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. $|x - 2| = 5$

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

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

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

Absolute Value Inequalities

$> \atop \geq$ } OR

$< \atop \leq$ } AND

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

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

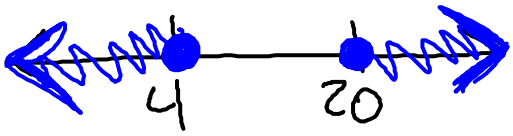
7. Solve $\left|\frac{1}{4}x - 3\right| \geq 2$. OR
Graph the solution on a number line.

$\frac{1}{4}x - 3 \geq 2$ OR $\frac{1}{4}x - 3 \leq -2$

$+3 \quad +3$ $\quad +3 \quad +3$

$4 \cdot \frac{1}{4}x \geq 5 \cdot 4$ $\quad 4 \cdot \frac{1}{4}x \leq 1 \cdot 4$

$x \geq 20$ OR $x \leq 4$



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

$\frac{2}{3}x + 7 < 5$ AND $\frac{2}{3}x + 7 > -5$

$-7 \quad -7$ $\quad -7 \quad -7$

$\frac{3}{2} \cdot \frac{2}{3}x < -2 \cdot \frac{3}{2}$ $\quad \frac{3}{2} \cdot \frac{2}{3}x > -12 \cdot \frac{3}{2}$

$x < \frac{-2}{1} \cdot \frac{3}{2}$ $\quad x > \frac{-12}{1} \cdot \frac{3}{2}$

$x < -3$ AND $x > -18$