Warm Up

Lesson Presentation

Lesson Quiz

Warm Up

Find the intercepts of each line.

1. $3x + 2y = 18$ (0, 9), (6, 0)

2. $4x - y = 8$ (0, –8), (2, 0)

3. $5x + 10 = 2y$ (0, 5), (–2, 0)

$5x+10=0$

$5x=-10$

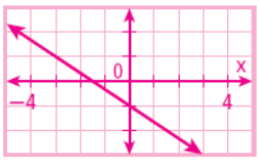
Write the function in slope-intercept form. Then graph.

4. $2x + 3y = -3$

$-2x \quad -2x$

$3y = -2x - 3$

$y = -\frac{2}{3}x - 1$



2.1

Problem Solving

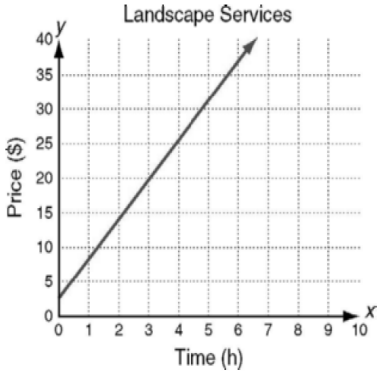
1. 4.5 cm
2. $y = 4.5x - 1$
3. 11 days
4. $x + (x + 5) + (x - 3) = 49$
   Keith is 12
5. C
6. No; she forgot to reverse the inequality sign when multiplying by a negative number.
7. Yes

15

2.3

Problem Solving

1. No; Possible answer: the rate of change is not constant.
2. a. Because the rate of change is constant
   b. 6
   c.



   d. $56
3. D
4. B

Aug 15-8:22 AM

Objectives

Graph linear inequalities on the coordinate plane.

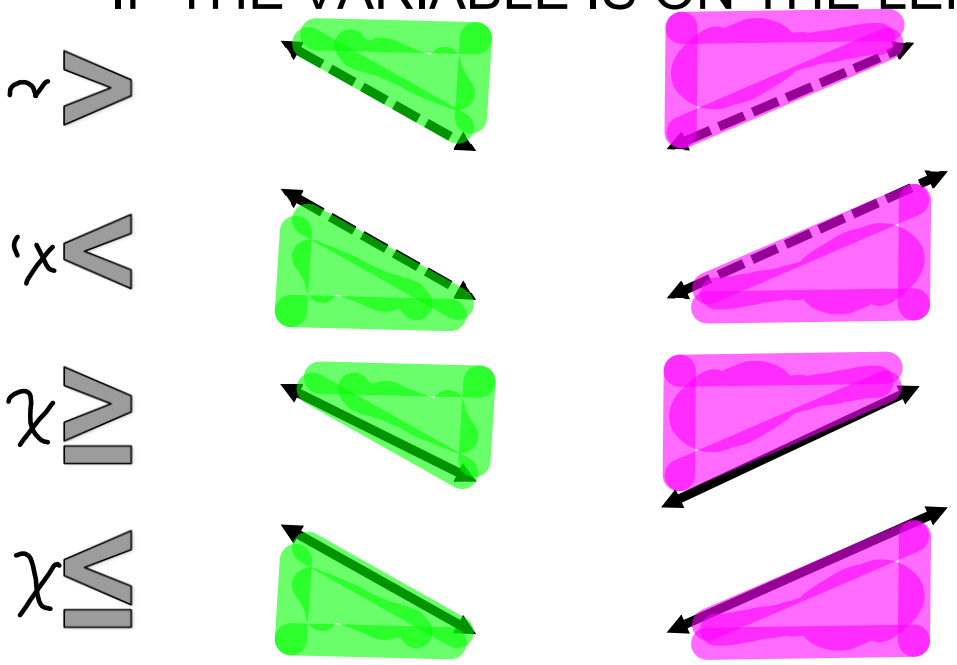
Solve problems using linear inequalities.

Vocabulary

linear inequality
boundary line

Linear functions form the basis of *linear inequalities*. A **linear inequality** in two variables relates two variables using an inequality symbol, such as $y > 2x - 4$. Its graph is a region of the coordinate plane bounded by a line. The line is a **boundary line**, which divides the coordinate plane into two regions.

IF THE VARIABLE IS ON THE LEFT.



Example 1A: Graphing Linear Inequalities

Graph the inequality $y \geq -\frac{1}{3}x + 2$.

