LESSON 24

Graphing Linear Inequalities

Review It! When you graph linear inequalities, remember these words:

closed half-plane a half-plane that includes the boundary line

open half-plane a half-plane that does not include the boundary line

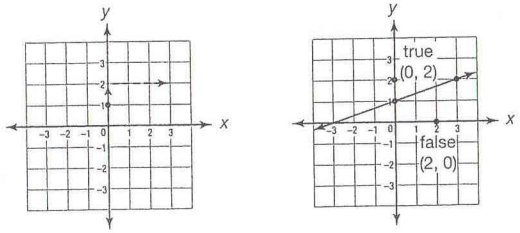
Graph: $y \geq \frac{1}{3}x + 1$

Step 1 Graph the line $y = \frac{1}{3}x + 1$.

REMEMBER $y = \frac{1}{3}x + 1$ is in slope-intercept form.

slope = _____ y-intercept = _____

Plot a point at the y-intercept (0, _____).



Use the slope to draw another point at $(0 + 3, 1 + 1) = (3, 2)$.

The line through both points divides the plane into two half-planes.

The line $y = \frac{1}{3}x + 1$ is part of the solution because $y \geq \frac{1}{3}x + 1$.

Draw a solid line for equations with $\leq$ or $\geq$. Draw a dashed line for equations with $<$ or $>$.

Step 2 Test a point above or below the line. Shade the half-plane where the inequality is true.

For (0, 2): $2 \geq \frac{1}{3} \times 0 + 1$, so shade the half-plane where (0, 2) lies.

So, the graph of $y \geq \frac{1}{3}x + 1$ is the line and the shaded region above the line.

Try It! Decide whether the given point is a solution. Write *yes* or *no*.

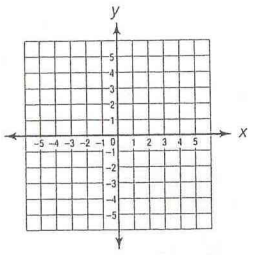
Ask Yourself

1. (2, 3); $y > 3x + 4$ _____
2. (−1, 1); $y < 5x - 1$ _____
3. (1, 1); $y \geq x - 5$ _____
4. (0, 2); $y \leq -2x + 6$ _____
5. (3, 0); $y \geq x - 8$ _____
6. (1, −2); $y > -4x + 1$ _____

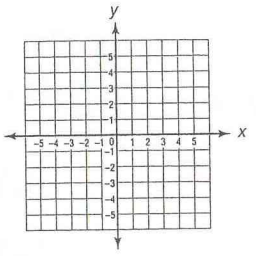
1. Which is the x-coordinate? 2, or 3?
2. Which is the y-coordinate? −1, or 1?

Graph each inequality.

7. $y < 2x - 3$

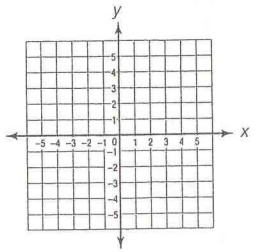


8. $y \geq x + 4$

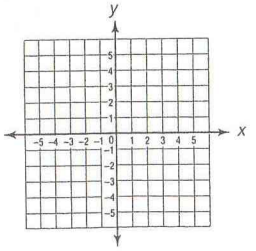


7. What type of line should be graphed? solid, or dashed?

9. $y > x - 2$



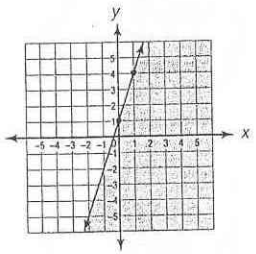
10. $y \leq -2x + 1$



On Your Own!

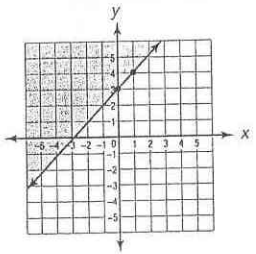
Circle the best answer for each question.

1. Which inequality has this graph?



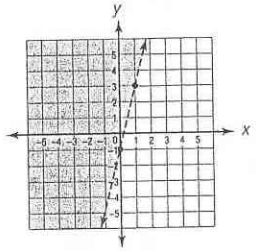
A. $y \geq 3x + 1$
B. $y \leq 3x + 1$
C. $y > 3x + 1$
D. $y < 3x + 1$

2. Which inequality has this graph?



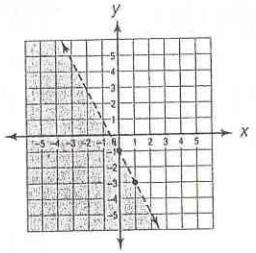
A. $y \geq x + 3$
B. $y \leq x + 3$
C. $y > x + 3$
D. $y < x + 3$

3. Which inequality has this graph?



A. $y \leq 4x - 1$
B. $y \geq 4x - 1$
C. $y < 4x - 1$
D. $y > 4x - 1$

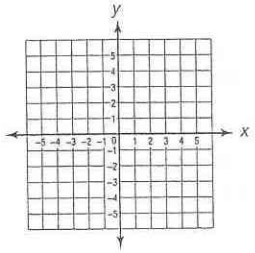
4. Which inequality has this graph?



A. $y \leq -2x - 1$
B. $y \geq -2x - 1$
C. $y < -2x - 1$
D. $y > -2x - 1$

5. Use the inequality $y < -\frac{2}{3}x + 3$.

Part A Graph the inequality.



Part B Is (3, 1) a solution of the inequality?

Math Words

Fill in the blanks.

6. The graph of $y < 3x$ is a(n) _____ half-plane.

7. The graph of $y \leq -5x + 8$ is a(n) _____ half-plane.