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The Order of Real Numbers: Inequalities

An inequality is an operation describing how one number can be compared to another. This lesson will describe and define inequalities and the symbols used to represent them. It will also give some examples on how to work with inequalities.

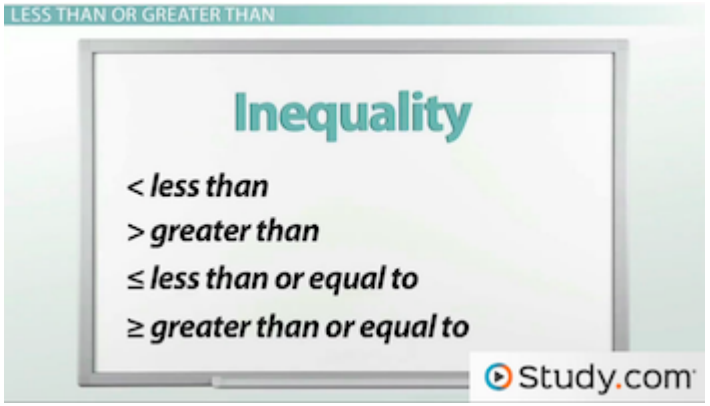
Which is Bigger?

When you were little, did your teacher ever ask your class to line up from tallest to smallest? Or have you ever lined something from smallest to greatest? I know I like the spice jars in the cabinet in my house to be lined up according to size. This type of organization deals with deciding the 'unequalness' of things, which of them are bigger or which of them are smaller than all the others.

Less Than or Greater Than

In mathematics, lining up numbers according to size involves the use of inequalities. An **inequality** is the relationship between two values that are different. Working with inequalities involves determining what that relationship is -- how each number is bigger or smaller than the other numbers in a particular group. The notation for inequalities consists of the following symbols:

These symbols are used to notate exactly what they say. If you have two quantities, the symbols can be used to show which one is larger or smaller than the other.



Inequality symbols

How to Use Inequalities

Inequalities can be used in many different ways. First, they can be used to show the relationship between two quantities. For example:

1 < 13

and

7.5 > 7.2

Inequalities are a good way to show the differences between real numbers that might not be easily apparent at a glance.

Real numbers are all numbers that are not imaginary. They include the following sets of numbers:

- **Whole numbers**, which are non-negative numbers that are not fractions or decimals.
- **Integers** , which are all numbers that are not fractions or decimals, including negative numbers.
- **Rational numbers** are positive and negative numbers that include fractions and decimals.
- **Irrational numbers** include decimal numbers that cannot be written as fractions, for example: e and pi.

Here's another example:

sqrt. 2 < pi

2/3 > 0.15

The second way you can use inequalities is to solve problems, such as:

Given the inequality a < b, write another inequality with the same meaning.

Answers to this question might be things like:

2 < 6

or

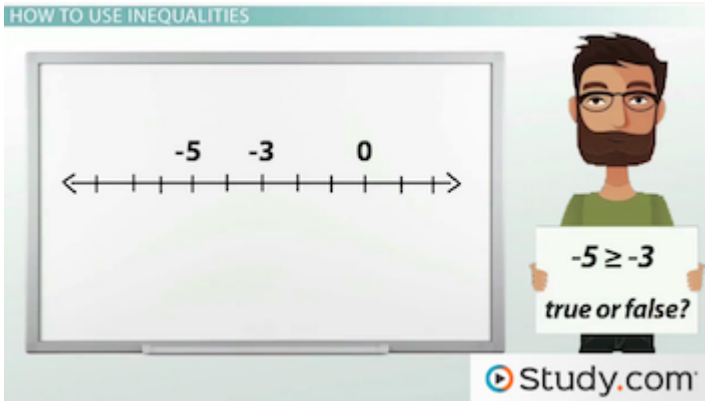
1.8 > sqrt. 3

Lastly, inequalities can be used to write true or false statements, such as:

Is the statement '-5 is greater than or equal to -3' true or false?

For problems like these, if it's not easy to see the answer, it can be helpful to draw a number line to help you figure it out.

You can see from the number line below that the -5 is to the left of the -3, which means that it is less than. So, our statement from before is false; -5 is not greater than or equal to -3. A little trick for remembering inequalities on the number line is to look at the arrows at each end. The arrow on the left of the number line looks like a less than symbol, which means that numbers to the left on the number line are less than the numbers to the right. The arrow on the right of the number line looks like a greater than symbol, so numbers to the right are always greater than numbers to the left.



Number line for example problem above

Let's try another example.

Is the statement, 'sqrt. 7 < pi,' true or false?

The first step to solving this problem is to figure out the decimal equivalents for the square root of 7 and pi.

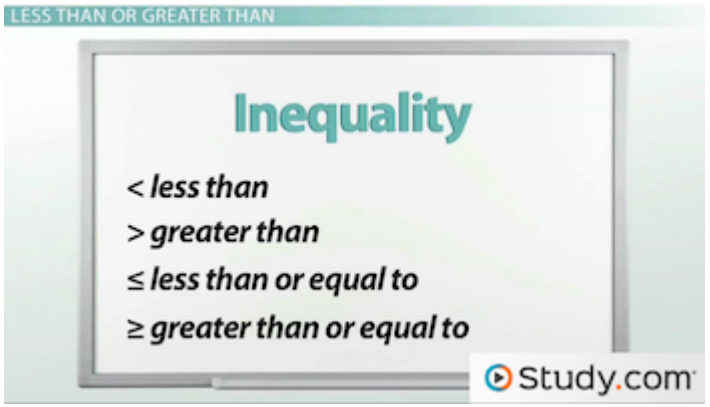
The square root of 7 = 2.65 and pi = 3.14

It is much easier then to see that 2.65 < 3.14, which means that the statement from above is true.

Lesson Summary

An inequality shows the relationship between two numbers. The four inequality symbols are:

These symbols are used to show the relationship between the sizes of two numbers. Bigger numbers are greater than smaller numbers and will appear to the right of the smaller number on the number line. Smaller numbers are less than the bigger numbers and will be to the left on the number line.



Inequality symbols

Learning Outcomes

Watch this lesson and develop the skills necessary to:

- Identify the four inequality symbols
- List several types of real numbers
- Outline the ways that you can use inequalities

- Tell of the usefulness of a number line when considering inequalities