**Algebra RH**

Essential Questions: How do we solve equations involving decimals? How do we solve absolute value equations?

**Do Now:**

(a) $0.04(100) = \underline{\quad 4 \quad}$

(b) $0.3(10) = \underline{\quad 3 \quad}$

(c) $0.105(\underline{\quad 1000 \quad}) = 105$

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**Key Concept:** In order to "clear" the decimal, multiply by a power of ten.

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**Examples:**

(1.) $0.06x - 1 = 0.2$

$$100(0.06x - 1) = 100(0.2)$$
$$6x - 100 = 20$$
$$6x = 120$$
$$\boxed{x = 20}$$

(2.) $0.12x - 0.5 = 0.02 - 0.01x$

$$100(0.12x - 0.5) = 100(0.02 - 0.01x)$$
$$12x - 50 = 2 - x$$
$$13x - 50 = 2$$
$$13x = 52$$
$$\boxed{x = 4}$$

(3.) $0.002(x + 5) = 0.015 - 0.003x$

$$1000[0.002(x+5)] = 1000(0.015 - 0.003x)$$
$$*\ \underline{(1000)(0.002)}(x+5) = 15 - 3x$$
$$2(x+5) = 15 - 3x$$
$$2x + 10 = 15 - 3x$$
$$5x + 10 = 15$$
$$5x = 5$$
$$\boxed{x = 1}$$

$$|2x - 5| = x - 7$$

$2x - 5 = x - 7$

$x = -2$       $2x - 5 = -x + 7$

$3x = 12$

$x = 4$

**Solving Absolute Value Equations**

*What is the value of x?*

a. $|x| = 5$

$x = 5$
or
$x = -5$

$\{5, -5\}$

$|5| = 5$

$|-5| = 5$

b. $\left|\frac{1}{2}x\right| = 5$

$x = 10$
or
$x = -10$

$\{10, -10\}$

c. $|x + 2| = 5$

$x = 3$ or $x = -7$

$|3 + 2| = 5$    $|-7 + 2| = 5$

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

$\{3, -7\}$

**Key Concept:**

Given $|ax + b| = c$

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

\* isolate absolute value expression

**Examples:**

(4.) $|x - 2| = 5$

$x - 2 = 5$ or $x - 2 = -5$

$x = 7$    $x = -3$

$\{7, -3\}$

(5.) $|4x + 2| = 26$

$4x + 2 = 26$ or $4x + 2 = -26$

$4x = 24$    $4x = -28$

$x = 6$    $x = -7$

$\{6, -7\}$

(6.) $|2x - 7| - 5 = 4$

$|2x - 7| = 9$

$2x - 7 = 9$ or $2x - 7 = -9$

$2x = 16$    $2x = -2$

$x = 8$    $x = -1$

$\{8, -1\}$

(7.) $2|4 - 8x| = 40$

$|4 - 8x| = 20$

$4 - 8x = 20$ or $4 - 8x = -20$

$-8x = 16$    $-8x = -24$

$x = 2$    $x = 3$

$\{-2, 3\}$