

Inequality Expressions

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CHAPTER

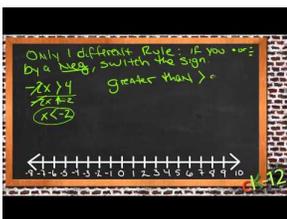
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Inequality Expressions

Here you'll learn how to write and graph inequalities in one variable on a number line.

What if the maximum occupancy of an elevator were listed at 20 people? How could you graph the number of allowable occupants on the elevator? After completing this Concept, you'll be able to write and graph inequalities like this one.

Watch This



MEDIA

Click image to the left for use the URL below.

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CK-12 Foundation: 0601S Graphing Inequalities (H264)

Guidance

Dita has a budget of \$350 to spend on a rental car for an upcoming trip, but she wants to spend as little of that money as possible. If the trip will last five days, what range of daily rental rates should she be willing to consider?

Like equations, inequalities show a relationship between two expressions. We solve and graph inequalities in a similar way to equations—but when we solve an inequality, the answer is usually a set of values instead of just one value.

When writing inequalities we use the following symbols:

$>$ is greater than

\geq is greater than or equal to

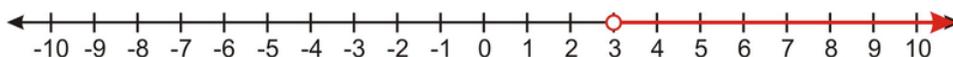
$<$ is less than

\leq is less than or equal to

Write and Graph Inequalities in One Variable on a Number Line

Let's start with the simple inequality $x > 3$.

We read this inequality as “ x is greater than 3.” The solution is the set of all real numbers that are greater than three. We often represent the solution set of an inequality with a number line graph.



Consider another simple inequality: $x \leq 4$.

We read this inequality as “ x is less than or equal to 4.” The solution is the set of all real numbers that are equal to four or less than four. We can graph this solution set on the number line.



Notice that we use an empty circle for the endpoint of a strict inequality (like $x > 3$), and a filled circle for one where the equals sign is included (like $x \leq 4$).

Example A

Graph the following inequalities on the number line.

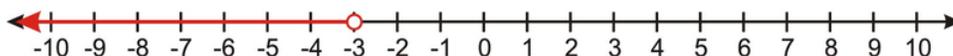
a) $x < -3$

b) $x \geq 6$

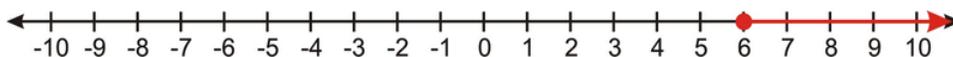
c) $x > 0$

Solution

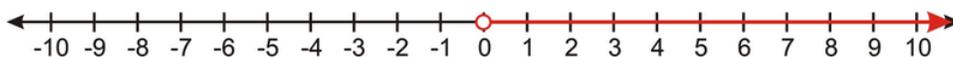
a) The inequality $x < -3$ represents all numbers that are less than -3. The number -3 is not included in the solution, so it is represented by an open circle on the graph.



b) The inequality $x \geq 6$ represents all numbers that are greater than or equal to 6. The number 6 is included in the solution, so it is represented by a closed circle on the graph.



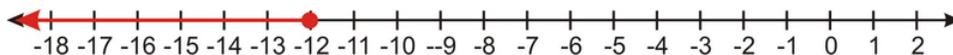
c) The inequality $x > 0$ represents all numbers that are greater than 0. The number 0 is not included in the solution, so it is represented by an open circle on the graph.



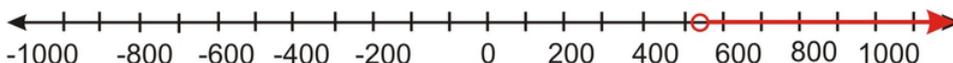
Example B

Write the inequality that is represented by each graph.

a)



b)



c)



Solution

- a) $x \leq -12$
 b) $x > 540$
 c) $x < 6.5$

Inequalities appear everywhere in real life. Here are some simple examples of real-world applications.

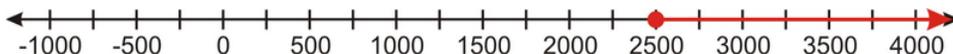
Example C

Write each statement as an inequality and graph it on the number line.

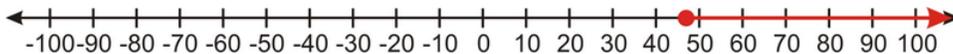
- a) You must maintain a balance of at least \$2500 in your checking account to get free checking.
 b) You must be at least 48 inches tall to ride the “Thunderbolt” Rollercoaster.
 c) You must be younger than 3 years old to get free admission at the San Diego Zoo.

Solution

- a) The words “at least” imply that the value of \$2500 is included in the solution set, so the inequality is written as $x \geq 2500$.



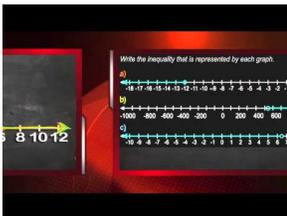
- b) The words “at least” imply that the value of 48 inches is included in the solution set, so the inequality is written as $x \geq 48$.



- c) The inequality is written as $x < 3$.



Watch this video for help with the Examples above.

**MEDIA**

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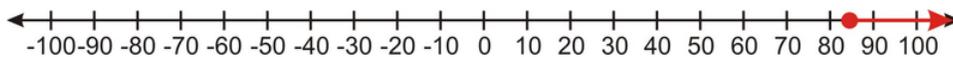
CK-12 Foundation: Graphing Inequalities

Vocabulary

- The answer to an **inequality** is usually an **interval of values**.

Guided Practice

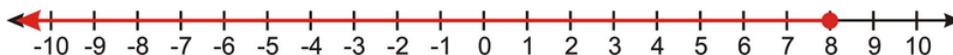
1. Graph the inequality $x \leq 8$ on the number line.
2. Write the inequality that is represented by the graph below.



3. Write the statement, "the speed limit on the interstate is 65 miles per hour or less" as an inequality.

Solution

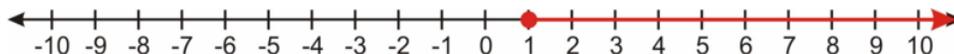
1. The inequality $x \leq 8$ represents all numbers that are less than or equal to 8. The number 8 is included in the solution, so it is represented by a closed circle on the graph.



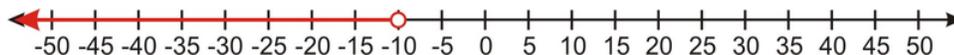
2. $x \geq 85$
3. Speed limit means the highest allowable speed, so the inequality is written as $x \leq 65$.

Explore More

1. Write the inequality represented by the graph.



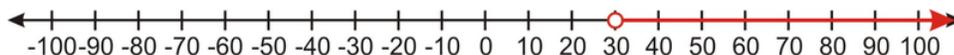
2. Write the inequality represented by the graph.



3. Write the inequality represented by the graph.



4. Write the inequality represented by the graph.



Graph each inequality on the number line.

5. $x < -35$
6. $x > -17$
7. $x \geq 20$
8. $x \leq 3$
9. $x \geq -5$
10. $x > 20$