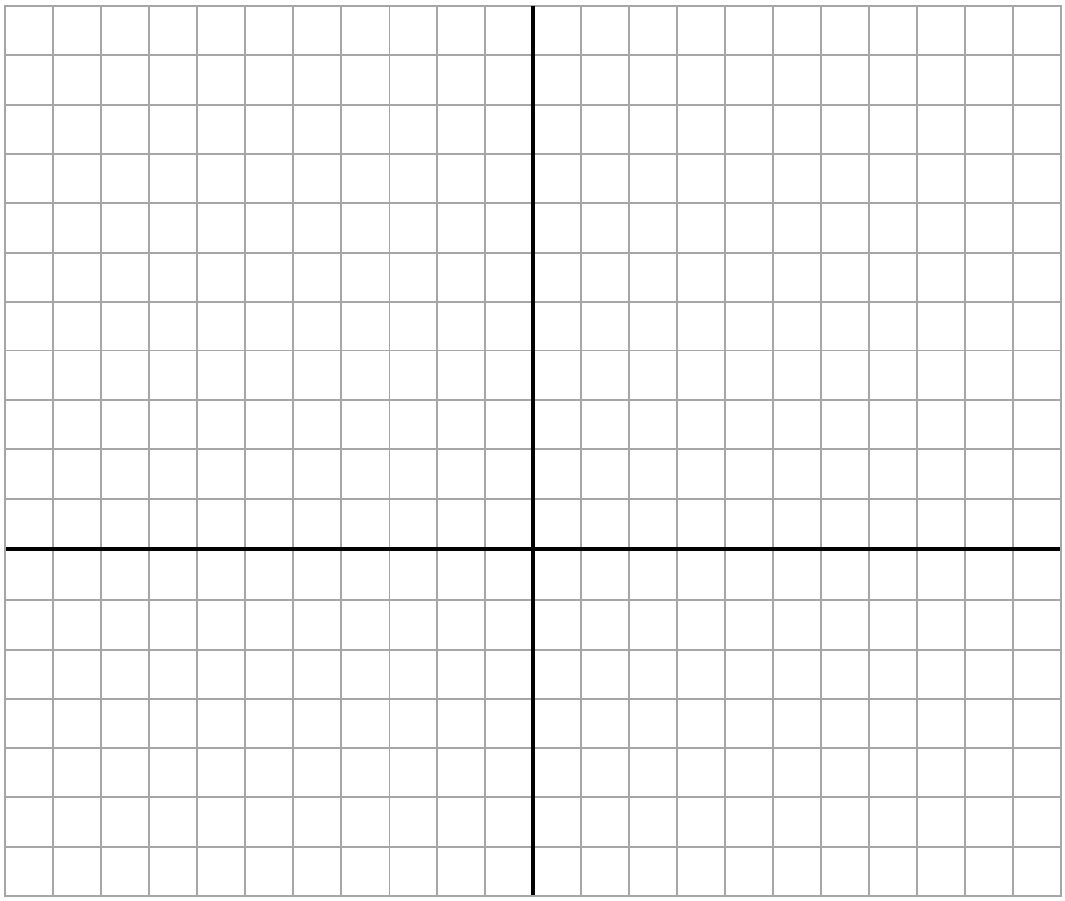
1. Does the parabola open up or down? _____
2. What is the y-intercept? Plot it. _____
3. Factor to find the roots of the equation. Plot and label them on the graph with the word root and their coordinates.
4. Find the axis of symmetry. Draw it on your graph as a dashed line and label with its equation.
5. Find the vertex of the parabola. Graph it and label it with the word vertex and its coordinates.
6. Sketch the rest of the parabola. Be sure to include arrows on the ends.



**Advanced Algebra Quiz 5.5b - 2015** Name _____

$$y = -x^2 - 2x + 8$$

1. Does the parabola open up or down? _____
2. What is the y-intercept? Plot it. _____
3. Factor to find the roots of the equation. Plot and label them on the graph with the word root and their coordinates.
4. Find the axis of symmetry. Draw it on your graph as a dashed line and label with its equation.
5. Find the vertex of the parabola. Graph it and label it with the word vertex and its coordinates.
6. Sketch the rest of the parabola. Be sure to include arrows on the ends.



