MORE PRACTICE...

Worksheet - Graphing Inequations with 2 variables.pdf

Worksheet Solutions

Line Segment vs Line vs Ray

↳ has 2 endpoints

↳ continuous in both directions

↳ has an endpoint while other end is continuous

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

Unknown

x → # of words Malia spells

y → # of words Lainey spells

Step 2: State restrictions

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)

Test (0,0)

LS	> RS
0	3(0)+1
	1

No

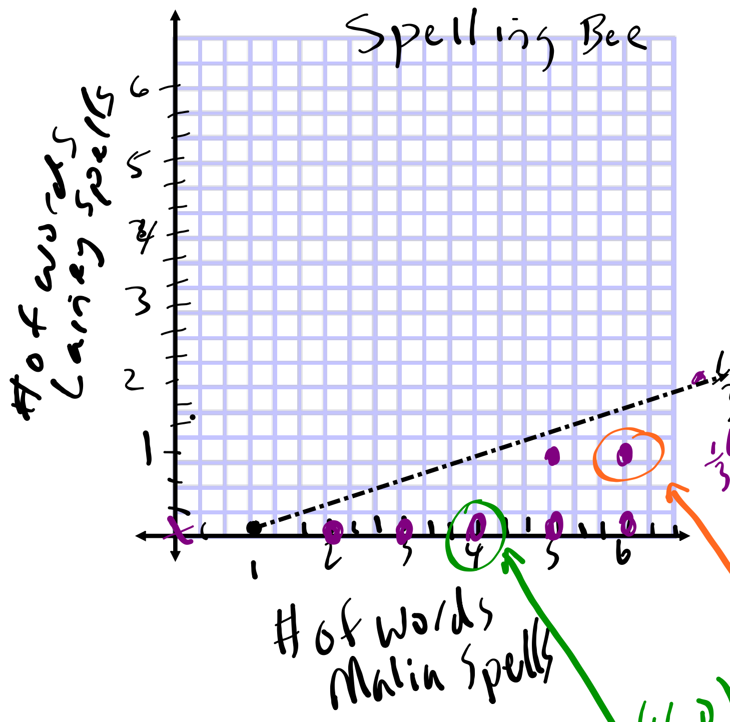
$x = 3y + 1$

$x - 1 = 3y$

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

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

x	y
1	0
4	1
7	2



$1x > 3y + 1$

Points

4(1) Malia spelled 4 words

3(0) + 1 Lainey spelled none

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 → # of skis sold
y → # of snowboards

Step 1: Declare variables

Step 2: State restrictions

$x \in W$, $y \in W$ } Quad I

Step 3: Develop the inequation

$\$100x + \$120y \geq \$600$

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

$100x + 120y = 600$

x-int → $100x + 120(0) = 600$

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

$x = 6$

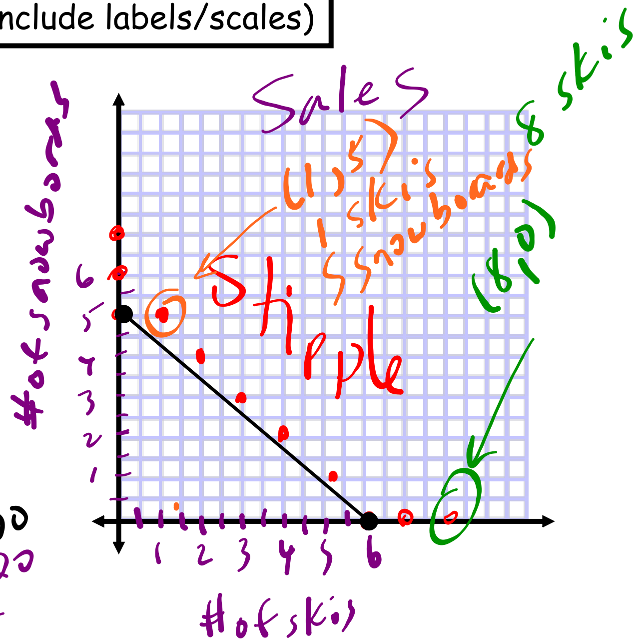
$(6, 0)$

y-int → $100(0) + 120y = 600$

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

$y = 5$

$(0, 5)$



In Summary p. 220

Key Idea

- When a linear inequality in two variables is represented graphically, its boundary divides the Cartesian plane into two half planes. One of these half planes represents the solution set of the linear inequality, which may or may not include points on the boundary itself.

