Section 9.1
Representing Inequalities

Day 2 - Modeling & Double Inequalities

Is 4 a possible value for x?

$x > 3$ ✓

$x < 4$ ✗

$x > -9$ ✓

$x \geq 4$ ✓

Learning Targets:

1. **Translate** English phrases into inequalities.

2. **Model** real-world situations with linear inequalities.

3. Representing inequalities with more than one inequality (called a **double inequality**).

Inequality Phrases and How to Translate Them:

It is often helpful to find a real-world situation you are familiar with and to help illustrate the phrases we are going to be working with.

Inequality Phrases and the Symbols they Translate into: $>$, $<$, $\geq$, $\leq$

At least... $\geq$

At most... $\leq$

More than... $>$

Fewer than... $<$

Inequality Phrases and the Symbols they Translate into: $>$, $<$, $\geq$, $\leq$

Maximum of ... $\leq$

Minimum of... $\geq$

No more than... $\leq$

No less than... $\geq$

Inequality Phrases and the Symbols they Translate into: $>$, $<$, $\geq$, $\leq$
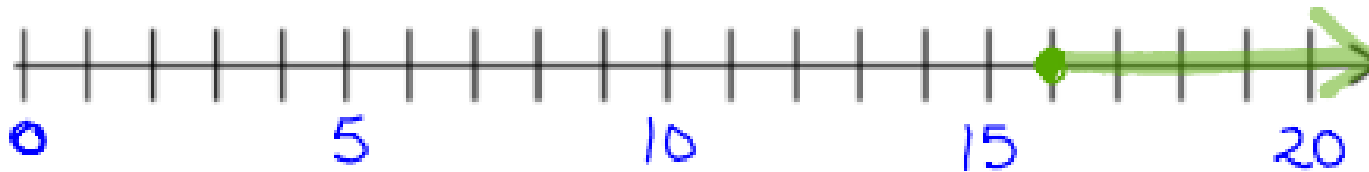
Must exceed ... $>$

Cannot exceed... $<$

Example:

In SK, in order to get a drivers' licence, a person must be at least 16 years old.

If "a" represents the age of a person, represent this inequality on a number line and algebraically.

$$a \geq 16$$

Example:

Maxine earns overtime at her job when she works **more than 40 hours** in one week.

a) Give 3 possible values for the number of hours that would result in overtime.

$$42, 45, 60$$

b) Represent the inequality verbally.

For overtime, the number of hours must exceed 40

Example:

Maxine earns overtime at her job when she works **more than 40 hours** in one week.

c) Represent the inequality graphically.

d) Represent the inequality algebraically using "h" to represent the number of hours.

$$h > 40$$

You Try:

Maxine earns overtime at her job when she works more than 40 hours in one week.

Represent the amount of time that does NOT qualify as overtime as an inequality verbally, graphically and algebraically.

You Try:

Maxine earns overtime at her job when she works **more than 40 hours** in one week.

Represent the amount of time that does NOT qualify as overtime as an inequality verbally, graphically and algebraically.

Solution: the hours worked are at most 40

$$h \leq 40$$

Example:

If Emily keeps a daily balance of **at least $1500.00** in her savings account, she will not be charged any bank fees.

a) If "**b**" represents her balance, write an inequality that represents the possible values for **b** that would result in her paying no fees.

$$b \geq 1500$$

b) Represent this inequality on a number line.

