NAME _____ DATE _____ PERIOD _____

2-8 Study Guide and Intervention

Graphing Linear and Absolute Value Inequalities

Graph Linear Inequalities A **linear inequality**, like $y \geq 2x - 1$, resembles a linear equation, but with an inequality sign instead of an equals sign. The graph of the related linear equation separates the coordinate plane into two half-planes. The line is the boundary of each half-plane.

To graph a linear inequality, follow these steps.

Step 1 Graph the boundary; that is, the related linear equation. If the inequality symbol is $\leq$ or $\geq$, the boundary is solid. If the inequality symbol is $<$ or $>$, the boundary is dashed.

Step 2 Choose a point not on the boundary and test it in the inequality. (0, 0) is a good point to choose if the boundary does not pass through the origin.

Step 3 If a true inequality results, shade the half-plane containing your test point. If a false inequality results, shade the other half-plane.

Example **Graph $x + 2y \geq 4$.**

The boundary is the graph of $x + 2y = 4$.

Use the slope-intercept form, $y = -\frac{1}{2}x + 2$, to graph the boundary line.

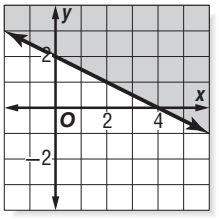
The boundary line should be solid.

Test the point (0, 0).

$0 + 2(0) \stackrel{?}{\geq} 4$ $(x, y) = (0, 0)$

$0 \geq 4$ false

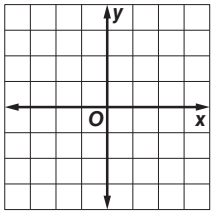
Shade the region that does *not* contain (0, 0).



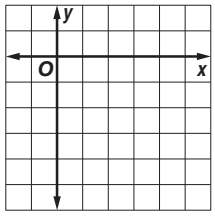
Exercises

Graph each inequality.

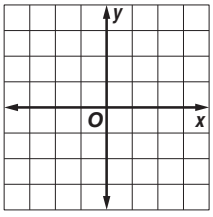
1. $y < 3x + 1$



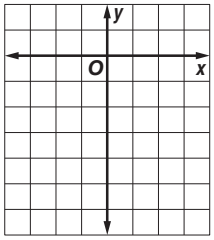
2. $y \geq x - 5$



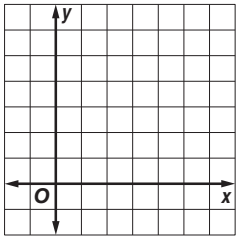
3. $4x + y \leq -1$



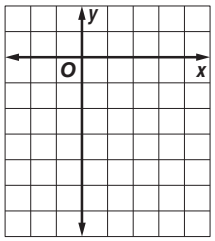
4. $y < \frac{x}{2} - 4$



5. $x + y > 6$



6. $0.5x - 0.25y < 1.5$



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2-8 Study Guide and Intervention *(continued)*

Graphing Linear and Absolute Value Inequalities

Graph Absolute Value Inequalities Graphing absolute value inequalities is similar to graphing linear inequalities. The graph of the related absolute value equation is the boundary. This boundary is graphed as a solid line if the inequality is $\leq$ or $\geq$, and dashed if the inequality is $<$ or $>$. Choose a test point not on the boundary to determine which region to shade.

Example **Graph $y \leq 3|x - 1|$.**

First graph the equation $y = 3|x - 1|$.

Since the inequality is $\leq$, the graph of the boundary is solid.

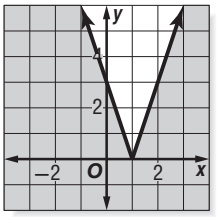
Test (0, 0).

$0 \stackrel{?}{\leq} 3|0 - 1|$ $(x, y) = (0, 0)$

$0 \stackrel{?}{\leq} 3|-1|$ $|-1| = 1$

$0 \leq 3$ true

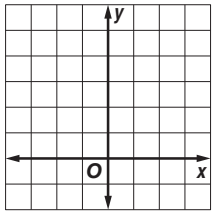
Shade the region that contains (0, 0).



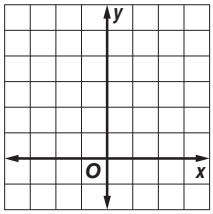
Exercises

Graph each inequality.

