5-7 Graph a Linear Inequality in the Coordinate Plane

Name _____ Date _____

<table>
<tr><th colspan="5">Graphing Linear Inequalities</th></tr>
<tr><td>Inequality</td><td>$y \leq mx + b$</td><td>$y < mx + b$</td><td>$y \geq mx + b$</td><td>$y > mx + b$</td></tr>
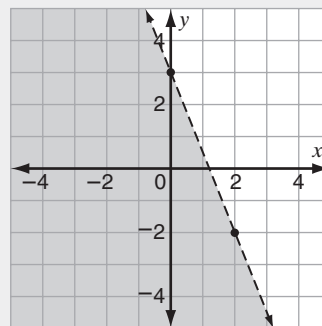<tr><td>Boundary Line</td><td>solid</td><td>dashed</td><td>solid</td><td>dashed</td></tr>
<tr><td>Shading</td><td>below</td><td>below</td><td>above</td><td>above</td></tr>
</table>

Graph the solution to the linear inequality.

$-5x - 2y > -6$ ⟵ Solve for y.

$\qquad -2y > 5x - 6$ ⟵ Use the Addition Property of Inequality.

$\qquad y < -\frac{5}{2}x + 3$ ⟵ Use the Division Property of Inequality.

> **Remember:** Reverse the inequality symbol when dividing by a negative number.

Graph $y = -\frac{5}{2}x + 3$. ⟵ Use a dashed line for $<$.

Shade the half-plane *below* the line. ⟵ Shade below for $<$.

Check: Does $(0, 0)$ satisfy $y < -\frac{5}{2}x + 3$?

$$0 \overset{?}{<} -\frac{5}{2}(0) + 3$$

$$0 < 3 \ \textbf{True}$$

Tell whether the ordered pair is a solution to the inequality.

1. $y < 2x + 5; (-2, 3)$
$3 < 2(-2) + 5$
$3 < -4 + 5$
$3 < 1 \ \textbf{false}$
$\underline{\qquad \textbf{no} \qquad}$

2. $y < -2x + 5; (1, 5)$

3. $3x + 4y \geq -3; (-2, 1)$

4. $2x + 5y \geq -4; (-3, 3)$

5. $5y > -2; \left(-4\frac{3}{4}, 7\frac{7}{8}\right)$

6. $2y > -8; \left(-2\frac{7}{8}, -1\frac{3}{4}\right)$

7. $3x - 2y < -12; (-2.5, 1.4)$

8. $4x - y < -17; (-3.6, 2.5)$

9. $3x - 4y \geq 1; \left(\frac{3}{2}, \frac{1}{2}\right)$

Graph each linear inequality on a separate sheet of paper. Then describe the solution set. (*Hint:* When the boundary line is vertical, shade to the left for $\leq$ and $<$; shade to the right for $\geq$ and $>$.)

10. $x + y < 1$
$x - x + y < -x + 1$
$y < -x + 1$
The graph has a dashed boundary line, $y = -x + 1$, and is shaded below.

11. $x + y < 2$

12. $3x > 7$

13. $-2y \geq 11$

14. $2x - y < 3$

15. $-9x + 3y < 0$

16. $8x + 2y > 4.8$

17. $6x + 3y > 12.3$

18. $\frac{4}{5}x + 4y \geq 9$

Solve. Show your work.

19. A manufacturer takes 3 hours to make a chair and 2 hours to make a stool. If it spends a maximum of 800 hours making chairs and stools and makes 70 stools, what is the maximum number of chairs it can make?

20. Which inequalities have $(2.4, -0.5)$ as a solution? $y > -6x + 9$ $3x \leq 15$
$2x - y \geq 8$ $3.9x + 1.1y < 8.81$

CRITICAL THINKING

21. Explain why no solution to the inequality $y \geq 2x + 2$ can be an ordered pair of the form $(+, -)$.