$m = -\frac{1}{3}$

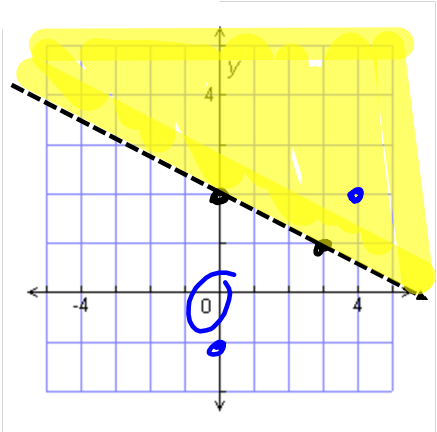
$b = 2$

$(0, 2)$

$0 > 0 + 2$

$0 > 2$

(1, 1)



Example 1B: Graphing Linear Inequalities

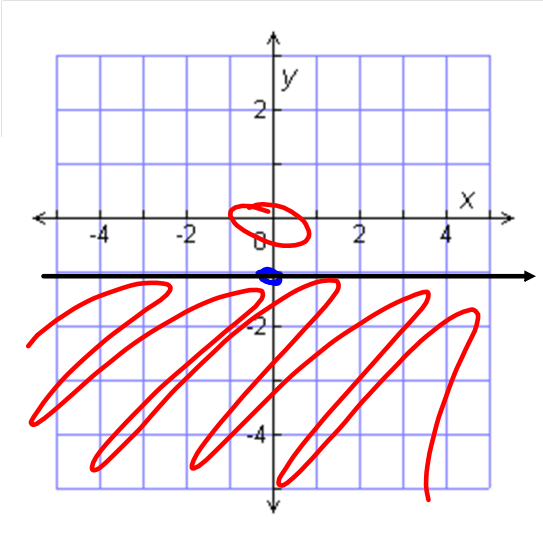
$0 \leq -1$

Graph the inequality $y \leq -1$.

$m = 0$

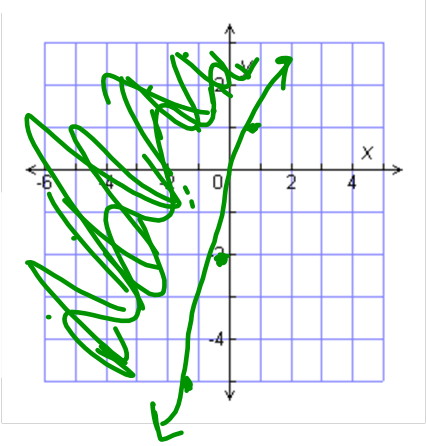
$b = -1$

$(0, -1)$



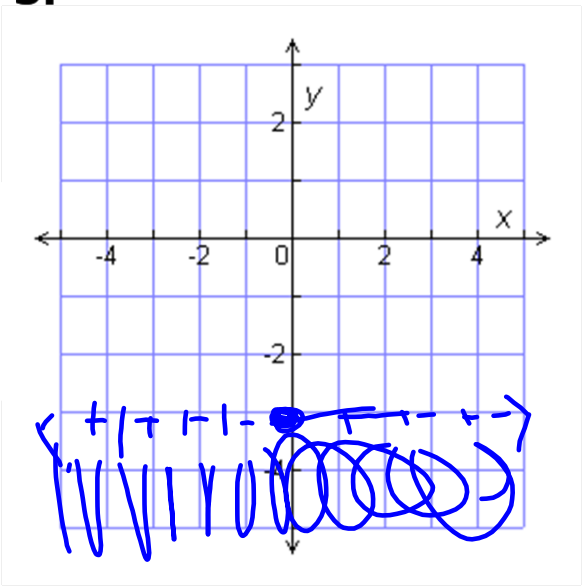
Check It Out! Example 1a

Graph the inequality $y \geq 3x - 2$.



Check It Out! Example 1b

Graph the inequality $y < -3$.



If the equation of the boundary line is not in slope-intercept form, you can choose a test point that is not on the line to determine which region to shade. If the point satisfies the inequality, then shade the region containing that point. Otherwise, shade the other region.

Helpful Hint

The point (0, 0) is the easiest point to test if it is not on the boundary line.

Example 2: Graphing Linear Inequalities Using Intercepts

Graph $3x + 4y \leq 12$ using intercepts.

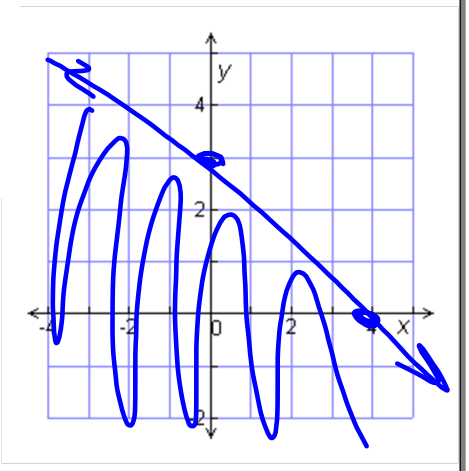
Step 1 Find the intercepts.

