Lesson 13

Foundations of College Algebra

# Addition and Subtraction Properties of Equality

## Definition - Linear equations

A **linear equation in one variable** has one variable and:

* No exponents on the variable
* No variables in a denominator.

## Subtraction Property of Equality

For any numbers , , and , if , then .

**That is, when you subtract the same quantity from both sides of an equation, you still have equality.**

## Addition Property of Equality

For any numbers , , and , if , then .

**That is, when you add the same quantity to both sides of an equation, you still have equality.**

## Examples

Solve each equation using the Subtraction and Addition Properties of Equality.

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# Multiplication and Division Properties of Equality

## Division Property of equality

For any numbers , , and , and , if , then .

**That is, when you divide both sides of an equation by any non-zero number, you still have equality.**

## Multiplication Property of equality

For any numbers , , and , and , if , then .

**That is, when you multiply both sides of an equation by any non-zero number, you still have equality.**

## Examples

Solve the following equation using the Division and Multiplication Properties of Equality.

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# Simplify Equations and Then Solve

Solve each equation.

# Translate to and Equation and Solve

## How To - Translate an English Sentence to an Algebraic Equation

1. Locate the “equals” word(s). Translate to an equals sign (=).
2. Translate the words to the left of the “equals” word(s) into an algebraic expression.
3. Translate the words to the right of the “equals” word(s) into an algebraic expression.

## Examples

Translate and solve.

1. Three less than is .
2. The sum of and is .
3. Avril rode her bike a total of 18 miles, from home to the library and then to the beach. The distance from Avril’s house to the library is 7 miles. What is the distance from the library to the beach?
4. Mollie paid $36.25 for 5 movie tickets. What was the price of each ticket?
5. Aiden is 27 inches tall. He is 38 as tall as his father. How tall is his father?

**Reference** Remixed from OpenStax Elementary Algebra 2e. Access for free at <https://openstax.org/books/elementary-algebra-2e/pages/1-introduction>