# 1.7 Solving Absolute Value Equations and Inequalities

absolute value - the distance a number is from 0
- always positive because distance is positive

An absolute value equation is in the form $|ax + b| = c$.

To solve an absolute value equation when $c \geq 0$:

$ax + b = c$ or $ax + b = -c$

If $c < 0$, there is no solution.

Solve each absolute-value equation.

1. $|x - 2| = 5$

$x - 2 = 5$ OR $x - 2 = -5$

$+2 \quad +2 \qquad +2 \quad +2$

$x = 7$ OR $x = -3$

2. $|x + 3| = -8$

absolute value cannot equal negative

NO SOLUTION

3. $|2x - 1| + 3 = 17$

$-3 \quad -3$

$|2x-1| = 14$

$2x-1=14$ OR $2x-1=-14$

$+1 \quad +1 \qquad +1 \quad +1$

$2x=15$ OR $2x=-13$

$\frac{2x}{2}=\frac{15}{2}$ OR $\frac{2x}{2}=\frac{-13}{2}$

$x=\frac{-15}{2}$ OR $x=\frac{-13}{2}$

4. $\frac{1}{2}|x + 5| - 6 = -3$

$+6 \quad +6$

$2\cdot\frac{1}{2}|x+5| = 3\cdot 2$

$|x+5| = 6$

$x+5=6$ OR $x+5=-6$

$-5 \quad -5 \qquad -5 \quad -5$

$x=1$ or $x=-11$

# Absolute Value Inequalities

greator or $>$ $\geq$ } OR

less than $<$ $\leq$ } AND

5. Solve $|3x + 2| > 4$.
Graph the solution on a number line.

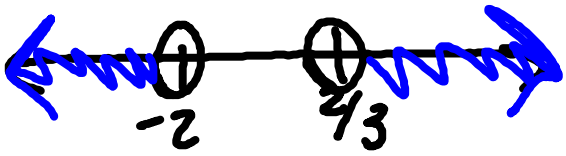
OR

$3x+2 > 4$ OR $3x+2 < -4$

$-2 \quad -2 \qquad\qquad -2 \quad -2$

$\frac{3x}{3} > \frac{2}{3}$ OR $\frac{3x}{3} < \frac{-6}{3}$

$x > \frac{2}{3}$ OR $x < -2$




6. Solve $|2x - 7| \leq 1$.
Graph the solution on a number line.

AND

$2x-7 \leq 1$ AND $2x-7 \geq -1$

$+7 \quad +7 \qquad\qquad +7 \quad +7$

$\frac{2x}{2} \leq \frac{8}{2}$ AND $\frac{2x}{2} \geq \frac{6}{2}$

$x \leq 4$ AND $x \geq 3$

7. Solve $\left|\frac{1}{4}x - 3\right| \geq 2$.
Graph the solution on a number line.

8. Solve $\left|\frac{2}{3}x + 7\right| < 5$.
Graph the solution on a number line.