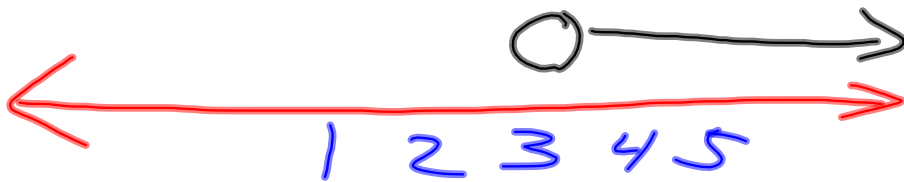


2.4 - Inequalities / $x < 3$

Inequalities have more than one solution. All of the solutions are called the **solution set**.

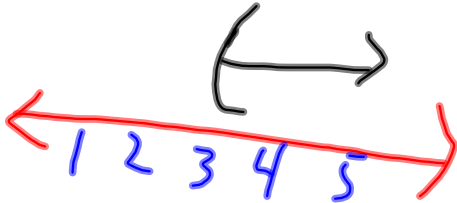
open
circle

$$x > 3$$



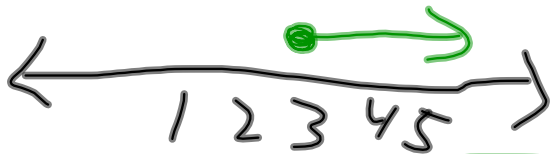
interval notation

open circle = (= not included



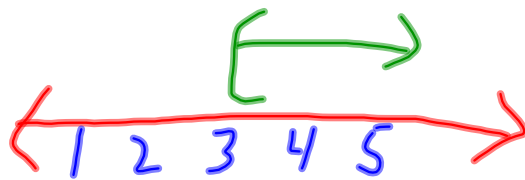
write as $(3, \infty)$

closed
circle \Rightarrow $\{$



Interval notation

closed circle = $[$ = included



write as $[3, \infty)$

Solve linear inequalities,

* If the coefficient next to the variable is negative then flip the sign.

solve and graph:

$$3x - 12 < 3$$

$$\begin{array}{l} \text{solve} \\ 3x < 15 \end{array}$$

$$x < 5$$

solve with algebra. $<$ stay the same.

check it by using any # less than 5.

$$3x - 12 < 3$$

check it

$$x < 5$$

$$\begin{aligned} 3(4) - 12 &< 3 \\ 12 - 12 &< 3 \\ 0 &< 3 \end{aligned}$$

← 0



$$(-\infty, 5)$$

$$3 - 2x \leq 11 \quad \text{Solve and graph}$$

$$\underline{-3} \qquad \underline{-3}$$

$$\underline{-2}x \leq \underline{8}$$

$$x \geq -4$$

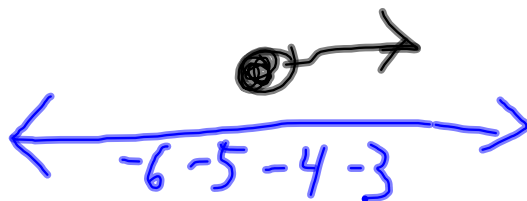
Flip the sign
because it's $-2x$

check

$$3 - 2(0) \leq 11$$

$$3 \leq 11$$

check it



graph

$$3 - 2x \leq 11$$

-3 -3

$$\frac{-2x}{-2} \leq \frac{8}{-2}$$

$$x \geq -4$$



$$3 - 2(0) \leq 11$$

$$3 \leq 11$$



$$[-4, \infty)$$

Inequalities that are fractions

$$12 \frac{x}{4} \geq \frac{x}{3} + 2$$

* Use LCD to get rid of denominator

$$\begin{array}{r} 3x \geq 4x + 24 \\ -4x \quad -4x \end{array}$$

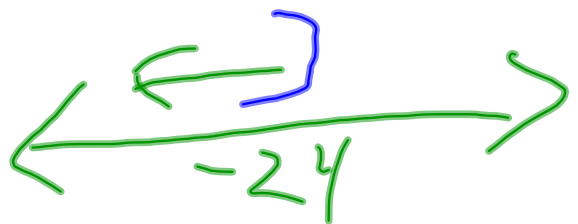
$$\text{LCD} = 12$$

$$\begin{array}{r} -x \geq 24 \\ -1 \quad -1 \end{array}$$

$$x \leq -24$$

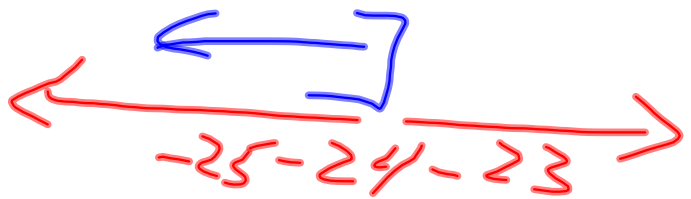
solve and graph

$$(-\infty, -24]$$



$$\frac{x}{4} \geq \frac{x}{3} + 2$$

$$x \leq -24$$



$$\frac{-24}{4} \geq \frac{-24}{3} + 2$$

$$-6 \geq -8 + 2$$

$$-6 \geq -6$$

* Always make sure the solution is true or false:

$$v > v + \#$$

$$x > x + 1$$

$$-x \quad -x$$

$$0 > 1$$

No solutions

$$v + \# \leq v - \#$$
$$X + 7 \leq X - 2$$

$$\begin{array}{r} -X \quad -X \\ 7 \leq -2 \end{array}$$

all real #s
or no solution

$$\begin{array}{r} X + 7 \leq X - 2 \\ -X + 2 \quad -X + 2 \\ 9 \leq \emptyset \end{array}$$

solve and
graph

$$\textcircled{1} 6 + 5(2 - x) \leq 41$$

$$\textcircled{2} 12 \geq 2(3n + 1)$$

$$\textcircled{3} 2x - 3 > 2(x - 5)$$

$$\textcircled{4} 4(x - 3) + 7 \geq 4x + 1$$

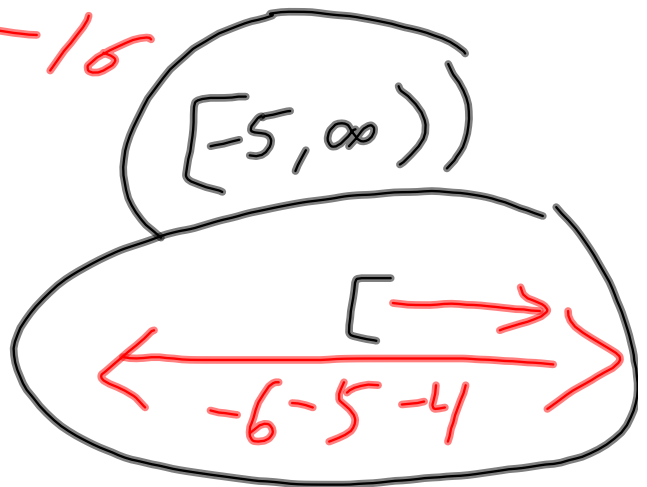
$$\textcircled{1} 6 + 5(2 - x) \leq 41$$

$$6 + 10 - 5x \leq 41$$

$$\begin{array}{r} \cancel{6} - 5x \leq 41 \\ -10 \end{array}$$

$$\begin{array}{r} -5x \leq 25 \\ \underline{-5} \quad \underline{-5} \end{array}$$

$$x \geq -5$$



$$\textcircled{2} 12 \geq 2(3n+1)$$

$$12 \geq 6n + 2$$

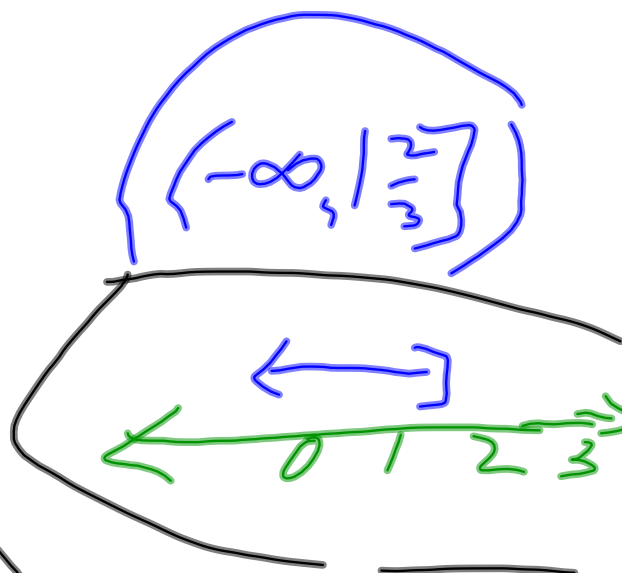
$-2 \qquad \qquad -2$

$$\frac{10}{6} \geq n$$

$$\frac{10}{6} \geq n$$

$$\frac{5}{3} = 1\frac{2}{3}$$

$$1\frac{2}{3} \geq n$$



$$\textcircled{3} \quad 2x - 3 > 2(x - 5)$$

$$\begin{array}{r} \cancel{2}x - 3 > \cancel{2}x - 10 \\ \hline -3 > -10 \\ +3 & \quad +3 \\ \hline 0 > -7 \end{array}$$

$$0 > -7$$

all real #s



$$\textcircled{4} \quad 4(x-3) + 7 \geq 4x + 1$$

$$4x - 12 + 7 \geq 4x + 1$$

$$\begin{array}{r} 4x - 5 \geq 4x + 1 \\ -4x + 5 \quad -4x + 5 \end{array}$$

$$\begin{array}{r} 0 \geq 6 \\ \text{no sol'n} \end{array} \quad \{ \}$$

