## 1.4 Solving Absolute Value Equations

**Objective**: Evaluate expressions involving absolute values.
Solve absolute value equations.

$|-5| = 5$
$|5| = 5$

**What is absolute value?** Always (+)

- distance from 0

**I. Evaluate.**

* Ex 1) $2.7 + |6 - 2x|$ if $x = 4$

$2.7 + |6 - 2 \cdot 4|$
$2.7 + |6 - 8|$
$2.7 + |-2|$
$2.7 + 2 = 4.7$

**II. Solve.**

Ex 2) $|x - 18| = 5$

$x - 18 = 5$ or $x - 18 = -5$
$+18 \quad +18 \qquad +18 \quad +18$
$x = 23$ ✓ $\qquad x = 13$ ✓

Check your Answers!

Ex 3) $|y + 3| = 8$

$y + 3 = 8 \qquad y + 3 = -8$
$-3 \quad -3 \qquad -3 \quad -3$
$y = 5$ ✓ $\qquad y = -11$ ✓

Ex 4) $|6 - 4t| + 5 = 0$
$-5 \quad -5$
$|6 - 4t| = -5$
∅

$6 - 4t = -5 \qquad 6 - 4t = 5$
$-6 \quad -6 \qquad -6 \quad -6$
$-4t = -11 \qquad -4t = -1$
$t = \frac{11}{4}$ does not check $\qquad t = \frac{1}{4}$

Ex 5) $5|w - 2| = 25$
$\frac{5}{5} \quad \frac{25}{5}$
$|w - 2| = 5$

*Cannot distribute through absolute value

$w - 2 = 5$ or $w - 2 = -5$
$+2 \quad +2 \qquad +2 \quad +2$
$w = 7$ ✓ $\qquad w = -3$ ✓

Ex 6) $|x + 6| = 3x - 2$

$x + 6 = 3x - 2$ or $x + 6 = -(3x - 2)$
$+2 \quad +2$
$x + 8 = 3x$
$-x \quad -x$
$8 = 2x$
$\frac{8}{2} = \frac{2x}{2}$
$x = 4$

$x + 6 = -3x + 2$
$-2 \quad -2$
$x + 4 = -3x$
$+3x \quad +3x$
$4x + 4 = 0$
$-4 \quad -4$
$\frac{4x}{4} = \frac{-4}{4}$
$x = -1$

Ex 7) $|8 + y| = 2y - 3$

$8 + y = 2y - 3$
$-y \quad -y$
$8 = y - 3$
$+3 \quad +3$
$11 = y$

$8 + y = -2y + 3$
$+2y \quad +2y$
$8 + 3y = 3$
$-8 \quad -8$
$3y = -5$
$y = -\frac{5}{3}$

Ex 8) Now let us look at page 30...numbers 14 -16...

$|x - \text{desired amount}| = \text{the error}$

14. $|x - 160| = 2$

15. $x - 160 = 2$ or $x - 160 = -2$
$x = 162°F \qquad x = 158°F$