Name: _____ Date: _____ # _____

Section 4-9 Quadratic Systems

Learning Goal: To understand how to solve and graph systems of linear and quadratic equations;
To understand how to solve and graph systems of quadratic inequalities.

Essential Questions: What are the advantages of a quadratic function in vertex form?
What are the advantages of a quadratic function in standard form?
How is any quadratic function related to the parent function of $y = x^2$?
How are the real solutions of a quadratic equation related to the graph of
the related quadratic function?

Warm Up:

1.   Solve the system of inequalities by graphing. $\begin{cases} y < 2x + 4 \\ y \geq |x - 3| + 2 \end{cases}$
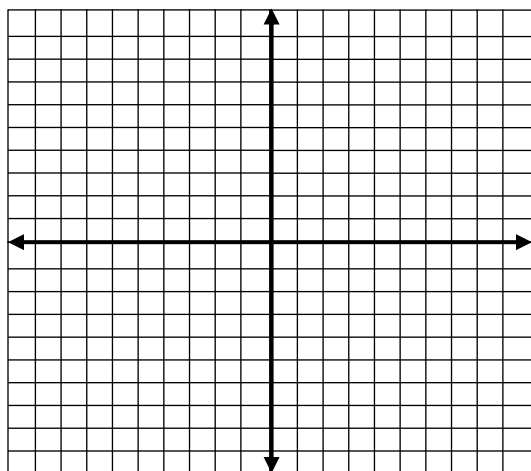
Vocabulary:

Solution(s) of a system- the points where the graphs of the equations intersect represented by an ordered pair (x, y).

You Try:

What is the solution of the system of equations?

1. $\begin{cases} y = -x^2 + 6x + 9 \\ y = x + 3 \end{cases}$

2. $\begin{cases} y = x^2 - 2x + 1 \\ y = x - 3 \end{cases}$
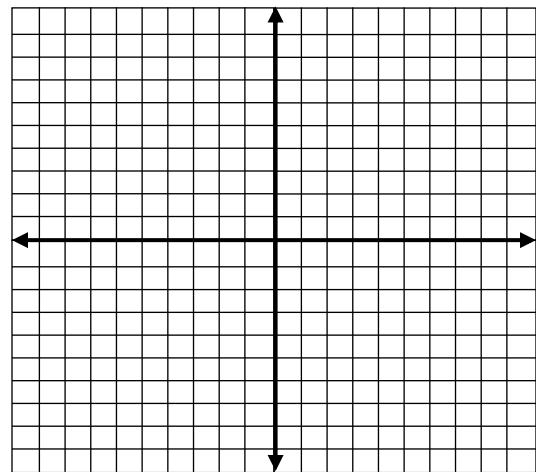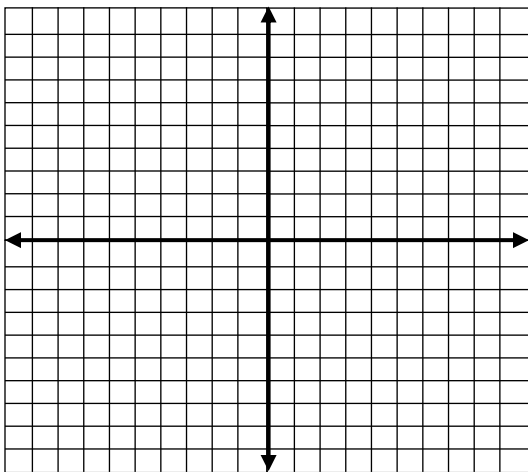
You can solve using the Substitution method.

Example:
$$\begin{cases} y = -x^2 - x + 6 \\ y = x + 3 \end{cases}$$

Your Try:

3.
$$\begin{cases} y = -x^2 - 3x + 10 \\ y = x + 5 \end{cases}$$

4.
$$\begin{cases} y = x^2 + 3x + 9 \\ y = -3x + 4 \end{cases}$$

Example – 2 Quadratics

$$\begin{cases} y = -x^2 - x + 12 \\ y = x^2 + 7x + 12 \end{cases}$$

You Try:

What is the solution of the system of equations.   Solve algebraically. **Check** using the graphing calculator.

