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Simplify addition and subtraction

/en/algebra-topics/writing-algebraic-expressions/content/ Simplifying expressions Simplifying an expression is just another way to say solving a math problem. When you simplify an expression, you're basically trying to write it in the simplest way possible. At the end, there shouldn't be any more adding, subtracting, multiplying, or dividing left to do. For example, take this expression: $4 + 6 + 5$ If you simplified it by combining the terms until there was nothing left to do, the expression would look like this: 15 In other words, 15 is the simplest way to write $4 + 6 + 5$. Both versions of the expression equal the exact same amount; one is just much shorter. Simplifying algebraic expressions is the same idea, except you have variables (or letters) in your expression. Basically, you're turning a long expression into something you can easily make sense of. So an expression like this... $(13x + -3x) / 2$...could be simplified like this: $5x$ If this seems like a big leap, don't worry! All you need to simplify most expressions is basic arithmetic -- addition, subtraction, multiplication, and division -- and the order of operations. The order of operations Like with any problem, you'll need to follow the order of operations when simplifying an algebraic expression. The order of operations is a rule that tells you the correct order for performing calculations. According to the order of operations, you should solve the problem in this order: ParenthesesExponentsMultiplication and divisionAddition and subtraction Let's look at a problem to see how this works. In this equation, you'd start by simplifying the part of the expression in parentheses: $24 - 20 \cdot (24 - 20)2 + 18 / 6 - 30$ 24 minus 20 is 4 . According to the order of operations, next we'll simplify any exponents. There's one exponent in this equation: 42 , or four to the second power: $2 \cdot 42 + 18 / 6 - 30$ 42 is 16 . Next, we need to take care of the multiplication and division. We'll do those from left to right: $2 \cdot 16$ and $18 / 6$. $2 \cdot 16 + 18 / 6 - 30$ $2 \cdot 16 + 18 / 6 - 30$ $2 \cdot 16 + 18 / 6 - 30$ $2 \cdot 16$ is 32 , and $18 / 6$ is 3 . All that's left is the last step in the order of operations: addition and subtraction. $32 + 3 - 30$ $32 + 3$ is 35 , and $35 - 30$ is 5 . Our expression has been simplified—there's nothing left to do. 5 That's all it takes! Remember, you must follow the order of operations when you're performing calculations—otherwise, you may not get the correct answer. Still a little confused or need more practice? We wrote an entire lesson on the order of operations. You can check it out here. Adding like variables To add variables that are the same, you can simply add the coefficients. So $3x + 6x$ is equal to $9x$. Subtraction works the same way, so $5y - 4y = 1y$, or just y . $5y - 4y = 1y$ You can also multiply and divide variables with coefficients. To multiply variables with coefficients, first multiply the coefficients, then write the variables next to each other. So $3x \cdot 4y$ is $12xy$. $3x \cdot 4y = 12xy$ The Distributive Property Sometimes when simplifying expressions, you might see something like this: $3(x+7)$ -5 Normally with the Order of Operations, we would simplify what is inside the parentheses first. In this case, however, $x+7$ can't be simplified since we can't add a variable and a number. So what's our first step? As you might remember, the 3 on the outside of the parentheses means that we need to multiply everything inside the parentheses by 3 . There are two things inside the parentheses: x and 7 . We'll need to multiply them both by 3 . $3(x) + 3(7) - 5$ $3 \cdot x$ is $3x$ and $3 \cdot 7$ is 21 . We can rewrite the expression as: $3x + 21 - 5$ Next, we can simplify the subtraction $21 - 5$. $21 - 5$ is 16 . $3x + 16$ Since it's impossible to add variables and numbers, we can't simplify this expression any further. Our answer is $3x + 16$. In other words, $3(x+7) - 5 = 3x+16$. /en/algebra-topics/solving-equations/content/ Instructional video Additional materials About this video You'll gain access to tutorials, extensions, task implementation guides, and more for this instructional video. In this lesson you will learn how to simplify addition and subtraction expressions by combining like terms. Before studying this topic you may wish to review the section on addition and subtraction of numbers. Suppose that A and B are any two expressions. Adding B to A means setting up the sum as (A) + (B), and then simplifying as much as possible. Subtracting B from A means setting up the difference as (A) − (B), and then simplifying as much as possible. The reason that we put brackets around A and B is that they are expressions, not just numbers, and the addition or subtraction is supposed to apply to whatever A and B may contain. (We want the addition or subtraction to be at the end in the order of operations.) The simplifications that