Lesson 4: Solving a Linear Equation

Classwork

Exercises

For each problem, show your work, and check that your solution is correct.

1. Solve the linear equation $x + x + 2 + x + 4 + x + 6 = -28$. State the property that justifies your first step and why you chose it.

$x + x + 2 + x + 4 + x + 6 = -28$ given

$4x + 12 = -28$ combine like terms

$-12 \quad -12$

$\frac{4x}{4} = -\frac{40}{4}$ subt. prop. of eq.

$x = -10$ div. prop. of eq.

2. Solve the linear equation $2(3x + 2) = 28$. State the property that justifies your first step and why you chose it.

$2(3x + 2) = 28$ given

$6x + 4 = 28$ distributive property

$-4 \quad -4$

$6x = 24$ subt. prop. of eq.

$x = 4$ div. prop of eq.

To get an equation ready to solve, we mu
combine like terms and for distribut

Like terms:

same letter, same exponent

3. Solve the linear equation [illegible]. State the property that justifies your first step and why you chose it.

$$\frac{5 \cdot (2x+1)}{5} = 11 \cdot 5 \quad \text{given}$$

$$2x + 1 = 55 \quad \text{mult. prop. of eq.}$$

$$2x = 54 \quad \text{subt. prop. of eq.}$$

$$x = 27 \quad \text{div. prop. of eq.}$$

4. Solve the linear equation [illegible]. State the property that justifies your first step and why you chose it.

$$-3(x+2) - 4(2x-1) = 53 \quad \text{given}$$

$$-3x - 6 - 8x + 4 = 53 \quad \text{distributive prop.}$$

$$-11x - 2 = 53 \quad \text{combine like terms}$$

$$-11x = 55 \quad \text{add. prop. of eq.}$$

$$x = -5 \quad \text{div. prop. of eq.}$$

5. Solve the linear equation [illegible]. State the property that justifies your first step and why you chose it.

Let x be a number.

$$\frac{1}{2}x + 2(x+5) = 10 \quad \text{given}$$

$$\frac{1}{2}x + 2x + 10 = 10 \quad \text{dist. prop.}$$

$$2.5x + 10 = 10 \quad \text{combine like terms}$$

$$2.5x = 0 \quad \text{subt. prop. of eq.}$$

$$x = 0 \quad \text{div. prop. of eq.}$$

Lesson Summary

The properties of equality, shown below, are used to transform equations into simpler forms. If A, B, C are rational numbers, then

- If $A = B$, then $A + C = B + C$. Addition property of equality
- If $A = B$, then $A - C = B - C$. Subtraction property of equality
- If $A = B$, then $A \cdot C = B \cdot C$. Multiplication property of equality
- If $A = B$, then $\frac{A}{C} = \frac{B}{C}$, where C is not equal to zero Division property of equality

To solve an equation, transform the equation until you get to the form of x equal to a constant ($x = 5$, for example).

Problem Set

For each problem, show your work and check that your solution is correct.

1. Solve the linear equation $x + 4 + 3x = 72$. State the property that justifies your first step and why you chose it.

2. Solve the linear equation $x + 3 + x - 8 + x = 55$. State the property that justifies your first step and why you chose it.

3. Solve the linear equation $\frac{1}{2}x + 10 = \frac{1}{4}x + 54$. State the property that justifies your first step and why you chose it.

4. Solve the linear equation $\frac{1}{4}x + 18 = x$. State the property that justifies your first step and why you chose it.

5. Solve the linear equation $17 - x = \frac{1}{3} \cdot 15 + 6$. State the property that justifies your first step and why you chose it.

6. Solve the linear equation $\frac{x+x+2}{4} = 189.5$. State the property that justifies your first step and why you chose it.

7. Alysha solved the linear equation $2x - 3 - 9x = 14 + x - 1$. Her work is shown below. When she checked her answer, the left side of the equation did not equal the right side. Find and explain Alysha's error, and then solve the equation correctly.

$$\begin{aligned}
2x - 3 - 9x &= 14 + x - 1 \\
-6x - 3 &= 13 + 2x \\
-6x - 3 + 3 &= 13 + 3 + 2x \\
-6x &= 16 + 2x \\
-6x + 2x &= 16 \\
-4x &= 16 \\
\frac{-4}{-4}x &= \frac{16}{-4} \\
x &= -4
\end{aligned}$$