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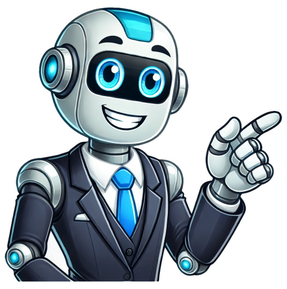

Home>Expanding Expressions Techniques & Examples ObjectiveAt the end of this lesson, students should be able to:Expand products of algebraic expressions.Expanding an expression means writing it without brackets. When removing brackets, every term inside the bracket must be multiplied by whatever is outside the bracket.Directed numbers are numbers with either a positive or a negative sign. When using these numbers in algebra, it is important that we follow the same rules as we would for normal directed number calculations.(Positive number) / (Positive number) = (Positive number)(Negative number) / (Negative number) = (Positive number)(Positive number) / (Negative number) = (Negative number)(Negative number) / (Positive number) = (Negative number)So 8 (3y) = 24xy and (8 (3y) = 24xyExample 1Expand the algebraic expression.Solution Example 2Expand the algebraic expression.Solution Example 3Expand the algebraic expression:SolutionExample 4Expand the algebraic expression 4x (x y + z2).Solution 4x (x y + z2) 4x (x) 4x(y) 4x (z2) 4x2 + 4xy 4xz2Example 5Expand the algebraic expression: 2a2 (a + 3b 1/a).Solution 2a2 (a + 3b 1/a) 2a2(a) 2a2(3b) 2a2 (1/a) 2a3 6a2b + 2aExample 6Expand the algebraic expression 2/x (x + 4y + 1/x).Solution 2/x (x + 4y + 1/x) = 2/x (x) 2/x (4y) 2/x (1/x)= 2 8y/x 2/x2 A polynomial looks like this: example of a polynomial this one has 3 terms To multiply two polynomials: multiply each term in one polynomial by each term in the other polynomial add those answers together, and simplify if needed Let us look at the simplest cases first. 1 term 1 term (monomial times monomial) To multiply one term by another term, first multiply the constants, then multiply each variable together and combine the result, like this (press play): (Note: I used "" to mean multiply. In Algebra we don't like to use "" because it looks too much like the letter "x") For more about multiplying terms, read Multiply and Divide Variables with Exponents 1 term 2 terms (monomial times binomial) Multiply the single term by each of the two terms, like this: 2 term 1 terms (binomial times monomial) Multiply each of the two terms by the single term, like this: (I did that one a bit faster by multiplying in my head before writing it down) 2 terms 2 terms (binomial times binomial) Each of the two terms in the first binomial ... ... is multiplied by ... ... each of the two terms in the second binomial That is 4 different multiplications ... Why? Matching up Partners Two friends (Alice and Betty) challengetwo other friends (Charles and David) toindividual tennis matches. How many matches does that make? Alice plays Charles, and then Alice plays David Then Betty plays Charles and then Betty plays David They could play in any order, so long as each of the first two friendsgets to play each of the second two friends. It is the same when we multiply binomials! Instead of Alice and Betty, let's just use a and b, and Charles and David can be c and d: We can multiply them in any order so long as each of the first two terms gets multiplied by each of the second two terms. But there is a handy way to help us remember to multiply each term called "FOIL". It stands for "Firsts, Outers, Inners, Lasts": Firsts: ac Outers: ad Inners: bc Lasts: bd So you multiply the "Firsts" (the first terms of both polynomials), then the "Outers", etc. Let us try this on a more complicated example: 2 terms 3 terms (binomial times trinomial) "FOIL" won't work here, because there are more terms now. But just remember: Multiply each term in the first polynomial by each term in the second polynomial Like Terms And always remember to add Like Terms: (x + 2y)(3x 4y + 5) = 3x2 4xy + 5x + 6xy 8y2 + 10y = 3x2 + 2xy + 5x 8y2 + 10y Note: 4xy and 6xy are added because they are Like Terms. Also note: 6yx means the same thing as 6xy Long Multiplication You may also like to read about Polynomial Long Multiplication 346, 1100, 347, 1101, 1102, 2411, 2412, 3885, 3886 Copyright 2024 Rod Pierce "Expanding" means removing the ( )but we have to do it the right way! ( ) are called "parentheses" or "brackets" Whatever is inside the ( ) needs to be treated as a "package". So when multiplying: multiply by everything inside the "package". Answer: It is now expanded. We can also complete the calculation: 3 (5+2) = 3 5 + 3 2 = 15 + 6= 21 In Algebra In Algebra putting two things next to each other usually means to multiply. So 3(a+b) means to multiply 3 by (a+b) Here is an example of expanding, using variables a, b and c instead of numbers: And here is another example involving some numbers. Notice the "" between the 3 and 6 to mean multiply, so 36 = 18: Multiplying negatives has special rules: a negative times a positive gives a negative, but multiplying two negatives gives a positive: In that case 3 -5 = +15 (a positive answer), but here is an example where the second part is negative: So the second term ended up negative because 2x a = 2ax, (it is also neater to write "2ax" rather than "2xa"). That was also interesting because of x being squared (x2) Lastly, we have an