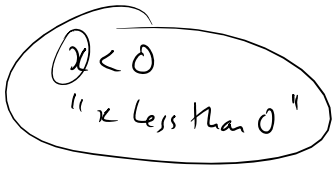
FMP10 Date _____

Unit 4: Linear Relations & Functions
4.0 Inequalities Review

Inequality – A mathematical statement comparing expressions that may not be equal

Inequality Symbols:

$2 < 10$ less than
$>$ greater than
$\leq$ less than or equal to
$\geq$ greater than or equal to
$\neq$ not equal to



$x \leq 0$

We can express inequalities:

1) Verbally/written

All numbers more than 3

2) Algebraically (with an inequality sign)

$x > 3$ or $3 < x$

3) Visually/graphically (on a number line)

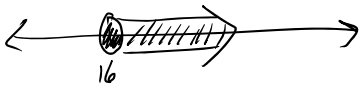
Boundary Value
open (hollow) – NOT included
closed (shaded) – is included

Ex. Show each statement graphically and algebraically:

a) All numbers equal to at most -1.

$x \leq -1$

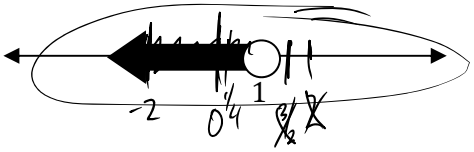
b) You must be at least 16 years old to get a driver's license.



$x \geq 16$

Ex. State each inequality shown in words and algebraically:

a)



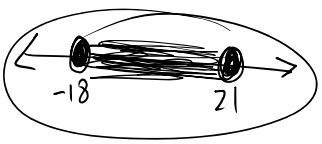
All #'s less than 1 $x < 1$

b)

All #'s at least −2 $x \geq -2$

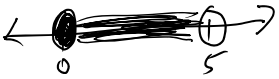
Combination (compound) Inequalities

Ex. The average temperature fluctuates from a low of $-18°C$ to a high of $21°C$.



$-18 \leq t \leq 21$

Ex. $0 \leq x < 5$



All #'s from 0 inclusive to 5 exclusive

Consider the inequality $-3 < 6$. How do mathematical operations $[+, -, \times, \div]$ affect the inequality?

$-3 < 6$ $+2$ $+2$ → $-1 < 8$

$-3 < 6$ -3 -3 → $-6 < 3$

$-3 < 6$ $\times 4$ $\times 4$ → $-12 < 24$

$-3 < 6$ $\times -5$ $\times -5$ → $15 > -30$

$-3 < 6$ $\div 3$ $\div 3$ → $-1 < 2$

$-3 < 6$ $\div -3$ $\div -3$ → $1 > -2$

Conclusion: Multiply OR divide by a negative, you flip the inequality

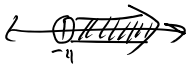
Ex. Solve, show solution algebraically and graphically:

a) $x - 3 \geq 2$ $+3$ $+3$

$x \geq 5$

b) $-2x < 8$ -2 -2

$x > -4$



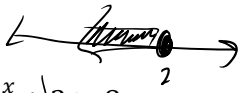
c) $\frac{x}{3} > -5$ $\cdot 3$ $\cdot 3$

$-15 > x$ OR $x < -15$

d) $4x + 2 \leq 10$ -2 -2

$4x \leq 8$ $\div 4$ $\div 4$

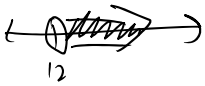
$x \leq 2$



e) $\frac{x}{-3} - 20 < -24$ $+20$ $+20$

$\cdot -3\left(\frac{x}{-3}\right) < (-4)(-3)$

$x > 12$



f) $5 - x > 8$ -5 -5

$-x > 3$ $\div -1$ $\div -1$

$x < -3$

g) $\frac{x}{4} + 3 > 8$ -3 -3

$4\left(\frac{x}{4}\right) > (5)\,4$

$x > 20$

h) $-2(x + 3) \leq 10x + 18$

$-2x - 6 \leq 10x + 18$ $-10x$ $+6$ $-10x$ $+6$

$-12x \leq 24$ $\div -12$ $\div -12$

$x \geq -2$

$x + 3 \geq -5x - 9$ -3 $+5x$ -3 $+5x$

$6x \geq -12$ $\div 6$ $\div 6$

$x \geq -2$

Practice: WS5.0 front [222] on sheet/back [224] work on separate paper