

Solving Compound Inequalities

A **compound inequality** is an inequality formed by joining two inequalities with the word “and” or the word “or.”

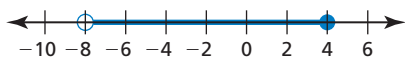
Example 1 Write each sentence as an inequality. Graph each inequality.

- a. A number x is greater than -8 and less than or equal to 4 .
- b. A number y is at most 0 or at least 2 .

a. A number x is greater than -8 and less than or equal to 4 .

$$x > -8 \quad \text{and} \quad x \leq 4$$

▶ An inequality is $-8 < x \leq 4$.

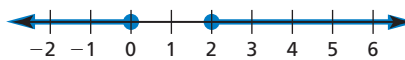


Graph the intersection of the graphs of $x > -8$ and $x \leq 4$.

b. A number y is at most 0 or at least 2 .

$$y \leq 0 \quad \text{or} \quad y \geq 2$$

▶ An inequality is $y \leq 0$ or $y \geq 2$.



Graph the union of the graphs of $y \leq 0$ and $y \geq 2$.

You can solve a compound inequality by solving two inequalities separately. When a compound inequality with “and” is written as a single inequality, you can solve the inequality by performing the same operation on each expression.

Example 2 Solve $-4 < x - 2 < 3$. Graph the solution.

Separate the compound inequality into two inequalities, then solve.

$$-4 < x - 2 \quad \text{and} \quad x - 2 < 3 \quad \text{Write two inequalities.}$$

$$\underline{+2} \quad \underline{+2} \quad \underline{+2} \quad \underline{+2} \quad \text{Add 2 to each side.}$$

$$-2 < x \quad \text{and} \quad x < 5 \quad \text{Simplify.}$$

▶ The solution is $-2 < x < 5$.

Practice

Check your answers at BigIdeasMath.com.

Write the sentence as an inequality. Graph the inequality.

1. A number d is more than 0 and less than 10 . $0 < d < 10$

2. A number a is fewer than -6 or no less than -3 . $a < -6$ or $a \geq -3$

Solve the inequality. Graph the solution.

3. $5 \leq m + 4 < 10$
 $1 \leq m < 6$

4. $-3 < 2k - 5 < 7$
 $1 < k < 6$

5. $4c + 3 \leq -5$ or $c - 8 > -1$
 $c \leq -2$ or $c > 7$

6. $2p + 1 < -7$ or $3 - 2p \leq -1$
 $p < -4$ or $p \geq 2$