example with three terms inside: The same rule applies: multiply by everything inside the (). And here is a hint: when a multiplication is obvious (like a 2) do it straight away, but when it needs more thought (like a b) leave it for the next line. Many Times Many Conclusion Multiply by everything inside the () Do it in two stages: Write down the multiplications Then do the multiplications 328, 329, 2096, 2097, 3166, 3167, 3168, 3169, 3874, 3875 Copyright 2024 Rod Pierce Here we break down everything you need to know about expanding brackets. Youll learn how to expand single brackets and double brackets in order to leave a simplified algebraic expression. At the end youll find expanding brackets worksheets based on Edexcel, AQA and OCR exam questions, along with further guidance on where to go next if youre still stuck. To expanding brackets means multiplying each term in the brackets by the expression outside the brackets. Expanding brackets is the reverse process of factorisation and is sometimes referred to as multiplying out. In effect by expanding brackets you are removing the brackets. To expand brackets we multiply everything outside of the bracket, by everything inside the bracket. For example if we expand We will get \[(2x + 1)(x 3) = 2x^{2} 5x 3 \] Download a free expanding brackets worksheet with 20+ reasoning and applied questions, answers and mark scheme to help your students prepare for GCSEs. Includes reasoning and applied questions. DOWNLOAD FREE x Download a free expanding brackets worksheet with 20+ reasoning and applied questions, answers and mark scheme to help your students prepare for GCSEs. Includes reasoning and applied questions. DOWNLOAD FREE Multiplying out brackets or multiply out is another term for expanding brackets. It means exactly the same thing. Expand the brackets is the same as multiply out the brackets, it just gives the additional clue that when we expand brackets, we are multiplying everything outside the brackets by everything inside the brackets. One use of brackets in maths in maths is to group items together, another is to give information about the order of operations. E.g Here is a rectangle. Its perimeter is: (x+8)+(x-3)+(x+8)+(x-3) Here the brackets are used to group the terms so that the expressions for the sides are clear. The perimeter can also be written as: 2(x+8)+2(x-3) Here brackets are needed to preserve that the whole expressions for the sides are doubled to find the perimeter of a rectangle. In order to expand brackets you need to multiply the terms outside the brackets (or parentheses) by the terms inside the brackets. There are three main ways to do this, each of which is explained below. Expanding single brackets Expanding double brackets Expanding triple brackets Expanding single brackets 3(2x + 1) = 6x + 3 Expressions with two terms like 6x + 3 are known as a binomials. 2. Expanding double brackets (x + 5)(x 1) = x2+ 4x 5 Expressions with three terms like x2 + 4x 5 are known as trinomials. Terms that are raised to the power of 2 like x2 are known as quadratic terms. 3. Expanding triple brackets (x + 1)(x + 2)(x + 3) = x3 + 6x + 11x + 6 A polynomial expression consists of two or more algebraic terms. There is a fourth, more complex situation in which you may need to use your expanding brackets knowledge but this is usually only seen on the higher level GCSE maths papers so is not part of this lesson. In summary, in order to expand brackets involving surds we multiply every term outside the brackets by every term inside the brackets and follow the rules of surds. For example if we expand \[\sqrt{5}(\sqrt{3} 2\sqrt{5})\] We will get \[\sqrt{5}(\sqrt{3} 2\sqrt{5}) = \sqrt{15} 10\] Step-by-step guide: Surds To expand a single bracket we multiply the term outside of the bracket by everything inside of the bracket. In order to expand single brackets: Multiply the term outside of the bracket by the first term inside the bracket. Multiply the term outside the bracket by the second term inside the bracket. Expand: 2(x + 3) Multiply the term outside of the bracket (2) by the first term inside the bracket (x). 2 x = 2x 2Multiply the value outside the bracket (2) by the second term inside the bracket (3). 2 3 = 6 The answer is positive so we need to write + 6. 2(x + 3) = 2x + 6 Expand: 3(y 4) Multiply the term outside of the bracket (3) by the first term inside the bracket (y). 3 y = 3y + = so the answer is negative. Multiply the term outside the bracket (3)by the second term inside the bracket (4). 3 x 4 = + 12 = + so the answer is positive. We need to write + 12. 3(y 4) = 3y + 12 Expand: 3x(4x 2y) Multiply the term outside of the bracket (3x) by the first term inside the bracket (4x). 3x 4x = 12x2 Multiply the term outside the bracket (3x) by the second term inside the bracket (2y). 3x 2y = 6xy + = so the answer is negative. We need to write 6xy. 3x(4x 2y) = 12x2 6xy Expand: 2x(3 5y + 6x2) Multiply the value outside of the bracket (2x) by the first term inside the bracket (3). 2x 3 = 6x Multiply the value outside the bracket (2x) by the second term inside the bracket (5y). 