HOMEWORK... Questions?

p. 221: #1, #2, #4 and #6

~~Warm up #5~~

6a)

solid boundary

Stipple Quad I

6. Graph the solution set for each linear inequality.

a) $\{(x, y) \mid \boxed{2x - y \geq 5y + 2x + 12,} \; x \in W, y \in W\}$

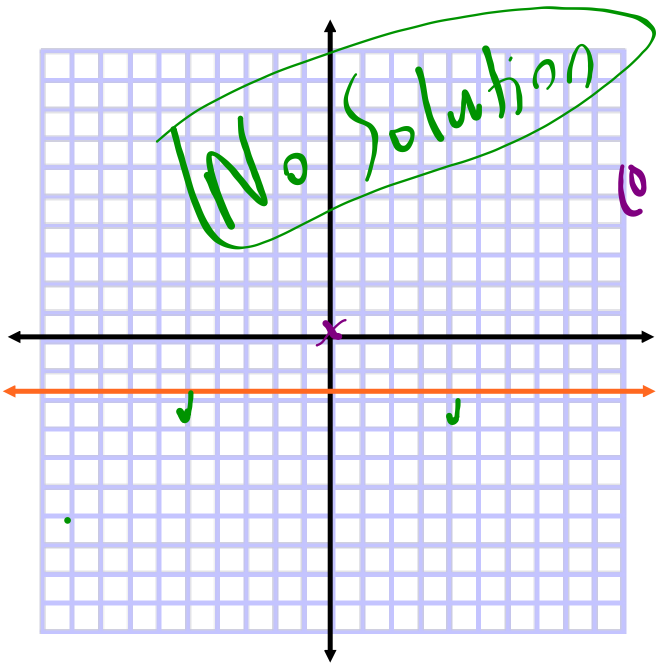
$$2x - y = 5y + 2x + 12$$

$$-y - 5y = \cancel{-2x} + \cancel{2x} + 12$$

$$\frac{-6y}{-6} = \frac{12}{-6}$$

$$y = -2$$

horizontal



$$2x - y \geq 5y + 2x + 12$$

$(0,0)$ LS $\geq$ RS

LS	RS
$2(0) - 0$	$5(0) + 2(0) + 12$
$0 \geq$	12

Not a solution

dashed

b) $\{(x, y) \mid x + 6y - 14 < 0, x \in \mathrm{I}, y \in \mathrm{I}\}$ Stipple

$\frac{7}{3} = 2\frac{1}{3}$

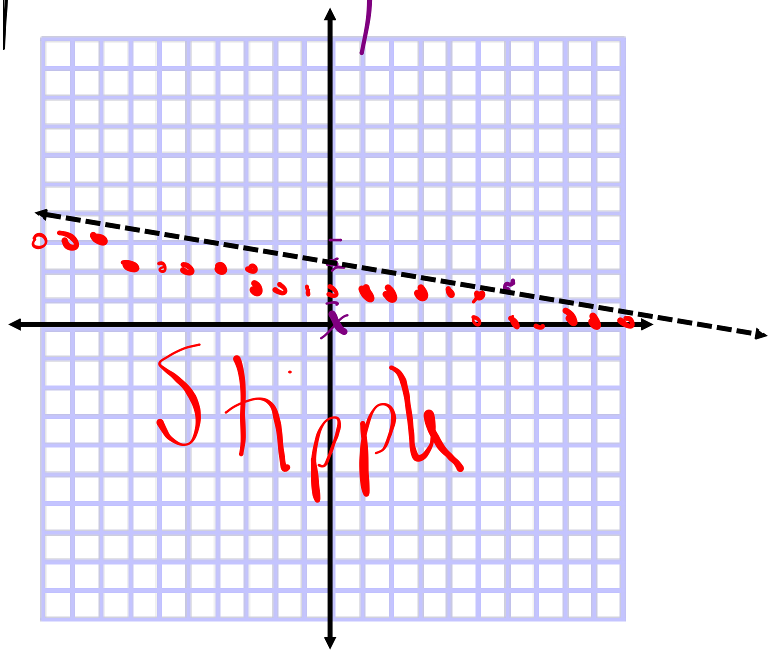
$2.\overline{3}$

LS	< RS
$0+6(0)$	0
-14	
-14 <	yes

$x + 6y - 14 = 0$

$\frac{6y}{6} = \frac{-x}{6} + \frac{14}{6}$

$y = -\frac{1}{6}x + \frac{7}{3}$



$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\;\; \in W \quad\;\; \in W$

