

# Warmup:

Simplify each expression.

$$\frac{3}{(k+4)} + \frac{6}{k-2}$$

$$\begin{array}{l} (k+4) \{ (k-2) \\ \phantom{(k+4)} \} \\ (k+4)(k-2) \end{array}$$

$$\frac{3(k-2)}{(k+4)(k-2)} + \frac{6(k+4)}{(k+4)(k-2)}$$

$$\frac{3k-6+6k+24}{(k+4)(k-2)}$$

$$= \frac{9k+18}{(k+4)(k-2)}$$

$$= \frac{9(k+2)}{(k+4)(k-2)}$$

$$\frac{2n}{n+3} + \frac{5}{n-5}$$

$$\frac{2n(n-5)}{(n+3)(n-5)} + \frac{5(n+3)}{(n+3)(n-5)}$$

$$\frac{2n^2 - 10n + 5n + 15}{(n+3)(n-5)}$$

$$\frac{2n^2 - 5n + 15}{(n+3)(n-5)}$$

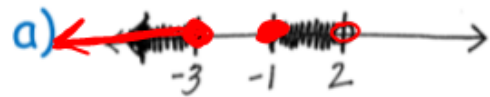
$$\begin{array}{l} 30 \\ \times \\ -5 \end{array}$$

$$\begin{array}{l} 1 \cdot 30 \\ 2 \cdot 15 \\ 3 \cdot 10 \\ 5 \cdot 6 \end{array}$$

# Rational Inequalities

## Inequalities Practice:

Example 1: Write the inequality that corresponds to the number line.



$$x \leq -3 \quad -1 \leq x < 2$$



$$-2 \leq x < 3 \quad x \geq 6$$



$$x \leq -3 \quad 0 < x < 5 \quad x \geq 7$$



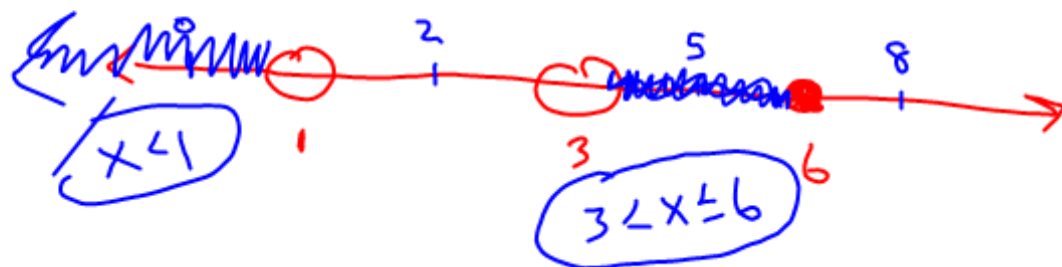
$$-4 < x \leq -2$$

$$2 < x \leq 4$$

## How to Solve Rational Inequalities:

$<, >$  :  $\circ$   
 $\leq, \geq$  :  $\bullet$

1. Find the ~~domain~~ *excluded values*.
2. Change the rational inequality to an **equation**
3. **Solve** the equation
4. Plot your **solutions** and ~~domain~~ *excluded values* on a number line
  - **Open** circle on the ~~domain~~ *excluded values*
  - **Open** or **closed** circle on solutions based on the inequality symbol
5. **Test** a number from each **interval** in the **original** inequality
6. **Shade** the intervals where the numbers make the inequality **true**
7. Write the inequality that **corresponds** to your shaded **number line**

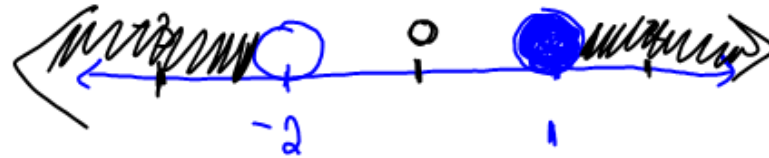


Example 2: Solve the following inequalities.

