

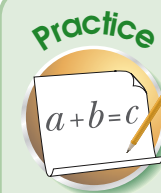
Inequalities are mathematical statements which compare the values of two expressions. In other words, one side of the statement does not exactly equal the other.

Inequalities are similar to equations, but instead of the left and right sides being separated by an equals sign (=), the sides are separated by one of four inequality symbols—greater than (>), less than (<), greater than or equal to (≥), or less than or equal to (≤). For example,  $5 < 10$  is an inequality. Additionally, while equations provide only one correct answer, inequalities leave room

for a variety of answers. For example, if  $x > 5$  then  $x$  is 6, or 7, or 8, or any number bigger than 5.

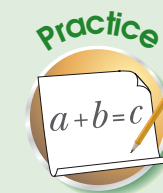
When you are working with inequalities, remember that positive numbers are always greater than negative numbers and 0 is less than a positive number but greater than a negative number.

A compound inequality is a slightly more complex statement that shows two inequalities at once. In a compound inequality, the value of a single variable falls within a specific range of values. For example,  $-5 < y < 5$  is a compound inequality that defines the value of  $y$  as a range of numbers between  $-5$  and  $5$ .



**Practice** Describe each of the following inequalities in words. For example,  $1 < 5$  would be “one is less than five.” You can check your answers on page 256.

- 1)  $-1 < 0$
- 2)  $3 \geq 2$
- 3)  $5 \leq 5$
- 4)  $-1 < x \leq 3$
- 5)  $4 \geq y \geq -3$
- 6)  $0 < 4 < 10$



**Practice** Determine whether each of the following inequalities is true or false. You can check your answers on page 256.

- a)  $0 < 4$
- b)  $3 > 3$
- c)  $-4 \leq 2$
- d)  $-1 \geq -1$
- e)  $-1 < -2$
- f)  $10 > 5$

### About Inequalities

$2 < 5$     2 is less than 5

$6 \leq 20$     6 is less than 20 or equal to 20

$10 > 7$     10 is greater than 7

$8 \geq 3$     8 is greater than 3 or equal to 3

$15 \geq 15$     15 is greater than 15 or equal to 15

### Inequalities: True or False

$50 < 100$     true

$-6 \leq -15$     false

$-30 \leq -30$     true

$-20 \geq 1$     false

$-2 > -5$     true

### Inequalities with Variables

$x < 25$      $x$  is less than 25

$y \leq 30$      $y$  is less than 30 or equal to 30

$a > 7$      $a$  is greater than 7

$b \geq 14$      $b$  is greater than 14 or equal to 14

### Compound Inequalities

$8 < x < 14$      $x$  is greater than 8 and less than 14

$40 \leq y < 50$      $y$  is greater than or equal to 40 and less than 50

$15 < a \leq 25$      $a$  is greater than 15 and less than or equal to 25

$10 \leq b \leq 30$      $b$  is greater than or equal to 10 and less than or equal to 30

- An inequality is a mathematical statement in which one side is less than, greater than or possibly equal to the other side.
- Inequalities use four different symbols.
  - $<$  less than
  - $\leq$  less than or equal to
  - $>$  greater than
  - $\geq$  greater than or equal to

Note: The point in an inequality symbol ( $<$ ) points at the smaller number.

- An inequality can be considered true or false.
- When comparing a positive number to a negative number, the positive number is always greater. For example,  $-2 < 1$ . When comparing two negative numbers, the number closer to zero is always greater. For example,  $-2 > -5$ .

- An inequality can include a variable. The inequality indicates if a variable is larger, smaller or possibly equal to a specific number.
- For example,  $x < 25$  indicates that the value of  $x$  can be any value less than 25.

- A compound inequality, such as  $8 < x < 14$ , defines a range of possible values for a variable. A compound inequality has a lower and upper boundary for the range of possible values.
  - When writing a compound inequality, you will usually write the lower boundary on the left and the upper boundary on the right.
- Note: If an inequality symbol is  $<$ , the lower or upper boundary is not included in the range of possible values. If the inequality symbol is  $\leq$ , the lower or upper boundary is included in the range of possible values.