2x 5y = 10xy + = so the answer is negative. We need to write 10xy. Multiply the value outside the bracket (2x) by the third term inside the bracket (6x^{2}). 3 5y6x22x6x 10xy+ 12x3 2x 6x2 = + 12x3 The answer is positive so we need to write + 12x3. \[2x(3 5y + 6x^2) = \] With a single bracket expansion, we must be sure to multiply each term inside the bracket by the number in front of the bracket. With a single bracket expansion, we must be sure to multiply each term inside the bracket by the number in front of the bracket. Care must be taken when multiplication involves negative numbers. With a single bracket expansion, we must be sure to multiply each term inside the bracket by the number in front of the bracket. Make sure to include the correct index numbers. With a single bracket expansion, we must be sure to multiply each term inside the bracket by the number in front of the bracket. Make sure to include the correct index numbers. Care must be taken when multiplication involves negative numbers. With a single bracket expansion, we must be sure to multiply each term inside the bracket by the number in front of the bracket. With a single bracket expansion, we must be sure to multiply each term inside the bracket by the number in front of the bracket. Make sure to include the correct index numbers. To expand double brackets we multiply every term in the first bracket, by every term in the second bracket. In order to expand double brackets follow these steps: Draw a grid and insert the terms of the first and second brackets. Fill in the grid by multiplying each of the terms together. Write out each of the terms and simplify the expression by collecting like terms. Expand and simplify: (x+2)(x+3) Draw a grid and insert the terms of the first and second brackets. 2Fill in the grid by multiplying each of the terms together. x x = x2x 3 = 3xx 2 = 2x2 3 = 6 3Write out each of the terms and simplify the expression by collecting like terms. x2 + 3x + 2x + 6= x2 + 5x + 6 Expand and simplify: (x + 5)(x 1) Draw a grid and insert the terms of the first and second brackets. Fill in the grid by multiplying each of the terms together. x x = x2x 1 = x + = so the answer is negative. x 5 = 5x5 1 = 5 + = so the answer is negative. Write out each of the terms and simplify the expression by collecting like terms. x2 x + 5x 5x2 + 4x 5 Expand and simplify: (2x 3)(x + 4) Draw a grid and insert the terms of the first and second brackets. Fill in the grid by multiplying each of the terms together. x+ 42x2x2+ 8x 3 3x 12 2x x = 2x22x 4 = 8x x 3 = 3x + = so the answer is negative. 4 3 = 12 + = so the answer is negative. Write out each of the terms and simplify the expression by collecting like terms. 2x2 + 8x 3x 122x2 + 5x 12 Expand and simplify: (3x 4)2 Draw a grid and insert the terms of the first and second brackets. (3x 4)2 = (3x 4)(3x 4) Remember: when we square something (raise it to the power of 2) we multiply it by itself. Fill in the grid by multiplying each of the terms together. 3x 43x9x2 12x 4 12x+ 16 3x 3x = 9x23x 4 = 12x3x 4 = 12x + = so the answer is negative. 4 4 = + 16 = + so the answer is positive. Write out each of the terms and simplify the expression by collecting like terms. 9x2 12x 12x + 169x2 24x + 16 (x+5)(x+6) Expanding the brackets gives x^{2}+6x+5x+30 and then we can collect like terms x^{2}+11x+30 (x-4)(x+2) Expanding the brackets gives x^{2}+2x-4x-8 and then we can collect like terms x^{2}-2x-8 (2x+3)(x+4) Expanding the brackets gives 2x^{2}+8x+3x+12 and then we can collect like terms 2x^{2}+11x+12 (3x-2)(x+1) Expanding the brackets gives 3x^{2}+3x-2x-2 and then we can collect like terms 3x^{2}+x-2 (x-4)^{2} means the same as (x-4)(x-4) so we can expand as usual x^{2}-4x-4x+16 and then collect like terms x^{2}-8x+16 (2x+5)^{2} means the same as (2x+5)(2x+5) so we can expand as usual 4x^{2}+10x+10x+25 and then collect like terms 4x^{2}+20x+25 To expand triple brackets we first multiply the first two brackets together. We then multiply every term in this new expression by every term in the third bracket. In order to expand triple brackets: Draw a grid, insert the terms of the first and second brackets, then fill it in by multiplying each of the terms together. Write out each of the terms and simplify the expression by collecting like terms. Draw a grid, insert the terms from this new expression and the third bracket, then fill it in by multiplying each of the terms together. Write out each of the terms and simplify the expression by collecting like terms. Expand and simplify: (x + 1)(x + 2)(x + 3) Draw a grid, insert the terms of the first and second brackets, then fill it in by multiplying each of the terms together. x x = x2x 2 = 2x x 1 = x1 2 = 2 2Write out each of the terms and simplify the expression by collecting like terms. x2 + 2x + x + 2x2 + 3x + 2 3Draw a grid, insert the terms from this new expression and the third bracket, then fill it in by multiplying each of the terms together. x2+ 3x+ 2xx3+ 3x2+ 2x+ 3+ 3x2+ 9x+ 6 x x2 = x3x 3x = 3x2x 6 = 6x3 x2 = 3x23 3x = 9x3 6 = 18 4Write out each of the terms and simplify the expression by collecting like terms. x3 + 3x2 + 3x2 + 9x + 2x + 6x3 + 6x2 + 11x + 6 Expand and simplify: (x + 