Using multiple inequalities to represent a situation

Sometimes it takes more than one inequality to represent a situation.
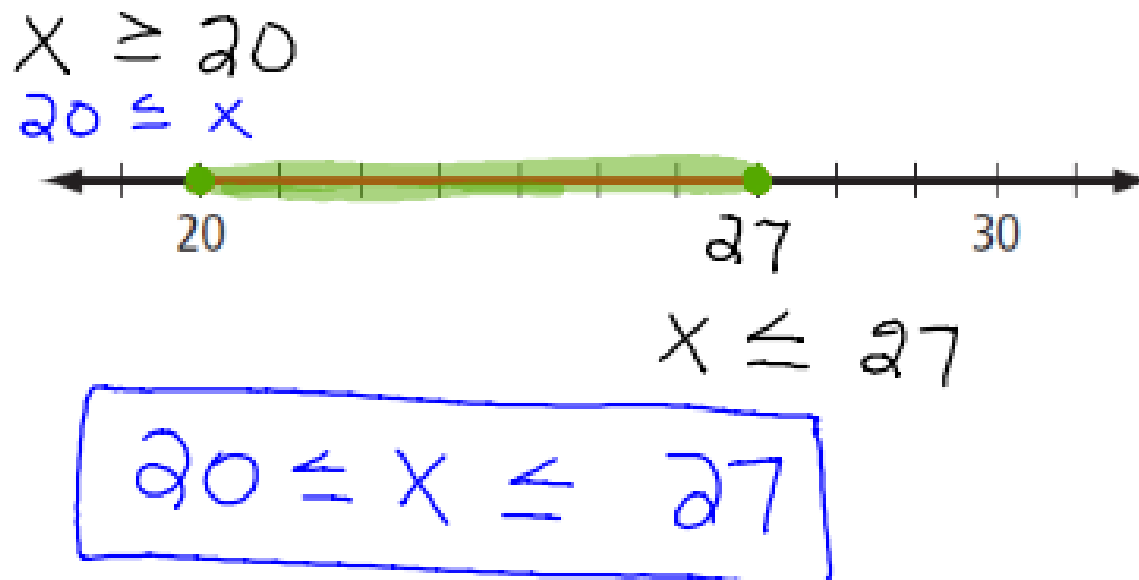
When the quantity we want to represent is <u>between two values</u>, it takes two inequalities to represent it.

These two inequalities can be written in a more compact form: *a double inequality*

Example:

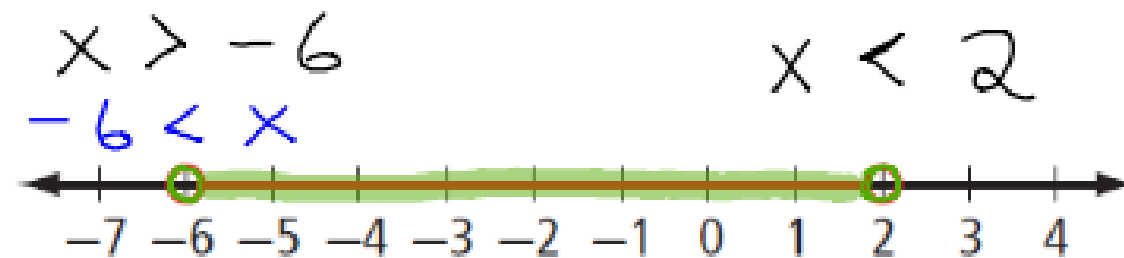Examine the number line below and write the two inequalities that are being represented.

Then, combine the two inequalities into a double inequality.

$$x \geq 20$$
$$20 \leq x$$

$$x \leq 27$$

$$20 \leq x \leq 27$$

Example:

Examine the number line below and write the two inequalities that are being represented.

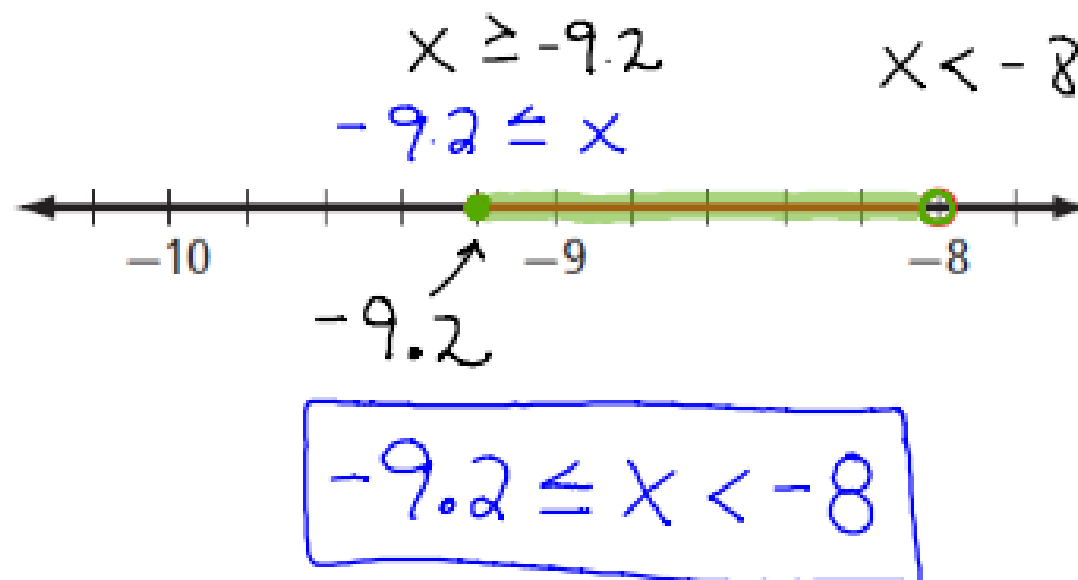Then, combine the two inequalities into a double inequality.

