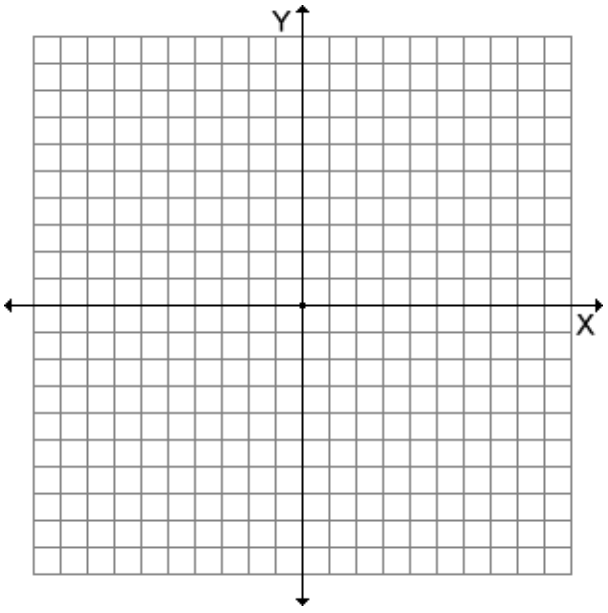
Solving Systems of Equations and Inequalities Graphically

Method:

- Identify the type of equation you will be graphing (linear or quadratic)
- Draw the graph of each equation/inequality on the same coordinate plane.
- The point/points of intersection of both equations (x,y) is the solution. Likewise, with inequalities, the overlapping shaded area includes all points which satisfy both inequalities.
- Check solution in both equations. Select a point in the shaded region to check both inequalities.

I Linear-Linear Systems

1) Solve this system graphically: $\begin{cases} y = 2x \\ 2x + 2y = 12 \end{cases}$



$y = 2x$ type of equation: _____

$2x + 2y = 12$ type of equation: _____

Graph to find the point of intersection.

Solution: (____,_____)

These are called ***consistent equations*** and they have ***one point of intersection***.

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2) Solve this system: $\begin{cases} y = x + 2 \\ y = x - 1 \end{cases}$

$y = x + 2$ type of equation: _____

$y = x - 1$ type of equation: _____

Solution(s)?

These are ***inconsistent equations***; the lines have the same slope, but different y-intercepts so ***lines are parallel and have no points of intersection***.

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3) Solve this system graphically: $y = \frac{1}{2}x + 1$ and $2y - x = 2$

Solution(s)?

These are called ***dependent equations***: The lines are identical (they have the same slope and y-intercept) so they have ***infinite points of intersection***.

II Quadratic-Linear Systems

4) Solve the system graphically: $\begin{cases} y - x = -4 \\ y = x^2 - 6x + 6 \end{cases}$

$y - x = -4$ type of equation:

$y = x^2 - 6x + 6$ type of equation:

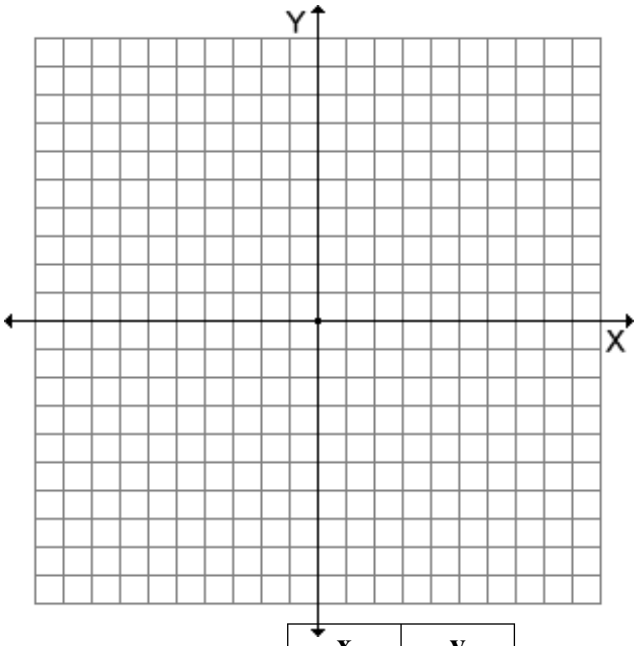
Graph each equation:

Quadratic: $y = x^2 - 6x + 6$

1. Find the axis of symmetry:

2. Make a table.

3. Graph & label the parabola.



x	y

Linear: $y - x = -4$

1. Find slope and y-intercept.

2. Graph & label.

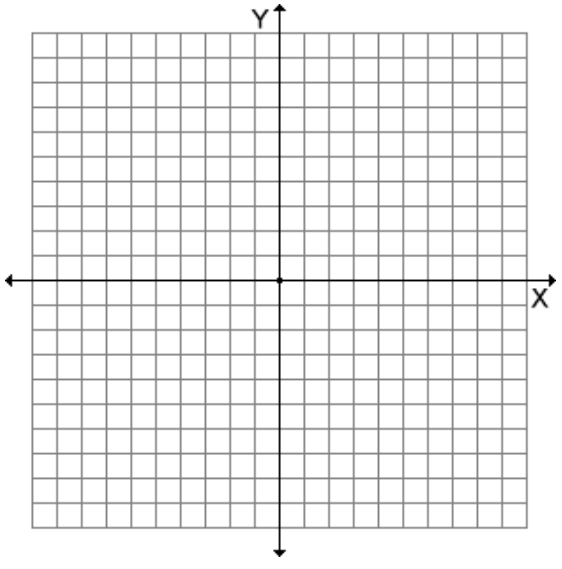
Find the solution(s) where the 2 intersect.
LABEL THESE ON THE GRAPH!!!!!

Solution(s):

5) June Regents Question

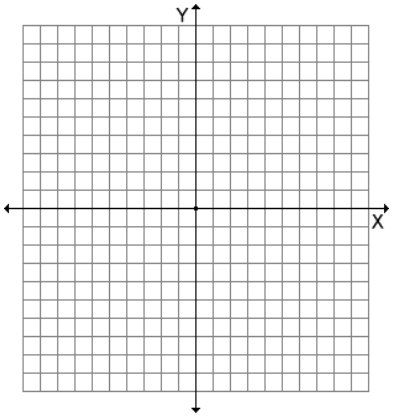
Solve the following system of equations graphically.