3)2(x 1) Draw a grid, insert the terms of the first and second brackets, then fill it in by multiplying each of the terms together. (x + 3)2 = (x + 3)(x + 3) x x = x2x 3 = 3x x 3 = 3x3 3 = 9 Write out each of the terms and simplify the expression by collecting like terms. x2 + 3x + 3x + 9x2 + 6x + 9 Draw a grid, insert the terms from this new expression and the third bracket, then fill it in by multiplying each of the terms together. x2+ 6x+ 9xx3+ 6x2+ 9x 1 x2 6x 9 x x2 = x3x 6x = 6x2x 9 = 9x 1 x2 = x2 1 6x = 6x 1 9= 9 Write out each of the terms and simplify the expression by collecting like terms. x3 + 6x2 x2 + 9x 6x 9x3 + 5x2 + 3x 9 (x+2)(x+3)(x+4) Expanding the first two brackets gives (x^{2}+3x+2x+6)(x+4) or (x^{2}+5x+6)(x+4) and then expanding again x^{3}+4x^{2}+5x^{2}+20x+6x+24 Collect like terms x^{3}+9x^{2}+26x+24 (x+3)(x-2)^{2} can be written as (x+3)(x-2)(x-2) Expanding the two identical brackets first gives (x+3)(x^{2}-2x-2x+4) (x+3)(x^{2}-4x+4) and expanding again x^{3}-4x^{2}+4x+3x^{2}-12x+12 then collect like terms x^{3}-x^{2}-8x+12 (2x+1)^{3} can be written as (2x+1)(2x+1)(2x+1) Expanding two of the brackets gives (2x+1)(4x^{2}+2x+2x+1) (2x+1)(4x^{2}+4x+1) and expanding again 8x^{3}+8x^{2}+2x+4x^{2}+4x+1 then collect like terms 8x^{3}+12x^{2}+6x+1 We must multiply the value outside the brackets by every term inside the brackets. 2(6x2 3x) = 12x2 3x Here we have multiplied the value outside of the brackets by the first term inside of the bracket, but not the second term. The correct answer is 2(6x2 3x) = 12x2 6x We need to multiply all the terms inside the bracket. For two numbers to multiply to give a + their signs must be the same. e.g. 2 3 = 6 e.g. 2 3 = 6 4 5 = 20 4 5 = 20 For two numbers to multiply to give a their signs must be different. e.g. 2 3 = 6 e.g. 2 3 = 6 4 5 = 20 4 5 = 20 4(3y 5) = 12y 20 Here we have not used = + 4 5 = + 20 The correct answer is 4(3y 5) = 12y + 20 When we square something, we multiply it by itself. 32 = 3 3x2 = x x(5y)2 = 5y 5y When we square a bracket, we multiply it by the entire bracket. (x + 3)2 = (x + 3)(x + 3) NOT x2 + 9 (1 mark) (1 mark) 3. Expand and simplify: 5(x 3) 3(x + 5) (2 marks) You have now learned how to: Multiply a single term over a bracket Expand products of 2 or more binomials Factorising Solving equations Simultaneous equations Prepare your KS4 students for maths GCSEs success with Third Space Learning. Weekly online one to one GCSE maths revision lessons delivered by expert maths tutors. Find out more about our GCSE maths tuition programme. Brackets are symbols used in pairs to group things together. Types of brackets include: parentheses or "round brackets" ( ) "square brackets" or "box brackets" [ ] braces or "curly brackets" { } "angle brackets" < > (Note: Angle brackets can be confusing as theylook like the "less than" and "greater than" signs) When we see things inside brackets we do them first (as explained in Order of Operations). The parentheses group 3 and 2 together, and 6 and 4 together, so they get done first: (3 + 2) (6 4) = (5) (2) = 52 = 10 Without the parentheses the multiplication is done first: 3 + 2 6 4 = 3 + 12 4 = 11 (not 10) With more complicated grouping we can use different types of brackets: The parentheses group 3 and 2 together, and 6 and 4 together, and the square brackets tell us to do all the calculations inside them before multiplying by 4: [(3 + 2) (6 4) + 2] 4 = [(5) (2) + 2] 4 = [10 + 2] 4 = 12 4 = 48 Curly Brackets Curly brackets {} are used in Sets: Is the set of even numbers from 2 to 8 Angle Brackets Angle brackets are used in Bra-Ket Notation. 1673, 1674, 1675, 1676 Copyright 2025 Rod PierceExamples, solutions, and videos to help GCSE Maths students learn how to expand and simplify algebraic expression by expanding brackets.Expand and simplify expressionsThree examples of how to expand brackets then simplify an algebraic expression a) 8(6q + 4) - 8(-7q - 5)b) -3(7y + 10) + 9(-y + 8)c) 7(-8u + 6) - 10(3u + 6)Expanding and simplifying Expanding and simplifying brackets.Help with GCSE Maths AQA Mod 3 3(2x + 6) + 2(5x - 7)2(3x - 5) - 7(3x - 4)Show Video Expand and Simplify 4(3d - 2e) - (2d - 5e) Try out our new and fun Fraction Concoction Game.Add and subtract fractions to make exciting fraction concoctions following a recipe.There are four levels of difficulty: Easy, medium, hard and insane. Practice the basicsof fraction addition and subtraction or challenge yourself with the insane level. We welcome your feedback, comments and questions about this site or page. Please submit your feedback or enquiries via our Feedback page. Expanding brackets is a method used in algebra to simplify expressions that are inside brackets by multiplying them out. It means taking each term inside the bracket and multiplying it by the term outside the bracket.For example, if you have: 2(x + 3)To expand the brackets, you multiply 2 by both x and 3 separately:2 x = 2x and 2 3 = 6So, the expanded form of 2(x + 3) is: 2x + 6Expanding Single BracketsGeneral Rule: If having an expression like a(b + c), expand it as: a(b + c) = ab + acExample 1: 3(x + 5)3(x + 5) = 3 x + 3 5 = 3x + 15Example 2: -2(4x - 