

# 4 2 solving inequalities using addition and subtraction

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Solving Inequalities by Addition or Subtraction\*\*

Inequalities represent unequal relationships between expressions. To solve inequalities, we can utilize the addition or subtraction properties of equality.

### Addition and Subtraction Properties of Inequality

- **Addition Property of Inequality:** If we add the same quantity to both sides of an inequality, the inequality remains true.
- **Subtraction Property of Inequality:** If we subtract the same quantity from both sides of an inequality, the inequality remains true.

### Adding Two Inequalities

We cannot directly add two inequalities. Instead, we can add the corresponding sides separately:

- Add the left-hand sides (LHS) of both inequalities.
- Add the right-hand sides (RHS) of both inequalities.

### Subtracting Inequalities with Both Sides

- Subtract the RHS of the first inequality from the LHS of the second inequality.
- Switch the inequality symbol to its opposite.

## Solving Equations by Adding or Subtracting

To solve equations using addition or subtraction:

- Isolate the variable on one side of the equation.
- Add or subtract the appropriate constant from both sides to obtain the value of the variable.

## Addition Property and Subtraction Rule

- **Addition Property:** For all numbers  $a$ ,  $b$ , and  $c$ ,  $a + b = b + a$ .
- **Subtraction Rule:** For all numbers  $a$ ,  $b$ , and  $c$ ,  $a - b = a + (-b)$ .

## Properties of Addition and Subtraction

The four properties of addition and subtraction are:

- Commutative Property:  $a + b = b + a$  and  $a - b = b - a$
- Associative Property:  $(a + b) + c = a + (b + c)$  and  $(a - b) - c = a - (b + c)$
- Identity Property:  $a + 0 = a$  and  $a - 0 = a$
- Inverse Property:  $a + (-a) = 0$  and  $a - a = 0$

## Solving Two Inequalities

To solve two inequalities:

- Solve each inequality separately.
- Identify the intersection or union of the solutions.

## Why Can't You Subtract Inequalities?

When subtracting inequalities, the inequality symbol can change depending on the signs of the numbers being subtracted, which may lead to incorrect results.

## Solving Inequalities

To solve an inequality:

- Isolate the variable on one side of the inequality.
- Multiply or divide by a non-zero constant, but remember to switch the inequality symbol if dividing by a negative number.

## **Adding and Subtracting Inequalities**

To add or subtract inequalities:

- For addition, add the corresponding sides.
- For subtraction, subtract the RHS of the first inequality from the LHS of the second inequality and switch the inequality symbol.

## **Example of the Addition Property of Inequality**

If  $x > 3$ , then  $x + 5 > 3 + 5$ .

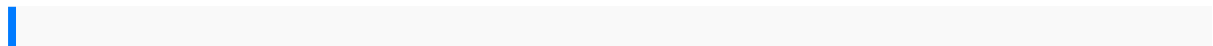
## **Rules of Inequality**

The four rules of inequality are:

- Transitive Property: If  $a < b$  and  $b < c$ , then  $a < c$ .
- Addition Property: If  $a < b$  and  $b < c$ , then  $a < c$ .
- Subtraction Property: If  $a < b$  and  $c < d$ , then  $a + c < b + d$ .
- Multiplication Property: If  $a < b$  and  $c > 0$ , then  $ac < bc$ .

## **First Step to Solving a Two-Step Equation or Inequality**

The first step is to isolate the variable on one side of the equation or inequality by performing the inverse operation of the last operation performed.



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