2.6

Interval Notation

We use interval notation for short

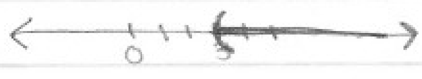
(or) is used for < or > (called exclusive)
[or] is used for ≤ or ≥ (called inclusive)

ex $2<x<10 \to (2,10)$ $\quad$ $2<x\le 10 \to (2,10]$
$2\le x\le 10 \to [2,10]$ $\quad$ $2\le x<10 \to [2,10)$

ex $x>-5 \to (-5,\infty)$, ∞ represents infinity
$x\le -5 \to (-\infty,-5]$

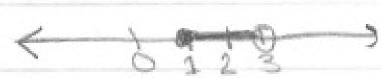
We never "include" ∞ or $-\infty$, that is don't write $[-\infty$ or $\infty]$.

Graphing Inequalities

ex $x > 3$  or 

$x \geq 3$  or 

ex $1 < x < 3$  or 

$1 \leq x < 3$  or 

Solving Inequalities

solution of an inequality - any number that makes an inequality true.

ex $x<5$; 2 is a solution, so is 3, 4, 1, 0, -1, -2, ...

To solve for complicated inequalities
If $a<b$ then $a+c<b+c$ (same w/ $a\leq b, a>b, a\geq b$)
If $a<b$ then $a-c<b-c$ "

ex
$$x+2\leq 5$$
$$-2 \quad -2$$
$$x\leq 3$$

try a couple: $0+2=2\leq 5$
$4+2=6\not\leq 5$

ex
$$x-10>-5$$
$$+10 \quad +10$$
$$x>5$$

try a couple: $6-10=-4>-5$
$4-10=-6\not>-5$

Multiplication/division for inequalities is different
If $a<b$ and c is positive, then $ac<bc$
If $a<b$ and c is negative, then $ac>bc$
same true for $\frac{a}{c}<\frac{b}{c}$, $\frac{a}{c}>\frac{b}{c}$
same true for $>, \leq, \geq$

This says, if $\times$ or $\div$ by a negative number, switch the sign.
$\leq$ and $\geq$, $<$ and $>$

ex $\frac{x}{-5} > 2$

$-5\left(\frac{x}{-5}\right) < -5(2)$

$x < -10$

try a couple: $\frac{-15}{-5} = 3 > 2$

$\frac{0}{-5} = 0 \not> 2$

$-3x \leq 6$

$\frac{-3x}{-3} \geq \frac{6}{-3}$

$x \geq -2$

try a couple: $-3(0) = 0 \leq 6$

$-3(-3) = 9 \not\leq 6$

ex $5x - 2 < 8$ $-3x + 4 \geq 13$ $\frac{2x+4}{-3} \leq -4$

$+2 \quad +2$ $-4 \quad -4$ $2x + 4 \geq 12$

$5x < 10$ $-3x \geq 9$ $2x \geq 8$

$x < 2$ $x \leq -3$ $x \geq 4$

try a couple:

$5(1) - 2 = 3 < 8$ ✓ $-3(-4) + 4 = 16 \geq 13$ $\frac{2(5)+4}{-3} = \frac{14}{-3} = -4.\overline{6} \leq -4$

$5(3) - 2 = 13 \not< 2$ ✓ $-3(-2) + 4 = 10 \not\geq 13$ $\frac{2(3)+4}{-3} = \frac{10}{-3} = -3.\overline{3} \not\leq -4$

ex $3(x+7) - 15 > 4(x-2)$

$3x + 21 - 15 > 4x - 8$

$3x + 6 > 4x - 8$

$14 > x$ or $x < 14$

try a couple:

$3(13+7) - 15 = 60 - 15 = 45$ ✓

$4(13-2) = 4(11) = 44$