5th

1.3 Notetaking with Vocabulary

Learning target: Understand solving liner equations.

Success criteria: I can solve multi-step equations

Write the meaning of each vocabulary term.

identity – see later

Core Concepts

Solving Equations with Variables on Both Sides

To solve an equation with variables on both sides, **simplify** one or both sides of the equation, if necessary. Then use inverse operations to **collect the variable terms** on one side, **collect the constant terms** on the other side, and **isolate the variable**.

Example 1: Solve $12 - 3x = -6x$. Check your solution.

$+3x \quad +3x$

$\frac{12}{-3} = \frac{-3x}{-3}$

$-4 = x$ one solution

Check: $12 - 3(-4) \stackrel{?}{=} -6(-4)$

$12 + 12 \stackrel{?}{=} 24$

$24 = 24$ ✓

Example 2: Solve $3x - 8(2x + 3) = -6(2x + 5)$. Check your solution.

$3x - 16x - 24 = -12x - 30$

$-13x - 24 = -12x - 30$

$+13x \quad +13x$

$-24 = x - 30$

$+30 \quad +30$

$6 = x$

$3(6) - 8(2 \cdot 6 + 3) \stackrel{?}{=} -6(2 \cdot 6 + 5)$

$18 - 8(12 + 3) \stackrel{?}{=} -6(12 + 5)$

$18 - 8(15) \stackrel{?}{=} -6(17)$

$18 - 120 = -102$

$-102 = -102$ ✓

Example 3: Solve $\frac{3}{4}(48 - 16x) = 4(4 + 2x)$. Check your solution.

$\left(\frac{3}{4}\right)\left(\frac{12}{1}\right)\left(\frac{48}{1}\right) - \left(\frac{3}{4}\right)\left(\frac{4}{1}\right)\left(\frac{16x}{1}\right) = 16 + 8x$

$36 - 12x = 16 + 8x$

$+12x \quad +12x$

$36 = 16 + 20x$

$-16 \quad -16$

$20 = 20x$

$1 = x$

Check

$\frac{3}{4}(48 - 16(1)) \stackrel{?}{=} 4(4 + 2(1))$

$\frac{3}{4}\left(\frac{8}{1}\right)\left(\frac{32}{1}\right) \stackrel{?}{=} 4(6)$

$24 = 24$ ✓

1.3 Notetaking with Vocabulary (continued)

Special Solutions of Linear Equations

any # works

Equations do not always have one solution. An equation that is true for all values of the variable is an identity and has infinitely many solutions. An equation that is not true for any value of the variable has no solution.

Example 4: Solve the equation. Determine whether the equation has *one solution*, *no solution*, or *infinitely many solutions*.

a. $6(4s + 12) = 8(3s - 14)$

$24s + 72 = 24s - 112$

$-24s \quad -24s$

$72 = -112$ F

No solution

b. $16f + 24 = 8(2f + 3)$

$16f + 24 = 16f + 24$

$-16f \quad -16f$

$24 = 24$ T

Infinitely many solutions

Steps for Solving Linear Equations

Here are several steps you can use to solve a linear equation. Depending on the equation, you may not need to use some steps.

Simplify

Step 1 Use the Distributive Property to remove any grouping symbols. ( ), [ ]

Step 2 Simplify the expression on each side of the equation. - combine like terms

Solve

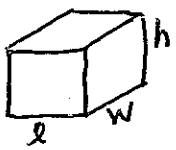
Step 3 Collect the variable terms on one side of the equation and the constant terms on the other side. (do first) ↳ if variable eliminated → infinitely many sol'ns T / no solution F

Step 4 Isolate the variable. → one solution

Step 5 Check your solution.

SA = V

Example 5: The value of the surface area of a rectangular prism is equal to the value of the volume of the rectangular prism. Write and solve an equation to find the value of x.



$V = \ell wh$

$SA = 2\ell w + 2wh + 2\ell h$

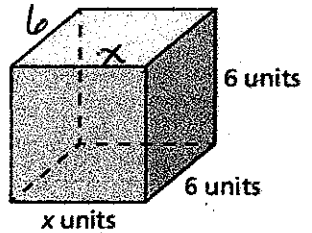
$V = x \cdot 6 \cdot 6$

$V = 36x$

$SA = 2(x \cdot 6) + 2(6 \cdot 6) + 2(x \cdot 6)$

$SA = 12x + 72 + 12x$

$SA = 24x + 72$



SA = V

①

$24x + 72 = 36x$

$-24x \quad -24x$

$\frac{72}{12} = \frac{12x}{12}$

$6 = x$

6 units = x