**Advanced Algebra Quiz 5.6a - 2015** Name _____

Answer questions 1-3 given the quadratic equation and related quadratic function below.

$$3x^2 + 3x - 5 = 0 \qquad y = 3x^2 + 3x - 5$$

1. Find the value of the discriminant.

2. Circle the letter of the best description of the roots of the equation.
   a) imaginary
   b) real rational equal
   c) real rational unequal
   d) real irrational unequal

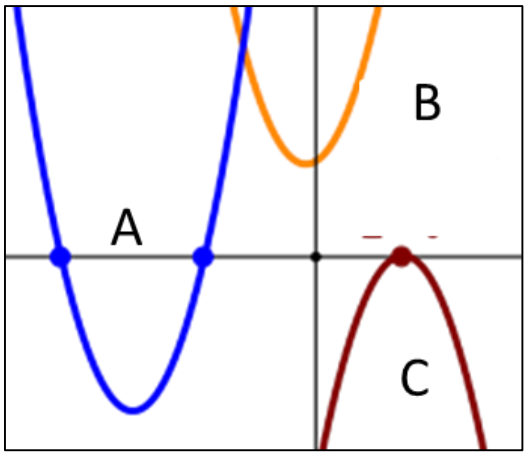
**3.** Circle the letter of the best description of the related parabola.
   a) opens up and intersects the x-axis twice
   b) opens down and intersects the x-axis twice
   c) opens up tangent to x-axis
   d) opens down tangent to x-axis
   e) lies entirely above the x-axis
   f) lies entirely below the x-axis.

4. Based on the diagram below, state a possible value of the discriminant of each parabola

   A. _____

   B. _____

   C. _____



5. Determine the values of $\boldsymbol{a}$ that will make the roots of $ax^2 + 8x - 2 = 0$ imaginary.

6. Determine the value(s) of $\boldsymbol{b}$ that will make the roots of $x^2 + bx + 9 = 0$ real.

7. Determine the value(s) of $\boldsymbol{b}$ that will make the roots of $2x^2 + bx + 5 = 0$ real but not equal.

**Advanced Algebra Quiz 5.6b - 2015** Name _____

Answer questions 1-3 given the quadratic equation and related quadratic function below.

$$-3x^2 + 3x - 5 = 0 \qquad y = -3x^2 + 3x - 5$$

1. Find the value of the discriminant.

2. Circle the letter of the best description of the roots of the equation.
   a) imaginary
   b) real rational equal
   c) real rational unequal
   d) real irrational unequal

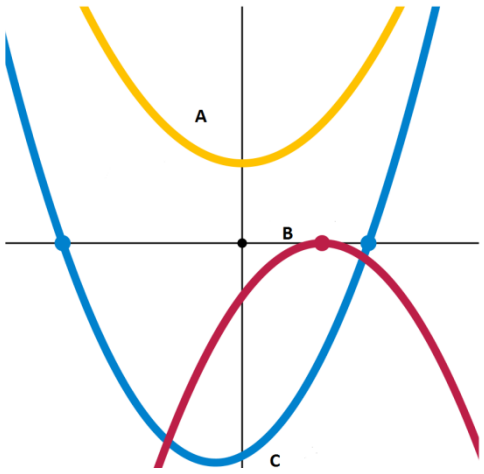
**3.** Circle the letter of the best description of the related parabola.
   a) opens up and intersects the x-axis twice
   b) opens down and intersects the x-axis twice
   c) opens up tangent to x-axis
   d) opens down tangent to x-axis
   e) lies entirely above the x-axis
   f) lies entirely below the x-axis.