5. $\begin{cases} y = x^2 + 9x + 7 \\ y = -x^2 + 3x + 7 \end{cases}$

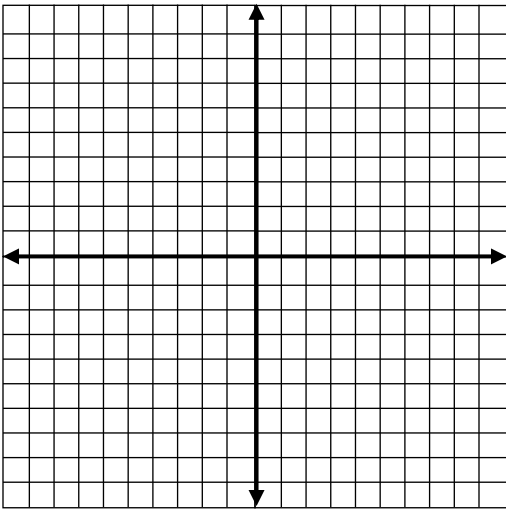6. $\begin{cases} y = x^2 - 4x + 5 \\ y = -x^2 + 5 \end{cases}$

7. $\begin{cases} y = x^2 - 3x - 3 \\ y = -2x^2 - x + 5 \end{cases}$

Solving a quadratic system of inequalities

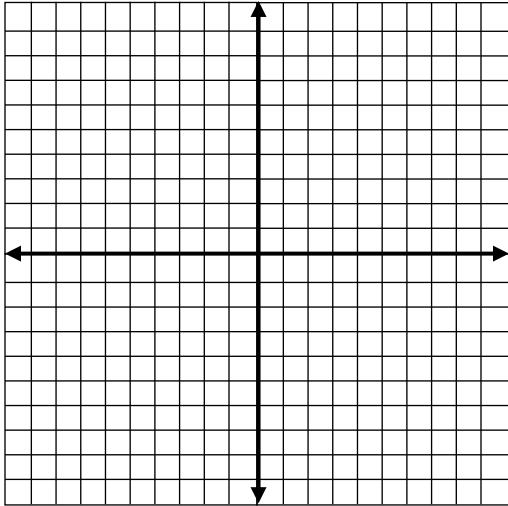- your solution is a shaded region (where your graphs overlap)
- Remember: **Solid line** ($£, ^3, =$) and a **Dashed line** for ($<, >, ^1$)
- Test point

What is the solution of the system of inequalities?
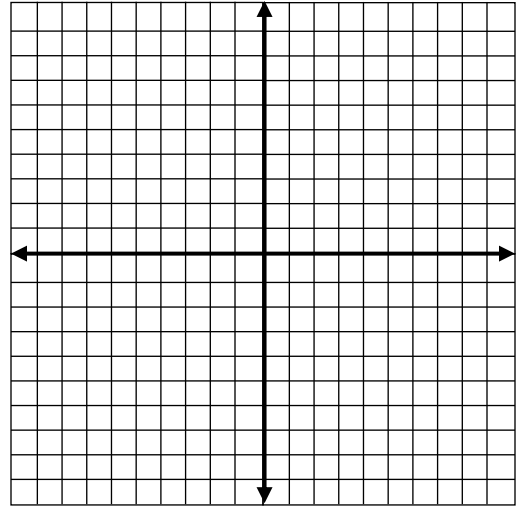$$\begin{cases} y < -x^2 - 9x - 2 \\ y > x^2 - 2 \end{cases}$$

You Try:

8.
$$\begin{cases} y \le -x^2 - 4x + 3 \\ y > x^2 + 3 \end{cases}$$

9.
$$\begin{cases} y \ge x^2 + 5x - 8 \\ y > -x^2 + 3x + 4 \end{cases}$$

Closure: How are linear systems similar to, yet different from, quadratic systems?

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Assignment: section 4.9 # 9,12,18,19,23,37,43,47(8 problems)