Note Title 9/17/2018

From RR6

a) $\frac{1}{2}\left(3x-\frac{1}{4}\right)+\frac{1}{4}=-\frac{7}{8}$

$\frac{1}{2}(3x)+\frac{1}{2}\left(-\frac{1}{4}\right)+\frac{1}{4}=-\frac{7}{8}$

$\frac{3}{2}x-\frac{1}{8}+\frac{1}{4}=-\frac{7}{8}$

$8\left(\frac{3}{2}x\right)-8\left(\frac{1}{8}\right)+8\left(\frac{1}{4}\right)=8\left(-\frac{7}{8}\right)$

$12x-1+2=-7$

$12x+1=-7$

$12x=-7-1$

$12x=-8$

$\frac{12x}{12}=\frac{-\cancel{8}^{2}}{\cancel{12}_{3}}$

$x=-\frac{2}{3}$

OR

$8\left(\frac{1}{2}\right)\left(3x-\frac{1}{4}\right)+8\left(\frac{1}{4}\right)=8\left(-\frac{7}{8}\right)$

$4\left(3x-\frac{1}{4}\right)+2=-7$

$12x-4\left(\frac{1}{4}\right)+2=-7$

$12x-1+2=-7$

same

$\boxed{\left\{-\frac{2}{3}\right\}}$

2.8: Linear Inequalities

$<$ means "is less than"

$>$ means "is greater than"

$\leq$ means "is less than or equal to"

$\geq$ means "is greater than or equal to"

Note: $\leq$ and $\leqslant$ are equivalent.

$\geq$ and $\geqslant$ are equivalent.

Definition: A linear inequality (in one variable x) is any relationship that can be written in the form

$ax+b<c$, $ax+b>c$

$ax+b\leqslant c$ $ax+b\geqslant c$

where a, b, c are numbers and x is the variable.

Examples: $2x-3<5$, or $6\geqslant 2(6x+1)$

We can use a number line to graph the solution set of an inequality. 2.8.2

$x = 4$

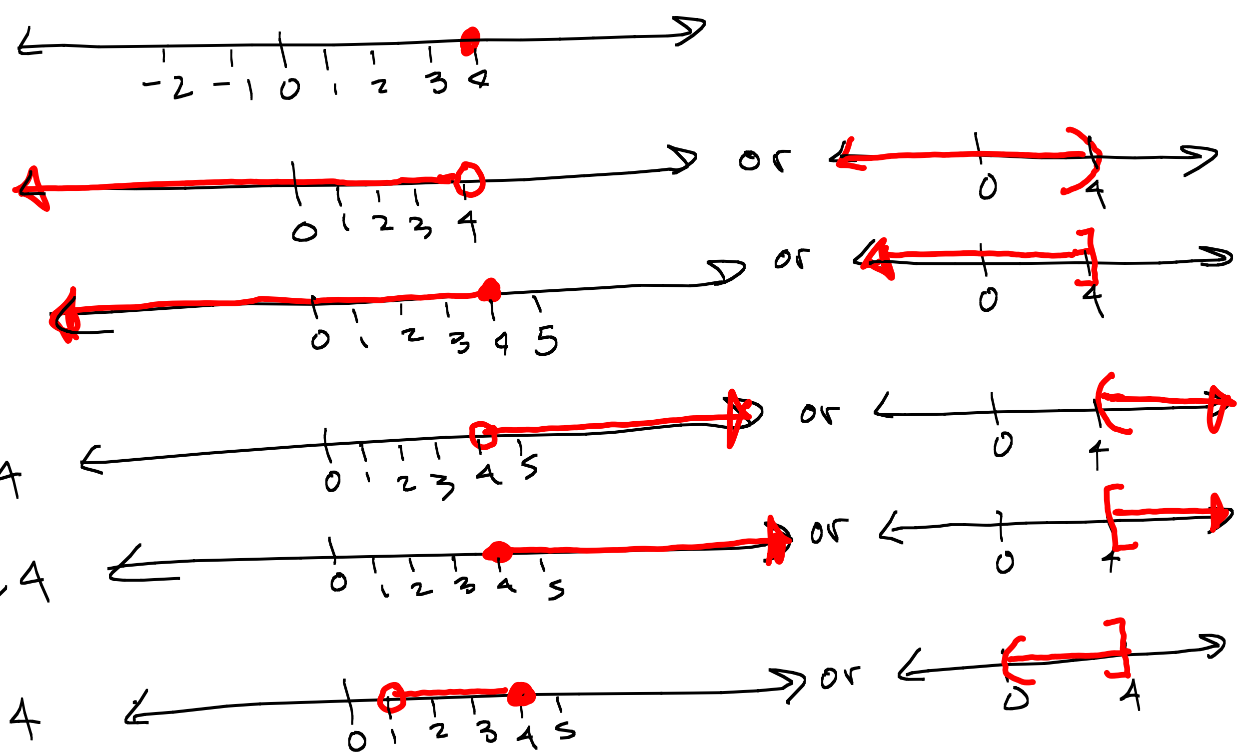
$x < 4$

$x \leq 4$

$x > 4$

$x \geq 4$

$1 < x \leq 4$



$1 < x \leq 4$ is a combined inequality.

$1 < x \leq 4$ means $1 < x$ and $x \leq 4$

Rewrite: $1 < x$ is equivalent to $x > 1$.

Set-builder notation (set roster notation)

Inequality: $x \leq 4$

set builder notation: $\{x \mid x \leq 4\}$

"such that"

The set of all numbers x such that $x \leq 4$.