4. Based on the diagram below, state a possible value of the discriminant of each parabola

   A. _____

   B. _____

   C. _____



5. Determine the value(s) of $\boldsymbol{b}$ that will make the roots of $x^2 + bx + 25 = 0$ real.

6. Determine the values of $\boldsymbol{a}$ that will make the roots of $ax^2 + 4x - 2 = 0$ imaginary.

7. Determine the value(s) of $\boldsymbol{b}$ that will make the roots of $3x^2 + bx + 5 = 0$ real but not equal.

## Advanced Algebra Quiz 5.3a - 2014

Name _____

## Advanced Algebra Quiz 5.4a - 2014

Name _____

**Show all work! Write formulas before using them!!!**

8. Write a quadratic equation whose roots are $4 \pm 3i$.

9. The roots of $x^2 + bx + c = 0$ are $5 + \sqrt{2}$ $and$ $5 - \sqrt{2}$. Find the values of $b$ and $c$.

10. Solve and Check: $\sqrt{3x + 1} + 1 = x$

## Advanced Algebra Quiz 5.2a - 2014

Name _____

Show all work as explained in class.

1. Solve by factoring: $3x^2 + 13x = 10$

2. Solve, graph, and express your answer in interval notation: $6x^2 > x + 12$

## Advanced Algebra Quiz 5.4a - 2014

Name _____

Solve, graph and write your answer in interval notation:

## Advanced Algebra Quiz 5.4a - 2014

Name _____

Solve, graph and write your answer in interval notation:

Determine the value(s) of $\boldsymbol{b}$ that will make the roots of $2x^2 + bx + 5 = 0$ real but not equal.

# Unit 5 Extra Practice

**Absolute value equations**

Solve and check each of the following equations.

1. $|5b - 10| = 25$
2. $|35 - 5x| - 3x = 7x$

Solving Quadratic Equations by factoring review Page 29 #3, 9, 12, 15, 16, 17

Solving quadratic inequalities Page 35 #5, 11, 12, 13 P37 #36, 40

Solving quad equations that can't be factored

P196 #12, 13, 16 Solve using the Quadratic Formula

#15 Solve using Completing the Square

P219 #6 Solve using the Quadratic Formula

#5, 7, 8 Solve using Completing the Square

The Discriminant P201 3, 4, 6, 11-14, (15, 16, 17, 18, 20, 23) a only, 25

Sum and product of roots

Page 223 #3, 6, 9, 11, 12, 15, 18, 20, 22, 26, 27, 30, 31, 35, 38, 41

Page 224 #32,36,39,43

Solving radical equations

Page 112 #9, 12, 15, 16, 17, 18, 19, 21, 22, 31, 33, 34

Assignment 5.B

Page 224 #44 - 46

Page 113 #38 - 41

Page 227 #29 or 30, 31

## Answers to Unit 5 Homework Assignments

**A5.1** 1) $x = 7, -3$ 2) $x = \frac{7}{3}$ 3) $x = 4$

**A5.2** 3) $x = 1,3$ 9) $x = -1,4$ 12) $x = -3,4$ 15) $x = -3,2$

**A5.3** 5) $[1,2]$ 11) $(-\infty, 0] \cup [2, \infty)$ 12) $(-2,3)$ 13) $(-\infty, 2) \cup (2, \infty)$

Number lines are also required for all inequalities.

**A5.4** easier: 16) $x = 1$ 36) $(-\infty, -5) \cup (7, \infty)$ harder: 17) x=5 40) $(-\infty, -2] \cup [1, \infty)$

Both: 12) $x = \frac{1 \pm \sqrt{17}}{8}$ 15) $x = 3 \pm \sqrt{6}$ 6) $x = -\frac{1}{2} \pm \frac{1}{2}i$ 5) $x = 2 \pm 3i$

**A5.5** 13) $x = \frac{5 \pm \sqrt{33}}{4}$ 16) $x = \frac{1}{2} \pm \sqrt{3}$ 7) $x = -5 \pm 2i$ 8) $x = -4 \pm i$

3,4,6,11-14 answers not provided 15) 0, (2) rational and equal 16) 49, (1) rational and unequal

17) 5, (3) irrational and unequal 18) 64, (1) rational and unequal 20) -11, (4) not real #'s

**A5.6** 23) -11, (4) not real #'s 25a) $c = 1$ b) & c) will go over in class, d) $c > 1$

3) $sum = -1, prod = 1$ 6) $sum = \frac{-2}{5}$ $prod = -2$ 9) $sum = 8,$ $prod = -12$