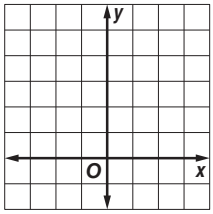
1. $y \geq |x| + 1$



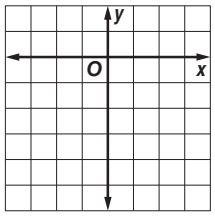
2. $y \leq |2x - 1|$



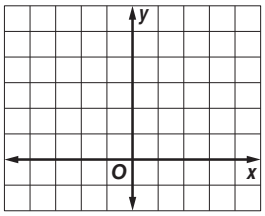
3. $y - 2|x| > 3$



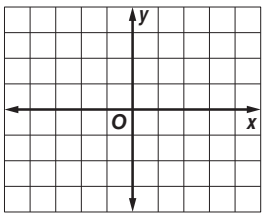
4. $y < -|x| - 3$



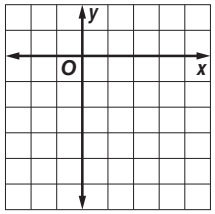
5. $|x| + y \geq 4$



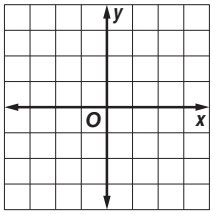
6. $|x + 1| + 2y < 0$



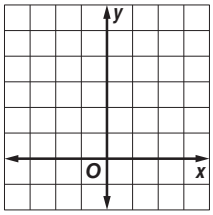
7. $|2 - x| + y > -1$



8. $y < 3|x| - 3$



9. $y \leq |1 - x| + 4$



Lesson 2-8

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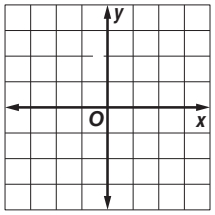
2-8 Skills Practice

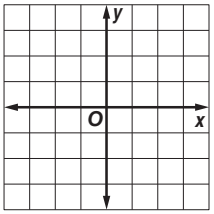
Graphing Linear and Absolute Value Inequalities

Graph each inequality.

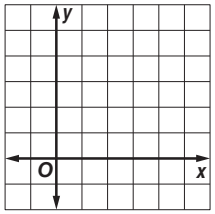
1. $y > 1$



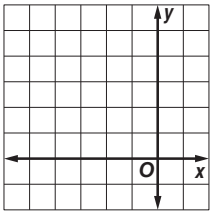
2. $y \leq x + 2$



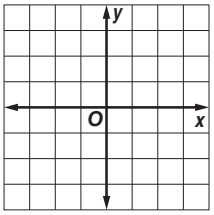
3. $x + y \leq 4$



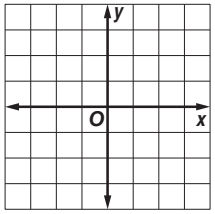
4. $x + 3 < y$



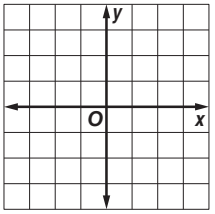
5. $2 - y < x$



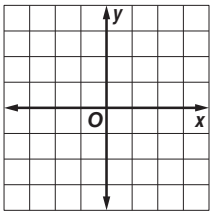
6. $y \geq -x$



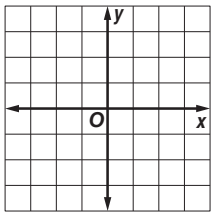
7. $x - y > -2$



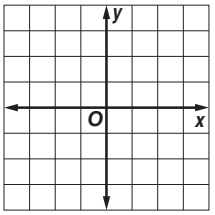
8. $9x + 3y - 6 \leq 0$



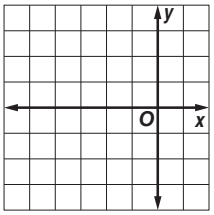
9. $y + 1 \geq 2x$



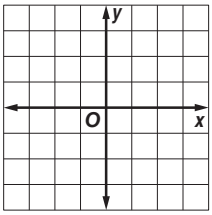
10. $y - 7 \leq -9$



11. $x > -5$



12. $y > |x|$



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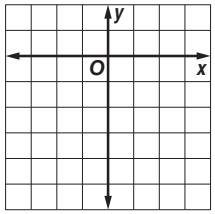
2-8 Practice

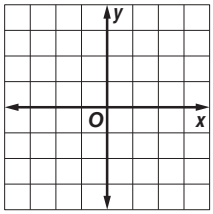
Graphing Linear and Absolute Value Inequalities

Graph each inequality.

