Absolute Value Equations:

$|2x+6| = 10$

$2x+6 = 10 \qquad 2x+6 = -10$
$\underline{-6 \quad -6} \qquad \underline{-6 \quad -6}$
$\dfrac{2x}{2} = \dfrac{4}{2} \qquad \dfrac{2x}{2} = \dfrac{-16}{2}$
$x = 2 \qquad\qquad x = -8$

$|2\cdot 2 + 6| \overset{?}{=} 10 \qquad |2\cdot(-8)+6| \overset{?}{=} 10$ ✓

$|x-1| + 3 = 14$
$ \underline{-3 \quad -3}$
$|x-1| = 11$

$x-1 = 11 \qquad x-1 = -11$
$\underline{+1 \ +1} \qquad \underline{+1 \ +1}$
$x = 12 \qquad x = -10$

$|3(x+2)| + 5 = 2$
$ \underline{-5 \ -5}$
$|3(x+2)| = -3 \longleftarrow \left|\begin{smallmatrix}\text{Abs.}\\ \text{Val}\end{smallmatrix}\right| = -\#$

$|3x + 6| = -3$

No Solutions ∅

$3x+6 = -3 \qquad 3x+6 = 3$
$x = -3 \qquad\qquad x = -1$

$|3(-3+2)| + 5 \overset{?}{=} 2$
$|-3| + 5 \overset{?}{=} 2$

Inequalities:

○ not equal to
● equal to

$x > -2$

$-3 < x \le 4$

$x \ge 5$

Interval Notation

$(-2, \infty)$

$(-3, 4]$

$[5, \infty)$

symbols
(parentheses) if x is not equal to ○
if # is -∞ or ∞

[brackets] if x is equal to ●

✱ when you multiply/divide by a negative #, you *must* flip the inequality sign

$4 - 2x \le 8$
$\underline{-4 -4}$
$\dfrac{-2x}{-2} \le \dfrac{4}{-2}$ flip ↓
$\boxed{x \ge -2}$

$[-2, \infty)$

$-3 < 4x + 1 \le 9$
$\underline{-1 -1 \quad -1}$
$\dfrac{-4}{4} < \dfrac{4x}{4} \le \dfrac{8}{4}$
$\boxed{-1 < x \le 2}$

$(-1, 2]$