12) $sum = 0, prod = \frac{-1}{4}$ 15) $sum = \frac{-3}{4},$ $prod = \frac{-9}{8}$ 18) $root = -10$ 30) $x^2 - 7x + 10 = 0$

**A5.7** 11) $sum = \frac{5}{2}, prod = -4$ 20) $root = \frac{-5}{2}$ 22) $root = \frac{-1}{6}$ 26) $root = 3$

27) $root = \frac{-5}{7}$ 31) $x^2 - 11x + 28 = 0$ 35) $4x^2 - 16x + 7 = 0$ 38) $x^2 - 4x + 1 = 0$

41) $x^2 - 6x + 10 = 0$

**A5.8** 32) $x^2 - x + 12 = 0$ 36) $32x^2 - 12x - 9 = 0$ 39) $x^2 - x - 1 = 0$ 43) $4x^2 + 9 = 0$

9) $x = 4$ 12) $a = 44$ 15) $x = 2$ 18) $x = 4$ 21) $x = -1$ 31) $a = -10$

**A5.9** 16) $x = 25$ 17) $x = 4$ 19) $x = 5$ 22) $a = 5$ 25) $x = 5$ 33) $x = -34$ 34) $n = 18$

## Assignment 5.B

Show all work! Name _____

1. What is the value of the discriminant of the equation whose roots are $\sqrt{2} \pm 1$.

2. Suppose you picked an integer at random from 1 through 20 as a value for c in the equation $y = x^2 + 8x + c$. What is the probability that the resulting equation will have imaginary roots?

3. Solve and Check: $\sqrt{x+4} - \sqrt{x-1} = 1$

## Warmup – Rational and Radical Equations

Name _____

Solve each equation. Show all work. BE SURE TO CHECK THE RATIONAL EQUATIONS MENTALLY, AND FORMALLY CHECK THE RADICAL EQUATIONS. Do 1 and 2, check answers, and then if OK, go on to 3 and 4.

| | |
|---|---|
| 1. $m - \frac{3}{m} = 2$ | 2. $\sqrt{3x-2} - 4 = 0$ |

| | |
|---|---|
| 1. $\frac{x}{x-2}-\frac{8}{x+3}=\frac{10}{x^2+x-6}$ | 2. $\sqrt{3x+1}+1=x$ |

## Wonderful Wordy Word Problem Take Home Quiz

Date Due _____ Name _____

Do this alone…the only person you can speak to regarding this assignment is Mrs. Bemis. SHOW ALL WORK! This includes let statements, equation, work to solve, and writing your answer in a complete sentence that answers the question.

Do either question 1 or 2. Each is worth 10 points.

1. Brad is 3 years older than Francis. The product of their ages is 154. Determine their ages.
2. The length of a rectangle is 6 feet less than three times the width. The area of the rectangle is 144 square feet. Find the dimensions of the rectangle.

Do either question 3 or 4. Each is worth 10 points.

3. The ratio of peanuts to cashews in a certain mixture is 7:3. The number of peanuts is twelve less than three times the number of cashews. How many total nuts are in the mixture?
4. In the chess club, the ratio of boys to girls is 6:5. There are 3 more boys than girls in the club. How many members are in the club?

Do either question 5 or 6. Each is worth 12 points.

5. The width of a rectangle is x and the length is $\sqrt{x-1}$. If the width is twice the length, what are the dimensions of the rectangle?

6. The difference in the lengths of the sides of two squares is 1 meter. The difference in the areas of the squares is 13 square meters. What are the lengths of the sides of the squares?

Bonus – This problem is not extra. You can replace any of the problems above for this one instead. This problem is worth 13 points.

Diego had traveled 30 miles at a uniform rate of speed when he encountered construction and had to reduce his speed to one-third of his original rate. He continued at this slower rate for 10 miles. If the total time for these two parts of the trip was one hour, how fast did he travel at each rate?

# AA Quiz 5.5 – 2012

Name _____ __

You must show all work and use product and sum of roots methods to solve these problems. Other methods will earn no credit.