7)-2(4x - 7) = -2 4x + (-2) (-7) = -8x + 14FOIL Method for Expanding Double BracketsFoil method is the technique used to expand the product of two binomials such as (a + b)(c + d). Acronym Foil stands for First, Outer, Inner, and Last that describes the order in which to multiply terms:First (first terms of each expression are multiplied together)Outer (outside terms are multiplied that is, the first term of the first expression and the second term of the second expression)Inner (inside terms of the expressions are multiplied second term of the first expression and first term of the second expression)Last (last terms of each expression are multiplied) Let's consider another example for better understanding.Example: (x + 3)(x + 4)Solution:First: Multiply first terms of each brackets: x x = x2Outer: Multiply outer terms of each brackets: x 4 = 4xInner: Multiply inner terms: 3 x = 3xLast: Multiply last terms of each brackets: 3 4 = 12After performing above Multiplications now combine like terms:x2 + 4x + 3x + 12 = x2 + 7x + 12Special CasesPerfect Squares: when expanding binomial squared (a + b)2 or (a -b)2 use formula: (a + b)2 = a2 + 2ab + b2 and (a - b)2 = a2 + 2ab - b2 Example:(x + 5)2 = x2 + 2(5)(x) + 52 = x2 + 10x + 25(x - 3)2 = x2 + 2(x)(3) - 32 = x2 + 6x - 9 Difference of Squares: For expression like (a - b)(a + b), the result is difference of squares: (a - b)(a + b) = a2 -b2Example: (x - 3)(x + 3) = x2 - 9Expanding More than Two BracketsFor three brackets we can either use formula: (x + a)(x + b)(x + c) = x3 + (a + b + c)x2 + (ac + bc + ab)x + abcor we can expand this step by step as following example:Example: (x + 2)(x - 1)(x + 3)First expand 1st two brackets:(x + 2)(x - 1) = x2 - x + 2x - 2 = x2 + x - 2Next multiply by (x + 3):(x2 + x - 2)(x + 3) = x2(x + 3) + x(x + 3) - 2(x + 3) = x3 + 3x2 + x2 + 3x - 2x - 6 = x3 + 4x2 + x - 6ConclusionExpanding the brackets is an essential skill in algebra which ensures simplifying expressions and solving the equations efficiently. Whether dealing with single, double, or multiple brackets, understanding methods and practicing will ensure accuracy and confidence in solving algebraic problems.Read More, \mathrm{simplify} \mathrm{solve\:for} \mathrm{expand} \mathrm{factor} \mathrm{rationalize} See All AI explanations are generated using OpenAI technology. AI generated content may present inaccurate or offensive content that does not represent Symbolab's view. Expand equations step-by-step Frequently Asked Questions (FAQ) In mathematics, the term 'expand' refers to the process of multiplying out a mathematical expression to make it more detailed or to simplify it. How to expand using the distributive property? To expand an expression using the distributive property, multiply each term inside a set of parentheses by each term outside the parentheses, and then simplify by combining like terms. The FOIL method is a mnemonic used to help remember the steps for multiplying two binomials. FOIL stands for 'First, Outer, Inner, Last', and refers to the order in which you multiply the terms of the two binomials to get the expanded expression. What is the perfect square rule? The perfect square rule is a technique used to expand expressions that are the sum or difference of two squares, such as (a + b)^2 or (a - b)^2. The rule states that the square of the sum (or difference) of two terms is equal to the sum (or difference) of the squares of the terms plus twice the product of the terms. expand-calculator en Related Symbolab blog posts AI may present inaccurate or offensive content that does not represent Symbolab's views. View Full Notebook Upon completing this section you should be able to:Recognize polynomials.Identify binomials and trinomials.Find the product of a monomial and binomial.A polynomial is the sum or difference of one or more monomials. Generally, if there is more than one variable, a polynomial is written in alphabetical order. Special names are used for some polynomials. If a polynomial has two terms it is called a binomial.If a polynomial has three terms it is called a trinomial.In the process of removing parentheses we have already noted that all terms in the parentheses are affected by the sign or number preceding the parentheses. We now extend this idea to multiply a monomial by a polynomial. Placing 2x directly in front of the parentheses means to multiply the expression in the parentheses by 2x. Notice each term is multiplied by 2x. Again, each term in the parentheses is multiplied by 3y2 Again, each term in the parentheses is multiplied by 3y2.In each of these examples we are using the distributive property. PRODUCTS OF POLYNOMIALSOBJECTIVESUpon completing this section you should be able to:Find the product of two binomials.Use the distributive property to multiply any two polynomials.In the previous section you learned that the product A(2x + y) expands to A(2x) + A(y).Now consider the product (3x + z)(2x + y).Since (3x + z) is in parentheses, we can treat it as a single factor and expand (3x + z)(2x + y) in the same manner as A(2x + y). This gives usIf we now expand each of these terms, we haveNotice that in the final answer