HOMEWORK...

Worksheet - Applications of a Linear Inequality.pdf

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

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

HW Questions...

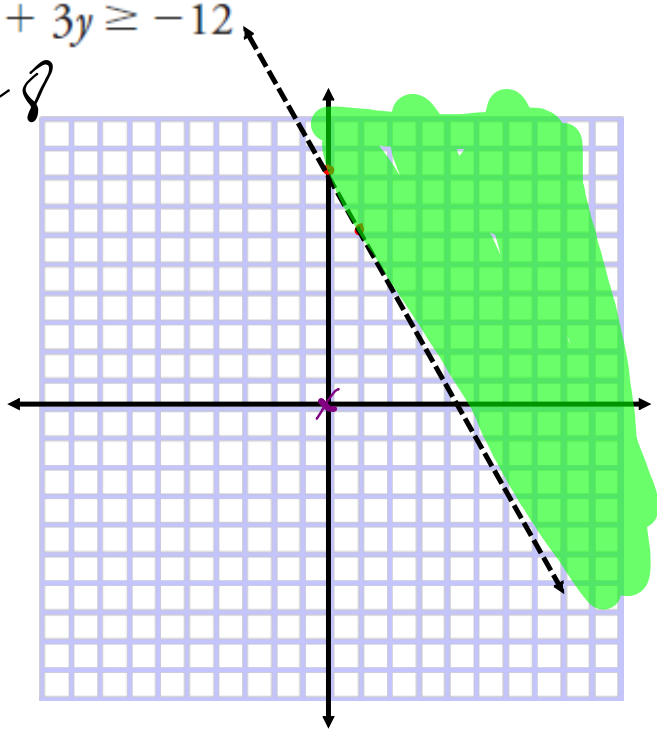
5. Graph the solution set for each linear inequality.

a) $y > -2x + 8$
b) $-3y \leq 9x + 12$
c) $y < 6$
d) $-4x - 8 > 4$
e) $10x - 12 < -y$
f) $4x + 3y \geq -12$

$y = -2x + 8$

$y > -2x + 8$

LS	RS
0	$-2(0) + 8$
	8
	No



(8)

8. Eamon coaches a hockey team of 18 players. He plans to buy new practice jerseys and hockey sticks for the team. The supplier sells practice jerseys for $50 each and hockey sticks for $85 each. Eamon can spend no more than $3000 in total. He wants to know how many jerseys and sticks he should buy.

a) Write a linear inequality to represent the situation.
b) Use your inequality to model the situation graphically.
c) Determine a reasonable solution to meet the needs of the team, and provide your reasoning.

- Declare variables

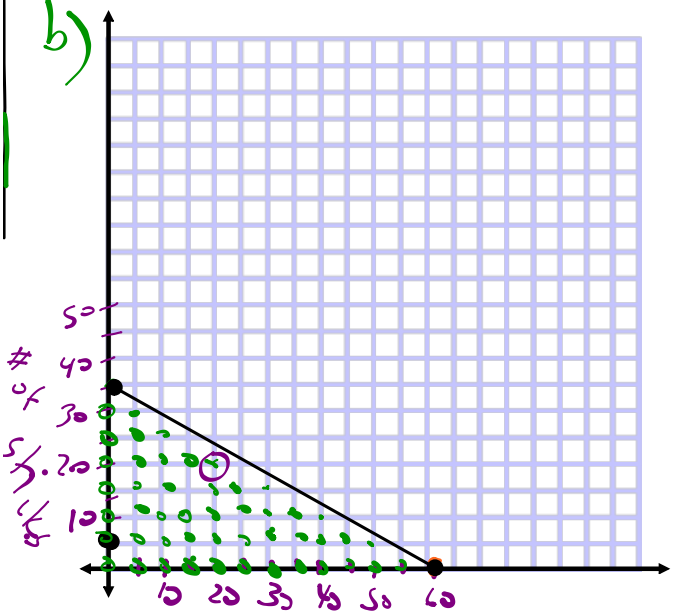
$x \rightarrow$ # of jerseys
$y \rightarrow$ # of sticks

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

- Restrictions
- Inequation

a) $50x + 85y \leq 3000$

b)



$50x + 85y = 3000$

x-int

$50x + 85(0) = 3000$

$\frac{50x}{50} = \frac{3000}{50}$

$x = 60$

$(60, 0)$

y-int

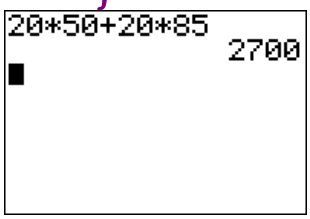
$50(0) + 85y = 3000$

$\frac{85y}{85} = \frac{3000}{85}$

$y = 35.3$

$(0, 35.3)$

c) 20 sticks
20 jerseys



9. For every teddy bear that is sold at a fundraising banquet, \$10 goes to charity. For every ticket that is sold, \$32 goes to charity. The organizers' goal is to raise at least \$5000. The organizers need to know how many teddy bears and tickets must be sold to meet their goal.