11. For the equation $3x^2 - 2x + 9 = 0$, find the sum and the product of the roots.

12. Write a quadratic equation whose roots are -5 and 6.

13. Write a quadratic equation whose roots are $4 \pm 3i$.

14. One root of $x^2 - 7x + c = 0 \ \ is \ \ -4$. Find the other root.

15. The roots of $x^2 + bx + c = 0$ are $5 + \sqrt{2} \ \ and \ \ 5 - \sqrt{2}$. Find the values of $b$ and $c$.

## Advanced Algebra Quiz 5.1

Name _____ ___

Show all work as explained in class.

| | |
|---|---|
| 1. Solve: $21 - x = 25 + 3x$ | 2. Solve and Graph: $x - 2 > 3x + 4$ |
| 3. Solve and Graph: $-8 < 5x + 7 \leq 32$ | 4. Graph, and express in interval notation: $\{x \mid x < -2\}$ |
| 5. Graph, and express in interval notation: $\{x \mid -7 \leq x < 4\}$ | 6. Solve: $x^2 + x - 72 = 0$ |
| 7. Solve and Check: $\lvert 2x - 7 \rvert = 23$ | |

## Advanced Algebra Quiz 5.1

Name _____ _ __

Show all work as explained in class.

| | |
|---|---|
| 1. Solve: $10 - (3x - 11) = 25$ | 2. Solve and Graph: $x - 2 \leq 3x + 4$ |
| 3. Solve and Graph: $-6 < 5x + 7 \leq 22$ | 4. Graph, and express in interval notation: $\{x \mid x \geq -2\}$ |
| 5. Graph, and express in interval notation: $\{x \mid -3 < x \leq 5\}$ | 6. Solve: $3x^2 - 13x - 10 = 0$ |
| 7. Solve and Check: $\lvert 2x - 7 \rvert = 23$ | |

## Advanced Algebra Quiz 5.1 top

Name _____

Show all work as explained in class.

1. Solve and graph: $|6 - 3x| - 5 \leq 4$ Express your answer in interval notation.

2. Solve by factoring: $3x^2 + 13x - 10 = 0$

3. Solve, graph, and express your answer in interval notation: $x^2 - 2x + 15 > 0$

## Advanced Algebra Practice for Quiz 5.3

Name_____

Solve each using the quadratic formula:

1. $3x^2 - 5x + 2 = 0$

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

Solve each by completing the square:

3. $x^2 - 10x + 29 = 0$

4. $x^2 + 8x - 16 = 0$

## Advanced Algebra Quiz 5.3a - 2014

Name _____

Solve each equation using the method indicated. Show all work as explained in class. Express each answer in simplest form.

1. Solve using the quadratic formula: $9x^2 - 6x - 5 = 0$

2. Solve by completing the square: $x^2 + 33 = 6x$

## Advanced Algebra Quiz 5.3 top Name _____

Solve each equation using the method indicated. Show all work as explained in class. Express each answer in simplest form.

5. Solve using the quadratic formula: $3x^2 - 5x + 2 = 0$

6. Solve by completing the square: $x^2 - 10x + 29 = 0$

## Advanced Algebra Quiz 5.4 2013

Name _____

1. In the table below, 4 discriminants are given in the first column. In the second column, place the letter that corresponds to the proper description of the roots of an equation with that discriminant. In the third column, place the # that corresponds to the proper description of the graph of the function with that discriminant.

A. Imaginary
B. Real, rational and unequal
C. Real, irrational and unequal
D. Real, rational and equal

1. Intersects the x-axis twice
2. Tangent to the x-axis
3. Does not intersect the x-axis

| Discriminant | A, B, C, or D | 1, 2, 3 |
|---|---|---|
| 5 | | |
| 0 | | |
| 81 | | |
| -81 | | |

2. If $5x - 6 = 3x^2$, find the value of the discriminant.

For each graph below, give a possible value of the discriminant of the associated function.

| 3. | 4. | 5. |
|---|---|---|
| | | |

6. Determine the values of $\boldsymbol{a}$ that will make the roots of $ax^2 + 8x - 2 = 0$ real.

7. Determine the value(s) of $\boldsymbol{b}$ that will make the roots of $x^2 + bx + 9 = 0$ equal.

8. Determine the value(s) of $\boldsymbol{c}$ that will make the roots of $4x^2 + 8x + c = 0$ imaginary.

**Advanced Algebra Quiz 5.5** Name _____

You must use only sum and product methods to do the problems on this quiz.