$$2x^2 - 4x = y + 1$$
$$x + y = 1$$

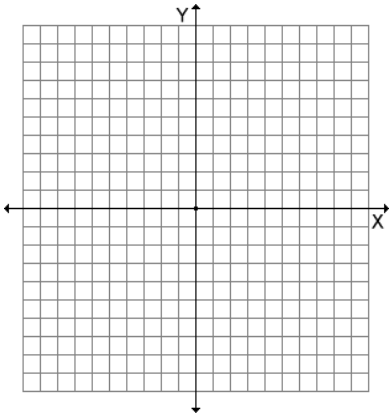


Warm Up: Graph the following. **Name:**

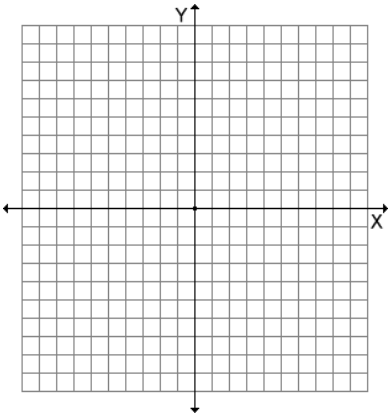
1) $y = -3$



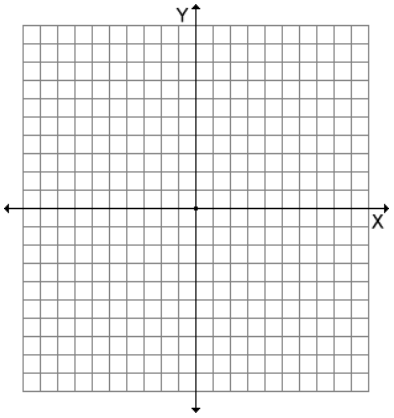
2) $y \geq 6$



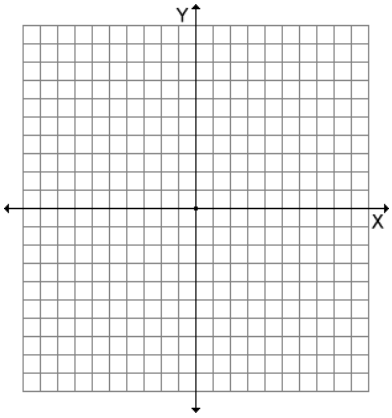
3) $y < -1$



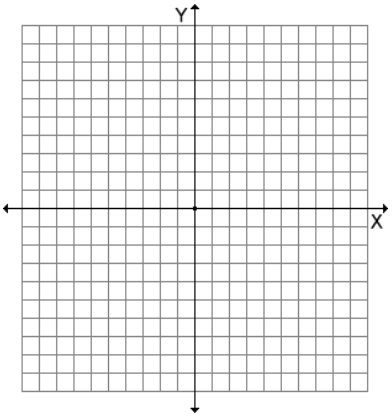
4) $x = -3$



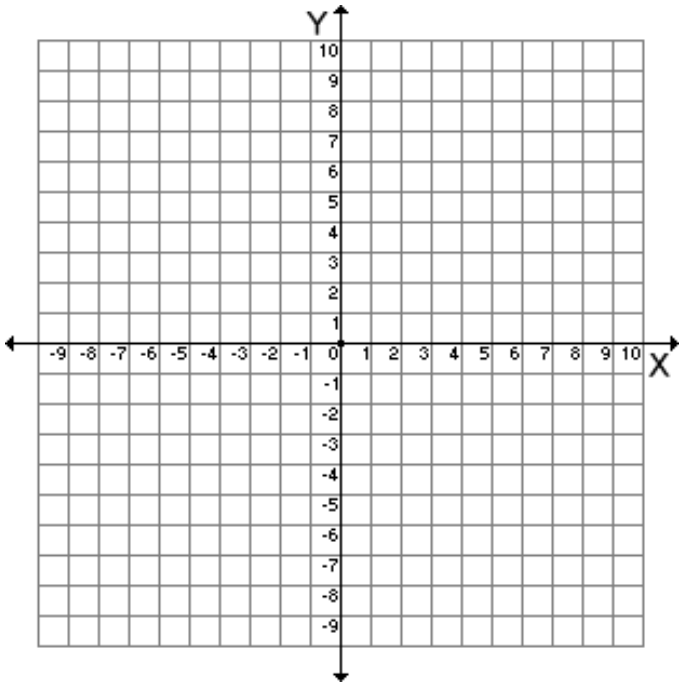
5) $x \leq 6$



6) $x \geq -1$



7) Regents Question: Graph the parabola whose equation is $y = x^2 - 2x - 8$ over the interval $-3 \leq x \leq 5$.



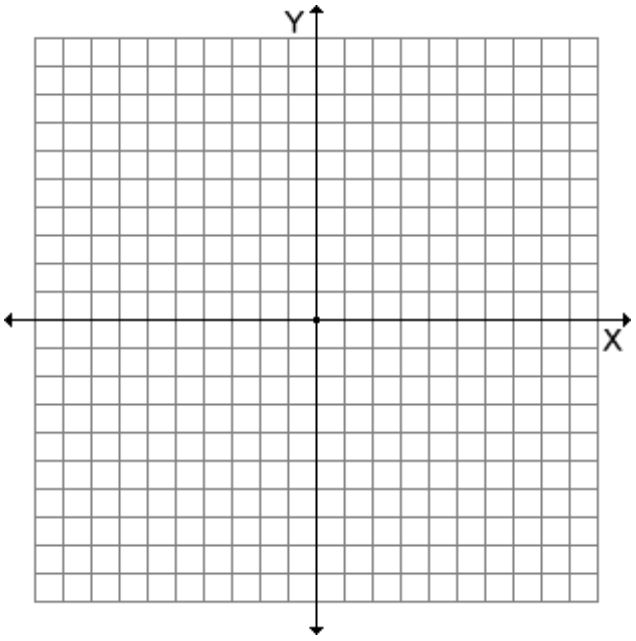
III Systems of Inequalities

When you solve a system of inequalities, the solution set is the shaded region that satisfies both inequalities. Here are the steps:

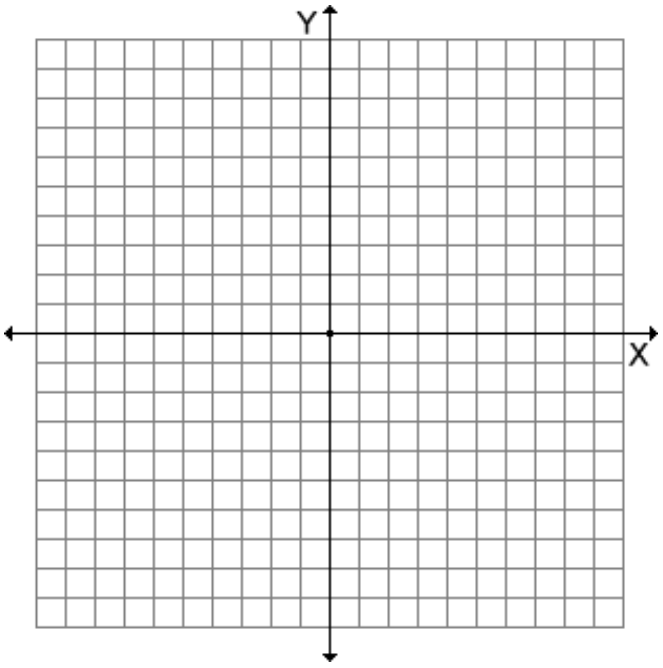
- Graph the lines. (Remember to choose a dotted or solid line).
- Shade and label each inequality
- The double shaded area is the solution.

6) Solve the system: $\begin{cases} y > x + 4 \\ y \leq -x \end{cases}$

Label solution set with an S.

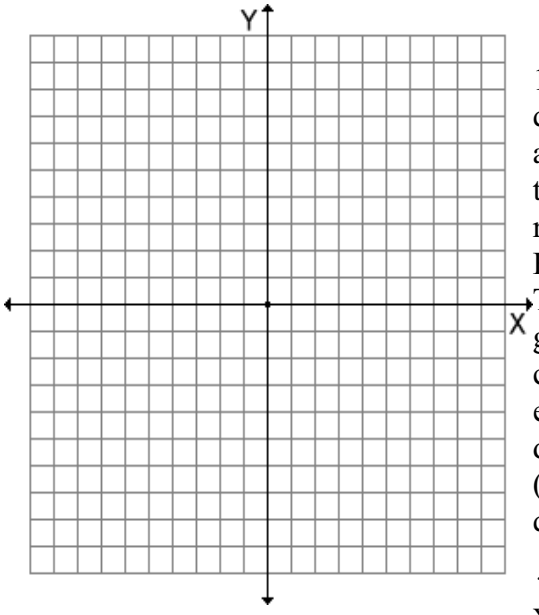


7) Solve the system, $y > -5$ and $y \geq x + 5$. Label solution set with a J.

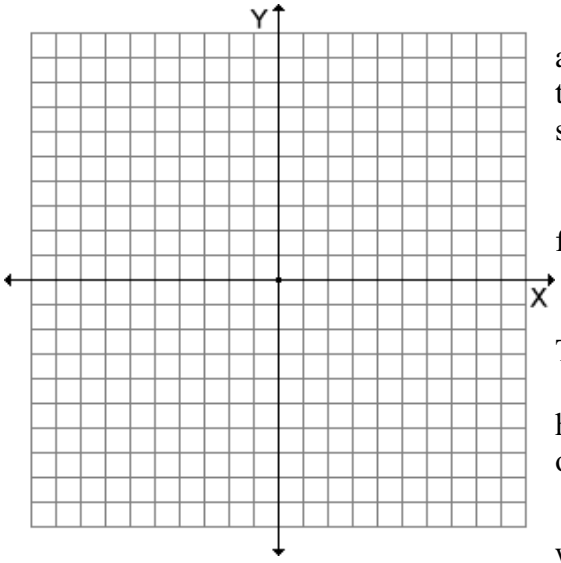


Solve the system of equations and inequalities. For inequalities, shade and label the solution set with an S.

8) $x < 2$
$x - 3y < 6$



9) $y = 4$ and $y - x = 4$



10) Ryan shoots a quarter from the top of a building at the same time that Nicole releases a Happy Birthday balloon for Tristan from the ground. (What a coincidence?!) The equation describing the height (y) above ground of the quarter in feet is $y = 64 - 2x^2$ where x is seconds. The equation describing the elevation of the balloon in feet is $y = 6x + 8$. **After how many seconds will the balloon and quarter pass each other (i.e. be at the same height at the same time)?**

CALCULATOR HELP: Adjust WINDOW if necessary, then push 2nd CALC (5)Intersect Enter Enter Enter