each term of one parentheses is multiplied by every term of the other parentheses. Note that this is an application of the distributive property. Note that this is an application of the distributive property. Since - 8x and 15x are similar terms, we may combine them to obtain 7x.In this example we were able to combine two of the terms to simplify the final answer.Here again we combined some terms to simplify the final answer. Note that the order of terms in the final answer does not affect the correctness of the solution. The commutative property allows the rearrangement of order. Try to establish a system for multiplying each term of one parentheses by each term of the other. In these examples we have taken the first term in the first set of parentheses and multiplied it by each term in the second set of parentheses. Then we took the second term of the first set and multiplied it by each term of the second set, and so on. This calculator allows you to obtain an expanded version of the algebraic expression entered. You can enter polynomials, rational expressions, exponentials, among others. Step 1: Enter the algebraic expression in the corresponding input box. Use * to indicate multiplication between variables and coefficients. For example, enter 4*x or 3*x^2, instead of 4x or 3x^2. Step 2: Click Expand to get the expanded version of the algebraic expression entered. Step 3: The solution along with the algebraic expression will be displayed at the bottom. To enter algebraic expressions, we must use the * sign to indicate multiplication between variables and exponents. Also, we must use the ^ sign to indicate an exponent. For example, To write \((5x-2)^3\), enter (5*x-2)^2. To write \(\frac{1}{3}x+\frac{1}{3}\)^2+2x\), enter (1/3*x+1/3)^2+2*x. To write \(\frac{1}{3x}+\frac{1}{3}\)^2+2x\), enter (1/(3*x)+1/3)^2+2*x. It is also important to use parentheses to correctly indicate operations. For example, by entering (5*x-2)^2, we indicate that the exponent is applied to the entire expression inside the parentheses. Also, by writing 1/(3*x) we indicate that the entire expression inside the parentheses is in the denominator of the fraction. The expansion of algebraic expressions involves the removal of parentheses and other grouping signs. To eliminate these grouping signs, we often have to use the distributive property or apply the indicated exponent. If we have an expression of the form (x+1)(2x+2), we can expand it using the distributive property and multiply each term in the first parentheses by each term in the second parentheses. If we have an expression of the form \((x+2)^3\), we can expand it using the binomial theorem. In this way, we will obtain the coefficients and the exponents of each term of the expanded version. By expanding algebraic expressions, we can obtain a simpler version of the expression. Since the expression will be fully expanded, it is also possible to find all like terms to combine them to get the simplest possible version. Often, expanded versions can make it easier to perform some operations, such as finding derivatives. You can explore other calculators here. High Impact Tutoring Built By Math Experts Personalized standards-aligned one-on-one math tutoring for schools and districts Request a demo Here you will learn how to expand expressions before simplifying the resulting algebraic expressions. Students will first learn about expanding expressions as part of expressions and equations in 6th grade. Expanding expressions (or multiplying out) is the process by which you use the distributive property to remove parentheses from an algebraic expression. To do this, you need to multiply out the parentheses by multiplying everything outside of the parentheses by everything inside the parentheses. Then, if needed, you simplify the resulting expression by combining the like terms. For example, 2(x+5) = 2x+10 For this example, The expression has two sets of parentheses. You will need to simplify by combining like terms after expanding the expression. \begin{aligned} & 2(x+5)+3(x-1) \\\\ & =2 x+10+3 x-3 \\\\ & =5 x+7 \end{aligned} How does this relate to 6th grade math? Grade 6 Expressions and Equations (6.EE.A.3)Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 \, (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 \, (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y . In order to expand expressions: Use the distributive property to multiply out the parentheses in the expression. Combine the like terms. Use this worksheet to check your 6th grade to high school students understanding of expanding expressions. 15 questions with answers to identify areas of strength and support! DOWNLOAD FREE x Use this worksheet to check your 6th grade to high school students understanding of expanding expressions. 15 questions with answers to identify areas of strength and support! DOWNLOAD FREE Expand: 9 \, (y+6) Use the distributive property to multiply out the parentheses in the expression. \begin{aligned} & 9 \, (y+6) \\\\ & =(9 \times y)+(9 \times 6) \\\\ & =9 y+54 \end{aligned} 2Combine the like terms. There are no like terms in the expression, so you are finished. The expanded expression is 9y+54 . Expand and simplify: 6 \, (+ 8)12 Use the distributive property to multiply out the parentheses in the expression. \begin{aligned} & 6 \, (t+8)-12 \\\\ & =(6 \times t)+(6 \times 8)-12 \\\\ & =6 t+48-12 \end{aligned} 6 t+48-12 = 6t+36 So the expanded and simplified expression is 6t+36 . 