InEqualities

- Involves <, ≤, ≥, or >

- Language tends to be more complex than that of equations.

- For example, we "solve" an equation for x but "find all possible values of x" in an inequality.

Equation Example: 2x = 5 – 3x → x = 1

The solution for x describes a specific value. However, in an

Inequality: 8 - 2x > 6, the x describes a range of values.

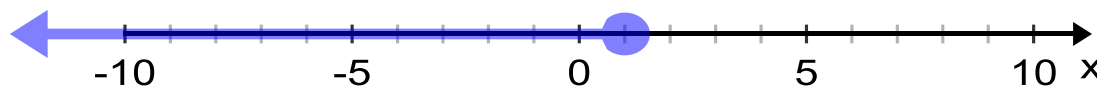Initial task is the same for both equations & inequality which is to isolate x on 1 side. So solving 8 - 2x > 6 for x → -2x > 6 – 8 →

Multiply by (-1/2) remember to flip the inequality symbol when x(-1),

(-1/2) -2x > -2(-1/2) → x < 1

Graphically, x < 1 represents a range of answers...

Note the open circle because x < 1 (less than 1)...
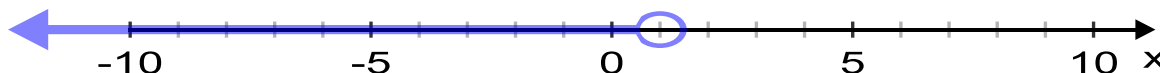
IF x ≤ 1 (greater than *or equal to 1*)...note the filled-in circle.

Check:

Plug in numbers that would make the inequality true.

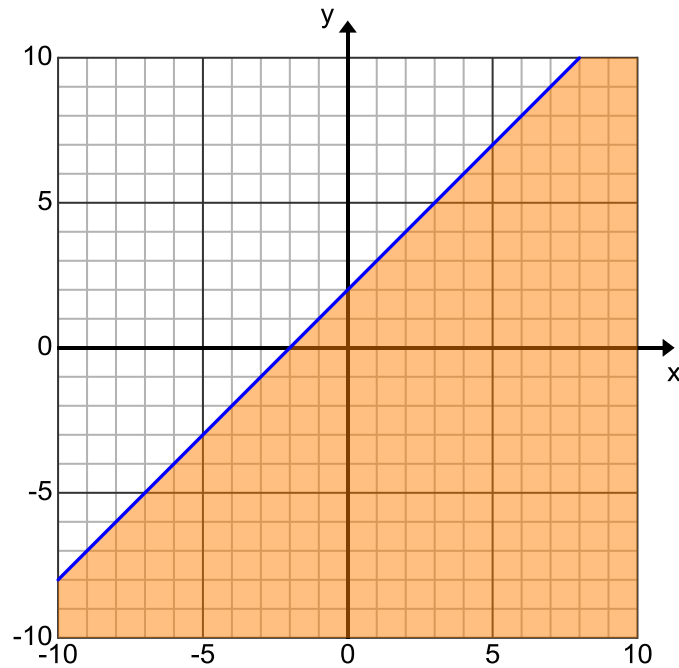Is x = 0 true from the graph? In the inequalities?

Is x = -4 true?

What about x = 5?

