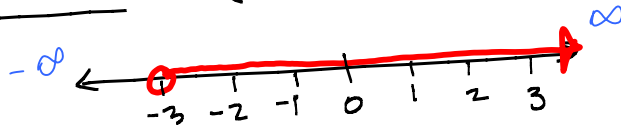


Review Questions (from RR 6)

① $y > -3$



∞ : infinity

$$(-3, \infty)$$

or



② $x \leq 2$



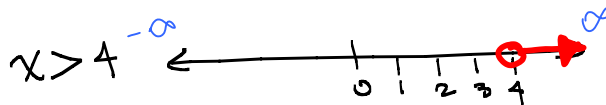
$$(-\infty, 2]$$

or



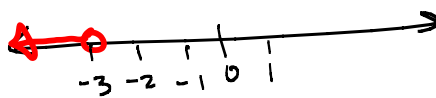
③ $4 < x$

Rewrite with variable on left:



$$(4, \infty)$$

④ $-3 > x$
Rewrite: $x < -3$



$$(-\infty, -3)$$

⑤ $-1 \leq x < 3$



$$[-1, 3)$$

Interval notation:

- * Left and right boundaries, separated by comma
- * Bracket $[]$ if boundary point is included (with $\leq$ or $\geq$)
- Parentheses $()$ if boundary point is not included (with $<$ or $>$)
- * $-\infty$ represents far left end of number line
- ∞ represents far right end of number line

Additive Property of Inequality

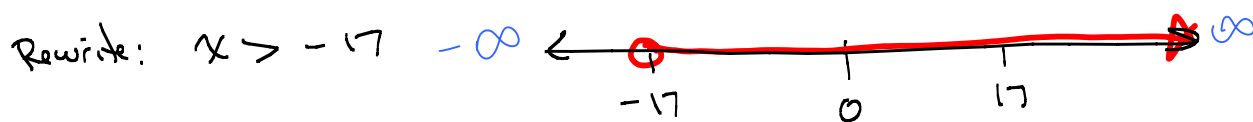
2.8.5

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

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

Ex: Solve. $-5 < x + 12$

$$\begin{array}{r} -12 \\ -5 < x + 12 \\ \hline -17 < x \end{array}$$



Set-builder notation:

$$\{x \mid x > -17\}$$

Interval notation:

$$(-17, \infty)$$

Multiplicative Property of Inequality

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.

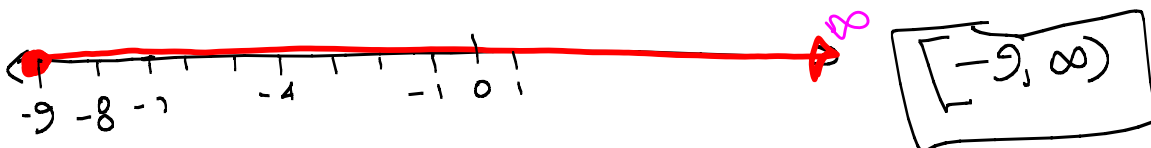
2.8.6

Ex: Solve

$$-2x \leq 18$$

$$\frac{-2x}{-2} \geq \frac{18}{-2} \quad [\text{Reverse the inequality}]$$

$$x \geq -9$$



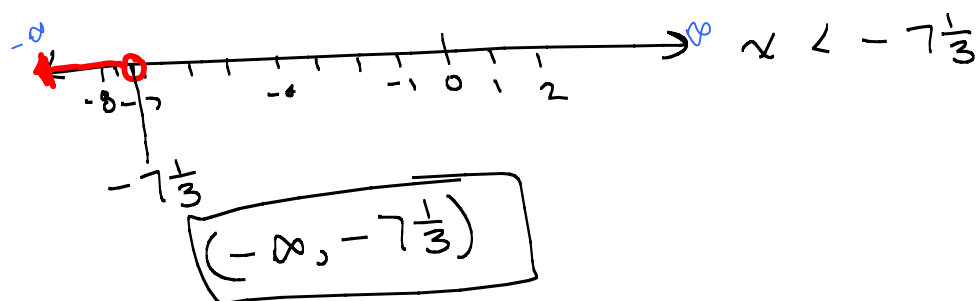
Ex: Solve. $4 + 3x < -18$

-4 -4

$$3x < -22$$

$$\frac{3x}{3} < \frac{-22}{3}$$

$$x < -\frac{22}{3}$$



2.8.7

Ex:

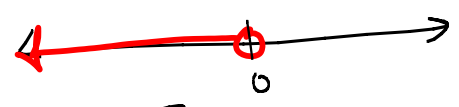
$$2x + 9 < 9$$

$$\quad \quad -9 \quad \quad -9$$

$$2x < 0$$

$$\frac{2x}{2} < \frac{0}{2}$$

$$x < 0$$



$$(-\infty, 0)$$

$$\{x | x < 0\}$$

Example: Solve.