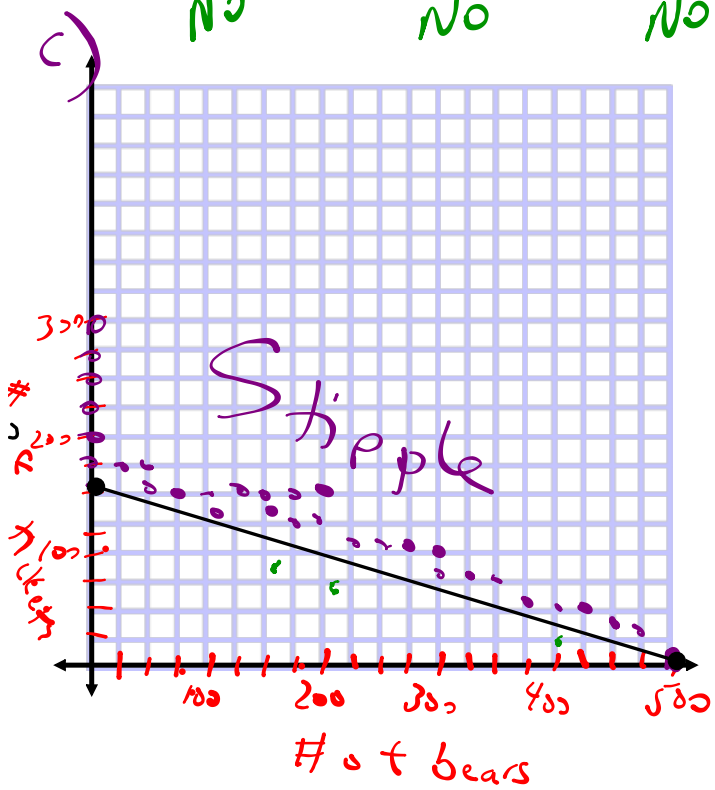
a) Define the variables and write a linear inequality to represent the situation.

b) What are the restrictions on the variables? How do you know?

c) Graph the linear inequality to help you determine whether each of the following points is in the solution set. The first coordinate is the number of teddy bears and the second is the number of tickets.

i) (400, 20) ii) (205, 98) iii) (156, 105)

No No No



x → # of bears
y → # of tickets
x ∈ W
y ∈ W

a.)
b.)

$10x + 32y \geq 5000$

$10x + 32y = 5000$

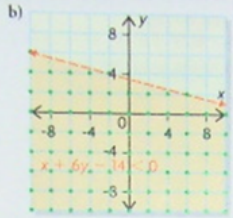
x-int (500, 0)

y-int (0, 156)

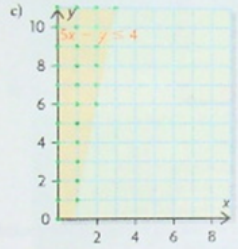
SOLUTIONS...

6. a) no solution

b)



c)



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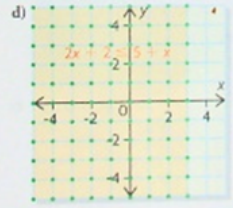

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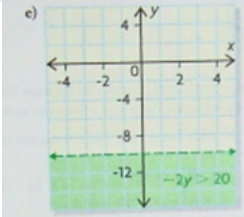

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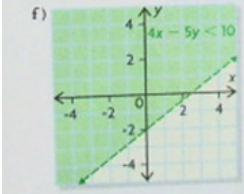
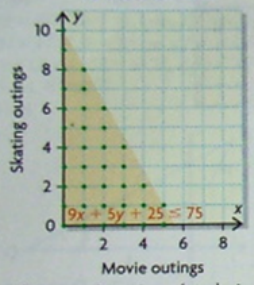