In 2-dimensions: Inequalities graph as lines are called boundary lines with shaded regions known as half-planes.
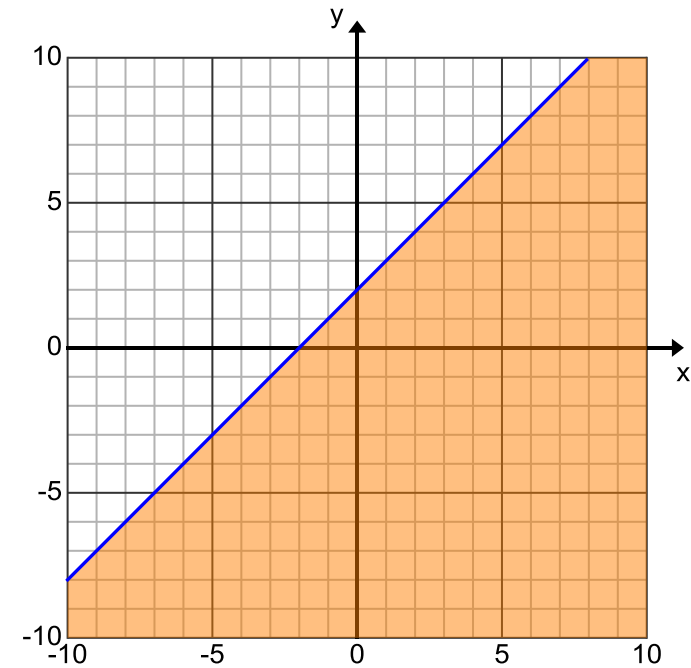Note the solid line vs. dashed lines. Is the point (0,2) a solution in A? in B?
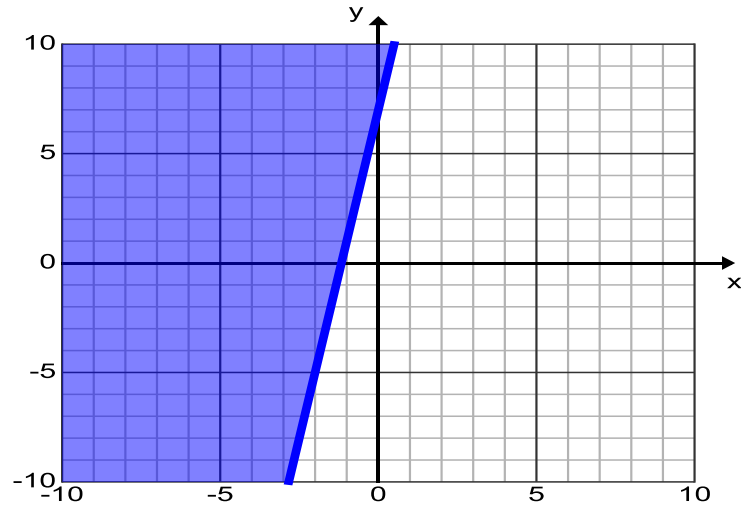Does (0,1) satisfy the inequalities? Is (0,1) in the shaded area?
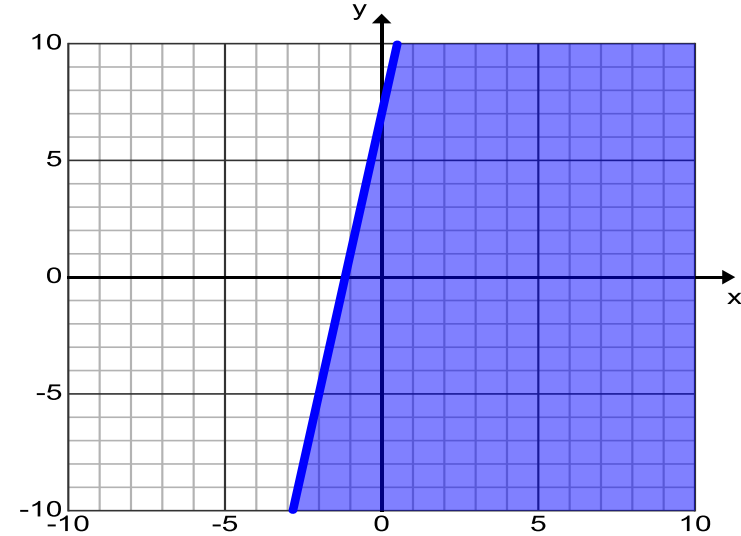
Example A) Y ≤ X + 2

Example B) Y < X + 2

Which graph represents the solution set for
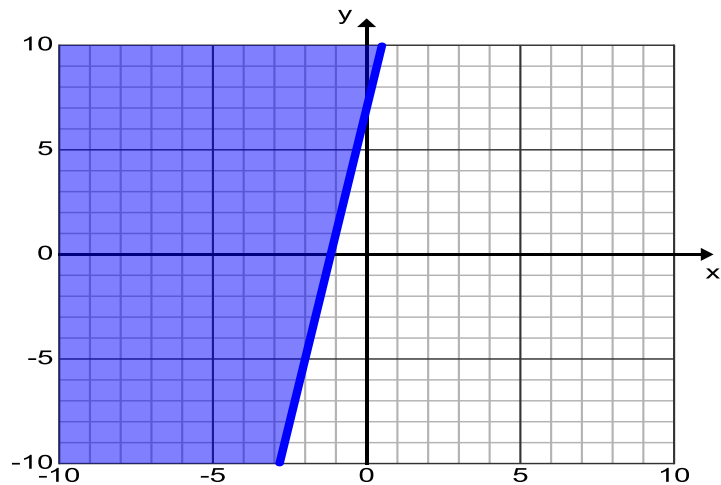y < 6x + 7? Do (1,20) or (0,0) satisfy the inequality? Plug in graph and check.
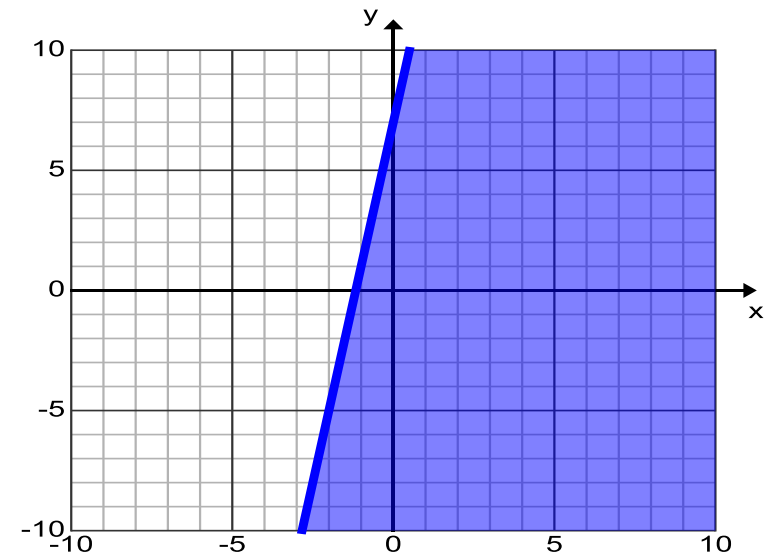
A)