$$x > -6$$
$$-6 < x$$

$$x < 2$$

$$-6 < x < 2$$

Example:

Examine the number line below and write the two inequalities that are being represented.

Then, combine the two inequalities into a double inequality.

$$x \geq -9.2 \qquad\qquad x < -8$$

$$-9.2 \leq x$$

$$-9.2$$

$$\boxed{-9.2 \leq x < -8}$$
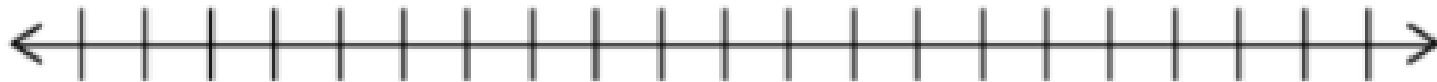
You Try:

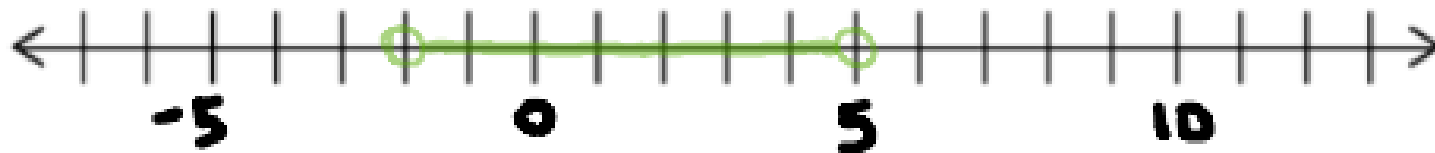Represent the possible values for x graphically if $x > -2$ and $x < 5$.

Then, combine the two inequalities into a double inequality.

You Try:

Represent the possible values for x graphically if x > -2 and x < 5.

Then, combine the two inequalities into a double inequality.
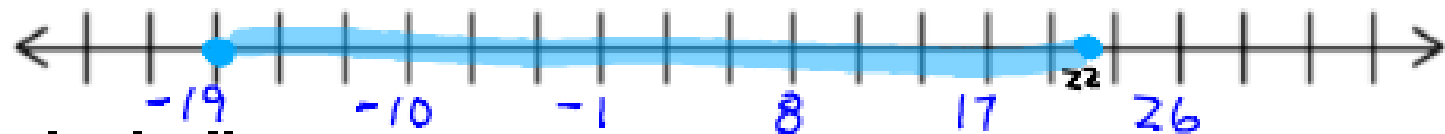

Double inequality: -2 < x < 5

Example:

The most extreme temperature change in Canada took place in January 1962 in Pincher Creek, AB. A warm dry wind, known as a chinook, raised the temperature from -19°C to 22°C in one hour.

Represent the temperature during this hour using inequalities:

verbally: the temperature was between -19°C and 22°C (including -19°C and 22°C)

graphically:

algebraically:

$$-19 \leq t \leq 22$$

Check your understanding questions:

pg. 347 - 349
#8, 13, 16, 18, 20, 23, 25

Worksheet: Translating Linear Inequalities

(answer key on Edsby and weebly)