5 b+7(b-2)-18 Use the distributive property to multiply out the parentheses in the expression. \begin{aligned} & 5 b+7(b-2)-18 \\\\ & =5 b+(7 \times b)-(7 \times 2)-18 \\\\ & =5 b+7 b-14-18 \end{aligned} \begin{aligned} & 5 b+7 b-14-18 \\\\ & =12 b-32 \end{aligned} So the expanded and simplified expression is 12b-32 . Expand and simplify: 8(x-2)+6(x+3) Use the distributive property to multiply out the parentheses in the expression. Multiply out the first set of parentheses. \begin{aligned} & 8 \, (x-2) \\\\ & =(8 \times x)-(8 \times 2) \\\\ & =8 x-16 \end{aligned} The first set of parentheses expands to 8x16 . \begin{aligned} & 6 \, (x+3) \\\\ & =(6 \times x)+(6 \times 3) \\\\ & =6 x+18 \end{aligned} The second set of parentheses expands to 6x + 18 . The expression is now, 8 x-16+6 x+18 First, use the commutative property to group the like terms together. Underline the two x terms (8x and +6x) and combine them. Then do the same for the two constants (-16 and +18). Remember to underline the sign in front of the number too! 8 x+6 x=14 x -16 and +18 = 2 (Note that -16 + 18 can also be written as 18-16). So the expanded and simplified expression is 14x + 2 . Expand and simplify: 2 x(x+6)-3(x-2) Use the distributive property to multiply out the parentheses in the expression. Multiply out the first set of parentheses. \begin{aligned} & 2 x \, (x+6) \\\\ & =(2 x \times x)+(2 x \times 6) \\\\ & =2 x^2+12 x \end{aligned} The first set of parentheses expands to 2x^2 + 12x . Multiply out the second set of parentheses. \begin{aligned} & -3 \, (x-2) \\\\ & =(-3 \times x)+(-3 \times 2) \end{aligned} *Note: since the minus sign stays with the 3 to become negative 3, you will now add the products. =-3 x+6 The second set of parentheses expands to 3x + 6 . The expression is now, 2 x^2+12 x-3 x+6 The first term will be 2x^2 since there are no other exponents. Underline the two x terms (12x and -3x) and combine them. Remember to underline the sign in front of the number too. Since there is only one constant, the expression will end in +6. 12 x-3 x=9 x The expanded and simplified expression is 2x^2 + 9x + 6 . Expand and simplify: 3 \, (2 x-6 y)-5 \, (x-2 y) Use the distributive property to multiply out the parentheses in the expression. Multiply the first set of parentheses. Another method you can use is to write the terms in an area model: (A positive number times a negative number equals a negative number so 3 \times -6y gives a negative answer. You need to write -18y). The first set of parentheses expands to 6x18y . Multiply out the second set of parentheses. Remember, you are multiplying both x and -2y by -5 . (A negative number times a negative number equals a positive number so -5 \times -2y gives a positive answer. You need to write +10y). The second set of parentheses expands to 5x + 10y . The expression is now, 6 x-18 y-5 x+10 y Underline the two x terms (6x and -5x) and the two y terms (-18y and +10y). Remember to underline the sign in front of the number too. The expanded and simplified expression is x-8y . Assess students prior knowledge before beginning. Review key vocabulary terms including algebraic expression, parentheses, simplify, exponents, distributive property, binomial, polynomial, terms, coefficients. Review adding and subtracting negative numbers as needed. Allowing learners to use templates or organizers when practicing this skill or completing worksheets, such as the area model shown above, will help them organize their work as they complete the process step-by-step. Be sure students have had plenty of practice expanding expressions with one set of parentheses before moving on to expanding expressions with binomials or polynomials. The expanding expression tool kit you will provide students is essential for higher levels of mathematics. Multiplying all terms in the set of parenthesesYou must multiply the term outside the parentheses by every term inside the parentheses.For example, 2\left(6 x^2-3 x\right)=12 x^2-3 x Here, you have not multiplied the value outside of the parentheses by the second term. The correct answer is: 2\left(6 x^2-3 x\right)=12 x^2-6 x Squaring a termWhen you square something, you multiply it by itself.For example, \begin{aligned} 3^{2}&=3\times 3\\ x^{2}&=x\times x\\ (5y)^{2}&=5y\times 5y \end{aligned} Combining like termsWhen you combine like terms, you must include the sign in front of the number. Be sure to underline the sign along with the number when combining the like terms.For example, Expand each set of parentheses: 5m + 45-4m Combine like terms: m+45 Expand each set of parentheses: 4h-2h-16-1 Combine like terms: 2h-17 Expand each set of parentheses: 3x + 21-2x-6 Combine like terms: x+15 Expand each set of parentheses: 8y-40 + 5y-10 Combine like terms: 13y-50 Expand each set of parentheses: 15x^{2}-10x-8x^{2}-12x Combine like