Day 5 – Understanding Solutions – Notes & Practice

Learning Target: *I can determine if a point is a solution to a system of equations or inequalities.*

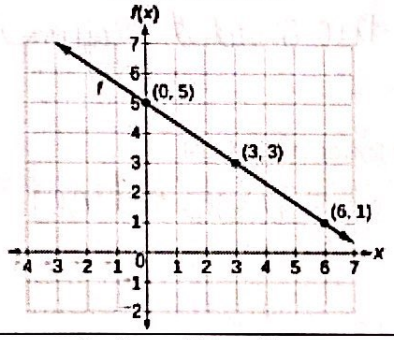
A **solution** is any number or ordered pair that makes an equation, inequality, or system true. We determine whether numbers or ordered pairs are solutions by:

- Substituting into the equation/inequality/system to see if it produces a true statement
- Looking at a graph and determining if the ordered pair is on the line (linear equation or system of equations) or falls in the shaded boundary area (linear inequality or system of inequalities)

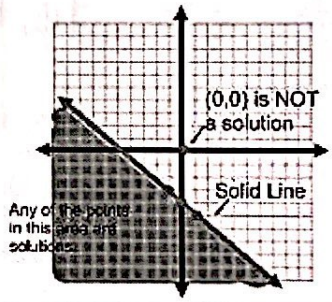
Word of Caution: If a point falls on a dotted line, it is NOT part of the solution set!!

Determining Solutions from a Graph

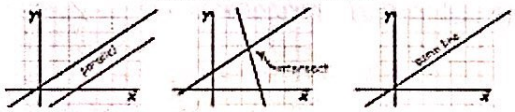
Linear Function



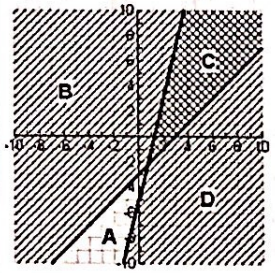
Linear Inequality



System of Equations



System of Inequalities



A: Not a solution region to either inequality.

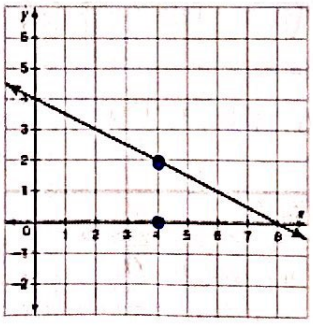
B: Solution region to only one inequality.

C: Solution region to both inequalities.

D: Solution Region to the other inequality.

Practice: Analyze the following graphs. Determine if the following points are solutions or not. Explain your reasoning.

a.



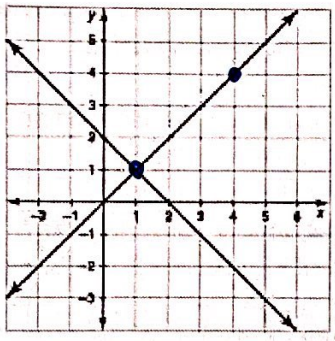
a. Is (4, 2) a solution to the linear function?

Yes, it is on the line.

b. Is (4, 0) a solution to the linear function?

No, it is not on the line.

b.



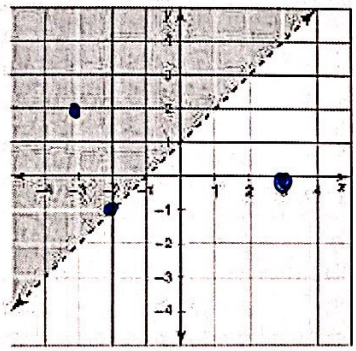
a. Is (4, 4) a solution to the system?

No, because it is not where the lines intersect.

b. Is (1, 1) a solution to the system?

Yes, because it is where the lines intersect.

c.



a. Is (3, 0) a solution to the linear inequality?

No, it is not in the shaded region

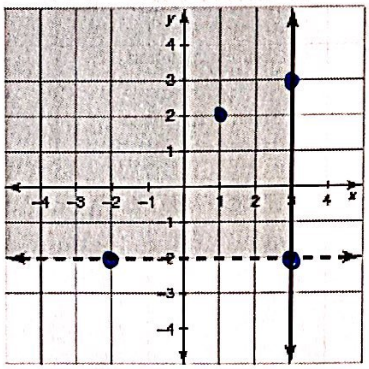
b. Is (-2, -1) a solution to the linear inequality?

No, because it is on a dashed line

c. Is (-3, 2) a solution to the linear inequality?

Yes, it is in the shaded region.

d.



a. Is (1, 2) a solution to the system of inequalities?

Yes it is in the shaded region.

b. Is (-3, -2) a solution to the system of inequalities?

No, it is on a dashed line.

c. Is (3, 3) a solution to the system of inequalities?

Yes, it is on the solid line, where the shaded region is.

d. Is (3, -2) a solution to the system of inequalities?

No, because one of the lines is dashed.

Determining Solutions from Equations

Linear Functions/Systems	**Linear/System Inequalities**
Substitute your coordinate point in for all equations. If the resulting equation is **TRUE** for **ALL** equations, the coordinate point is a **SOLUTION.** If the resulting equation is **FALSE** for **ANY** of the equations, the coordinate point is **NOT A SOLUTION.**	Substitute your coordinate point in for all inequalities. If the resulting inequality is **TRUE** for **ALL** inequaities, the coordinate point is a **SOLUTION.** If the resulting inequallity is **FALSE** for **ANY** of the inequalities, the coordinate point is **NOT A SOLUTION.**

Practice: Determine if the following points are solutions to the functions/systems.

	x y (-2, -7)	x y (1, 4)
a. $y = 3x - 1$	$-7 = 3(-2) - 1$ $-7 = -7$ Solution	$4 = 3(1) - 1$ $4 \neq 2$ Not a Solution
b. $x + 3y = 2$ $2x + 3y = 7$	(8, -2) $8 + 3(-2) = 2$ $\quad 2(8) + 3(-2) = 7$ $8 - 6 = 2$ $\quad 16 - 6 = 7$ $2 = 2$ $\quad 10 \neq 7$ Not a Solution	(5, -1) $5 + 3(-1) = 2$ $\quad 2(5) + 3(-1) = 7$ $5 - 3 = 2$ $\quad 10 - 3 = 7$ $2 = 2$ $\quad 7 = 7$ Solution
c. $y > x + 1$	(2, 3) $3 > 2 + 1$ $3 \not> 3$ Not a Solution	(-3, 3) $3 > -3 + 1$ $3 > -2$ Solution
d. $y > 2x + 4$ $y \leq -x - 2$	(-2, 3) $3 > 2(-2) + 4$ $\quad 3 \leq -(-2) - 2$ $3 > -4 + 4$ $\quad 3 \leq 2 - 2$ $3 > 0$ $\quad 3 \not\leq 0$ Not a Solution	(-4, 0) $0 > 2(-4) + 4$ $\quad 0 \leq -(-4) - 2$ $0 > -8 + 4$ $\quad 0 \leq 4 - 2$ $0 > -4$ $\quad 0 \leq 2$ Solution