

Section 6.3: Introduction to Linear Inequalities

What are Inequalities?

We use inequalities to model a situation that can be described by a range of numbers instead of a single number.

We use specific symbols:

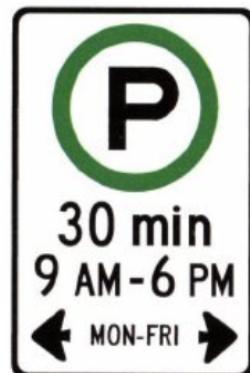
less than	<
greater than	>
less than or equal to	\leq
greater than or equal to	\geq

We can use inequalities to represent time:

Example 1:

Which inequality describes the time, t , for which a car could be legally parked?

- $t > 30$
- $t \geq 30$
- $t < 30$
- $t \leq 30$



Example 2:

Define a variable and write an inequality for each situation:



Writing an Inequality to Describe a Situation

Example 3:

Define a variable and write an inequality to describe each situation:

- a) Contest entrants must be at least 18 years old
- b) The temperature has been below -5°C for the last week
- c) You must have 7 items or less to use the express checkout line at a grocery store
- d) Scientist have identified over 400 species of dinosaurs

Determining Whether a Number is a Solution of an Inequality

- A **linear equation** is true for only **one** value of the variable.
- A **linear inequality** may be true for **many** values of the variable.
- The solution of an inequality is any value of the variable that makes the inequality true.
- There are usually too many numbers to list, so we may show them **on a number line**.

Example 4:

Determine which numbers are a solution of the inequality below:

$$b \geq 3$$

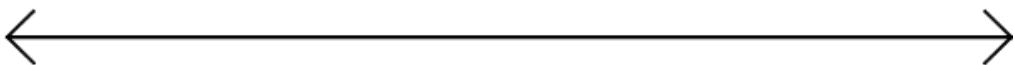
Possible solutions???

Example 5:

Is each number a solution of the inequality $b > -4$? Justify the answers.

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

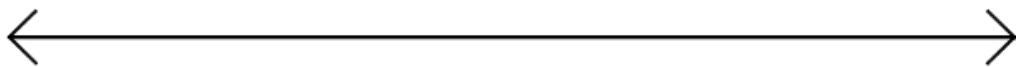
Method 1: Use a number line



Method 2: Substitute each number for b

GRAPHING INEQUALITIES

What would $a > 3$ look like on a number line?



NOTE: Since 3 is **NOT** part of the solution, we draw an **OPEN** circle at 3 to indicate this.

What about $b \leq -5$?

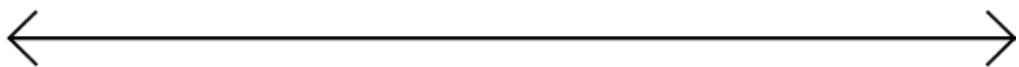


NOTE: Since -5 **IS** part of the solution, we draw a **SHADED** circle at -5 to indicate this.

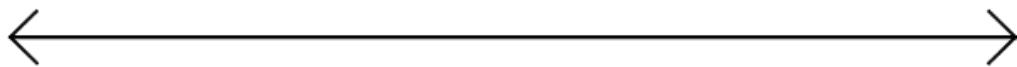
Example 6:

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

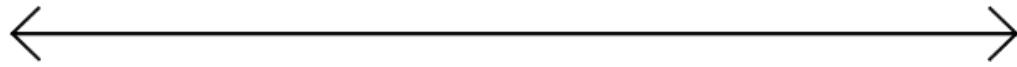
a) $t > -5$



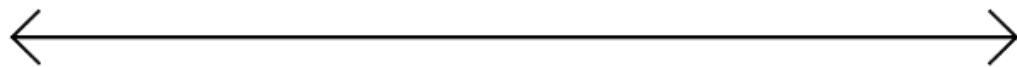
b) $-2 \geq x$



c) $0.5 \leq a$



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



Example 7:

Write an inequality to describe each situation, then graph the solution on a number line.

a) a number greater than 5

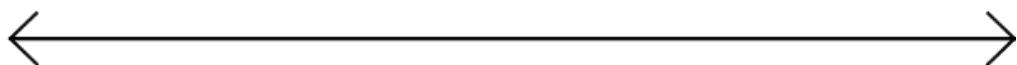


Example 7 (continued)

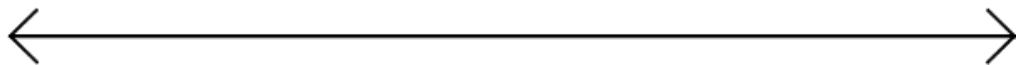
- b) a number is less than or equal to 4



- c) the temperature is below -1°C today.



- d) you must have 10 items or less to go to the express lane at the grocery store

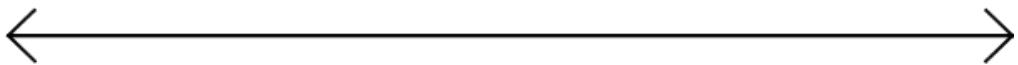


NOTE: Any **whole** number greater than or equal to 10, but not greater than 10, has to be included in the answer.

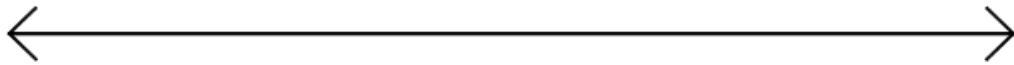
This problem involves **Discrete Data**.

We place **solid dots** on each included possible number.

- e) Chantal's mom said she should invite at least 10 people to her birthday party



- f) In most provinces, you have to be at least 16 years old to drive.



SUMMARY:

When graphing inequalities:

a) $>$ or $<$ use OPEN dots

\geq or \leq use SOLID dots

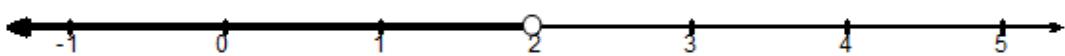
b) if continuous data = Shade line

if discrete data = use Dots

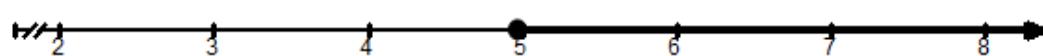
Example 8:

Write the inequality for each number line.

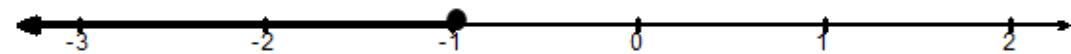
a)



b)



c)



d)