B)

C)

D)

Systems of inequalities are problems with 2 inequalities. The solution set is the area where the shading overlaps. Shading can be in the same direction or different directions.

One Variable Example: If $3x - 7 < 8$ and $-6x - 2 < -26$, what is one possible value of x? Solve each inequality individually...

$$3x - 7 < 8 \qquad\qquad\qquad -6x - 2 < -26$$
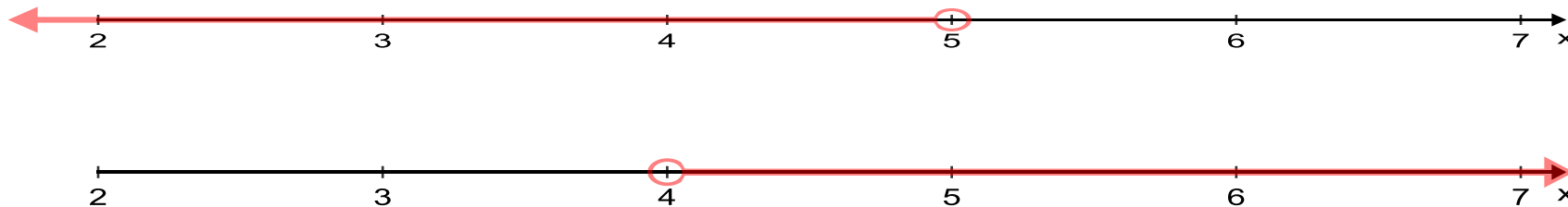
$$3x < 15 \qquad\qquad\qquad\qquad -6x < -24$$

