Ch1.4 Solving Absolute Value Equations

Solve each equation.

(40) $|x+11| = 42$

since $42 \geq 0$, solutions exist

$x+11 = 42$ or $x+11 = -42$

$-11 \quad -11 \qquad -11 \quad -11$

$\boxed{x = 31 \quad \text{or} \quad x = -53}$

(41) $\frac{3|x+6|}{3} = \frac{36}{3}$

$|x+6| = 12$

since $12 \geq 0$, solutions exist

$x+6 = 12$ or $x+6 = -12$

$-6 \quad -6 \qquad -6 \quad -6$

$\boxed{x = 6 \quad \text{or} \quad x = -18}$

(42) $|4x-5| = -25$

since $-25 < 0$, there are

$\boxed{\text{No Solutions}}$

students need to know..,
Absolute Values are always 0 or Positive

Absolute Value Equations.

1st: Isolate Abs. Val.
2nd: Determine if Absolute value is 0 or positive
3rd: Solve for two cases
1) Abs. Val of +
2) Abs Val of −

Chapter 1.4 continued

(43) $|x+7| = 3x-5$

since it is not known if $3x-5 \geq 0$, the answers need to be checked.

$x+7 = 3x-5$ or $x+7 = -(3x-5)$

$-x \quad -x$

$7 = 2x-5$

$+5 \quad +5$

$\frac{12}{2} = \frac{2x}{2}$

$6 = x$

✓ $(3(6)-5) \geq 0$

so $x=6$ is a solution

$x+7 = -3x+5$

$+3x \quad +3x$

$4x+7 = 5$

$-7 \quad -7$

$\frac{4x}{4} = \frac{-2}{4}$

$x = -\frac{2}{4} = -\frac{1}{2}$

since $3(-\frac{1}{2})-5 < 0$ the $x=-\frac{1}{2}$ is not a solution

$\boxed{x=6}$

(44) $|y-5|-2 = 10$

$+2 \quad +2$

$|y-5| = 12$

since $12 \geq 0$, there are solutions

$y-5 = 12$ or $y-5 = -12$

$+5 \quad +5 \qquad +5 \quad +5$

$\boxed{y=17 \text{ or } y=-7}$

Chapter 1.4 continued

(45) $\frac{4|3x+4|}{4} = \frac{4x+8}{4}$

$|3x+4| = x+2$

since it is not known if $x+2 \geq 0$, the answers must be checked.

$3x+4 = x+2$ or $3x+4 = -(x+2)$

$-x \quad -x$

$2x+4 = 2$

$-4 \quad -4$

$\frac{2x}{2} = \frac{-2}{2}$

$x = -1$

✓ since $-1+2 \geq 0$, $x=-1$ is a solution

$3x+4 = -x-2$

$+x \quad +x$

$4x+4 = -2$

$-4 \quad -4$

$\frac{4x}{4} = \frac{-6}{4}$

$x = -\frac{6}{4} = -\frac{3}{2}$

since $-\frac{3}{2}+2 \geq 0$

$x = -3/2$ is a solution

$x = -1$ or $x = \frac{-3}{2} = -1\frac{1}{2}$

(46) Paloma's training goal is to ride four miles on her bicycle in 15 minutes. If her actual time is always within plus or minus 3 minutes of her preferred time, how long are her shortest and longest rides?

The absolute value of a difference is used to represent "within" and "plus or minus"

$$|x - 15| = 3$$

$x - 15 = 3$ or $x - 15 = -3$

$+15 \quad +15$ $+15 \quad +15$

$x = 18$ or $x = -12$