TOPIC: ABSOLUTE VALUE INEQUALITIES

Solving Absolute Value Inequalities of the Form |X| < a

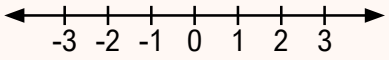
◆ Recall: To solve an absolute value *equation* $|X| = a$, rewrite as $X = a$ or $X = -a$ and solve both equations.

► To solve an absolute value *inequality* $|X| < a$, rewrite as _____ and solve the ___-part inequality.

New **Solving $|X| < a$ or $|X| \leq a$**

$$|x + 1| + 3 \leq 5$$

Interval Notation: _____



◆ Distance cannot be negative, so if $|X| < -a$, then there is ___ solution and if $|X| \leq 0$, X ___ 0.

EXAMPLE Solve the following absolute value inequalities.

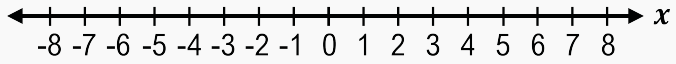
(A) $|x + 1| < -1$

(B) $|x + 1| \leq 0$

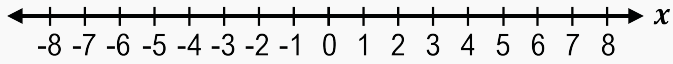
TOPIC: ABSOLUTE VALUE INEQUALITIES

PRACTICE Solve and graph the following absolute value inequalities. Express the solution in interval notation.

$(\boldsymbol{A})$ $\left|\frac{2x-5}{3}\right| \leq \frac{1}{3}$

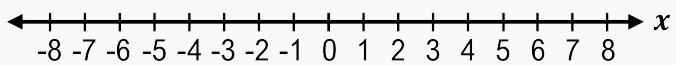


$(\boldsymbol{B})$ $3|2x+5|+3<12$

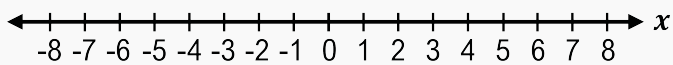


PRACTICE Solve and graph the following absolute value inequalities.

$(\boldsymbol{A})$ $|8x+6|+5<4$



$(\boldsymbol{B})$ $|6x-9|-7 \leq -7$



TOPIC: ABSOLUTE VALUE INEQUALITIES

EXAMPLE

A bag of chips is supposed to contain 20 grams, but there is a relative error of no more than 0.2 for each bag. If $c =$ actual weight of a bag of chips, $c_t = 20$ g, which is the expected weight, and $M = 0.2$, which is the maximum relative error, use the inequality below to find the weight range of bags of chips.

$$\left|\frac{c - c_t}{c}\right| \leq \text{relative error in } c$$

TOPIC: ABSOLUTE VALUE INEQUALITIES

Solving Absolute Value Inequalities of the Form |X| > a

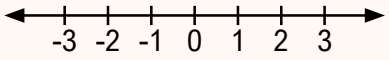
◆ Recall: To solve an absolute value *equation* $|X| = a$, rewrite as $X = a$ or $X = -a$ and solve both equations.

► To solve an absolute value *inequality* $|X| > a$, rewrite as $X \quad a$ or $X \quad -a$ and solve both inequalities.

New **Solving $|X| > a$ or $|X| \geq a$**

$$|x + 1| + 3 \geq 5$$

Interval Notation: _____



◆ Distance is always *at least* ___, so if $|X| \geq -a$, or $|X| \geq 0$, then the solution is _____.

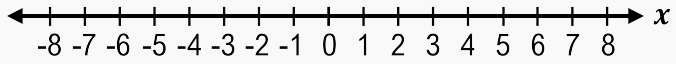
EXAMPLE Solve the absolute value inequality below.

$|x + 1| \geq -2$

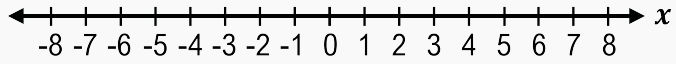
TOPIC: ABSOLUTE VALUE INEQUALITIES

PRACTICE Solve and graph the following absolute value inequalities. Express the solution in interval notation.

(A) $|2x + 0.6| > 2.6$

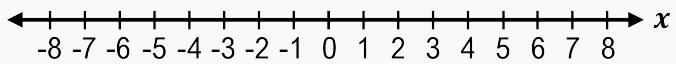


(B) $\frac{1}{2}|2x + 4| + 5 \geq 8$

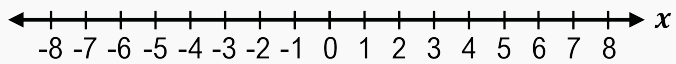


PRACTICE Solve and graph the following absolute value inequalities.

(A) $|10x - 4| - 2 > -8$



(B) $|0.5x + 1| + 8 \geq 8$



TOPIC: ABSOLUTE VALUE INEQUALITIES

EXAMPLE Solve the absolute value inequality. Express the answer in interval notation and graph the solution.

$$|3x + 6| > 0$$