

# Solving linear inequalities



Solve each inequality. Remember to flip the sign when you multiply or divide both sides by a negative number.

Name \_\_\_\_\_

Date \_\_\_\_\_

## Flip the sign on a negative step

An inequality solves just like an equation, except that multiplying or dividing both sides by a negative number turns the inequality sign around.

**Worked example** Solve  $-2x > 10$ .

$$\begin{array}{ccc} -2x & > & 10 \\ & \swarrow \text{flips} & \\ x & < & -5 \end{array} \quad \begin{array}{c} \downarrow \div (-2) \\ \text{both sides } (-ve) \end{array}$$

Divide both sides by  $-2$  (a negative number).  
Flip the inequality sign:  $x < -5$ .

1. Solve  $3x + 2 > 14$ .

**Solution**

$3x > 12$ , so  $x > 4$ .

2. Solve  $5x - 3 \leq 17$ .

**Solution**

$5x \leq 20$ , so  $x \leq 4$ .

3. Solve  $\frac{x}{3} + 4 < 9$ .

**Solution**

$x < 15$ .

4. Solve  $2x - 5 \geq 9$ .

**Solution**

$2x \geq 14$ , so  $x \geq 7$ .

5. Solve  $-2x < 8$ .

**Solution**

Divide by  $-2$ , flip:  $x > -4$ .

6. Solve  $-x - 3 \geq 2$ .

**Solution**

$-x \geq 5$ , flip:  $x \leq -5$ .

7. Solve  $8 - 3x \leq 2$ .

**Solution**

$-3x \leq -6$ , flip:  $x \geq 2$ .

8. Solve  $6 - 2x > -4$ .

**Solution**

$-2x > -10$ , flip:  $x < 5$ .

9. Solve  $4x + 3 \leq 2x + 11$ .

**Solution**

$2x \leq 8$ , so  $x \leq 4$ .

## Solving linear inequalities (continued)



Solve each inequality. Remember to flip the sign when you multiply or divide both sides by a negative number.

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**10.** Solve  $5x - 2 > 3x + 6$ .

**Solution**

$2x > 8$ , so  $x > 4$ .

**11.** Solve  $-2 < 3x - 2 \leq 10$ .

**Solution**

Add 2:  $0 < 3x \leq 12$ .

Divide by 3:  $0 < x \leq 4$ .

**12.** Solve  $-9 \leq 4x + 3 < 15$ .

**Solution**

Subtract 3:  $-12 \leq 4x < 12$ .

Divide by 4:  $-3 \leq x < 3$ .

**13.** Solve  $3(x + 2) < 2x + 11$ .

**Solution**

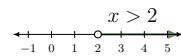
$3x + 6 < 2x + 11$ , so  $x < 5$ .

**14.** Solve  $-4(x - 1) \leq 16$ .

**Solution**

$-4x + 4 \leq 16$ , flip:  $x \geq -3$ .

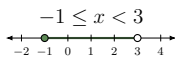
**15.** Write the inequality shown.



**Solution**

$x > 2$ .

**16.** Write the compound inequality shown.



**Solution**

$-1 \leq x < 3$ .

**17.** A student solves  $-4x > 12$  by writing  $x > -3$ . Explain the error and give the correct solution set.

**Solution**

The student divided by a negative but did not flip the sign.  
Correct:  $x < -3$ .

**18.** Solve  $-5 \leq 3x + 1 < 7$ .

**Solution**

Subtract 1:  $-6 \leq 3x < 6$ .

Divide by 3:  $-2 \leq x < 2$ .