7. a) Let x represent the number of movies Grace sees. Let y represent the number of times Grace goes skating.
$\{(x, y) \mid 9x + 5y + 25 \leq 75, x \in W, y \in W\}$

b) The variables must be whole numbers. $x \in W, y \in W$

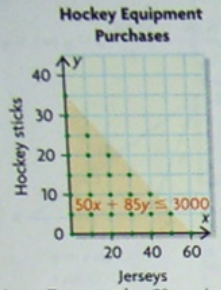
c)



i) e.g., see 3 movies and go skating 4 times
ii) e.g., see 5 movies and go skating once
iii) e.g., see 3 movies and go skating 6 times

8. a) Let x represent the number of jerseys. Let y represent the number of sticks.
$\{(x, y) \mid 50x + 85y \leq 3000, x \in W, y \in W\}$

b)

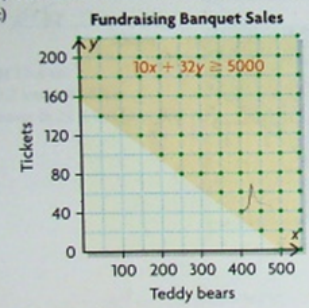


c) e.g., Eamon can buy 20 practice jerseys and 20 sticks for his team for $2700. It's reasonable to have a few extra jerseys and a few extra sticks.

9. a) Let x represent the number of teddy bears sold. Let y represent the number of tickets sold.
$\{(x, y) \mid 10x + 32y \geq 5000, x \in W, y \in W\}$

b) The variables must be whole numbers. $x \in W, y \in W$

c)

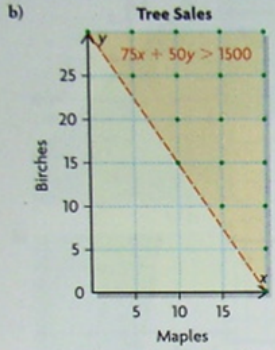


i) not a solution
ii) Yes, this is a solution.
iii) not a solution

10. a) Let x represent the number of maple trees sold. Let y represent the number of birch trees sold.
$\{(x, y) \mid 75x + 50y > 1500, x \in W, y \in W\}$

The variables must be whole numbers. $x \in W, y \in W$

b)



c) i) Yes, because (13, 13) is in the solution region.
ii) No, because (14, 9) lies on the dashed boundary and is not included in the shaded region; the point (9, 14) is also not in the solution region.

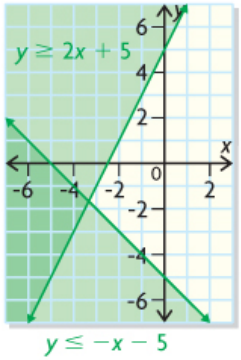
5.3 Graphing to Solve Systems of Linear Inequalities

GOAL

Solve problems by modelling systems of linear inequalities.

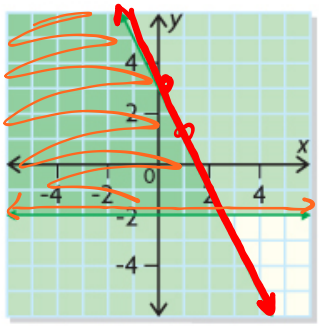
system of linear inequalities

A set of two or more linear inequalities that are graphed on the same coordinate plane; the intersection of their solution regions represents the solution set for the system.



EXPLORE...

- What conclusions can you make about the system of linear inequalities graphed below?



$x \in R$
$y \in R$
$y \leq -2x + 3$
$y \geq -2$

SAMPLE ANSWER

Any or all of the following solutions are acceptable:

- It represents a system of two linear inequalities, each with a straight boundary and a solution region.
- One linear inequality is $y \leq -2x + 3$, and the horizontal inequality is $y \geq -2$. I determined $y \leq -2x + 3$ using the slope and y-intercept and the form $y = mx + b$, and I was able to identify $y \geq -2$ because it's a horizontal line through -2 on the y-axis.
- Both inequalities include the possibility of equality because the boundaries are solid.
- The solution set of the system is represented by the overlapping region because it's where the solution regions for the two linear inequalities overlap. The solution set includes points along the boundaries of the overlap.
- The domain and range are from the set of real numbers because the solution region is green and not stippled.
- All four quadrants are included so there are no restrictions on the set of real numbers.

