Foundations 11 Date _____

6.0.2: Linear Inequalities in 1 Variable

Inequality: a statement using $<, >, \leq, \geq$

It can be written in the form: symbols, # line, interval notation

Boundary Point: separates values that are part of the solution from the values that are not

Open circle: for $>, <$ (symbols) ( ) (interval notation) ○ (# line)

Closed circle: for $\geq, \leq$ [ ] ●

Example 1: Solve each inequality.

a) $x - 3 \geq 2$

$+3 \quad +3$

$x \geq 5$

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

$-15 > x$ or $x < -15$

c) $-2x < 8$

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

$x > -4$

$-2x < 8$

$0 < 8 + 2x$

$-8 < 2x$

$-4 < x$

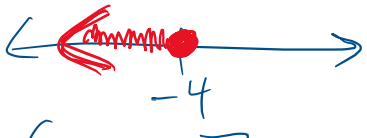
When multiplying or dividing by a negative sign you flip the inequality.

Example 2: Solve. State your answer in 3 different ways.

a) $x - 1.6 \leq -5.6$

$+1.6 \quad +1.6$

$x \leq -4$



$(-\infty, -4]$

b) $-10 > 4x$

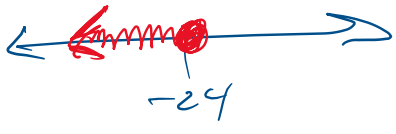
$\frac{-10}{4} > \frac{4x}{4}$

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

$\left(-\infty, -\frac{5}{2}\right)$

c) $\frac{x}{-8} \geq 3$ $\cdot -8$ $\cdot -8$

$x \leq -24$



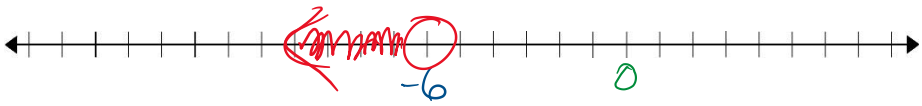
$(-\infty, -24]$

Example 3: Solve and graph, verifying your answers

1. Solve $-2x > 12$

$x < -6$

2. Graph



3. Verify

a. Check a point inside shading (-7) sub in to original inequality

$-2(-7) > 12$

$14 > 12$ ✓

b. Check a point outside shading

$-2(0) > 12$

$0 > 12$ x

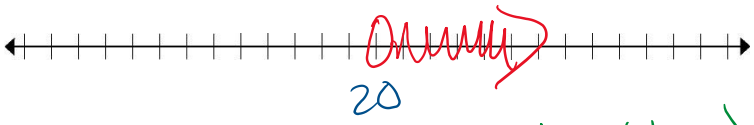
Example 4: Solve:

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

$-3 \quad -3$

$4 \cdot \frac{x}{4} > 5 \cdot 4$

$x > 20$



Choose 0 (outside solutions)

$\frac{0}{4} + 3 > 8$

$3 > 8$ x 0 is not a solution

b) $-3x - 10 \leq 5x + 38$

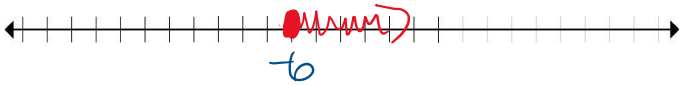
$+3x \quad +3x$

$-10 \leq 8x + 38$

$-38 \quad -38$

$\frac{-48}{8} \leq \frac{8x}{8}$

$-6 \leq x$



Choose (-10)

$-3(-10) - 10 \leq 5(-10) + 38$

$30 - 10 \leq -50 + 38$

$20 \leq -12$

not true

-10 is not a solution

Example 5: Solve a problem using inequalities

Sarah has offers for a position as a salesperson at two local electronic stores. Store A will pay a flat rate of $80 per day plus 3% of sales. Store B will pay a flat rate of $65 per day plus 5% of sales. What do Sarah's sales need to be for store B to be the better offer?

a) Write an inequality to model the problem. Are there any restrictions on the variable? Explain.

s is amount of sales

$80 + 0.03s < 65 + 0.05s$

$s \geq 0$

Can't have negative sales

b) Solve the inequality and interpret the solution

$80 + 0.03s < 65 + 0.05s$

$80 < 65 + 0.02s$

$15 < 0.02s$

$\$750 < s$

Sarah must sell $750/day to make more at store B

Example 6: Model and solve a problem

A game store is offering games on sale for $39.50, including tax. Sean set his spending limit to $150. How many games can Sean buy and stay within his limit.

a) Write an inequality to model the problem. Are there any restrictions on the variable? Explain.

g: # of games

$39.50g \leq 150$

$g \geq 0$, g is a whole number

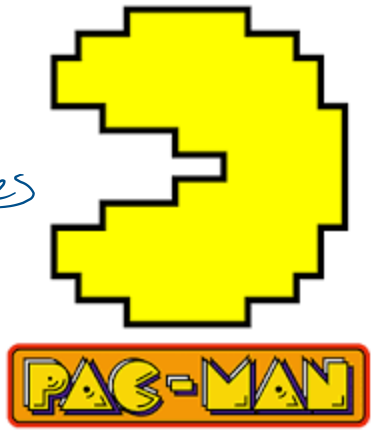
$g \in W$

b) Solve the inequality and interpret the solution

$\frac{39.50g}{39.50} \leq \frac{150}{39.50}$

$g \leq 3.8$

Sean can buy 3 games at most.



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