Graphing Linear Inequalities Practice

Use this key to check answers and read the explanations.

1. Which boundary line belongs on a graph of $y \geq x + 6$?
   - A. Solid line $y = x + 6$
   - B. Dashed line $y = x + 6$
   - C. Solid line $y = x - 6$
   - D. Dashed line $y = x - 6$

   Correct answer: A. Solid line $y = x + 6$
   The boundary is the line where y equals x + 6. Equality is allowed, so the boundary is solid.

2. Which graph represents $y < -2x + 7$?
   - A. Solid boundary $y = -2x + 7$ with shading below it
   - B. Dashed boundary $y = -2x + 7$ with shading above it
   - C. Dashed boundary $y = -2x + 7$ with shading below it
   - D. Solid boundary $y = -2x + 7$ with shading above it

   Correct answer: C. Dashed boundary $y = -2x + 7$ with shading below it
   For each x, y must be smaller than the boundary value. Shade below the line and draw it dashed because equality is excluded.

3. A graph has a dashed horizontal line at $y = -3$, with the region above the line shaded. Which inequality does it represent?
   - A. $y \geq -3$
   - B. $y > -3$
   - C. $y < -3$
   - D. $y \leq -3$

   Correct answer: B. $y > -3$
   Above $y = -3$ means y is greater than −3. The dashed line excludes $y = -3$ itself.

4. Which point belongs to the solution region of $y \leq 2x - 5$, including its boundary?
   - A. (1, −2)
   - B. (3, 2)
   - C. (2, 0)
   - D. (4, 3)

   Correct answer: D. (4, 3)
   At $x = 4$, the boundary value is $2(4) - 5 = 3$. The point (4, 3) is included because $3 \leq 3$.

5. A solid line has equation $x + y = 3$, and the shaded side contains (0, 5). Which inequality represents the graph?

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

Correct answer: B. $x + y \geq 3$
At (0, 5), the sum is 5, which is greater than 3. The solid line also includes all points where the sum is exactly 3.

6. A dashed line passes through $(-4, 2)$ and $(-4, -5)$. The shaded side contains $(-6, 0)$. Which inequality represents this graph?

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

Correct answer: A. $x < -4$
Both points on the line have $x = -4$, so the boundary is vertical. The shaded point has $x = -6$, to the left, and the dashed line excludes $x = -4$.

7. A student wants an off-boundary test point for $2x - 3y \geq 0$. Which point can the student use to decide which side to shade?

A. $(-3, -2)$
B. (0, 0)
C. (3, 2)
D. (3, 1)

Correct answer: D. (3, 1)
At (3, 1), $2x - 3y$ is $6 - 3 = 3$, so the point is off the boundary and lies on the shaded side. The expression is zero at the other three points, so each lies on the boundary.

8. Which inequality describes the same solution region as $3x - 2y < 8$?

A. $y > (3/2)x + 4$
B. $y < (3/2)x - 4$
C. $y > (3/2)x - 4$
D. $y < (3/2)x + 4$

Correct answer: C. $y > (3/2)x - 4$
Subtract 3x to get $-2y < 8 - 3x$. Dividing both sides by -2 reverses the inequality and gives $y > (3/2)x - 4$.

9. A solid boundary line passes through (0, −2) and (4, 0). The shaded region includes (0, 1). Which inequality describes the graph?

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

Correct answer: A. $y \geq x/2 - 2$
The line rises 2 units over a run of 4, so its slope is 1/2. Its y-intercept is −2. The shaded point is above the line and the solid boundary allows equality.

10. For $5x + 2y > 6$, a student drew the correct boundary equation, $5x + 2y = 6$, as a solid line. They shaded the side containing (0, 0). What should change?

A. Keep a solid line and keep the same shading.
B. Draw a dashed line and keep the same shading.
C. Keep a solid line and shade the opposite side.
D. Draw a dashed line and shade the opposite side.

Correct answer: D. Draw a dashed line and shade the opposite side.
The strict inequality requires a dashed line. The origin gives $0 > 6$, which is false, so the opposite side should be shaded.

11. Which point is in the common solution region for $x \leq 4$, $y > 1$, and $2x + y \leq 13$?

A. (1, 1)
B. (4, 6)
C. (4, 5)
D. (5, 3)

Correct answer: C. (4, 5)
At (4, 5), x is 4, y is greater than 1, and $2(4) + 5 = 13$. The other choices respectively exceed the sum limit, miss the strict y condition, or exceed the x limit.

12. Where do the shaded regions for $y \geq 2x + 1$ and $y < 2x - 2$ overlap?

A. They overlap in the strip between the two lines.
B. They have no points in common.
C. They overlap on the line $y = 2x + 1$ only.
D. They overlap everywhere above $y = 2x + 1$.

Correct answer: B. They have no points in common.
The line $y = 2x + 1$ is three units above $y = 2x - 2$ at every x. The system requires y to be at or above the higher line and below the lower line, so it has no solution.

13. The inequalities $x \geq 1$, $y \geq 2$, and $x + 2y \leq 9$ outline a closed triangle. Which list gives its three vertices?

A. (1, 2), (0, 4.5), (9, 0)
B. (1, 2), (1, 5), (4, 2)
C. (1, 2), (1, 8), (7, 2)
D. (1, 2), (1, 4), (5, 2)

Correct answer: D. (1, 2), (1, 4), (5, 2)
The vertical and horizontal boundaries meet at (1, 2). Substituting $x = 1$ into $x + 2y = 9$ gives $y = 4$, and substituting $y = 2$ gives $x = 5$.

14. A library needs at least 9 activity kits. A small kit uses 3 sheets of card and a large kit uses 5. There are 38 sheets available. If the library makes exactly 4 small kits, how many large kits meet both conditions?

A. 5 large kits
B. 3 large kits
C. 4 large kits
D. 6 large kits

Correct answer: A. 5 large kits
With 4 small kits, the library needs at least 5 large ones. The small kits use 12 sheets, leaving 26. Five large kits use 25 of those sheets and six would use 30, so five is the only feasible choice.

15. For which real values of x can some y satisfy both $y > 3x - 4$ and $y \leq -x + 8$?

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

Correct answer: C. $x < 3$
The lower boundary must be strictly below the upper boundary because y must exceed the lower one. So $3x - 4 < -x + 8$, which simplifies to $x < 3$. At $x = 3$, both boundaries give $y = 5$, which the strict inequality excludes.