

A.6 - Linear Inequalities

(1)

↳ Solving linear inequalities is just like solving linear equations (Do the same thing to both sides) except if you multiply or divide by a negative number, you change the direction of the inequality.

↳ the answer is an interval instead of a specific number.

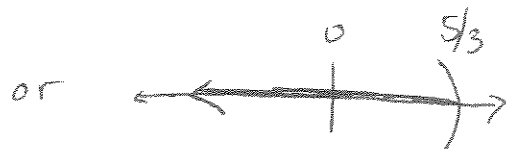
EX $2 < 4 \rightarrow$ multiply both sides by -2
 $-4 > -8$

EX $2x - 3 < 2 - x$

$\Rightarrow 3x < 5$

$\Rightarrow x < 5/3$

or $(-\infty, 5/3)$

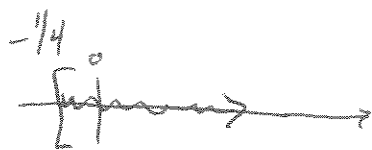


EX $1 - x \leq 3x + 2$

$\Rightarrow -4x \leq 1$

$\Rightarrow x \geq -1/4$

or $[-1/4, \infty)$



Double Inequalities:

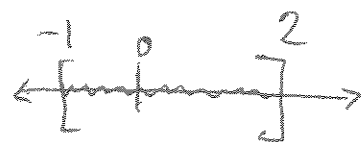
\rightarrow Do the same thing to all parts

EX a) $-2 \leq 3x + 1 \leq 7$

$\Rightarrow -3 \leq 3x \leq 6$

$\Rightarrow -1 \leq x \leq 2$

or $[-1, 2]$



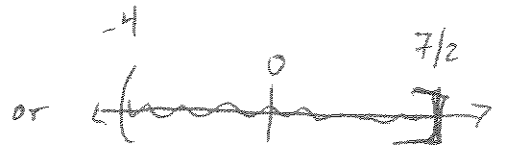
b) $-4 \leq -\left(\frac{2x+5}{3}\right) < 1$ → multiply everything by -1 (2)

⇒ $4 \geq \frac{2x+5}{3} > -1$ → can't just subtract 5 from all parts
 must multiply by 3 first. → Get rid of fractions 1st!

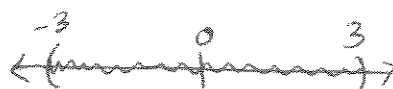
⇒ $12 \geq 2x+5 > -3$

⇒ $-7 \geq 2x > -8$


⇒ $-7/2 \geq x > -4$

so $-4 < x \leq 7/2$ or $(-4, 7/2]$ or 

Absolute Values and Inequalities

↳ Suppose $|x| < 3$. This means the distance between x and 0 is less than 3. Graphically 

→ So $|x| < 3$ means $-3 < x < 3$

↳ Suppose $|x| \geq 3$. Here, the distance between x and 0 is greater than or equal to 3. Graphically, 

so $|x| \geq 3$ means $x \leq -3$ or $x \geq 3$

EX solve

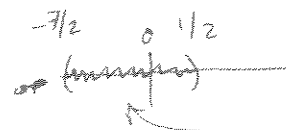
$|2x+3| < 4$

→ Distance between $2x+3$ and 0 is less than 4.


⇒ $-4 < 2x+3 < 4$

⇒ $-7 < 2x < 1$

⇒ $-7/2 < x < 1/2$

$-7/2$ 0 $1/2$


If x is in here then $2x+3$ is in here

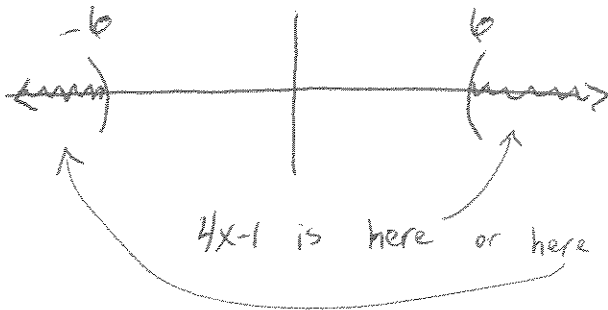
-4 0 4


$2x+3$ is in this interval

EX Solve $|4x-1| > 6$

③

Distance between $4x-1$ and 0 is greater than 6



$$4x-1 > 6 \quad \text{or} \quad 4x-1 < -6$$

$$\Rightarrow 4x > 7$$

$$x > 7/4$$

$$\Rightarrow 4x < -5$$

$$x < -5/4$$