Solving Systems of Linear Inequalities

A **system of linear inequalities** is an extension of a system of linear equations and consists of two (or more) linear inequalities that have the same variables. For example, $2x + 3y < 4$ and $3x + 4y < 5$ constitute a system of inequalities if x represents the same item in both equations, y represents the same item in both equations, and both equations describe the same context.

Example #1:

Graph the following system and determine a possible solution

$\{(x,y) \mid y \leq 3x - 1, x \varepsilon R, y \varepsilon R\}$

$\left\{(x,y) \mid y > -\frac{1}{3}x + 4, x \varepsilon R, y \varepsilon R\right\}$

$y = 3x - 1$

Test (10, 0)

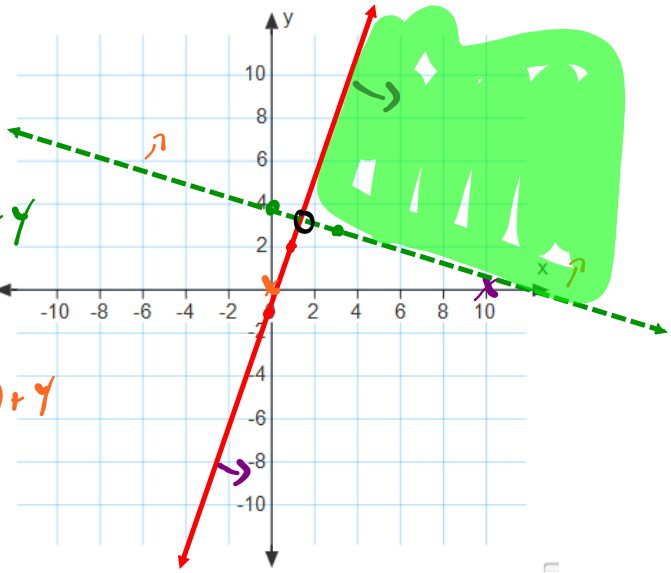
LS ≤ RS

0	$3(10) - 1$
≤	29
	Yes

$y = -\frac{1}{3}x + 4$

LS > RS

0	$-\frac{1}{3}(0) + 4$
>	4
	No



EXAMPLE #2...

Graph the solution set for the following system of inequalities. Choose two possible solutions from the set.

$3x + 2y > -6$

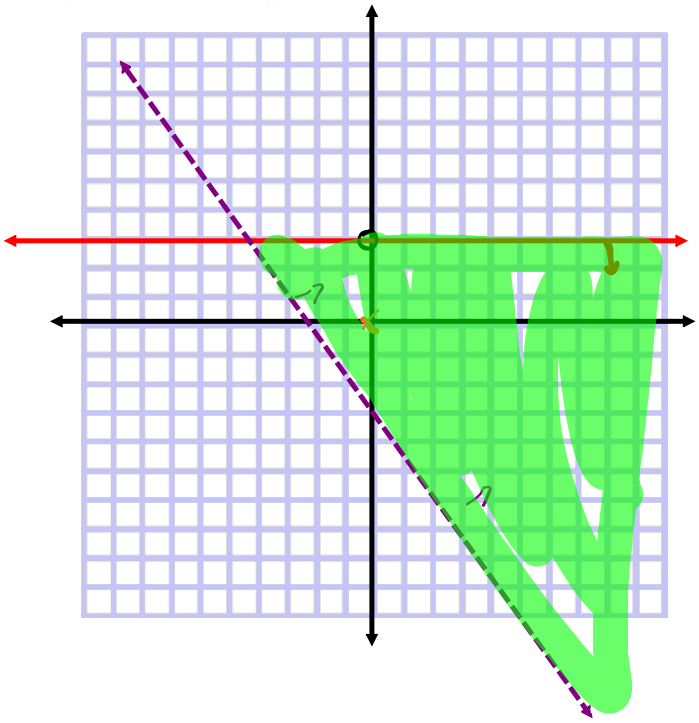
$y \leq 3$

$3x + 2y = -6$

$\frac{2}{2}y = -\frac{3}{2}x - \frac{6}{2}$

$y = -\frac{3}{2}x - 3$

$y = 3$



LS > RS

$3(0) + 2(0) \mid -6$

$0 \mid$ yes

HOMEWORK...

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Puzzle Worksheet - Systems of Linear Inequations.docx

Quiz Friday

Attachments

Worksheet - Applications of a Linear Inequality.pdf

Puzzle Worksheet - Systems of Linear Inequations.docx