3.1 – Graphing Linear Inequalities

What are some (x, y) **values that make** $x+y<5$ **true?**

List them here. *(Find 5 or 6 pairs)*
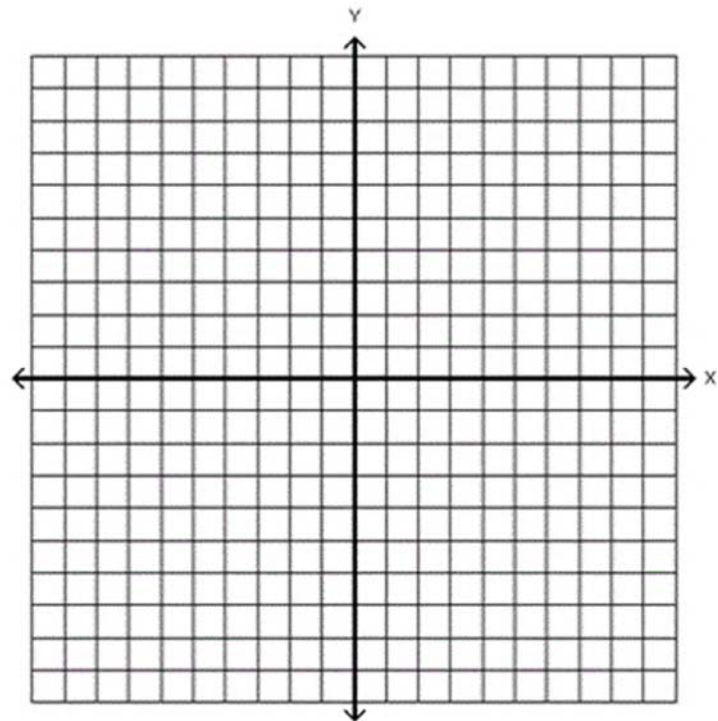
Now plot those points on the coordinate system.

Now graph the line, $x+y=5$ **on the coordinate system.**

What do you notice about the points you found before?

Linear Inequality

A **linear inequality** in two variables has the form

$$ax + by \leq c$$
$$ax + by < c,$$
$$ax + by \geq c,$$
$$\text{or} \quad ax + by > c,$$

for real numbers a, b, and c, with a and b not both 0.

The graph of a linear inequality, is the _____ **that makes the inequality**
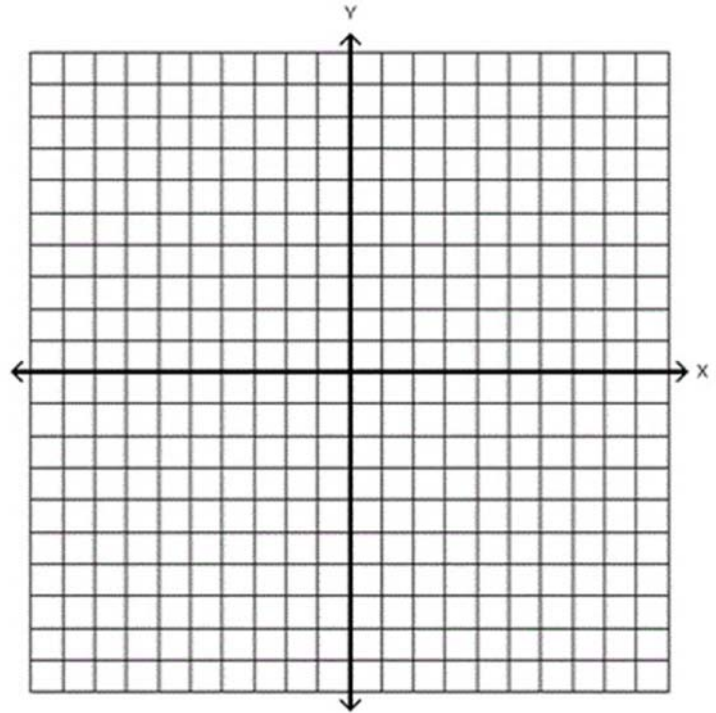_____. **We represent this by** _____ **that half.**

So the line itself represents the _____ and then one shaded side (half-plane) of the line represents the _____ and the other side represents the _____.

So if the inequality is _____ the boundary line will be _____.