must be done are: removing the brackets combining the like terms Example: If A = $4 \times y + 7$ and B = $8 \times y + 9 \times y$ then setting up the sum A + B gives: $(4 \times y + 7) + (8 \times y + 9 \times y)$ and setting up the difference A − B gives: $(4 \times y + 7) - (8 \times y + 9 \times y)$ Removing the brackets from (A) + (B) is easy: (A) + (B) always simplifies directly to A + B. The brackets can just be dropped. Here's why: The acronym BEDMAS (Brackets, Exponents, Division and Multiplication, Addition and Subtraction) helps us remember the order of operations within an expression. Brackets are at the top of the priority list and addition and subtraction are at the bottom. In the expression A + B the addition is already at the bottom of the list so we don't need brackets around A and B to move them any higher in the priority list. The same argument applies to A − B except in two cases. This is because in these two cases the subtraction is actually a multiplication by a negative, which is not at the bottom of the priority list! Here is the rule: (A) − (B) simplifies to A − B except in these two cases: Exception # 1: If B is a negative monomial then the subtraction of a negative must be replaced by an addition. Exception # 2: If B is a multinomial then the − sign of the subtraction must be distributed over each term of the multinomial. The result, as explained below, is that each term of B has its sign reversed when the brackets are dropped. Examples: $(x \ y) + (x \ z \ 2)$ simplifies to $x \ y + x \ z \ 2$ $(x \ y) + (w + x \ z \ 2)$ simplifies to $x \ y + w + x \ z \ 2$ $(x \ y) - (x \ z \ 2)$ simplifies to $x \ y - x \ z \ 2$ $(x \ y) - (-x \ z \ 2)$ simplifies to $x \ y + x \ z \ 2$ (this is exception # 1; subtracting a negative is adding) $(x \ y) - (a + b)$ simplifies to $x \ y - a - b$ (this is exception 2; you must distribute the − sign) $(x \ y) - (-x \ z \ 2 + 5)$ simplifies to $x \ y + x \ z \ 2 - 5$ (this is exception # 2; you must distribute the − sign) Explanation of Exception 2: Why does distributing a − sign cause each term in the brackets to have its sign reversed? For example, why does $a - (b - c)$ simplify to $a - b + c$? Here is the sequence of steps with an explanation of each step: Recall that like terms are terms in an expression that differ only in their coefficients; they have identical variable factors. Like terms can be added or subtracted by adding or subtracting their coefficients (essentially by factoring with the distributive law). Here are some examples. The first two examples are done in detail. Assume that x and y are variables. In the last example assume that a and b are constants. The like terms are shown in red. Example: Simplify the expression Example: Simplify the expression Example: Simplify the expression Example: Simplify the expression Note: In this last example the two terms in red were considered to be like terms because we were told that a and b are constants. If instead a and b were variables then the two terms in red would not be like terms and would NOT be combined. If you found this page in a web search you won't see the Table of Contents in the frame on the left. Click here to display it. In order to continue enjoying our site, we ask that you confirm your identity as a human. Thank you very much for your cooperation. Addition and Subtraction Addition and subtraction of like fraction When adding or subtracting like fractions, we add or subtract the numerators of the like fractions and keep the denominator as it is. For example: Addition and subtraction of unlike fractions When adding or subtracting unlike fractions we take the LCM of the denominators and convert the fractions into like fractions, then simplify. For example, the denominators of the fractions given below are 4 and 3. The LCM of 4 and 3 is 12. Then the given fractions are converted into like fractions and simplified as given below. While simplifying fractions under the relation of basic operations +, ×, −, and with brackets, we need to follow the BODMAS rule. 1. B Brackets [()] 2. O Of × 3. D Division ÷ 4. M Multiplication × 5. A Addition + 6. S Subtraction - The following worked out examples will give the concepts of addition, subtraction and simplification of the fractions. Workout Examples You can comment your questions or problems regarding the addition, subtraction and simplification of fractions here. Add and subtract proper and improper fractions with this calculator and see the work involved in the solution. Select the number of fractions in your equation and then input numerators and denominators in the available fields. Click the Calculate button to solve the equation and show the work. You can add and subtract 3 fractions, 4 fractions, 5 fractions and up to 9 fractions at a time. How to Add and Subtract Fractions When the Denominators are the Same When fractions have the same denominators we simply add or subtract the numerators as indicated and place the result over the common denominator. If necessary we