13.4

Personal Math Trainer 13.4 Solving Absolute Value Inequalities - Class & Homework HMH

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1 Solve the absolute value inequality $2|x - 7| \geq 6$ algebraically.
Select the number line showing the solution.

Divide both sides by 2.

$$\frac{2|x-7|}{2} \geq \frac{6}{2}$$

Rewrite as two inequalities.

$$|x - 7| \geq 3$$

Negative

$$-1(x - 7) \geq 3$$

$$-x + 7 \geq 3$$

$$-7 \quad -7$$

$$\frac{-x}{-1} \geq \frac{-4}{-1}$$

$$x \leq 4$$

Flip the inequality sign when multiplying or dividing by a negative

or

Positive

$$x - 7 \geq 3$$

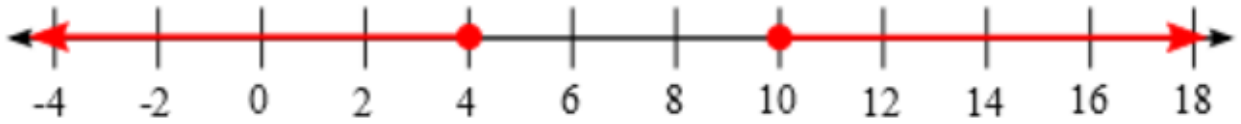
$$+7 \quad +7$$

$$x \geq 10$$

Combination Types

and	or
<	>
≤	≥

< or > ○
≤ or ≥ ●



2 Solve the absolute value inequality $|2x - 8| < 6$ algebraically. Select the number line showing the solution.

$$|2x - 8| < 6$$

Negative Positive

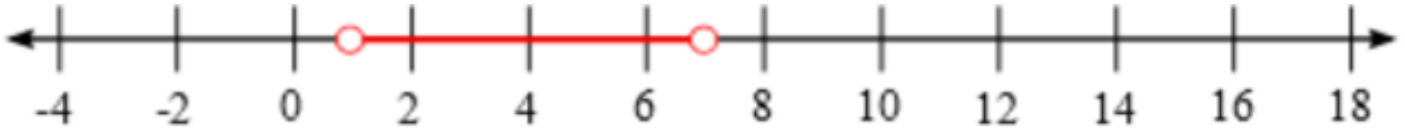
$$-(2x - 8) < 6 \quad \text{and} \quad 2x - 8 < 6$$

