

Grade 6 · Writing and Graphing Inequalities · Lesson

Common Core 6.EE.B.5, 6.EE.B.8 · mathovore.fr

An inequality compares two quantities using $<$, $>$, $\leq$, or $\geq$, such as $x > 5$. An inequality usually has infinitely many solutions. To graph $x > 5$, draw an open circle at 5 and shade to the right; for $x \geq 5$, use a closed circle because 5 is a solution.

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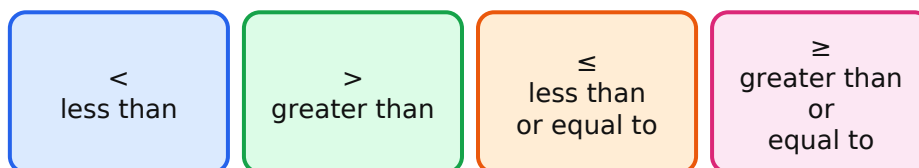
Key facts:

- A solution of an inequality is any value that makes it true: 7 is a solution of $x > 5$.
- Open circle for $<$ and $>$; closed circle for $\leq$ and $\geq$.
- Shade right for greater values and left for lesser values.
- "At least" means $\geq$ and "at most" means $\leq$.

What is an inequality?

An inequality is a statement that compares two quantities that are not necessarily equal. Where an equation uses an equals sign, an inequality uses one of four symbols. For example, $x > 5$ says "x is greater than 5."

Symbol	Meaning	Example
$<$	is less than	$2 < 7$
$>$	is greater than	$9 > 4$
$\leq$	is less than or equal to	$x \leq 3$
$\geq$	is greater than or equal to	$x \geq 5$



The four inequality symbols.

What does a solution of an inequality look like?

A **solution** of an inequality is any value of the variable that makes it true. For $x > 5$, the values 6, 5.5, and 100 are solutions because $6 > 5$, $5.5 > 5$, and $100 > 5$. The values 5 and 4 are not solutions, since $5 > 5$ is false.

Unlike $x + 2 = 7$, which has exactly one solution, $x > 5$ has **infinitely many solutions**, because there are always more numbers between and beyond those you list.

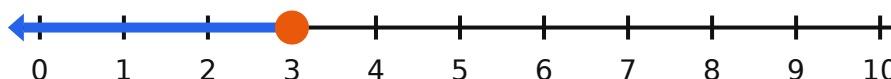


Graph of $x > 5$.

How do you graph an inequality on a number line?

1. Draw a number line and locate the boundary number.
2. Draw a circle at the boundary: an **open circle** for $<$ or $>$, because the boundary is not a solution, and a **closed circle** for $\leq$ or $\geq$, because it is a solution.
3. Shade or draw an arrow toward the solutions: to the right for greater values, to the left for lesser values.

The graph below shows $x \leq 3$: a closed circle at 3, shaded to the left.



Graph of $x \leq 3$.

How do you write an inequality for a real-world situation?

Key phrases

"More than" means $>$. "Less than" means $<$. "At least" means $\geq$. "At most" means $\leq$.

Example: a roller coaster at the county fair requires riders to be at least 48 inches tall. Let h be a rider's height in inches. "At least 48" includes 48 itself, so the inequality is $h \geq 48$. Its graph has a closed circle at 48 and shading to the right. A rider who is 47.5 inches tall is not a

solution, so that rider cannot ride.

Always ask whether the situation limits the values. A number of people must be a whole number, so 12.5 people is not a sensible solution even if it satisfies the inequality.



Graph of $h \geq 48$.

Writing and Graphing Inequalities: frequently asked questions

What is the difference between an equation and an inequality?

An equation uses an equals sign and often has one solution, such as $x+2=7$. An inequality uses $<$, $>$, $\leq$, or $\geq$ and usually has infinitely many solutions, such as $x>5$.

When do you use an open circle and when a closed circle?

Use an open circle when the inequality is $<$ or $>$, because the boundary number is not a solution. Use a closed circle when it is $\leq$ or $\geq$, because the boundary number is a solution.

What does at least mean in an inequality?

At least means the same as or greater than. A sign that says riders must be at least 48 inches tall gives $h \geq 48$, which includes a rider exactly 48 inches tall.

How many solutions does an inequality have?

Most inequalities with a variable have infinitely many solutions. For $x<10$, the numbers 9, 9.9, 9.99, and every smaller number all work, so you cannot list every solution.

How do you check whether a number is a solution?

Substitute the number for the variable and decide whether the statement is true. For $x \leq 3$ and $x=3$, $3 \leq 3$ is true, so 3 is a solution.