INEQUALITIES

An inequality is a mathematical sentence that is used to compare quantities and contains one of the following signs:

> **a < b** or "a is less than b"
>
> **a > b** or "a is greater than b"
>
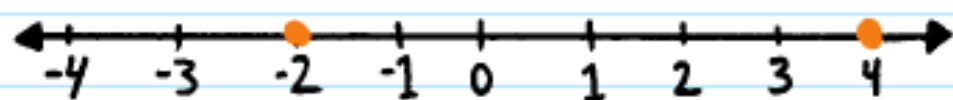> **a ≠ b** or "a is not equal to b"

OPEN SIDE > VERTEX SIDE

When using an inequality sign to compare two amounts, place the sign in between the numbers with the "open" side toward the greater amount and the "vertex" side toward the lesser amount.

You can use a number line to compare quantities. Numbers get smaller the farther you go to the left, and larger the farther you go to the right. Whichever number is farther to the left is "less than" the number on its right.

THE MATH MONSTER ALWAYS WANTS TO EAT THE GREATER AMOUNT!
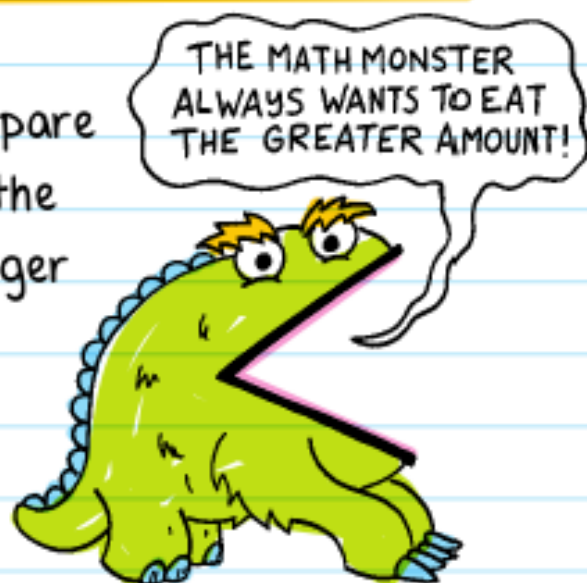
EXAMPLE: Compare -2 and 4.

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  ◄——┼————┼———●———┼———┼———┼———┼———┼———●——►
    -4    -3   -2   -1    0    1    2    3    4
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-2 is farther to the left than 4, so -2 < 4.

We can also reverse this expression
and say that 4 > -2.

-2 < 4 is the same as 4 > -2.

> Remember that any negative number is always less
> than zero, and any positive number is always greater
> than zero and all negative numbers.

Just like when we add or subtract fractions with different denominators, we have to make the denominators the same when comparing fractions.
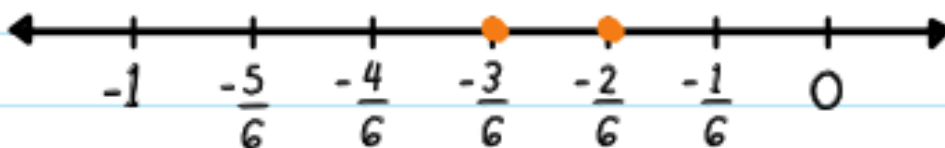
EXAMPLE: Compare $-\frac{1}{2}$ and $-\frac{1}{3}$

The LCM of 2 and 3 is 6.

$$-\frac{1 \cdot 3}{2 \cdot 3} = -\frac{3}{6}$$

$$-\frac{1 \cdot 2}{3 \cdot 2} = -\frac{2}{6}$$

Compare $-\frac{3}{6}$ and $-\frac{2}{6}$.

$$-\frac{3}{6} < -\frac{2}{6} \text{ therefore } -\frac{1}{2} < -\frac{1}{3}$$

There are two other inequality symbols you should know:

$a \le b$ or "a is less than or equal to b"

$a \ge b$ or "a is greater than or equal to b"

EXAMPLE: $x \le 3$, which means x can equal any number less than or equal to 3.

3 and any number to the left of 3 will make this number sentence true. The value of x could be 3, 2, 1, 0, -1, and so on. But x could not be 4, 5, 6, and so on.

EXAMPLE: $x \ge -\dfrac{1}{2}$

$-\dfrac{1}{2}$ and any number to the right of $-\dfrac{1}{2}$ will make this sentence true. The value of x could be 0, $\dfrac{1}{2}$, 1, and so on. But x could not be -1, $-1\dfrac{1}{2}$, and so on.

1. Compare −12 and 8.

2. Compare −14 and −15.

3. Compare 0 and −8.

4. Compare 0.025 and 0.026.

5. Compare $\frac{2}{5}$ and $\frac{4}{5}$.

6. Compare $-\frac{2}{3}$ and $-\frac{1}{2}$.

7. If $y \leq -4$, list 3 values that y could be.

8. If $m \geq 0$, list 3 values that m could NOT be.

9. Which is warmer: −5°C, or −8°C?

10. Fill in the blanks: Whichever number is farther to the left on a number line is _____ _____ the number on its right.

CHECK YOUR ANSWERS

1. -12 < 8 or 8 > -12

2. -14 > -15 or -15 < -14

3. 0 > -8 or -8 < 0

4. 0.025 < 0.026 or 0.026 > 0.025

5. $\frac{4}{5} > \frac{2}{5}$

6. $-\frac{1}{2} > -\frac{2}{3}$

7. -4 and/or any number less than -4, such as -5, -6, etc.

8. Any number less than 0, such as -1, -2, -3, etc.

9. -5°C

10. Less than

#7 and #8 have more than one correct answer.