Graphing Linear Inequalities Worksheet

Algebra 1 · Common Core HSA-REI.D.12

> Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Practice

Builds the skill step by step.

1. Is (1, 2) a solution of $y > x$?
   A. Yes, because $1 + 2 = 3$.
   B. No, because $1 < 2$.
   C. Yes, because $2 > 1$.
   D. No, because it is on the line $y = x$.

2. When you graph $y < 2x + 1$, what kind of boundary line do you draw?
   A. A dashed line, because points on the line are not solutions
   B. A solid line, because points on the line are solutions
   C. No line at all
   D. A dashed line, because the slope is positive

3. When you graph $y \geq -x + 3$, which side of the line $y = -x + 3$ do you shade?
   A. Below the line
   B. Neither side
   C. Above the line
   D. Both sides

4. Which point is a solution of $y \leq 2x - 1$?

   A. (0, 0)

   B. (3, 4)

   C. (1, 2)

   D. (2, 4)

5. To graph $x + y > 4$, you test (0, 0) and get $0 > 4$, which is false. Which side do you shade?

   A. The side that contains (0, 0)

   B. The side that does not contain (0, 0)

   C. Only the line $x + y = 4$

   D. No side

6. A graph has a dashed boundary line $y = x + 2$, and the region below the line is shaded. Which inequality does it show?

   A. $y > x + 2$

   B. $y \leq x + 2$

   C. $y \geq x + 2$

   D. $y < x + 2$

7. How many of these points satisfy $y \geq 2x$: (0, 0), (1, 5), (2, 1), (3, 6)?

8. How do you graph $x \geq 3$ in the coordinate plane?

   A. A solid vertical line at $x = 3$, shaded to the left

   B. A solid vertical line at $x = 3$, shaded to the right

   C. A solid horizontal line at $y = 3$, shaded above

   D. A dashed vertical line at $x = 3$, shaded to the right

9. Which point is in the solution of the system $y > 1$ and $x < 2$?

   A. (0, 0)

   B. (2, 2)

   C. (0, 3)

   D. (3, 3)

10. How do you graph $y < 3$ in the coordinate plane?

    A. A dashed horizontal line at $y = 3$, shaded below

    B. A dashed vertical line at $x = 3$, shaded left

    C. A solid horizontal line at $y = 3$, shaded below

    D. A dashed horizontal line at $y = 3$, shaded above

ALBERT

Name _____ Date _____

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On Level

Grade-level practice.

1. Which point is in the solution of the system $y \geq x - 1$ and $y \leq -x + 5$?

   A. (4, 4)

   B. (0, −3)

   C. (2, 2)

   D. (5, 1)

2. The boundary lines of $y \geq x - 1$ and $y \leq -x + 5$ cross at a corner of the solution region. What is that point?

3. Which inequality is the same as $2x + 3y \leq 12$?

   A. $y \leq -\frac{2}{3}x + 4$

   B. $y \geq -\frac{2}{3}x + 4$

   C. $y \leq \frac{2}{3}x + 4$

   D. $y \leq -\frac{2}{3}x + 12$

4. Which inequality is the same as $-2y > 4x - 6$?

   A. $y > -2x + 3$

   B. $y < 2x - 3$

   C. $y > 2x - 3$

   D. $y < -2x + 3$

5. How many points with whole-number coordinates satisfy $x \geq 0$, $y \geq 0$ and $x + y \leq 3$?

6. Is $(0, 0)$ in the solution of the system $y > x$ and $y < x + 4$?

   A. Yes, because $0 < 4$.

   B. Yes, because it is between the lines.

   C. No, because $0 > 0$ is false.

   D. No, because $0 < 4$ is false.

7. Adult tickets cost 10 dollars and child tickets cost 5 dollars. Sales must be at least 200 dollars, so $10a + 5c \geq 200$. If 12 adult tickets are sold, what is the fewest number of child tickets?

8. What shape is the solution region of $x \geq 0$, $y \geq 0$ and $x + y \leq 6$?

   A. A line

   B. A half-plane

   C. A square

   D. A triangle

9. What is the area of the solution region of $x \geq 0$, $y \geq 0$ and $x + y \leq 6$, in square units?

10. Which system has no solution?

    A. $y < x + 2$ and $y < x - 1$

    B. $y > x + 2$ and $y < x - 1$

    C. $y > x - 1$ and $y < x + 2$

    D. $y > x + 2$ and $y > x - 1$

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Challenge

Multi-step and word problems that stretch it.

1. What is the area of the solution region of $x \geq 0$, $y \geq 0$ and $2x + y \leq 8$, in square units?

2. A region is above the solid line $y = 1$ and to the left of the dashed line $x = 4$. Which system describes it?

   A. $y \geq 1$ and $x < 4$

   B. $y > 1$ and $x \leq 4$

   C. $y \leq 1$ and $x < 4$

   D. $y \geq 1$ and $x > 4$

3. The solution region of $x \geq 0$, $y \geq 0$, $x + 2y \leq 8$ and $3x + y \leq 9$ has corners $(0, 0)$, $(3, 0)$, $(0, 4)$ and one more. What is the greatest value of $x + y$ in the region?

4. Jo graphs $y < 2x + 1$ with a solid line and shades below it. What is her mistake?

   A. There is no mistake.

   B. The line should be dashed.

   C. The slope should be -2.

   D. She should shade above the line.

5. The system $y \leq 2x + 1$ and $y \leq -x + 7$ has a corner where the boundary lines cross. What is that point?

6. Which inequality describes all points at least 3 units directly above the line $y = x$?

   A. $y \leq x + 3$

   B. $y > x - 3$

   C. $y \geq 3x$

   D. $y \geq x + 3$

7. Shirts cost 15 dollars and hats cost 10 dollars. A club can spend at most 120 dollars and wants at least 2 shirts and at least 2 hats. What is the greatest number of hats it can buy?

8. To graph $3x - 4y < 12$, you test $(0, 0)$ and get $0 < 12$, which is true. Which side of the line $3x - 4y = 12$ do you shade?

   A. The side not containing the origin, below the line

   B. Only the line

   C. Neither side

   D. The side containing the origin, above the line

9. How many points with integer coordinates satisfy $x \geq 0$, $y > x$ and $y < 4$?

10. What is the solution set of the system $y \geq 2x + 1$ and $y \leq 2x + 1$?

    A. The line $y = 2x + 1$

    B. The whole plane

    C. No points

    D. The region above $y = 2x + 1$