

# Lesson 5: Solving Absolute Value Inequality

-  $|A| < 2$

shade possible solutions for  $A$  (ie, where  $A$ 's distance from 0 is less than 2)

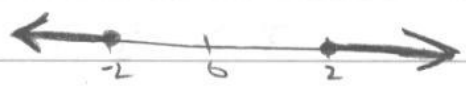


So notice:

$A < 2$  and  $A > -2$

- same as equations, only flip sign when testing the negative possibility.

-  $|A| \geq 2$



again  $A \geq 2$ ,  $A \leq -2$

def:  $\cup$  union of A and B = all the elements of A and all the elements of B

def  $\cap$  intersection of A and B = all the elements common to A and B (only what's in both)

Thus,

$x < 2 \Rightarrow$    $\Rightarrow (-\infty, 2)$

$x > -2 \Rightarrow$    $\Rightarrow (-2, \infty)$

intersection:  $(-\infty, 2) \cap (-2, \infty) = (-2, 2)$

union:  $(-\infty, 2) \cup (-2, \infty) = (-\infty, \infty)$

Write solutions as follows:

  $\Rightarrow [a, b]$

  $\Rightarrow (-\infty, a] \cup [b, \infty)$

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ex:  $|x| > 3$

$x > 3$        $x < -3$



$(-\infty, -3) \cup (3, \infty)$       ← interval notation

ex:  $|-3x + 2| > 8$

$-3x + 2 > 8$   
 $\quad \quad \quad -2 \quad -2$

$\frac{-3x}{-3} > \frac{6}{-3}$

$x < -2$

$-3x + 2 < -8$   
 $\quad \quad \quad -2 \quad -2$

$\frac{-3x}{-3} < \frac{-10}{-3}$

$x > \frac{10}{3}$



$(-\infty, -2) \cup (\frac{10}{3}, \infty)$

ex  $|\frac{2}{3}x - 5| + 3 \leq 9$   
 $\quad \quad \quad -3 \quad -3$

$|\frac{2}{3}x - 5| \leq 6$

$\frac{2}{3}x - 5 \leq 6$   
 $\quad \quad \quad +5 \quad +5$

$(\frac{3}{2}) \frac{2}{3}x \leq 11 (\frac{3}{2})$

$x \leq \frac{33}{2}$

$\frac{2}{3}x - 5 \geq -6$   
 $\quad \quad \quad +5 \quad +5$

$(\frac{3}{2}) \frac{2}{3}x \geq -1 (\frac{3}{2})$

$x \geq -\frac{3}{2}$