Substitute $x = 0$ and $y = 0$ into $3x + 4y = 12$ to find the intercepts of the boundary line.

***y*-intercept**	***x*-intercept**
$3x + 4y = 12$	$3x + 4y = 12$
$3(0) + 4y = 12$	$3x + 4(0) = 12$
$4y = 12$	$3x = 12$
$y = 3$	$x = 4$

(0, 3) (4, 0)

Example 2 Continued



Check It Out! Example 2

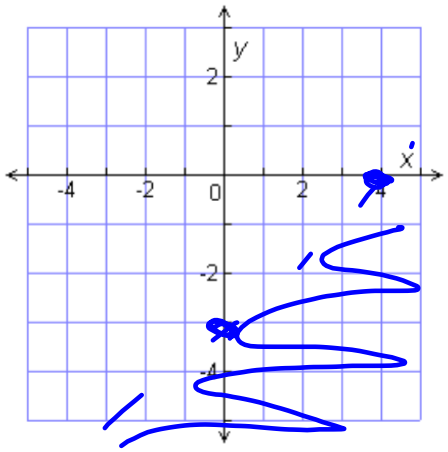
Graph $3x - 4y > 12$ using intercepts.

$0 > 12$

$-3x \quad -3x$

$\frac{-4y}{-4} > \frac{-3x + 12}{-4}$

$y < \frac{3}{4}x - 3$



Many applications of inequalities in two variables use only nonnegative values for the variables. Graph only the part of the plane that includes realistic solutions.

Caution

Don't forget which variable represents which quantity.

Example 3: Problem-Solving Application

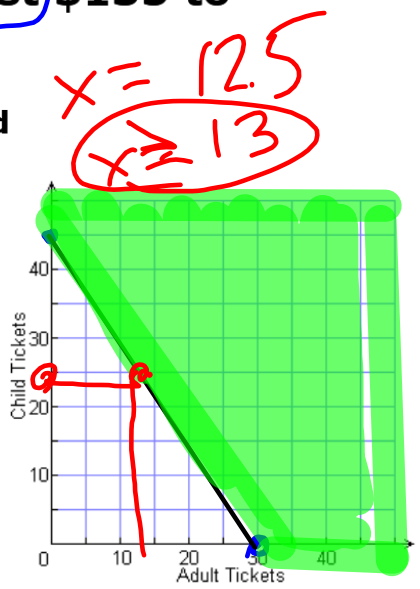
A school carnival charges $4.50 for adults and $3.00 for children. The school needs to make at least $135 to cover expenses.

A. Using *x* as the number of adult tickets and *y* as the number of child tickets, write and graph an inequality for the amount the school makes on ticket sales.

$4.5x + 3y \geq 135$

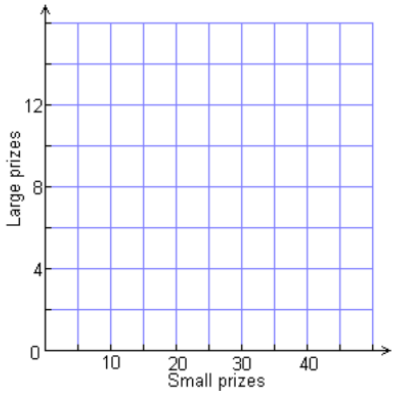
B. If 25 child tickets are sold, how many adult tickets must be sold to cover expenses?

$x \geq 13$



Check It Out! Example 3

A café gives away prizes. A large prize costs the café $125, and the small prize costs $40. The café will not spend more than $1500. How many of each prize can be awarded? How many small prizes can be awarded if 4 large prizes are given away?



Example 4: Solving and Graphing Linear Inequalities

Solve $\frac{3}{4}(8x - 2y) > 6$ for *y*. Graph the solution.

$\frac{4}{3} \cdot \frac{3}{4}(8x - 2y) > \frac{4}{3} \cdot 6$ *Multiply both sides by $\frac{4}{3}$.*

$8x - 2y > 8$

$-2y > -8x + 8$ *Subtract 8x from both sides.*

$y < 4x - 4$ *Divide by –2, and reverse the inequality symbol.*

Check It Out! Example 4

Solve $2(3x - 4y) > 24$ for *y*. Graph the solution.

$3x - 4y > 12$

Lesson Quiz: Part I

1. Graph $2x - 5y \geq 10$ using intercepts.

2. Solve $-6y < 18x - 12$ for y. Graph the solution.

Lesson Quiz: Part II

3. Potatoes cost a chef $18 a box, and carrots cost $12 a box. The chef wants to spend no more than $144. Use x as the number of boxes of potatoes and y as the number of boxes of carrots.

a. Write an inequality for the number of boxes the chef can buy.

b. How many boxes of potatoes can the chef order if she orders 4 boxes of carrot?