can simplify the fraction to lowest terms or a mixed number. When the Denominators are Unlike or Different When fractions have unlike denominators the first step is to find equivalent fractions so that all of the denominators are the same. We find the Least Common Denominator (LCD) then rewrite all fractions in the equation as equivalent fractions using the LCD as the denominator. When all denominators are alike, simply add or subtract the numerators and place the result over the common denominator. The resulting fraction can be simplified to lowest terms or written as a mixed number. How to Work With Negative Fractions When an equation calls for adding a negative fraction, we can rewrite the equation as subtracting a positive fraction. Likewise, if the equation calls for subtracting a negative fraction, this is the same as adding a positive fraction and can be rewritten this way. This calculator rewrites negative fractions when it shows the work involved in finding the answer. Simplifying Operations on Negative Numbers Whether you are working with fractions, whole numbers or decimals, use these guidelines when adding and subtracting positive and negative numbers. Subtracting a Positive Number Subtracting a Negative Number Subtracting a Positive Number For similar and more basic methods of working with fractions you can also visit Help With Fractions. If you're seeing this message, it means we're having trouble loading external resources on our website. If you're behind a web filter, please make sure that the domains *.kastatic.org and *.kasandbox.org are unblocked. Learn how to simplify decimals involving addition and subtraction decimals. 1. Simplify the following (a) 25.20 + 94.38 - 45.99 Solution: Converting into like decimals and solving by using order of operation. 25.20 + 94.38 - 45.99 Step I: Addition 25.20 + 94.38 = 119.58 Step II: Subtraction 119.58 - 45.99 = 73.59Answers: 73.59 (b) 11.6078 - 0.67 + 0.5 Solution: Converting into like decimals and solving, we get 11.6078 - 0.6700 + 0.5000 Step I: Subtraction 11.6078 - 0.6700 = 109378 Step II: Addition 10.9378 + 0.5000 = 11.4378Answers: 11.4378 Word problems to simplify decimals involving addition and subtraction decimals: 2. What must be added to 19.63 to obtain 57.87? Solution: Let x be added to 19.63 to obtain 57.87 i.e. 19.63 + x = 57.87 = 19.63 + x - 19.63 = 57.87 - 19.63 (subtract from both sides) = x = 38.24 Therefore, 38.24 must be added to 19.63 to obtain 57.87. 3. What must be subtracted from 381.6 to obtain 28.88? Solution: Let x be subtracted from 381.6 to obtain 28.88 i.e., 381.6 - x = 28.88 = x = 381.6 - 28.88 = x = 352.72 Therefore, 352.72 must be subtracted from 381.60 to obtain 28.88. ● Related Concept ● Decimals ● Decimal Numbers ● Decimal Fractions ● Like and Unlike Decimals ● Comparing Decimals ● Decimal Places ● Conversion of Unlike Decimals to Like Decimals ● Decimal and Fractional Expansion ● Terminating Decimal ● Non-Terminating Decimal ● Converting Decimals to Fractions ● Converting Fractions to Decimals ● H.C.F. and L.C.M. of Decimals ● Repeating or Recurring Decimal ● Pure Recurring Decimal ● Mixed Recurring Decimal ● BODMAS Rule ● BODMAS/PEMDAS Rule ● BODMAS/PEMDAS Rules - Involving Integers ● PEMDAS Rules - Involving Decimals ● PEMDAS Rule ● BODMAS Rules - Involving Integers ● Conversion of Pure Recurring Decimals into Vulgar Fractions ● Simplification of Decimal ● Rounding Decimals ● Rounding Decimals to the Nearest Whole Number ● Rounding Decimals to the Nearest Tenths ● Rounding Decimals to the Nearest Hundredths ● Round a Decimal ● Adding Decimals ● Subtracting Decimals ● Simplify Decimals involving Addition and Subtraction Decimals ● Multiplying Decimal by a Decimal Number ● Multiplying Decimal by a Whole Number ● Dividing Decimal by a Whole Number ● Dividing Decimal by a Decimal Number 7th Grade Math Problems From Simplify Decimals Involving Addition and Subtraction Decimals to HOME PAGE Didn't find what you were looking for? Or want to know more information about Math Only Math. Use this Google Search to find what you need. Share this page: What's this? Year 10 Interactive Maths - Second Edition Knowledge of adding and subtracting algebraic fractions is as important as knowledge of factorisation. To add or subtract algebraic fractions: Find the lowest common multiple of the denominators. Express all fractions in terms of the lowest common denominator. Simplify the numerators to obtain the numerator of the answer. Example 9 Solution: Often, we set out the solution as follows: Example 10 Solution: Note: Be careful of a minus sign before a bracket. Factorise the final answer to discover whether any common factor exists which may be cancelled. Always reduce the final answer to its lowest terms. Example 11 Solution: Useful Device Sometimes we use: to simplify algebraic expressions. Example 12 Solution: Note: Always be ready to use a - b = -(b - a). Leave the lowest common denominator in factorised form.

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