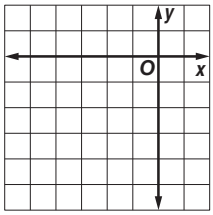
1. $y \leq -3$



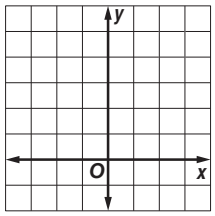
2. $x > 2$



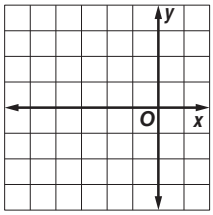
3. $x + y \leq -4$



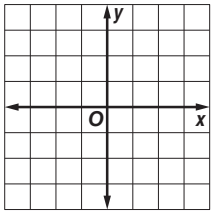
4. $y < -3x + 5$



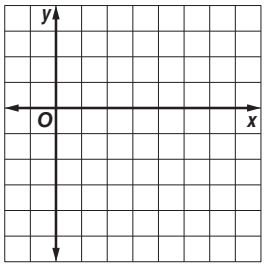
5. $y < \frac{1}{2}x + 3$



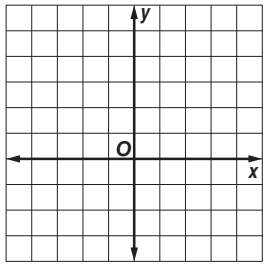
6. $y - 1 \geq -x$



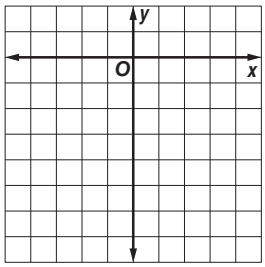
7. $x - 3y \leq 6$



8. $y > |x| - 1$



9. $y > -3|x + 1| - 2$

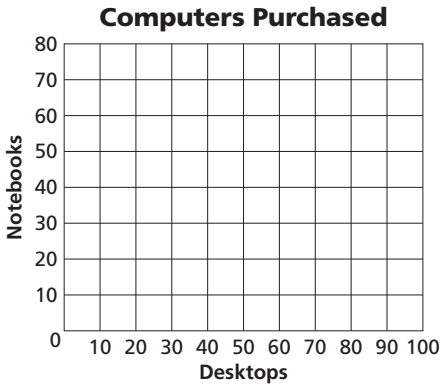


10. COMPUTERS A school system is buying new computers. They will buy desktop computers costing \$1000 per unit, and notebook computers costing \$1200 per unit. The total cost of the computers cannot exceed \$80,000.

a. Write an inequality that describes this situation.

b. Graph the inequality.

c. If the school wants to buy 50 of the desktop computers and 25 of the notebook computers, will they have enough money?



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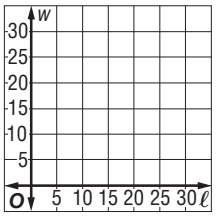
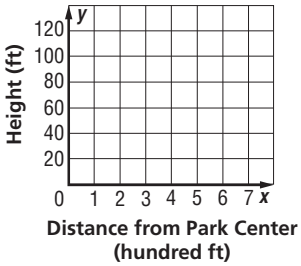
2-8 Word Problem Practice

Graphing Linear and Absolute Value Inequalities

1. FRAMES The dimensions of a rectangular frame that can be made from a 50 inch plank of wood are limited by the inequality $\ell + w \leq 25$. Graph this inequality.

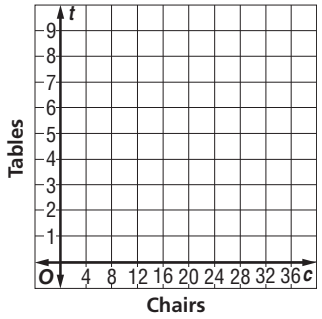


2. BUILDING CODE A city has a building code that limits the height of buildings around the central park. The code says that all buildings must be less than $0.1x$ in height where x is the distance of the building from the center of the park. Assume that the park center is located at 0. Graph the inequality that represents the building code.



3. LIVESTOCK During the winter, a horse requires about 36 liters of water per day and a sheep requires about 3.6 liters per day. A farmer is able to supply his horses and sheep with a total of 300 liters of water each day. Write an inequality that represents the possible number of horses and sheep this farmer can keep.

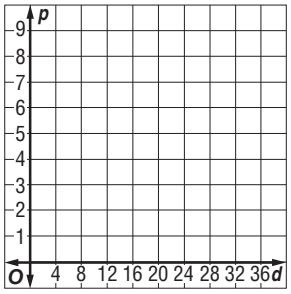
4. WEIGHT A delivery crew is going to load a truck with tables and chairs. The trucks weight limitations are represented by the inequality $200t + 60c < 1200$, where t is the number of tables and c is the number of chairs. Graph this inequality.



5. ART An artist can sell each drawing for \$100 and each painting for \$400. He hopes to make at least \$2000 every month.

a. Write an inequality that expresses how many paintings and/or drawings the artist needs to sell each month to reach his goal.

b. Graph the inequality.



c. If David sells three paintings one month, how many drawings would he have to sell in the same month to reach \$2000?

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