

# Rational Inequalities

ex. 1

$$\frac{(x-2)X+4}{X-2} > 0 \quad (x-2)$$

\* Open dots: ( ) \*

Solve:

open!

$$X+4 = 0$$

$$X = -4$$

undefined

$$X-2 = 0$$

$$X = 2$$

denominator is always open



$$(-\infty, -4) \cup (2, \infty)$$

Test "0"

$$\frac{0+4}{0-2} > 0$$

$$-2 > 0$$

no!!

ex. 2

$$\frac{(x-8)X}{X-8} \leq 0 \quad (x-8)$$

\* Closed dot  $\rightarrow$  solve BUT denominator is open!!

Solve: closed

$$X = 0$$

denomin. open

$$X-8 = 0$$

$$X = 8$$



$$[0, 8)$$

Test "1"

$$\frac{1}{1-8} \leq 0$$

yes!

$$\frac{1}{-7} \leq 0$$

Steps:

- Determine Open + closed
- \* Denominator always open
- Solve: multiply both sides by denominator.  

$$X =$$
- Set denominator = 0 solve!
- Draw # line w/ values
- Test a point  $\rightarrow$  test "0"
- Write in interval notation

ex. 3

~~(x+3)~~  $\frac{x-2}{x+3} < 6(x+3)$

\* open dots ( )

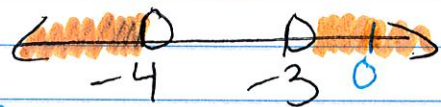
Solve:

$\frac{x-2}{-x-18} = \frac{6x+18}{-x-18}$

Denomin:

$x+3=0$   
 $x=-3$

$-20 = 5x$   
 $-4 = x$



$\frac{0-2}{0+3} < 6$      $-\frac{2}{3} < 6$

$(-\infty, -4) \cup (-3, \infty)$

yes!

ex. 4

~~(x-6)~~  $\frac{x}{x-6} \leq 3(x-6)$

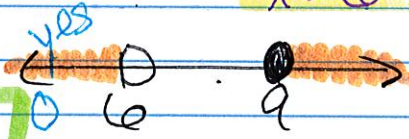
\* Closed, denomin open \*

$x = 3x - 18$   
 $-2x = -18$   
 $x = 9$

$x-6=0$   
 $x=6$

Test "0"

$\frac{0}{0-6} \leq 3$   
 $0 \leq 3$  ✓



$(-\infty, 6) \cup [9, \infty)$

ex. 5

~~(x+1)~~  $\frac{8}{x+1} \geq 0(x+1)$

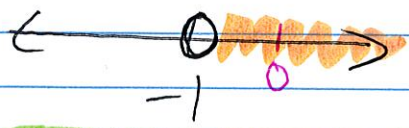
\* closed + open \*

Solve:

~~$8 = 0$~~

Denom:

$x+1=0$   
 $x=-1$



$\frac{8}{0+1} \geq 0$

$\frac{8}{1} \geq 0$  yes!

$(-1, \infty)$