$$x < 5 \qquad\qquad\qquad\qquad\qquad x > 4$$

Combine the 2 answers   on a graph....
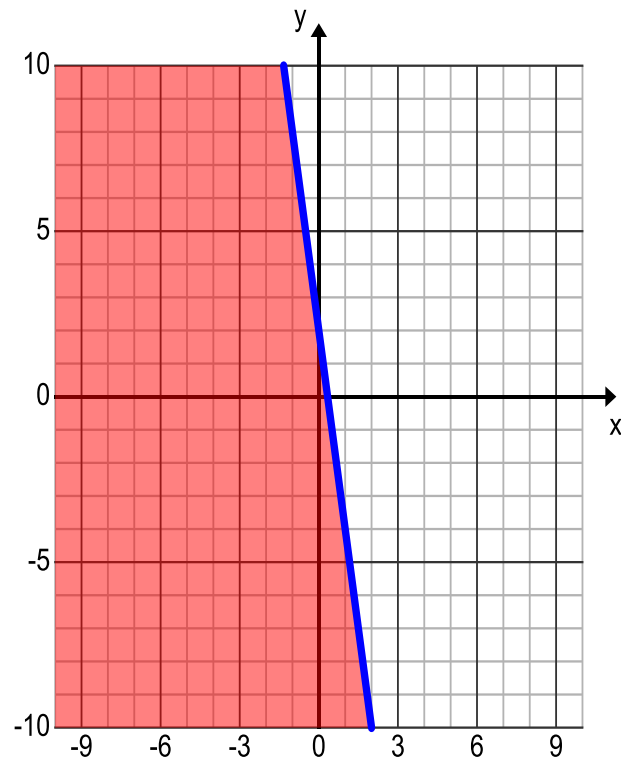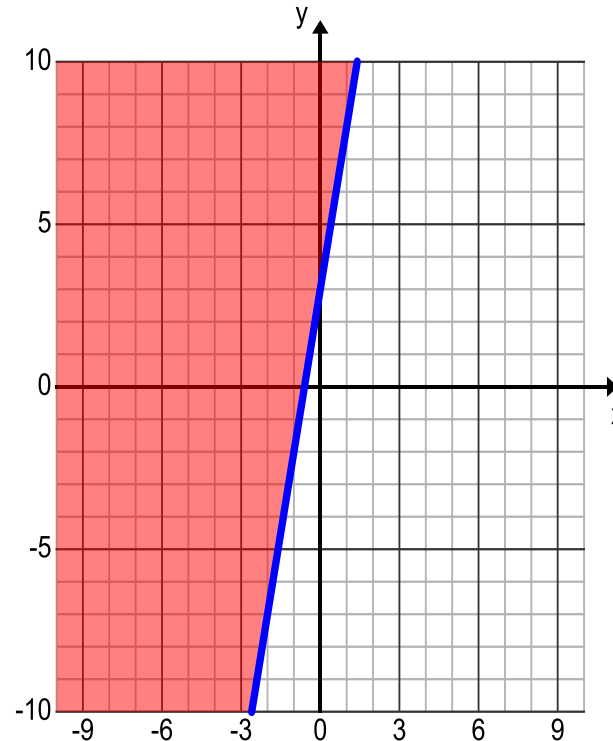
System of Inequalities, 2-variable example: If y ≤ -6x+2 & y ≥ 5x+3, find the graphical solution for the system.(hint: use a point,say(-3,0) to check)

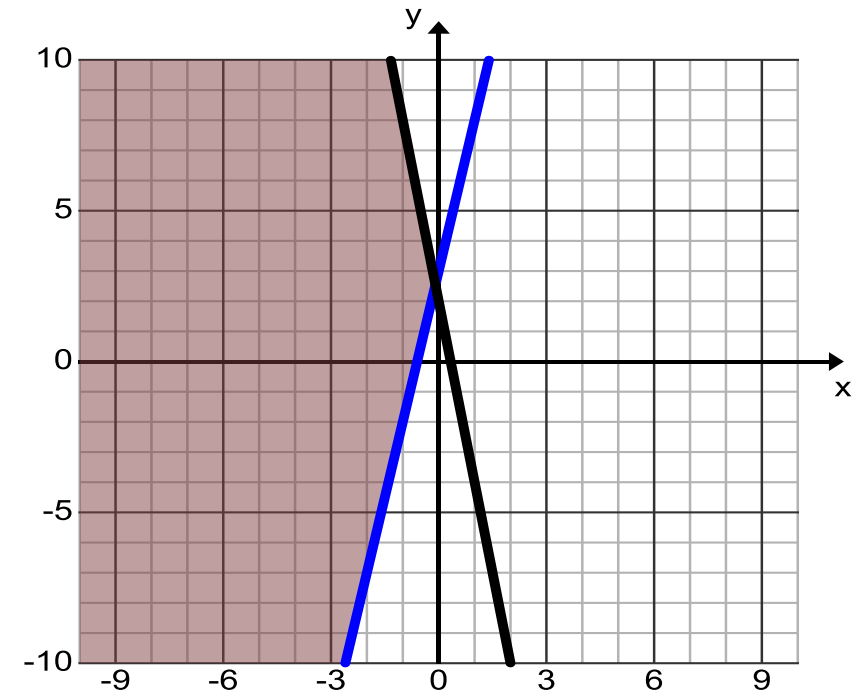- Solve for each inequality and graph separately before combing results.

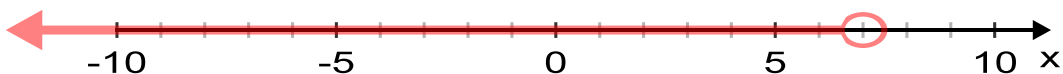y ≤ -6x+2   y ≥ 5x+3   Combined (intersection shaded)

Now you try. PSAT #7

1) Graph and solve: $3x + 12 \geq 4(x+2)$

2) What could be a value for a in the following systems of inequalities?
$$a + 2 > 5 \ \ \& \ a - 4 < 1$$

3) Given: & 15-x __?__ 8

Which inequality symbol would make the statement true?

4) Graph the system of inequalities. $Y \geq (5/6)x - 8$ and $y > (-2/3)x + 2$