$$-2x + 8 < 6 \qquad +8 \quad +8$$

$$-8 \quad -8$$

$$\frac{-2x}{-2} < \frac{-2}{-2} \qquad \frac{2x}{2} < \frac{14}{2}$$

$$x > 1 \text{ and } x < 7$$



3 Solve the absolute value inequality algebraically. Select the correct graph of the solution.

Order of operation backward

A	S
M	D

$$2\left|x-\frac{7}{2}\right|+2>6$$

$$2\left|x-\frac{7}{2}\right|+2>6 \quad -2 \quad -2$$

$$\frac{2\left|x-\frac{7}{2}\right|}{2}>\frac{4}{2}$$

$$\left|x-\frac{7}{2}\right|>2$$

Negative

$$x-\frac{7}{2}<-2 \quad \text{Flip symbol}$$

$$+\frac{7}{2} \quad +\frac{7}{2}$$

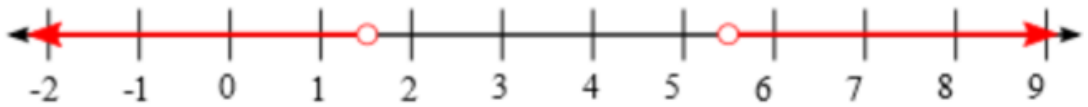
$$x<\frac{3}{2}$$

Postive

$$x-\frac{7}{2}>2$$

$$+\frac{7}{2} \quad +\frac{7}{2}$$

$$x>\frac{11}{2}$$



4 Solve the absolute value inequality $|2x + 1| - 1 < 4$ algebraically.
Select the correct solution.

Order of operation backward

A	S
M	D

$$|2x + 1| - 1 < 4$$
$$+1 \quad +1$$
$$|2x + 1| < 5$$

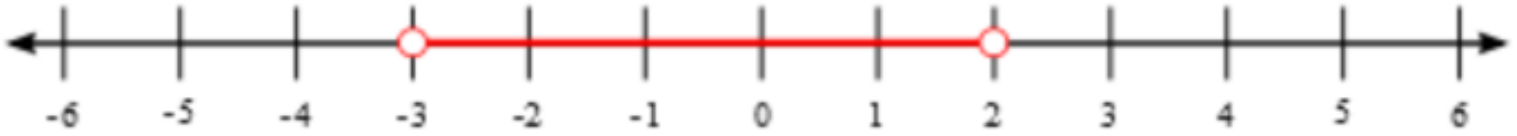
Negative

(Flip Symbol)

$$2x + 1 > -5$$
$$-1 \quad -1$$
$$2x > -6$$
$$\frac{2x}{2} > \frac{-6}{2}$$
$$x > -3$$

Positive

$$2x + 1 < 5$$
$$-1 \quad -1$$
$$2x < 4$$
$$\frac{2x}{2} < \frac{4}{2}$$
$$x < 2$$



5 Solve the absolute value inequality $2|x + 4| + 4 \geq 10$ algebraically.
Select the number line showing the correct answer.

Order of operation backward

A	S
M	D

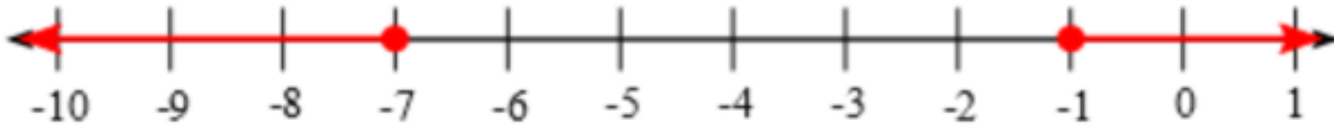
$$2|x + 4| + 4 \geq 10$$
$$-4 \quad -4$$
$$2|x + 4| \geq 6$$
$$\frac{}{2} \quad \frac{}{2}$$
$$|x + 4| \geq 3$$

Negative (Flip)

$$x + 4 \leq -3$$
$$-4 \quad -4$$
$$x \leq -7$$

Positive

$$x + 4 \geq 3$$
$$-4 \quad -4$$
$$x \geq -1$$



6 Solve the absolute value inequality algebraically. Select the number line showing the correct solution. $|x + 11| - 11 \leq -8$

$$|x + 11| - 11 \leq -8$$

$$|x + 11| \leq 3 \quad \text{Add 11 to both sides.}$$

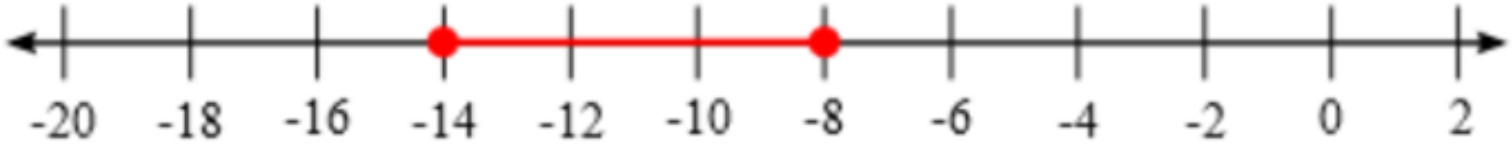
Rewrite as two inequalities.

Negative (Flip symbol) Positive

$x + 11 \geq -3$ and $x + 11 \leq 3$

Subtract 11 from both sides of both inequalities.

$x \geq -14$ and $x \leq -8$



7 Solve the absolute value inequality $5|x - 3| - 2 < 13$ algebraically.
Select the number line below that shows the correct solution.