terms: 7x^{2}-22x Expand each set of parentheses: 30x-10y-16x+10y Combine like terms: 14x How do you expand an expression? To expand an expression, you need to multiply out the parentheses by multiplying everything outside of the parentheses by everything inside of the parentheses. Then, if needed, you simplify the resulting expression by combining the like terms. How do you combine like terms? Combine like terms by first identifying the like terms, then adding them together using the value of their coefficients. Why is expanding an expression an important skill to have? Expanding expressions are useful when solving and graphing quadratic equations, rational expressions, and solving non-linear simultaneous equations. Math equations Inequalities Math formulas Types of graphs At Third Space Learning, we specialize in helping teachers and school leaders to provide personalized math support for more of their students through high-quality, online one-on-one math tutoring delivered by subject experts. Each week, our tutors support thousands of students who are at risk of not meeting their grade-level expectations, and help accelerate their progress and boost their confidence. Find out how we can help your students achieve success with our math tutoring programs. We use essential and non-essential cookies to improve the experience on our website. Please read our Cookies Policy for information on how we use cookies and how to manage or change your cookie settings.AcceptPrivacy & Cookies Policy We continue to learn the basics of algebra. In this lesson we will learn how to expand algebraic expressions. To expand parentheses means to get rid of the parentheses in an expression. To expand parentheses, you have to learn two rules by heart. With regular practice, you will be able to expand parentheses easily, and the rules that you had to memorize can be safely forgotten. The first rule of Expanding parentheses Consider the following expression: 8 + (9 + 3) The value of this expression is 2. Expand the parentheses in this expression. To expand parentheses means to get rid of them without affecting the value of the expression. That is, the value of the expression 8 + (-9 + 3) must still be 2. The first rule of expanding parentheses is as follows: When you expand parentheses, if there is a plus sign in front of the parentheses, that plus is removed with the parentheses. So, we see that in the expression 8 + (-9 + 3) there is a plus before the parentheses. This plus must be removed together with the parentheses. In other words, the parentheses disappear along with the plus sign in front of them. And what was in parentheses will be written unchanged: We obtained an expression without parentheses 8-9+3. This expression equals 2, just as the previous expression with parentheses was equal to 2. 8 + (9 + 3) = 2 8 9 + 3 = 2 Thus, between the expressions 8+(-9+3) and 8-9+3 we can put an equal sign, because they are equal to the same value: 8 + (9 + 3) = 8 9 + 3 2 = 2 Example 2. Expand parentheses in the expression 3 + (-1 - 4) There is a plus before the parentheses, so the plus is dropped together with the parentheses. What was in parentheses will remain unchanged: 3 + (1 4) = 3 1 4 Example 3. Expand parentheses in the expression 2 + (-1) There is a plus before the parentheses, so the plus is dropped together with the parentheses. What was in parentheses will remain unchanged: 2 + (1) = 2 1 In this example, expanding parentheses has become a kind of inverse operation replacing subtraction with addition. What does this mean? In the expression 2 - 1 there is subtraction, but it can be replaced by addition. Then we get 2 + (-1). But if you expand the parentheses in the expression 2 + (-1), you get the original 2 - 1. So you can use the first bracketing rule to simplify expressions after some transformations. That is, get rid of parentheses and make it simpler. For example, simplify the expression 2a + a- 5b + b. To simplify this expression, you can combine like terms. Recall that in order to combine the like terms, add the coefficients of the like terms and multiply the result by the common letter part: We obtain the expression 3a + (-4b). In this expression we expand the parentheses. There is a plus before the parentheses, so we use the first rule of expanding parentheses, i.e. we drop the parentheses together with the plus in front of the parentheses: 3a + (4b) = 3a 4b Thus, the expression 2a+a-5b+b is simplified to 3a-4b. After expanding one of the parentheses, there may be other parentheses along the way. Apply the same rules to them as to the first. For example, expand parentheses in the following expression: 2 + (3 + 1) + 3 + (6) Here are two places where parentheses need to be expanded. In this case, the first rule of expanding parentheses applies, namely, dropping the parentheses along with the plus sign in front of the parentheses: 2 + (3 + 1) + 3 + (6) = 2 3 + 1 + 3 6 Example 3. Expand the parentheses in the expression 6+(-3)+(-2) In both places where there are parentheses, there is a plus in front of them. Here again the first rule of parentheses expansion applies: 6 + (3) + (2) = 6 3 2 Sometim