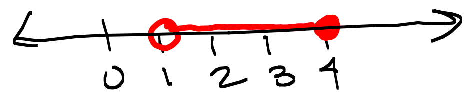
Interval notation: We use a comma to separate the left and right boundaries of the shaded area.

We use ∞ (infinity) for the far right "end" of the number line.

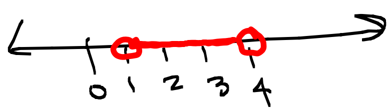
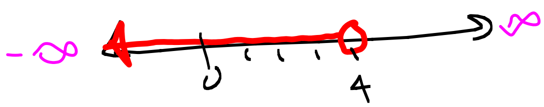
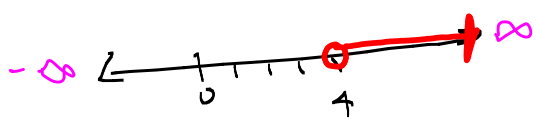
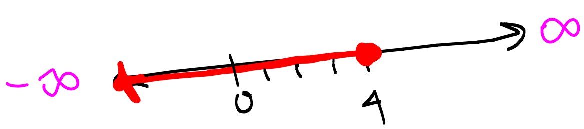
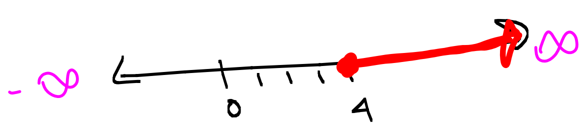
We use $-\infty$ for the left "end" of the number line.

Example: $1 < x \leq 4$

Set-builder notation: $\{x \mid 1 < x \leq 4\}$



Interval notation: $(1, 4]$

Set-builder	Graph	Interval notation
$\{x \mid 1 < x < 4\}$		$(1, 4)$
$\{x \mid x < 4\}$		$(-\infty, 4)$
$\{x \mid x > 4\}$		$(4, \infty)$
$\{x \mid x \leq 4\}$		$(-\infty, 4]$
$\{x \mid x \geq 4\}$		$[4, \infty)$

strict inequalities

2.8.4

Solving Linear Inequalities:

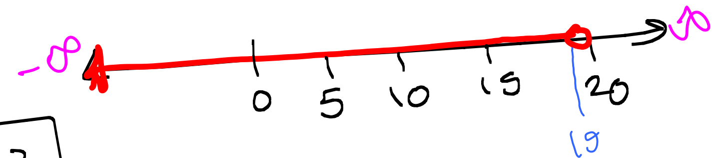
Addition Property of Inequality

If $a < b$, then $a + c < b + c$.

This means we can add (or subtract) the same quantity on both sides.

Ex: Solve.

$$x - 7 < 12$$
$$+7 \qquad +7$$
$$x < 19$$



Set-builder: $\boxed{\{x \mid x < 19\}}$

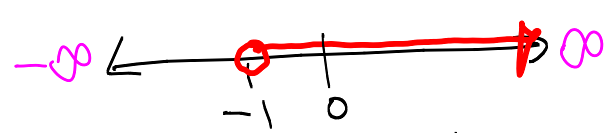
Interval notation: $\boxed{(-\infty, 19)}$

Ex: Solve.

$$3 < x + 4$$
$$-4 \qquad -4$$
$$-1 < x$$

$$x > -1$$

** Rewrite with the variable on the left!



$\boxed{\{x \mid x > -1\}}$

$\boxed{(-1, \infty)}$

Multiplicative Property of Equality

2.8.5

If $a < b$ and $c > 0$, then $ac < bc$.

If $a < b$ and $c < 0$, then $ac > bc$.

This means * we can multiply (or divide) both sides by the same positive number.

* we can multiply (or divide) both sides by the same negative number if we reverse the inequality sign.

Why? $1 < 2$ true!

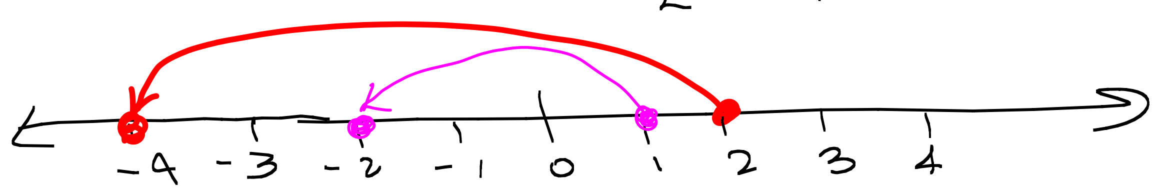
multiply by 2: $2(1) < 2(2)$

$2 < 4$ still true!

Start again with $1 < 2$ (still true)

multiply by -2: $-2(1) < -2(2)$

$-2 < -4$ False!



Ex: Solve

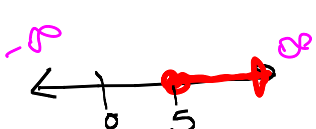
$4x + 1 \geq 21$

$-1 \quad -1$

$4x \geq 20$

$\frac{4x}{4} \geq \frac{20}{4}$

$x \geq 5$



$\boxed{[5, \infty)}$

Ex: Solve.

$$-3x - 2 > 16$$

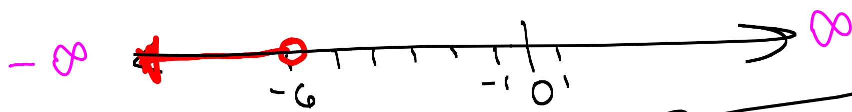
$$+2 \qquad +2$$

$$-3x > 18$$

Reverse the inequality!

$$\frac{-3x}{-3} < \frac{18}{-3}$$

$$x < -6$$



$$\boxed{(-\infty, -6)} \qquad \boxed{\{x \mid x < -6\}}$$