

MATH 8: UNIT 3: SOLVING LINEAR EQUATIONS

Students will create, simplify, and interpret solutions to linear equations with one variable, such as:

- Is $\$120 = \$25h - \$30$ an equation that represents working 6 hours at \$25/hour and then spending \$30 to buy your family dinner?
- Create an equation for buying a PS4 for \$400 if you currently have \$75 saved and then work at \$25/hour to earn the rest.
- If you walked at 5 mph for two hours, then walked at the same rate for 3 more hours, create an equation for how far you walked.

Useful text: Chapter 2: Equations, pages 69 - 132

Section 1: Recognize and create equations for one variable (like the above examples).

Section 2: Solve simple one-variable equations, including being able to simplify the equation first by isolating the variable, then dividing to get just one of the variable.

Section 3: Interpret whether equations have one, many, or no solutions.

Section 1: Recognize and create equations for one variable.

- a.** An equation like our example of $\$120 = \$25h - \$30$ can represent you working a number of hours at \$25/hour, spending \$30, and then having \$120 left. So, how many hours did you work? We'll practice this type of *algebra*. Algebra means counting when you don't know one of the things you need to count; in this case how many hours worked.

Section 2: Solve simple one-variable equations, including being able to simplify the equation first by isolating the variable, then dividing to get just one of the variable.

- a.** We'll simplify and solve basic algebra equations by combining like terms. For example, if $3x + 2x = 10$, what does x equal? In this case, $5x = 10$, so $x = 2$.
- b.** We'll use the order of operations with parentheses to simplify algebraic equations. Like, if $3(x + 2) - 6 = 9$, then what does x equal? Here: $3x + 6 - 6 = 9$, $3x = 9$, $x = 3$.
- c.** We'll then take the answers we get, and verify they are correct. For example, if we say $x = 2$ as a solution to the equation $3x + 2x = 10$, we'll check it. In this case, $3(2) + 2(2) = 10$, so we multiply to confirm $6 + 4 = 10$, $10 = 10$! We'll practice!

Section 3: Interpret whether equations have one, many, or no solutions.

- a.** The equation, $4x + 2x + 8 = 14$, has just one solution: $x = 1$. We can prove this by doing the simplification we practiced: $6x + 8 = 14$, $6x = 6$, $x = 1$.
- b.** The equation, $4x + 2x = 6x$, has infinite/many solutions. We prove this by showing $6x = 6x$, and $x = x$. This means that x can equal whatever number you want, and the equation is true!
- c.** The equation $4x + 2x = 6x + 1$ has no solutions. We prove this by showing $6x = 6x + 1$ can't be true for any number because a number can't equal itself plus one.