

Intro to Linear Inequalities

Inequality is the opposite of equal.

When one quantity is less than or equal to another quantity, we use this symbol: \leq

When one quantity is greater than or equal to another quantity, we use this symbol: \geq

How could we use these symbols to write an inequality to describe the time in minutes that a car can be parked?



\leq \geq

What's a linear inequality?

Define a variable and write an inequality for each situation:



Height Restriction

You must be at least 102 cm to go on this ride.





Skill #1: Write linear inequalities

- a) Contest entrants must be at least 18 years old

- b) The temperature has been below 5 degrees all week

- c) You must have 7 items or less to use the express checkout lane

- d) Scientists have discovered over 400 species of dinosaurs

Write more LI's

If the inequality is TRUE, we call it a **solution**
 If the inequality is not true, then its not a solution!

Is each number a solution of the inequality $b \geq 4$?

a) -8 b) -3.5 c) -4 d) -4.5 e) 0

*substitute the number in for b

Skill #2: Solution or not?

We can illustrate the solutions of an inequality by graphing them on a number line.

For $a > 3$, the solution is all numbers greater than 3. Since 3 is **not** part of the solution, we draw an **open circle** at 3 to indicate this.



For $b \leq -5$, the solution is all numbers less than or equal to -5. Since -5 **is** part of the solution, we draw a **shaded circle** at -5 to indicate this.



Skill #3: LI's on a number line

Graph each inequality on a number line.
 Write 4 numbers that are solutions of the inequality.

a) $t > -5$ * is -5 part of the solution?

b) $-2 \leq x$ * careful here! It's easier when your variables are on the left

c) $0.5 \leq a$

d) $p < -\frac{25}{3}$

LI's on a number line

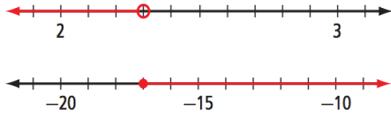
Just like you can take an inequality and put it on a number line, you should also be able to look at a number line and express an inequality!

Express graphically:

$$x \geq -\frac{4}{7}$$

$$35 < n$$

Express algebraically:

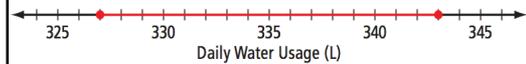


LI's on a number line

Many real life situations can be described by a combination of 2 inequalities. Represent the situation described in the newspaper headline using inequalities. Show it verbally, graphically, and algebraically.



Graphically: Draw a closed circle at 327 and a closed circle at 343. Your arrow will join the two circles



Algebraically: $w \geq 327$ and $w \leq 343$

LI's on a number line

For each combination of inequalities, show the possible values for x on a number line

- $x > 12$ and $x < 17$
- $x \geq -5$ and $x \leq 0$
- $x \geq 1\frac{3}{4}$ and $x \leq 4$
- $x < -4\frac{1}{2}$ and $x > -11$

LI's on a number line

1. Is each inequality true or false?

- | | |
|-----------------|--------------------------------|
| a) $5 < 8$ | b) $-5 < -8$ |
| c) $5 < -8$ | d) $5 < 5$ |
| e) $5 \leq 5$ | f) $0 \geq -5$ |
| g) $5.01 < 5.1$ | h) $\frac{1}{5} < \frac{1}{8}$ |

2. Write 4 numbers that are solutions of each inequality

- | | |
|----------------|-----------------|
| a) $b > 5$ | b) $7 > x$ |
| c) $-2 \leq v$ | d) $w \leq -12$ |

Practice

Define a variable and write an inequality to model each situation. Graph each on a number line.

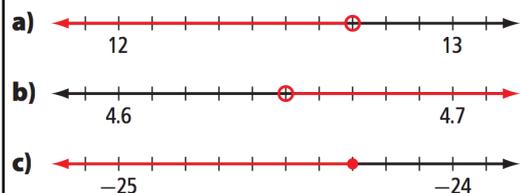
- A coffee maker can hold no more than 12 cups of water
- You must be at least 15 years old to obtain a learners permit to drive in Nunavut
- The maximum seating capacity of a school bus is 48 students
- The shoe store sells sizes no larger than 13.

Practice

Graph the solution of each inequality on a number line:

$$a < 6.8 \quad d \leq -\frac{2}{3} \quad 3 \leq s \quad c > \frac{2}{3}$$

Express each inequality algebraically in two different ways:



Practice