Name: _____

Date: _____ Period: _____

Focus Standard: 8.EE.C.7 Solve linear equations in one variable.
  a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ result (where a and b are different numbers).
  b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Student Outcomes

- Students extend the use of the properties of equality to solve linear equations having rational coefficients.

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).

Beginning Examples:

1. Solve the linear equation $2x - 3 = 4x$ for the number x.

2. Solve the linear equation $\frac{3}{5}x - 21 = 15$.

3. Solve the linear equation $\frac{1}{5}x + 13 + x = 1 - 9x + 22$.

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.

2. Solve the linear equation $2(3x + 2) = 2x - 1 + x$. State the property that justifies your first step and why you chose it.

3. Solve the linear equation $x - 9 = \frac{3}{5}x$. State the property that justifies your first step and why you chose it.

4. Solve the linear equation $29 - 3x = 5x + 5$. State the property that justifies your first step and why you chose it.

5. Solve the linear equation $\frac{1}{3}x - 5 + 171 = x.$ State the property that justifies your first step and why you chose it.

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.

$$2x - 3 - 9x = 14 + x - 1$$

$$-6x - 3 = 13 + 2x$$

$$-6x - 3 + 3 = 13 + 3 + 2x$$

$$-6x = 16 + 2x$$

$$-6x + 2x = 16$$

$$-4x = 16$$

$$\frac{-4}{-4}x = \frac{16}{-4}$$

$$x = -4$$