$$x < -2$$

$$x \geq 1$$

a)  $\frac{4x+5}{(x+2)} \geq 3$



①  $x \neq -2$

$$\frac{4x+5}{x+2} = 3 \quad (x+2)$$

$$4x+5 = 3(x+2)$$

$$4x+5 = 3x+6$$

$$\begin{array}{r} -3x \quad -3x \end{array}$$

$$x+5 = 6$$

$$\begin{array}{r} -5 \quad -5 \end{array}$$

$$x = 1$$

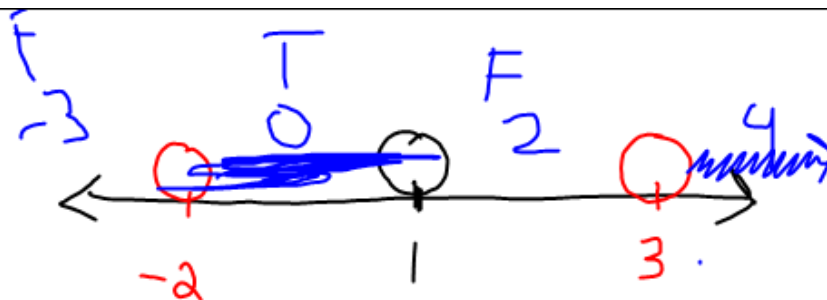
$$\frac{4(-3)+5}{-3+2} \geq 3$$

$$\frac{-7}{-1} = 7 \geq 3 \text{ true}$$

$$\frac{4(0)+5}{0+2} = \frac{5}{2} = 2.5 \not\geq 3 \text{ false}$$

$$\frac{4(2)+5}{2+2} = \frac{13}{4} = 3.25 \geq 3 \text{ true}$$

$$b) \frac{x^2 - x - 6}{x - 1} > 0$$



$$\left. \begin{array}{l} x - 1 = 0 \\ x \neq 1 \end{array} \right\}$$

$$\left[ \frac{x^2 - x - 6}{x - 1} = 0 \right] (x - 1)$$

$$x^2 - x - 6 = 0$$

$$(x + 2)(x - 3) = 0$$

$$x + 2 = 0 \quad x - 3 = 0$$

$$x = -2 \quad x = 3$$

$$\begin{array}{r} -6 \\ 2 \times -3 \\ -1 \end{array}$$

$$\begin{array}{l} -2 < x < 1 \\ x > 3 \end{array}$$

$$c) \quad 4x + 3 < \frac{1}{x}$$

Example 3:

$$a) \frac{x+2}{x-3} > 6$$

$$\text{b) } \frac{x-3}{x+1} < \frac{x+3}{x-2}$$



$$c) \frac{1}{x} \geq 2 - \frac{1}{x-4}$$

$$x \neq 0, 4$$

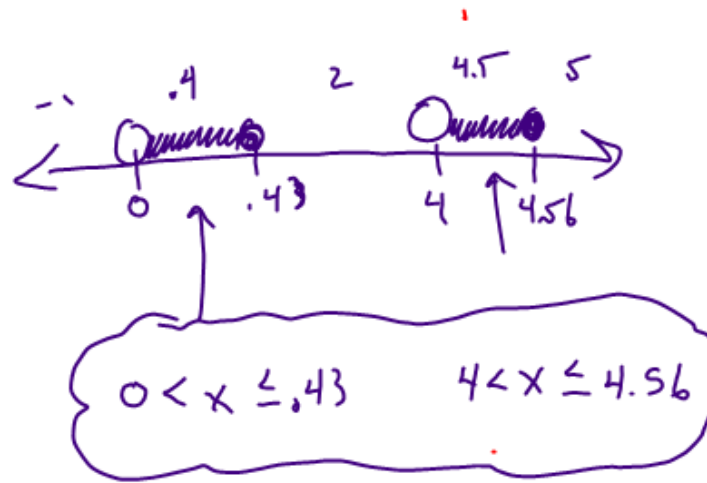
$$1(x-4) = 2x(x-4) - x$$

$$x-4 = 2x^2 - 8x - x$$

$$\begin{array}{r} x-4 \\ -x+4 \\ \hline 2x^2-9x \end{array} \quad \begin{array}{r} -9x \\ -x+4 \\ \hline \end{array}$$

$$0 = 2x^2 - 10x + 4$$

$$x = .43 \quad x = 4.56$$



$$d) \frac{1}{x+2} - \frac{x}{2-x} \leq \frac{x+6}{x^2-4}$$

Homework:

Solving Rational  
Inequalities