

Algebra 1: Problem Set 9C

Mr. Chamberlain

Name _____

Date _____ Period _____

FYI

The **STANDARD FORM** of a **QUADRATIC EQUATION** is:

$$y = ax^2 + bx + c \quad \text{where } a, b, c \text{ are coefficients and } a \neq 0$$

The axis of symmetry of a parabola can be found by using the formula:

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

N.B. The vertex of the parabola can be found by substituting this value of x into the original equation and solving for y .

The solutions (aka x -intercepts or roots or zeroes) of a quadratic equation can be found using the quadratic formula:

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

The discriminant, $b^2 - 4ac$, can be used to determine if a quadratic equation has real roots.

- a **positive discriminant** means that there are **two real roots**.
- a discriminant of **zero** means that there is only **one real root**.
- a **negative discriminant** means that there are **no real roots**.

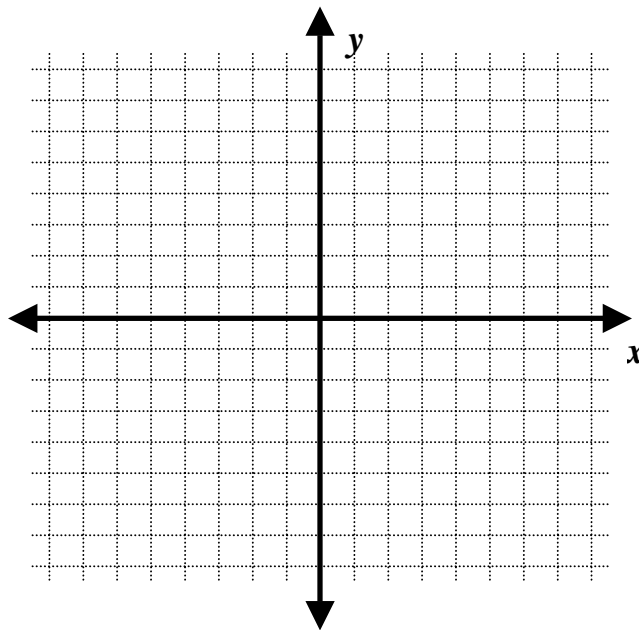
Quadratic Equations can be solved by the following methods:

- 1) **Graphing Manually** – All equations can be graphed manually. Watch your signs!! A manual graph will give you an approximation of the roots. For a more precise solution, you must use one of the following methods (#2-5).
- 2) **Square Rooting** – This method is effective as long as the **coefficient of the x term (aka the “middle term”)** is zero.
- 3) **Factoring** – Factoring is **FUN & EASY!** Always check to see if you can factor a quadratic trinomial before you move on to the more difficult methods. Even if the leading coefficient is not equal to 1, check for a common constant factor in all of the terms.
- 4) **Completing the Square** – SOLVES ALL... but can get ugly fast. This method is best used when the **leading coefficient is 1** and the **coefficient of the middle term** is an **even number**.
- 5) **Quadratic Formula** – The Quadrator SOLVES ALL!! Use this when methods #2-4 above are not viable.
- 6) **Graphing Calculator** – You should **always check your work on a graphing calculator** if one is available.

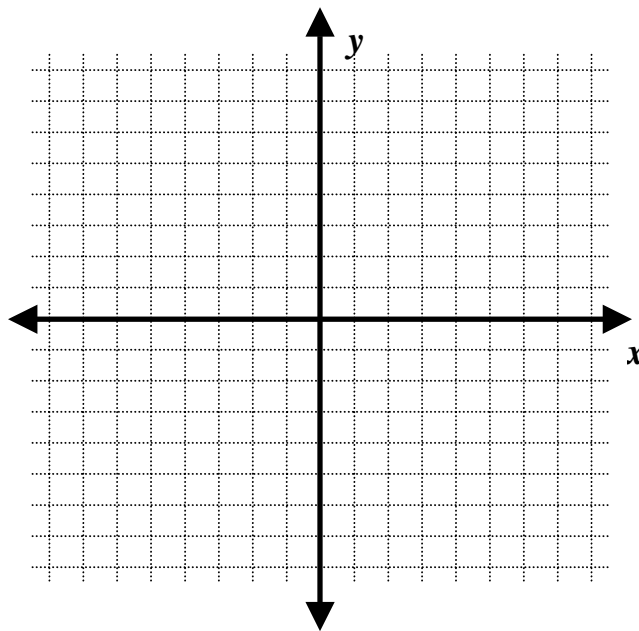
Graph the following quadratic equations. *SHOW ALL WORK.*

Find and **LABEL** the axis of symmetry and the coordinates for the vertex.

1. $y = x^2 - 5$



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



Solve the following quadratic equations. Use any method (except graphing). *SHOW ALL WORK.* Identify your method and give a brief reason as to why you used it.

3. $x^2 - 13x + 36 = 0$

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

Method:

Reason:

Method:

Reason:

5. $x^2 - 6x + 8 = 0$

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

Method:

Reason:

Method:

Reason:

7. $x^2 - 8x + 11 = 0$

8. $x^2 - 55 = 0$

Method:

Method:

Reason:

Reason:

Vertical Motion problems can be modeled by a quadratic equation:

$h = -16t^2 + vt + s$, where :

h = height in feet
 t = time (in seconds)
 s = initial height
 v = initial velocity

This model assumes no air resistance. Remember that velocity can be expressed in a positive (up) or negative (down) direction.

9. A rock is dropped from a bridge 336 feet above the water (assume an initial velocity of zero).
- a) Write the quadratic equation that models this situation.
 - b) How high will the rock be one second after it is dropped?
 - c) Solve the equation. About how many seconds will it take for the rock to hit the water?

10. This was problem #5: $x^2 - 6x + 8 = 0$. You probably solved it by factoring (since factoring is FUN & EASY!!). Solve this equation below using the Complete the Square method and then using the Quadratic Formula. Do you think you will get the same solution?