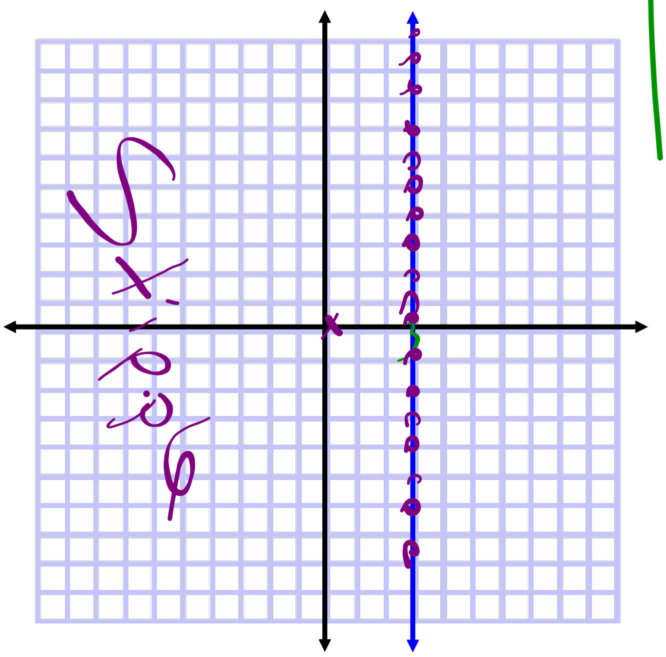
d) $\{(x, y) \mid 2x + 2 \le 5 + x, \cancel{x \in I, y \in I}\}$

$2x + 2 = 5 + x$

$\quad -x$

$2x = 5 - 2$

$x = 3$



LS	≤ RS
$2(0) + 2$	$5 + 0$
2	≤ 5
	yes

Line Segment vs Line vs Ray

Applications...Apply your skills to a context

EXAMPLE #2: HANDOUT - Application of a Linear Inequality.docx

Malia and Lainey are competing in a spelling quiz. Malia gets a point for every word she spells correctly. Lainey is younger than Malia, so she gets 3 points for every word she spells correctly plus one bonus point. What combination of correctly spelled words for Malia and Lainey result in Malia spelling more? Choose two combinations that make sense and explain why.

Step 1: Declare variables

x - # of words Malia spells
y - # of words Lainey spells

Step 2: State restrictions

* Number Set

$x \in W$
$y \in W$

Step 3: Develop the inequation

$1x > 3y + 1$

Step 4: Graph the solution set (MUST include labels/scales)

LS	>	RS
0	$\not>$	3(0)+1
		1

No

$x = 3y + 1$

$\frac{x}{3} - \frac{1}{3} = \frac{3y}{3}$

$\frac{1}{3}x - \frac{1}{3} = y$

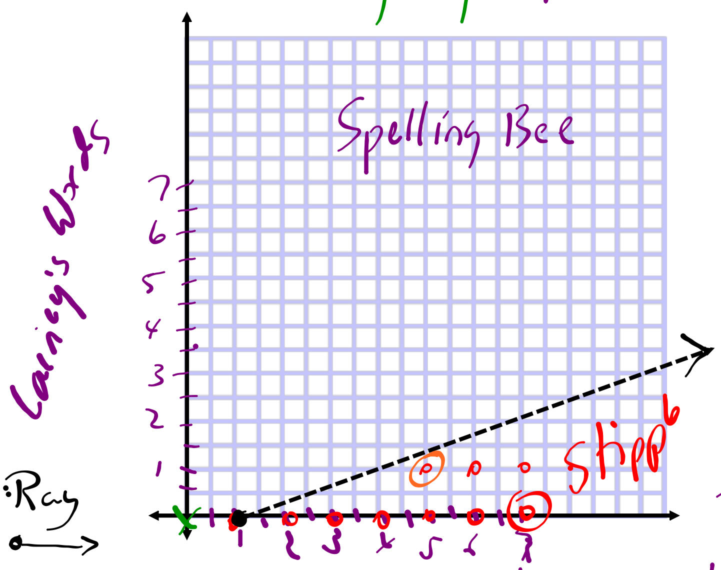
$y = \frac{1}{3}x - \frac{1}{3}$

x	y
0	$-1/3$
1	0
4	1
7	2

$\frac{1}{3}(1) - \frac{1}{3}$

$\frac{1}{3}(4) - \frac{1}{3}$

$\frac{1}{3}(7) - \frac{1}{3}$



Ray

Line Segment

Solution #1

(7, 0)

Malia → 7 [7 points]

Lainey → 0 [1 point]

#2 (5, 1)

EXAMPLE 3
p. 218

Solving a real-world problem by graphing a linear inequality with discrete whole-number solutions

A sports store has a net revenue of $100 on every pair of downhill skis sold and $120 on every snowboard sold. The manager's goal is to have a net revenue of more than $600 a day from the sales of these two items. What combinations of ski and snowboard sales will meet or exceed this daily sales goal? Choose two combinations that make sense, and explain your choices.

