Algebra 1 Name:

5.6 Explain – Linear Inequalities in Two Variables - Notes

Essential Question: How can you write and graph a linear inequality in two variables?

Main Ideas/ Questions	Notes/Examples
What You Will Learn	• Check solutions of linear inequalities. • Graph linear inequalities in two variables. • Write linear inequalities in two variables. • Use linear inequalities to solve real-life problems.
What is a linear inequality?	**Definition:** An inequality uses the following symbols: $<$ - is less than $>$ - is greater than $\leq$ - is less than or equal to $\geq$ - is greater than or equal to
What is a solution of a linear Inequality?	**Definition:** **Practice:** Tell whether the ordered pair is a solution of the inequality. 1. $x + y > 5; (3, 2)$ — $3+2 > 5$, $5 > 5$, NO 2. $x - y \geq 2; (5, 3)$ — $5-3 \geq 2$, $2 \geq 2$, Yes 3. $-x - 2y \geq 5; (-2, -3)$ — $-(-2)-2(-3) \geq 5$, $2+6 \geq 5$, $8 \geq 5$, Yes

Graphing Linear Inequalities

Steps to Graph an Inequality:

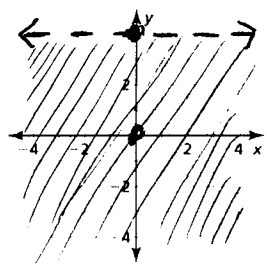
Step 1: Put the inequality in slope-intercept form.
Step 2: Graph the inequality using the slope and *y*-intercept.
Step 3: Graph the boundary line.
Step 4: Shade to represent all of the solutions.

Shading

	Boundary Line: Dashed	Boundary Line: Solid
Above	$>$	$\geq$
Below	$<$	$\leq$

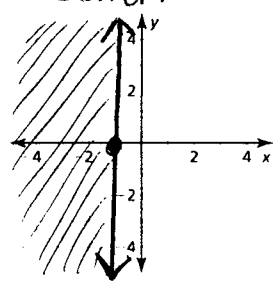
Practice: Graph the ***inequality*** in a coordinate plane.

4. $y < 4$
m = 0 Line: (DASHED)/SOLID
b = 4 Shade: ABOVE/(BELOW)



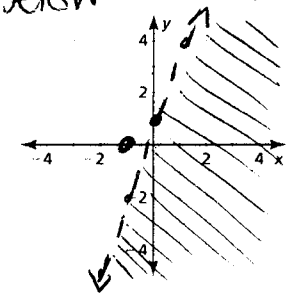
Can solutions be on the line? No
Is (0, 0) a solution? Yes

5. $x \leq -1$
shade below/left
solid line



Can solutions be on the line? Yes
Is (-1, 0) a solution? Yes

6. $y < 3x + 1$
dash below
$m = 3$, $b = 1$



Can solutions be on the line? No
Is (-1, 0) a solution? NO

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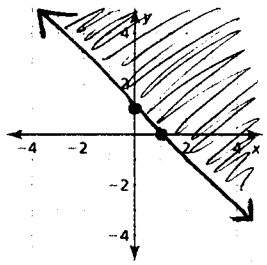
7. $y \geq -x + 1$

m = −1 Line: DASHED/SOLID

b = 1 Shade: ABOVE/BELOW



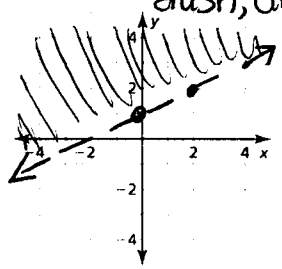
8. $-x + 2y > 2$

$+x \quad +x$

$\frac{2y}{2} > \frac{x}{2} + \frac{2}{2}$

$y > \frac{1}{2}x + 1$

↑ dash, above



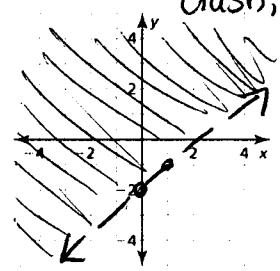
9. $x - y < 2$

$-x \quad -x$

$\frac{-y}{-1} < \frac{-x}{-1} + \frac{2}{-1}$ Flip →

$y > x - 2$

↑ dash, above



Writing an Inequality

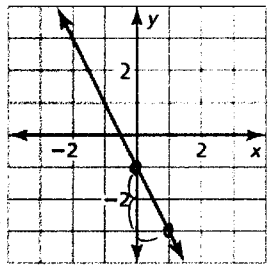
10. Write an inequality that represents the graph.

m = $\frac{-2}{1} = -2$

b = −1

Line: solid

Shading: below



Inequality:

$y \leq -2x - 1$

11. An ice cream truck can carry at most 75 gallons of ice cream. The table shows the inventory on the truck. Write an inequality that represents the numbers of gallons of strawberry and banana ice cream on the truck.

$20 + 15 + x + y + 18 \leq 75$

$53 + x + y \leq 75$

$\boxed{x + y \leq 22}$

Flavor	Quantity (gallons)
vanilla	20
chocolate	15
strawberry	x
banana	y
sherbet	18

Real-Life

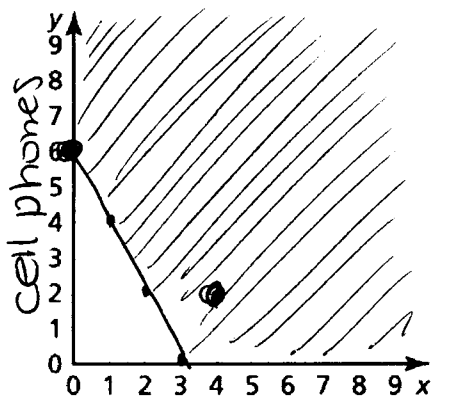
12. An online store sells digital cameras and cell phones. The store makes a $100 profit on the sale of each digital camera x and a $50 profit on the sale of each cell phone y. The store wants to make a profit of at least $300 from its sales of digital cameras and cell phones.

a. Write an inequality that represents how many digital cameras and cell phones they must sell.

