

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:

a)  b)  c)  d) 

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:

$$b \geq 3$$

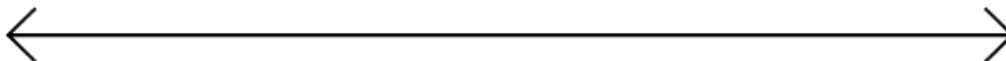
Possible solutions???

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

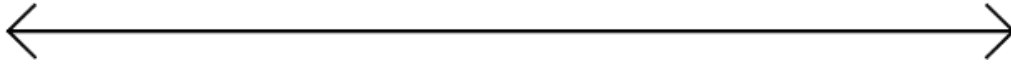
Method 1: Use a number line



Method 2: Substitute each number for b

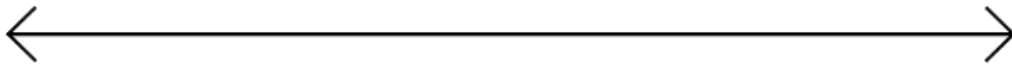
GRAPHING INEQUALITIES

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 $b \leq -5$?

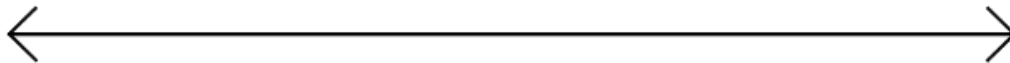


NOTE: Since -5 **IS** part of the solution, we draw a **SHADED** circle at -5 to indicate this.

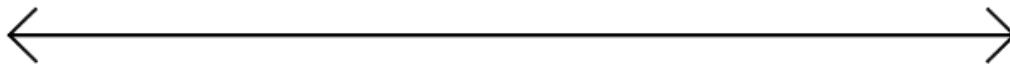
Example 6:

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

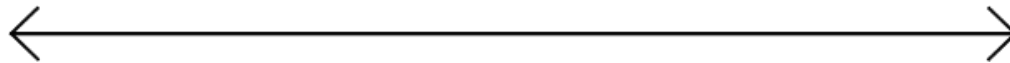
a) $t > -5$



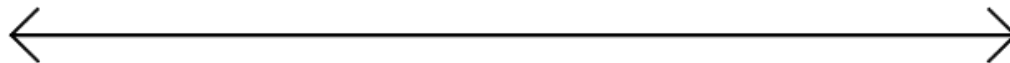
b) $-2 \geq x$



c) $0.5 \leq a$



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



Example 7:

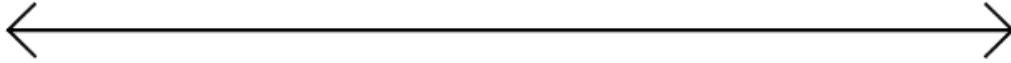
Write an inequality to describe each situation, then graph the solution on a number line.

a) a number greater than 5

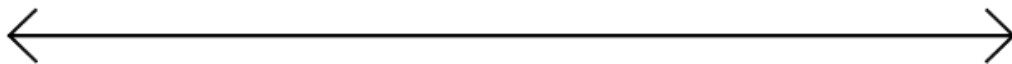


Example 7 (continued)

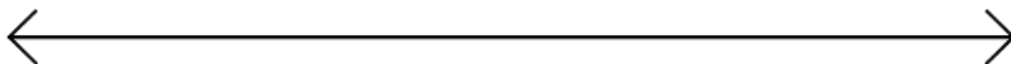
b) a number is less than or equal to 4



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.

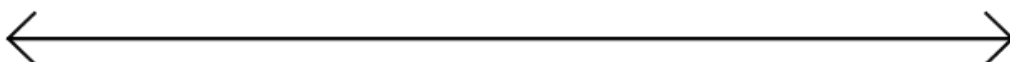
This problem involves **Discrete Data**.

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.