Need to Know

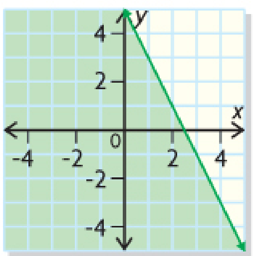
- To graph a linear inequality in two variables, follow these steps:

  Step 1. Graph the boundary of the solution region.
  - If the linear inequality includes the possibility of equality ($\leq$ or $\geq$), and the solution set is continuous, draw a solid green line to show that all points on the boundary are included.
  - If the linear inequality includes the possibility of equality ($\leq$ or $\geq$), and the solution set is discrete, stipple the boundary with green points.
  - If the linear inequality excludes the possibility of equality ($<$ or $>$), draw a dashed line to show that the points on the boundary are not included.
    - Use a dashed green line for continuous solution sets.
    - Use a dashed orange line for discrete solution sets.

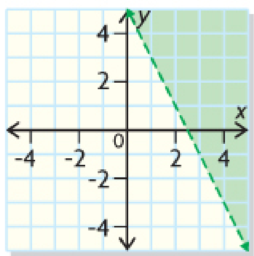
  Step 2. Choose a test point that is on one side of the boundary.
  - Substitute the coordinates of the test point into the linear inequality.
  - If possible, use the origin, (0, 0), to simplify your calculations.
  - If the test point is a solution to the linear inequality, shade the half plane that contains this point. Otherwise, shade the other half plane.
    - Use green shading for continuous solution sets.
    - Use orange shading with green stippling for discrete solution sets.

  For example,

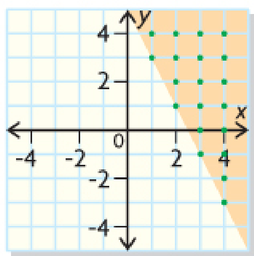
  $\{(x, y) \mid y \leq -2x + 5, x \in R, y \in R\}$



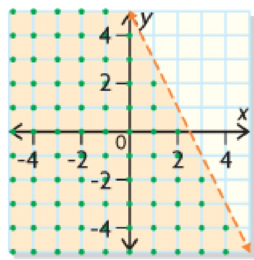
  $\{(x, y) \mid y > -2x + 5, x \in R, y \in R\}$



  $\{(x, y) \mid y \geq -2x + 5, x \in I, y \in I\}$



  $\{(x, y) \mid y < -2x + 5, x \in I, y \in I\}$



- When interpreting the solution region for a linear inequality, consider the restrictions on the domain and range of the variables.
  - If the solution set is continuous, all the points in the solution region are in the solution set.
  - If the solution set is discrete, only specific points in the solution region are in the solution set. This is represented graphically by stippling.
  - Some solution sets may be restricted to specific quadrants. For example, most linear inequalities representing real-world problem situations have graphs that are restricted to the first quadrant.

HOMEWORK...

Worksheet - Applications of a Linear Inequality.pdf

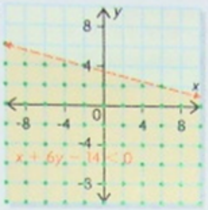
p. 221: #6ace, 7, 8, 9, 10

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

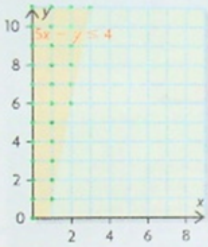
SOLUTIONS...

6. a) no solution

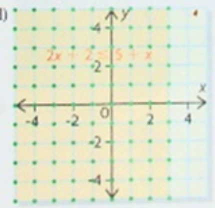
b)



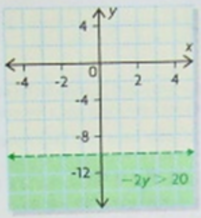
c)



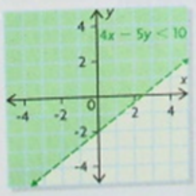
d)



e)



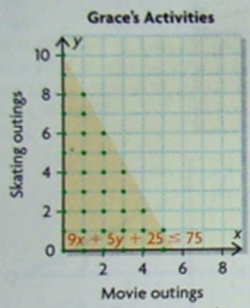
f)



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. $x \in W, y \in W$

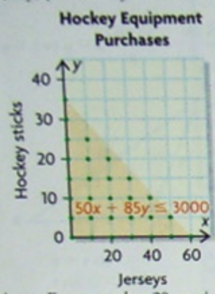
c)



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.
$\{(x, y) \mid 10x + 32y \geq 5000, x \in W, y \in W\}$

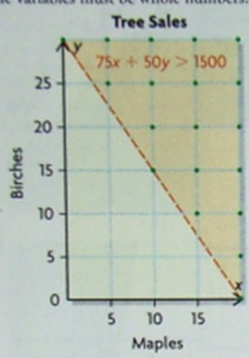
b) The variables must be whole numbers. $x \in W, y \in W$

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.

Attachments

Worksheet - Graphing Inequations with 2 variables.pdf

Worksheet - Graphing Linear Inequalities.pdf

Example - Application of a Linear Inequality.docx

Worksheet - Applications of a Linear Inequality.pdf