

TOPIC: ABSOLUTE VALUE INEQUALITIES

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

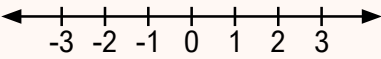
- ◆ Recall: To solve an absolute value *equation* $|X| = a$, rewrite as $X = a$ or $X = -a$ and solve both equations.
- To solve an absolute value *inequality* $|X| < a$, rewrite as _____ and solve the ____-part inequality.

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) $|x + 1| \leq 0$

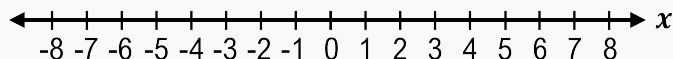
TOPIC: ABSOLUTE VALUE INEQUALITIES

PRACTICE

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

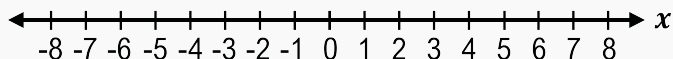
(A)

$$\left| \frac{2x - 5}{3} \right| \leq \frac{1}{3}$$



(B)

$$3|2x + 5| + 3 < 12$$

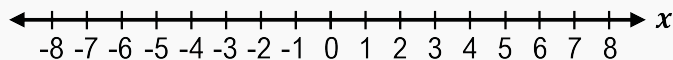


PRACTICE

Solve and graph the following absolute value inequalities.

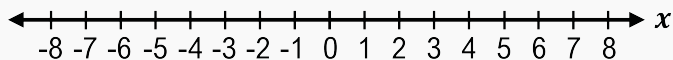
(A)

$$|8x + 6| + 5 < 4$$



(B)

$$|6x - 9| - 7 \leq -7$$



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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.

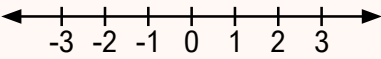
► To solve an absolute value *inequality* $|X| > a$, rewrite as $X > a$ or $X < -a$ and solve both inequalities.

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.

$$|x + 1| \geq -2$$

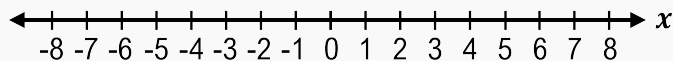
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PRACTICE

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

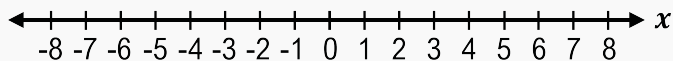
(A)

$$|2x + 0.6| > 2.6$$



(B)

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

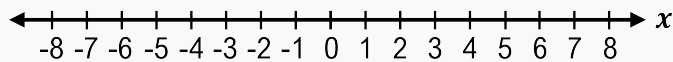


PRACTICE

Solve and graph the following absolute value inequalities.

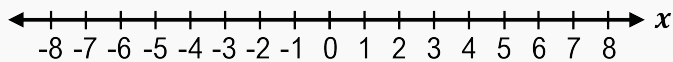
(A)

$$|10x - 4| - 2 > -8$$



(B)

$$|0.5x + 1| + 8 \geq 8$$



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EXAMPLE

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

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

