Key

Algebra 1
Unit 2, lesson 1 Notes
Solving 1, 2, and Multi-Step Linear Equations

Essential Question: How do I solve 1, 2, and multi-step linear equations?

New Vocabulary:

Expression: a mathematical phrase that can include #'s, variables + operation symbols

Equation: A mathematical sentence made up of 2 equivalent expressions w/an = in between
$7 + 9 = 2 + 3 + 4$

Linear Equation: An equation where the graph is a st line. The highest power is 1.

Solution: The answer to an equation (Any # that produces a true statement)

To solve an equation – the goal is to get the __Variable__ by itself on one side of the equal sign.

One-Step Equations (you only need to perform one operation to solve the equation)

I. Solve using addition or subtraction. Check your answers

1) $x + 10 = 33$
$$x = 23$$

2) $20 = x - 15$
$$x = 35$$

3) $x + 12 = -6$
$$x = -18$$

✓: $23 + 10 = 33$
$33 = 33$ ✓

II. Solve using multiplication or division. Check your answers

1) $4x = 20$
$$x = 5$$

2) $\frac{x}{15} = 3$
$$x = 45$$

3) $120 = 15x$
$$x = 8$$

III. Solve by using a reciprocal Check your answers!

1) $\frac{3}{4}x = 9$
$\frac{4}{3}\left(\frac{3}{4}\right)x = 9\left(\frac{4}{3}\right)$
$$x = 12$$

2) $\frac{3}{5}x = 6$
$\frac{5}{3} \cdot \frac{3}{5}x = 6 \cdot \frac{5}{3}$
$$x = 10$$

3) $12 = \frac{1}{2}x$
$\frac{2}{1} \cdot 12 = \frac{1}{2} \cdot \frac{2}{1}x$
$$24 = x$$

Two-Step Equations (These require two steps in order to solve the equation)

Example: $\frac{x}{2} + 5 = 11$

Add/subtract ~~firs~~ before
multiply/divide

$$\frac{x}{2} + 5 = 11$$
$$\underline{ -5 \quad -5}$$
$$2\left(\frac{x}{2}\right) = (6)2$$

$$\boxed{X = 12}$$

$\checkmark: \quad \frac{12}{2} + 5 = 11$

$6 + 5 = 11$

$11 = 11 \checkmark$

Now try these: Check your answers!

1) $5x + 9 = 24$
$ -9 \quad -9$

$$\frac{5x}{5} = \frac{15}{5}$$

$$\boxed{X = 3}$$

2) $-1 = \frac{z}{3} - 7$
$ +7 \qquad +7$

$$3(6) = \left(\frac{z}{3}\right)3$$

$$18 = z$$

$$\boxed{Z = 18}$$

3) $10x - 2x = 32$

$$8x = 32$$

$$\boxed{X = 4}$$

4) $-16 = 5d - 9d$

$$-16 = -4d$$

$$\underline{4 = d}$$

$$\boxed{d = 4}$$

Multi-Step Equations (Equations that require more than two steps to solve) Check your answers

Example: $7x + 2(x + 6) = 39$

$$7x + 2x + 12 = 39$$
$$9x + 12 = 39$$
$$ -12 \quad -12$$
$$\frac{9x}{9} = \frac{27}{9}$$

$$\boxed{x = 3}$$

$\checkmark: \quad 7(3) + 2(3 + 6) = 39$

$21 + 2(9) = 39$

$21 + 18 = 39$

$39 = 39 \checkmark$

Now try these:

1) $8x - 3x - 10 = 20$

$$5x - 10 = 20$$

$$5x = 30$$

$$\boxed{x = 6}$$

2) $\frac{3}{2}(3x + 5) = -24$

$$\frac{2}{3}\left[\frac{3}{2}(3x + 5)\right] = -24 \cdot \frac{2}{3}$$

$$3x + 5 = -16$$

$$3x = -21$$

$$\boxed{x = -7}$$