Questions 1 and 2: For each equation, find the sum and the product of the roots.

1. $x^2 + 2x - 35 = 0$

2. $2x^2 = 3x + 28$

3. If one root of $3x^2 - 5x + k = 0$ is -2, find the other root.

4. If one root of $6x^2 + bx - 2 = 0 \ \ is \ \ \frac{1}{2}$, find the other root.

Write a quadratic equation with integer coefficients with the given sum and product of the roots.

5. $sum = \frac{1}{2}\ ,\ product = \frac{2}{3}$

6. $sum = 0\ ,\ product = \frac{1}{3}$

Write a quadratic **<u>equation</u>** whose roots are given.

You must use only sum and product methods to do the problems on this quiz.

7. {-6, 7}

8. $\{5 \pm i\}$

9. $\{3 \pm \sqrt{2}\}$

Find the answer to each problem above. Find that answer in the table below. Circle the letters above the correct answer. Some answers may be used more than once. When you are done with all ten problems, the letters circled will be put together to make a secret code. Please do not share the code with anyone else.

| the | wri | Let | tem | sor | tee | ath | roc | frc | ksa |
|---|---|---|---|---|---|---|---|---|---|
| $6 \pm 6i$ | $-\frac{1}{3} \pm \frac{2\sqrt{2}}{3} i$ | $\left\{\frac{7}{2}\right\}$ | $6 \pm i\sqrt{6}$ | $-\frac{1}{3} \pm \frac{32}{3} i$ | $(-\infty, 0] \cup (5, \infty)$ | $\{0,6\}$ | $\left\{0, \frac{5}{14}\right\}$ | $[4, -9]$ | $\left\{\frac{7}{2}, \frac{-7}{2}\right\}$ |

| tth | eto | Ate | bre | pof | the | qui | ake | zto | mor |
|---|---|---|---|---|---|---|---|---|---|
| $\pm \frac{\sqrt{14}}{2}$ | $[-4,9]$ | $(-\infty, -4] \cup [9, \infty)$ | $\sqrt{\frac{7}{2}}$ | $(-\infty, 0] \cup [7, \infty)$ | $\left\{\frac{7}{2}, \frac{-7}{2}\right\}$ | $-\frac{1}{3} \pm \frac{2\sqrt{2}}{3} i$ | $2 \pm 4i\sqrt{2}$ | $[0,5)$ | $\{0,6\}$ |

| row | for | Lea | abo | try | nus | mat | poi | ll | nt |
|---|---|---|---|---|---|---|---|---|---|
| $[0,5)$ | $\{0,6\}$ | $\{5,30\}$ | $4 \pm 5\sqrt{2}$ | $[0,7]$ | $\pm \frac{\sqrt{14}}{2}$ | $\{4, -49\}$ | $6 \pm i\sqrt{6}$ | $[0,5]$ | $[-4,9]$ |

## Welcome Back From Break! - Extended Warmup

We have a quiz on Thursday on the Discriminant, so I thought it would be good to bring your brain back up to speed!

1. Match the description of the discriminant to the description of the roots.

| Description of Discriminant |
|---|
| Positive perfect square |
| Positive non-perfect square |
| Negative |
| Zero |

| Description of Roots |
|---|
| Real, rational, and equal. |
| Imaginary |
| Real, irrational and unequal. |
| Real, rational and unequal. |

2. Match the description of the discriminant to the graph.

| Description of Discriminant | Graph |
|---|---|
| Positive perfect square | |
| Positive non-perfect square | |
| Negative | |
| Zero | |

7. Find the value(s) of b such that the roots of $3x^2 + bx = -1$ will be equal.

8. Find the value(s) of c such that the roots of $2x^2 = -5x - c$ will be imaginary.

9. Find the value(s) of c such that the roots of $2x^2 - 4x + c = 0$ will be real.