$$-5 + 2x - 7 \leq -2(-5x + 1) + 9$$

$$-5 + 2x - 7 \leq 10x - 2 + 9$$

$$2x - 7 \leq 10x + 12$$

$$2x \leq 10x + 19$$

$$-8x \leq 19$$

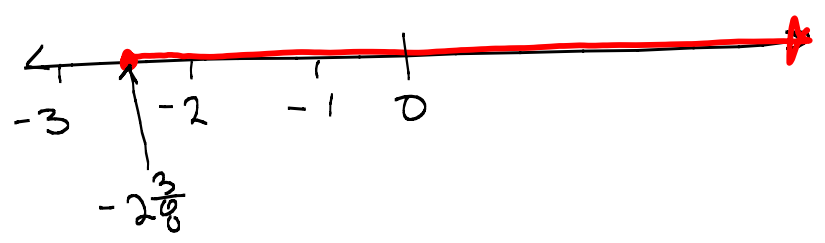
Reverse
the
inequality

$$\rightarrow \frac{-8x}{-8} \geq \frac{19}{-8}$$

$$x \geq -\frac{19}{8}$$

$$x \geq -2\frac{3}{8}$$

$$\{x | x \geq -2\frac{3}{8}\}$$



$$-5 + 2x - 7 \leq -2(-5x + 1) + 9$$

$$-12 + 2x \leq 10x - 2 + 9$$

$$-12 + 2x \leq 10x + 7$$

$$2x \leq 10x + 19$$

$$-19 + 2x \leq 10x$$

$$-19 \leq 8x$$

$$-\frac{19}{8} \leq \frac{8x}{8}$$

$$-\frac{19}{8} \leq x$$

Same

Rewrite:

$$x \geq -\frac{19}{8}$$

Combined inequalities

2.8.8

Example: Solve. $-7 \leq 2x+5 < 3$

This means $-7 \leq 2x+5$ and $2x+5 < 3$
 -5 -5 -5 -5

$$-12 \leq 2x$$

$$2x < -2$$

$$\frac{-12}{2} \leq \frac{2x}{2}$$

$$\frac{2x}{2} < \frac{-2}{2}$$

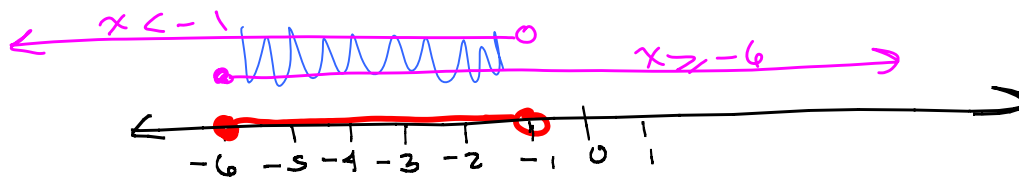
$$-6 \leq x$$

$$x < -1$$

Rewrite

$$x \geq -6$$

and



This area satisfies both

Interval Notation

$$[-6, -1)$$

Set builder notation:

$$-6 \leq x \text{ and } x < -1$$

$$\{x \mid -6 \leq x < -1\}$$

OR
(keep them together)

$$-7 \leq 2x+5 < 3$$

-5 -5 -5

$$-12 \leq 2x < -2$$

$$\frac{-12}{2} \leq \frac{2x}{2} < \frac{-2}{2}$$

$$-6 \leq x < -1$$

[subtract 5 from all 3 sides]

[divide all 3 sides by 2]

Set builder:

$$\{x \mid -6 \leq x < -1\}$$

Interval:

$$[-6, -1)$$

2.8.9

Ex: Solve.

$$-5 < 5(3-x) \leq 1$$

$$\begin{array}{ccc} -5 < 15 - 5x \leq 1 \\ -15 & -15 & -15 \end{array}$$

$$-20 < -5x \leq -14$$

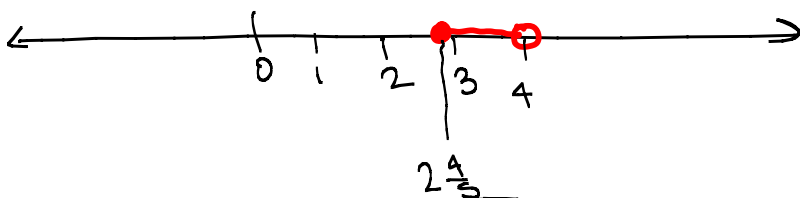
$$\frac{-20}{-5} > \frac{-5x}{-5} \geq \frac{-14}{-5} \quad \text{Reverse the inequality signs!}$$

$$4 > x \geq \frac{14}{5}$$

Rewrite so
small numbers:
on left

$$\{x \mid \frac{14}{5} \leq x < 4\}$$

$$\{x \mid 2\frac{4}{5} \leq x < 4\}$$



$$\boxed{[2\frac{4}{5}, 4)}$$

Always write
combine inequalities
like

$$a \leq b < c$$

Not

$$a \geq b > c$$

For final
answer