

Math 9 – Unit 3: Solving Equations

Name: _____

Lesson #2: Solving with Variables on Both Sides

Date: _____

Learning Goal: We are learning to solve equations with variable on both sides.

In many equations that you will see for the rest of your Mathematical career (may it be long and fruitful), the variable will be scattered throughout the equation, even on both sides! The goal is to collect the variables on the same side and move all the constants to the other side.

$$a) \quad 5x = 4x + 7$$

$$\quad \quad \quad \cancel{-4x} \quad \cancel{-4x}$$

$$x = 7$$

$$b) \quad 5y = 9y - 8$$

$$\quad \quad \quad \cancel{-9y} \quad \cancel{-9y}$$

$$\quad \quad \quad \cancel{-4y} = -8$$

$$\quad \quad \quad \underline{\quad -4 \quad} \quad \underline{\quad -4 \quad}$$

$$y = 2$$

$$c) \quad -30 + 5x = 2x$$

$$\quad \quad \quad \cancel{-3x} \quad \cancel{-5x}$$

$$\quad \quad \quad \underline{\quad -30 \quad} = \underline{\quad -3x \quad}$$

$$\quad \quad \quad \underline{\quad -3 \quad} \quad \quad \underline{\quad -3 \quad}$$

$$e) \quad 2m + 3m = 8m - 3$$

$$5m = 8m - 3$$

$$\quad \quad \quad \cancel{-8m} \quad \cancel{-8m}$$

$$\quad \quad \quad \underline{\quad -3m \quad} = \underline{\quad -3 \quad}$$

$$\quad \quad \quad \underline{\quad -3 \quad} \quad \quad \underline{\quad -3 \quad}$$

$$m = 1$$

$$d) \quad 2w = 0.35 - 5w$$

$$\quad \quad \quad \cancel{+5w} \quad \quad \quad \cancel{+5w}$$

$$\quad \quad \quad \cancel{7w} = \underline{\quad 0.35 \quad}$$

$$\quad \quad \quad \cancel{7} \quad \quad \quad 7$$

$$w = 0.05$$

$$f) \quad 5p - 3p = 6 - p$$

$$2p = 6 - p$$

$$\quad \quad \quad \cancel{+p} \quad \quad \quad \cancel{+p}$$

$$\quad \quad \quad \underline{\quad 3p \quad} = \underline{\quad 6 \quad}$$

$$\quad \quad \quad \underline{\quad 3 \quad} \quad \quad \underline{\quad 3 \quad}$$

$$p = 2$$

$$g) \quad 8y = 5y + 14$$

$$8y = 5y + 14$$

$$\quad \quad \quad \cancel{-5y} \quad \cancel{-5y}$$

$$\quad \quad \quad \underline{\quad 3y \quad} = \underline{\quad 14 \quad}$$

$$\quad \quad \quad \underline{\quad 3 \quad} \quad \quad \underline{\quad 3 \quad}$$

$$y = 7$$



$$h) \quad 3n = 10.1 + 9.9 - 2n$$

$$3n = 20 - 2n$$

$$\quad \quad \quad \cancel{+2n} \quad \quad \quad \cancel{+2n}$$

$$\quad \quad \quad \underline{\quad 5n \quad} = \underline{\quad 20 \quad}$$

$$\quad \quad \quad \underline{\quad 5 \quad} \quad \quad \underline{\quad 5 \quad}$$

$$n = 4$$

$$i) \quad 8k - 3 = 4k + 17$$

$$\quad \quad \quad \cancel{4k} + 3 - \cancel{4k} + 3$$

$$\quad \quad \quad \cancel{4k} = 20$$

$$\quad \quad \quad \frac{\cancel{4}}{4} = \frac{20}{4}$$

$$k = 5$$

$$j) \quad -10x + 14 = 18 - 2x$$

$$\quad \quad \quad \cancel{+2x} - 14 \quad \quad \quad \cancel{-14} + \cancel{2x}$$

$$\quad \quad \quad \cancel{-8x} = 4$$

$$\quad \quad \quad \frac{\cancel{-8}}{-8} = \frac{4}{-8}$$

$$x = -0.5$$

$$k) \quad 2u + 10 = 9 - 3u + 11$$

$$\quad \quad \quad \cancel{2u} + \cancel{10} = \cancel{20} - \cancel{3u}$$

$$\quad \quad \quad \cancel{+3u} - \cancel{10} \quad \quad \quad \cancel{-10} + \cancel{3u}$$

$$\quad \quad \quad \cancel{5u} = 10$$

$$\quad \quad \quad \frac{\cancel{5}}{5} = \frac{10}{5}$$

$$u = 2$$

$$l) \quad 16 + 3x - 9 = -3 + 8x + 10$$

$$m) \quad -29k - 18 + 11 = -36k - 10k - 177$$

$$\quad \quad \quad \cancel{-29k} - \cancel{7} = \cancel{-46k} - \cancel{177}$$

$$\quad \quad \quad \cancel{+46k} \quad \cancel{+7} \quad \quad \quad \cancel{+46k} \quad \cancel{+7}$$

$$\quad \quad \quad \cancel{17k} = -170$$

$$\quad \quad \quad \frac{\cancel{17}}{17} = \frac{-170}{17}$$

$$k = -10$$

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$$n) \quad 6x - 4 - 2x = 4x + 8$$

Success Criteria:

- I can solve equations by grouping variables on one side of the equation, and constants on the other side of the equation