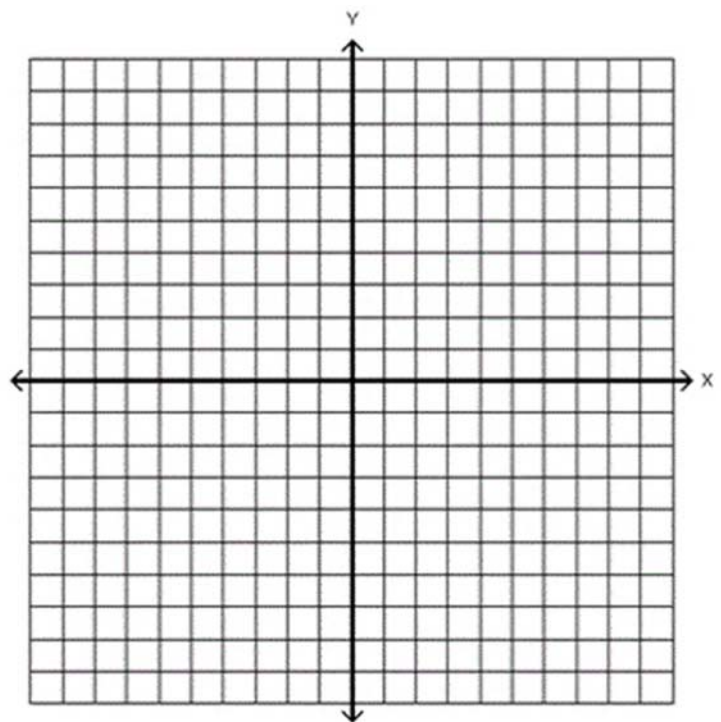**If the inequality is _____ the boundary line will be _____.**

#1. **Graph**

$$2x-3y>6$$

**#2.** **Graph**

$$2x+3y\geq9$$

Graphing a Linear Inequality

1. Draw the graph of the boundary line. Make the line solid if the inequality involves ≤ or ≥; make the line dashed if the inequality involves < or >.

2. Decide which half-plane to shade. Use either of the following methods.

   a. Solve the inequality for y; shade the region above the line if the inequality is of the form $y >$ or $y \geq$; shade the region below the line if the inequality is of the form $y <$ or $y \leq$.

   b. Choose any point not on the line as a test point. Shade the half-plane that includes the test point if the test point satisfies the original inequality; otherwise, shade the half-plane on the other side of the boundary line.

A _____ __ _____ is a collection of 2 or more inequalities.

#3. **Graph the system**

$$4x - y < 6$$
$$3x + y \leq 9$$
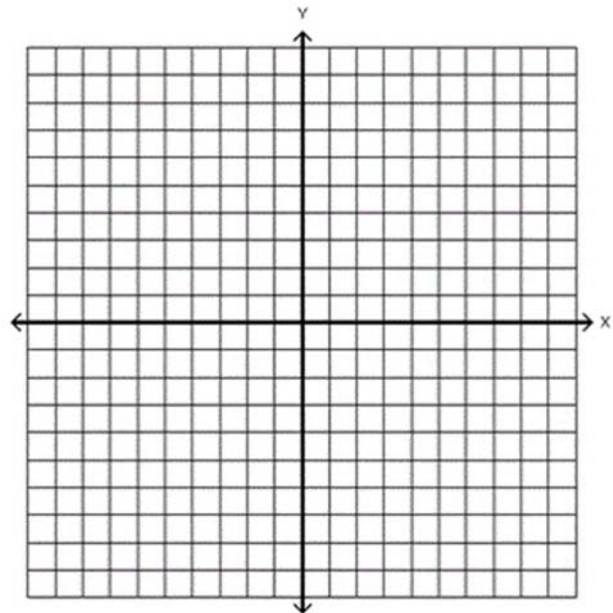
The overlapping shaded areas is often referred to as the _____ _____.

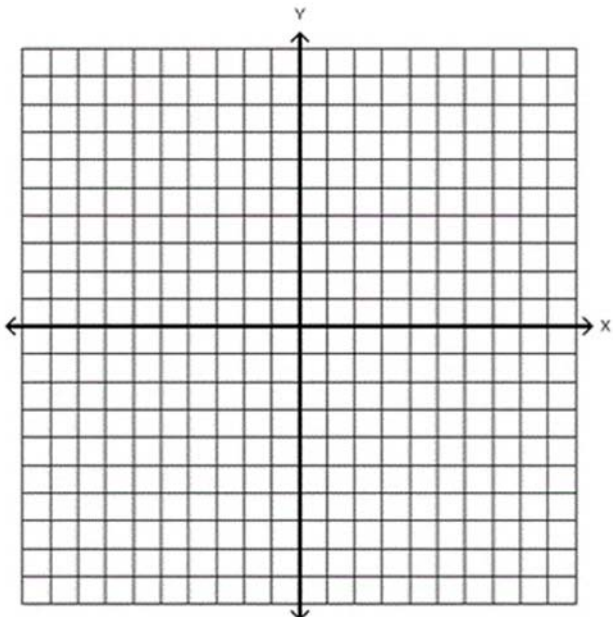#4. **Find the Feasible Region.**

$$2x + 3y \leq 12$$
$$2x + 3y > 3$$
$$3x + y < 4$$
$$x \geq 0$$
$$y \geq 0$$

43. Management The Gillette Company produces two popular battery-operated razors, the M3Power™ and the Fusion Power™. Because of demand, the number of M3Power™ razors is never more than one-half the number of Fusion Power™ razors. The factory's production cannot exceed 800 razors per day. Let x = the number of M3Power™ razors and y = the number of Fusion Power™ razors produced per day.

   a. Write a system of inequalities to express the conditions of the problem.

   b. Graph the feasible region of the system.