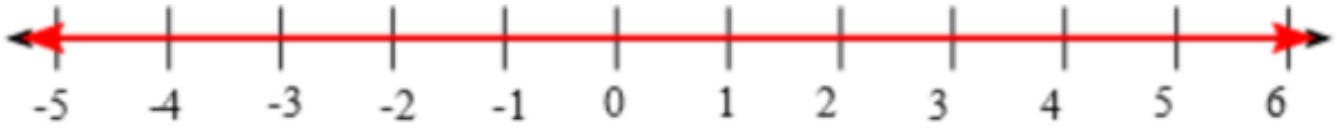
$$\begin{aligned} -5|x-3|-2 &< 13 \\ -5|x-3| &< 15 \quad \text{Add 2 to both sides.} \\ |x-3| &> -3 \quad \text{Divide both sides by } -5. \end{aligned}$$

Absolute value is always Positive* > Negative (3)

Always True, so all real numbers.

*The left-hand side is always positive or zero, so the inequality is always true.

color the whole line!



8 Solve the absolute value inequality $9|x + 4| + 14 < 5$ algebraically. Select the number line showing the solution.

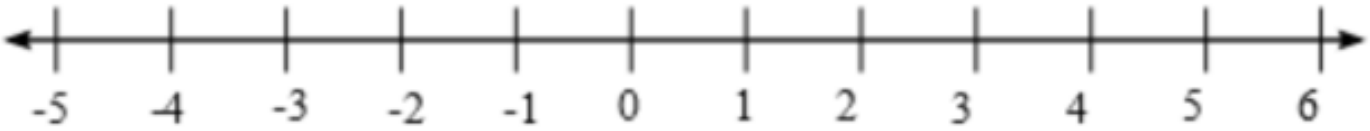
$$\begin{aligned} 9|x+4|+14 &< 5 \\ 9|x+4| &< -9 \quad \text{Subtract 14 from both sides.} \\ |x+4| &< -1 \quad \text{Divide both sides by 9.} \end{aligned}$$

Absolute value is always Positive* $<$ Negative (1)

Always False, so No Solutions.

*The left-hand side of the inequality is always positive or zero, so it can never be less than 1.

No color, empty line!



9 Determine whether each of the integers from 5 to 5 is a solution of the inequality $|x \quad 1| \quad 4 \quad \leq \quad 1$.

Part 1 out of 2

Drag and drop the integers below into the correct categories to show whether each of the integers is a solution of the inequality.

Solution	Not a Solution
-2, -1, 0, 1, 2, 3, 4	-5, -4, -3, 5

$$|x-1|-4 \leq -1$$
$$+4 \quad +4$$
$$|x-1| \leq 3$$

Negative(Flip)

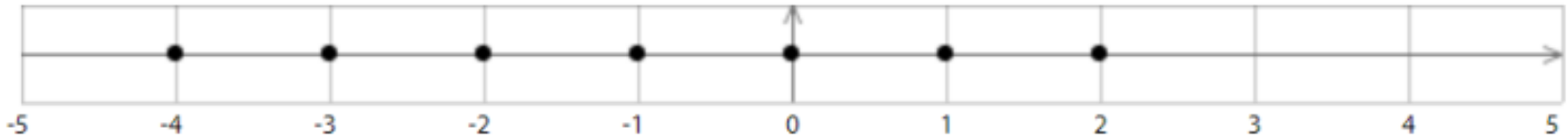
$$X - 1 \geq -3$$
$$+1 \quad +1$$
$$x \geq -2$$

Positive

$$X - 1 \leq 3$$
$$+1 \quad +1$$
$$x \leq 4$$

Part 2 out of 2

Plot the solutions on the number line.



10 Determine whether each of the integers from 5 to 5 is a solution of the inequality $|x - 1| + 3 \geq 5$.

Part 1 out of 2

Drag and drop the integers below into the correct categories to show whether each of the integers is a solution of the inequality.

Solution	Not a Solution
4, -5, -4, -1, -3, 3, -2, 5	1, 2, 0

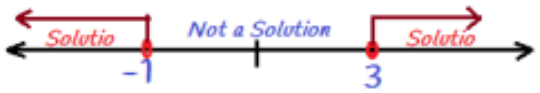
$$|x - 1| + 3 \geq 5$$
$$-3 \quad -3$$
$$|x - 1| \geq 2$$

Negative (Flip)

$$x - 1 \leq -2$$
$$+1 \quad +1$$
$$x \leq -1$$

Positive

$$x - 1 \geq 2$$
$$+1 \quad +1$$
$$x \geq 3$$



Part 2 out of 2

Plot the solutions on the number line.