

# Solving Compound Inequalities

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

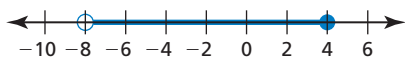
**Example 1** Write each sentence as an inequality. Graph each inequality.

- 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  $-8 < x \leq 4$ .

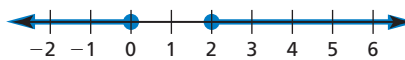


Graph the intersection of the graphs of  $x > -8$  and  $x \leq 4$ .

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.

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

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

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

► The solution is  $-2 < x < 5$ .



## Practice

Check your answers at [BigIdeasMath.com](http://BigIdeasMath.com).

Write the sentence as an inequality. Graph the inequality.

- 1. A number  $d$  is more than  $0$  and less than  $10$ .
- 2. A number  $a$  is fewer than  $-6$  or no less than  $-3$ .

Solve the inequality. Graph the solution.

- 3.  $5 \leq m + 4 < 10$
- 4.  $-3 < 2k - 5 < 7$
- 5.  $4c + 3 \leq -5$  or  $c - 8 > -1$
- 6.  $2p + 1 < -7$  or  $3 - 2p \leq -1$