$x \to$ # of skis
$y \to$ # of boards

Step 1: Declare variables

Step 2: State restrictions $\quad x \in W \quad y \in W$

Step 3: Develop the inequation $\quad \boxed{100x + 120y \geq 600}$

Step 4: Graph the solution set (MUST include labels/scales) $\quad 100x + 120y = 600$

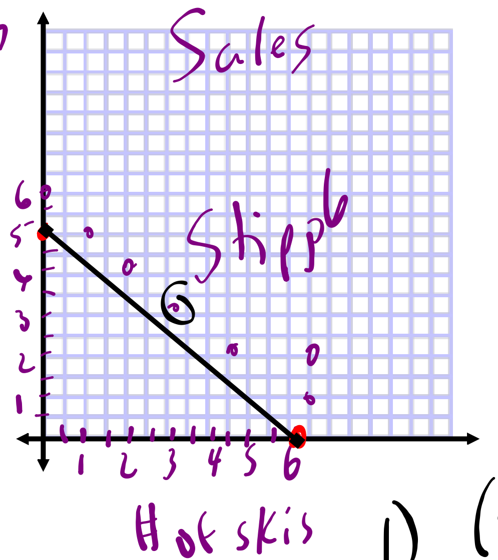
y int

$\cancel{100(0)} + 120y = 600$

$\frac{120y}{120} = \frac{600}{120}$

$y = 5$

$(0,5)$



x int

$100x + \cancel{120(0)} = 600$

$\frac{100x}{100} = \frac{600}{100}$

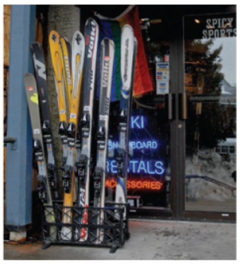
$x = 6$

$(6,0)$

1) $(5,2)$ 5 skis 2 boards

EXAMPLE 3 p. 218 — Solving a real-world problem by graphing a linear inequality with discrete whole-number solutions

A sports store has a net revenue of \$100 on every pair of downhill skis sold and \$120 on every snowboard sold. The manager's goal is to have a net revenue of more than \$600 a day from the sales of these two items. What combinations of ski and snowboard sales will meet or exceed this daily sales goal? Choose two combinations that make sense, and explain your choices.



Jerry's Solution

The relationship between the number of pairs of skis, x, the number of snowboards, y, and the daily sales can be represented by the following linear inequality:
$100x + 120y > 600$

> I defined the variables in this situation and wrote a linear inequality to represent the problem.

The variables represent whole numbers.
$x \in W$ and $y \in W$

> I knew that only whole numbers are possible for x and y, since stores don't sell parts of skis or snowboards.
>
> Because the domain and range are restricted to the set of whole numbers, I knew that the solution set is discrete.
>
> I also knew that my graph would occur only in the first quadrant.

$$100x + 120y > 600$$
$$120y > 600 - 100x$$
$$\frac{120y}{120} > \frac{600 - 100x}{120}$$
$$y > \frac{600}{120} - \frac{100x}{120}$$
$$y > 5 - \frac{5x}{6}$$
$$y > -\frac{5x}{6} + 5$$

> I isolated y so I could enter the inequality into my graphing calculator.

> I adjusted the calculator window to show only the first quadrant, since the domain and range are both the set of whole numbers.
>
> The boundary is a dashed line, which means that the solution set does not include values on the line.

$\{(x, y) \mid 100x + 120y > 600, x \in W, y \in W\}$

Test (0, 0) in $100x + 120y > 600$.

LS	RS
$100(0) + 120(0)$	600
0	

Since 0 is not greater than 600, (0, 0) is not in the solution region.

> I used the test point (0, 0) to verify that the correct half plane was shaded.
>
> Since (0, 0) is not a solution to the linear inequality, I knew that the half plane that did not include this point should be shaded. This was done correctly.

> When I interpreted the graph, I considered the context of the problem. I knew that
> - only discrete points with whole-number coordinates in the solution region made sense.
> - points along the dashed boundary are not part of the solution region.
> - points with whole-number coordinates along the x-axis and y-axis boundaries are part of the solution region.

Test (4, 4) in $100x + 120y > 600$.

LS	RS
$100(4) + 120(4)$	600
$400 + 480$	
880	

Since $880 > 600$, (4, 4) is a solution.

> I picked two points in the solution region, (4, 4) and (5, 3), as possible solutions to the problem. I verified that each point is a solution to the linear inequality.

Test (5, 3) in $100x + 120y > 600$.

LS	RS
$100(5) + 120(3)$	600
$500 + 360$	
860	

Since $860 > 600$, (5, 3) is a solution.

Sales of four pairs of skis and four snowboards or sales of five pairs of skis and three snowboards will exceed the manager's net revenue goal of more than \$600 a day.

> Some points in the solution region are more reasonable than others. For example, the point (1000, 1000) is a valid solution, but it might be an unrealistic sales goal.

HOMEWORK...

Word Problems

Worksheet - Applications of a Linear Inequality.pdf

p. 221: #5, 7, 8, 9, ~~10~~

Review

1) Declare variables
2) State restrictions
3) Develop inequation
4) Graph solution set

Attachments

Example - Application of a Linear Inequality.docx

Worksheet - Applications of a Linear Inequality.pdf