$100x + 50y \geq 300$

b. Graph the inequality. $50y \geq -100x + 300$

$y \geq -2x + 6$



b. Identify and interpret two solutions of the inequality.

(4, 2)

4 digital cameras & 2 cell phones

(0, 6)

No cameras & 6 cell phones

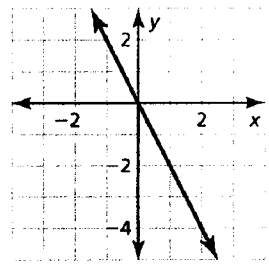
Name _____ Date _____

5.6 Linear Inequalities in Two Variables

In Exercises 1–4, tell whether the ordered pair is a solution of the inequality.

1. $x - y > 2$; $(5, 4)$ **2.** $x + y \leq -3$; $(-1, -4)$ **3.** $5x + y \leq 12$; $(2, 2)$ **4.** $x - 3y > 6$; $(3, -1)$

In Exercises 5–10, tell whether the ordered pair is a solution of the inequality whose graph is shown.



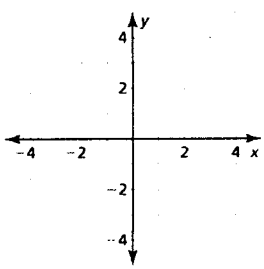
5. $(1, 0)$ **6.** $(-1, -1)$ **7.** $(0, 0)$

8. $(-3, 1)$ **9.** $(2, -4)$ **10.** $(0, 3)$

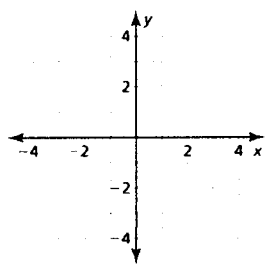
11. You have \$150 to spend on video games. The inequality $7x + 32y \leq 150$ represents the number x of used video games and the number y of new video games that you can purchase. Can you purchase 10 used video games and 3 new video games? Explain.

In Exercises 12–16, graph the inequality in a coordinate plane.

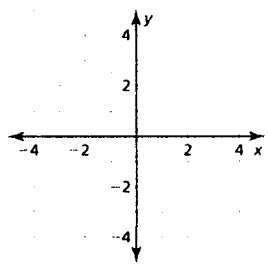
12. $y \geq 2$



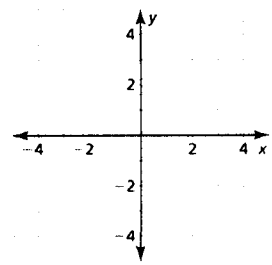
13. $x < -3$



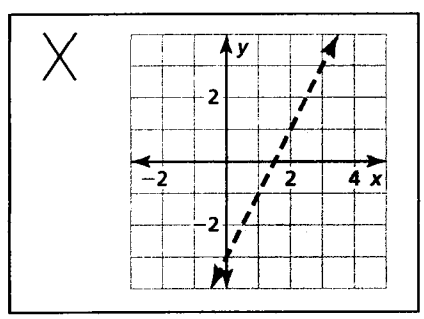
15. $y < 2x - 5$



16. $-3x + y \leq 1$

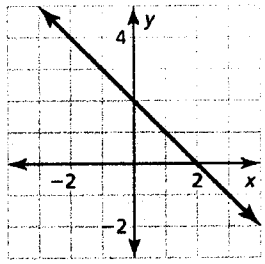


17. Describe and correct the error in graphing $y > 2x - 3$.



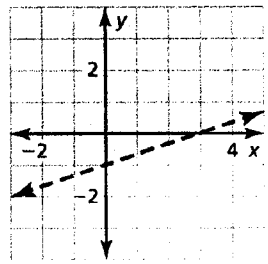
In Exercises 18 and 19, write an inequality that represents the graph.

18.



Inequality:

19.



Inequality:

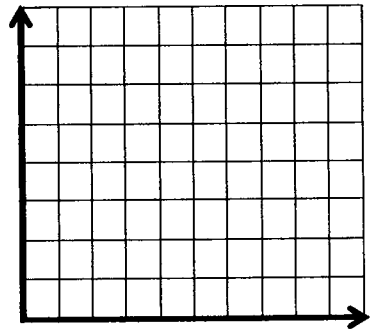
20. A department store offers a 10% discount on any purchase over $200. The table shows the costs of items in a purchase at the store. Write an inequality that represents the costs of the shirt and shoes that will qualify the purchase for the discount.

Item	Cost
backpack	$54.99
jeans	$39.99
shirt	x
shoes	y
video game	$49.95

21. You have at most $20 to spend at an arcade. Arcade games cost $0.75 each, and snacks cost $2.25 each.

a. Write an inequality that represents the numbers of games you can play and snacks you can buy.

b. Graph the inequality.



c. Identify and interpret two solutions of the inequality.

22. Write an inequality that describes all of the solutions to the inequality $3x + 2y > 12$ when $x = -2$.

23. The measure of an acute angle is represented by $(3x + 4)°$. Write an inequality that represents the possible solutions for the value of x.