Factorisation worksheets grade 9

Covid-19 has led the world to go through a phenomenal transition. E-learning is the future of today. Stay home, stay safe and keep learning!!! This section is about worksheet factorization. Q.1 Factor the following using identities where necessary. 1) x2 + 8x 2) x2 - 4x 3) x2 +x - 2 4) x2 - 9 5) x2 + 22x + 121 6) x2 - 8x + 16 7) x2 - 14x + 49 8) 2x - 14x 9) 10x2 - 14x 14x 3 + 18x4 10) 20a2b - 25a3b 11) 1 + a + ab + a2b 12) a2 + bc + ab + bc 13) a2b - 25 14) 15xy – 6x + 5y – 2 15) (a + c)2 – (a – c)2. 16) 3x + 9y 17) 5x2 - 10x3 + 20x4 18) 3xyz + 27 19) 15a2b2 - 24ab 20) 2ab + 7ac + 9bc Q.2 Factor the following polynomes. 1) x2 + 8x - 20 2)x2 - 6x - 16 3) x2 - 6x + 8 4) x2 - 5x - 50 5)x2 - 2x - 63 6) x2 - 7x + 5 10 7) x2 + 17x + 72 8) x2 + 4x - 60 9)x2 + 18x + 80 10) x2 + 5x + 6 11) 10x3 - 19x2 - 19x261x - 8 12) 20x3 + 15x2 + 28x - 21 13) 36x3 - 5x2 - 46x - 5 14) 10ab + 4a + 5b + 5b + 5b 2 15) 2x2 - 32 16) x2 - 7x + 12 17) 2x2 + 7x + 6 18) x2 -6x -40 19) 2x2 -15x + 22 20) 8x2 -21x + 10 21) 25x2 -20xy + 4y2 22) 4x2+ 4xy +y2 23) 6x2 - 11xy - 10y2 24) 4x2 + 17x + 15 25) 8x2 - 22x + 15 worksheets on factorization Worksheets Home Page Covid-19 has affected physical interactions between people. Don't let it affect your learning. Report this ad Explore More To get to the content This grade 9 math worksheet tests the algebraic expression skills students learned for the first two weeks of term 3 for the CAPS syllabus. The worksheet includes revision of polynomes and terminology, multiplication of monomials, binomials and polynomes, the sharing of polynomes by monomials, and factorizing common factors, difference of squares and trinomials in the form of x2 + bx + c and trinomials of the same form with common factors. Finally, there is a question about algebraic fractures involving factorizing. Download here: Worksheet 16: Algebraic Expressions for Term 3 Worksheet 16 Memorandum: Algebraic Expressions Term 3 Practice factorization worksheet by regrouping the terms. We know that we have to regulate the given algebraic expression in such a way that a common factor can be taken out of each group. 1. Factorize each of the following by regrouping: (i) x2 + xy + 9x + 9y (ii) 6xy - 4y + 6 – 9x (iii) 10ab + 6a + 5b +3 (iv) x3 + x2 + x 1 (v) a2 – y + ay – a (vi) x3 – x2y + 5x – 5y (vii) a(a + 3) – a – 3 (viii) 3ax + 3ay – 2bx – 2by (ix) x(x + y – z) – yz (x) a3 – a2 + ab2 – a2b2 2. Factor grouping the algebraic expressions: i) 4xy – 7y + 12x – 21 (ii) 7ab – 5a – 28b + 20 (iii) 5xy – 5 2x – 5y2 + 2y (iv) 6x2 – 15xz – 8yx + 20yz (v) 4ax + 5bx – 12ay – 15by 3. Factorize by regrouping the terms: (i) 7ab – 21bc – 7ax + 21xc (ii) x2 + xy(y + 1) + y3 (iii) ba2 – 2 22a(1 - b) - 4 (iv) x2 – x(a + 4b) + 4ab (v) x – 9 – (x – 9)2 + xy – 9y 4. Factorize by grouping the following expressions: i) (p - 4) – (p – 4)2 12 – 3p (ii) q (r – s)2 – p (s - r) + 3r – 3s (iii) (x2 + 2x)2 – 2 – 2 – 27 (x2 + 2x) – y (x2 + 2x) +7y (iv) a4x + a3 (2x – y) – a(2ay + z) - 2z (v) a3 – 2a2b + 3ab2 – 6b3 6b3 a2 + b – ab – a (vii) 5xy – y2 + 15zx - 3yz (viii) ab2 – bc2 – ab + c2Answers for the worksheet on factorization by regrouping the terms are given below to check the exact answers of the above factors. Answers: 1. i) (x + y) (x + 9) (ii) (2y - 3) (3x - 2) (iii) (2a + 1) (5b + 3) (iv) (x2 + 1) (x + 1) (v) (a - 1) (a + 1 (a + 1 (vi) (x - y) (x2 + 5) (vii) (a + 3) (a - 1) (viii) (x + y) (3a - 2b) (x + y) (x + z) (x) a a-a- 1) (a – b2) 2. (i) (y + 3) (4x - 7) (ii) (a - 4) (7b - 5) (iii) (x - y) (5y - 2) (iv) (3x - 4y) (2x - 5z) (v) (x – 3y) (4a + 5b) 3. (i) 7(b - x) (a – 3c) (ii) (x + y2) (x + y) (iii) (a + 2) (ab – 2) (iv) (x – 4b) (x - a) (x) (x - 9) (10 – x + y) 4. i) (p – 4) (2 – p) (ii) (r – s) (qr – qs + p + 3) (iii) (x2 + 2x - 7) (x2 + 2x - y) (iv) (a + 2) (a3x – a2y - z) (a - 2) (a - 2) (a - 2 (a 2 + 3b2) (vi) (a - 1) (a - b) (vii) (y + 3z) (5x - y) (viii) (ab – c2) (b – 1) 8th Grade Math PracticeMath Homework Sheets From Worksheet on Factorization by Regrouping to HOME PAGE Didn't you find what you were looking for? Or do you want more information about Math Only Math. Use this Google Search to find what you need. Factorization is the reverse process of expanding and is a powerful tool in algebra at every level of mathematics. It offers us a way to solve quadratic equations, simplify complicated expressions, and sketch out nonlinear relationships in year 10 and beyond. In factorization, we want to insert parentheses. What makes factorising difficult is that there are many different types. You need a lot of practice to quickly recognize the different species and master the different methods to apply each. NSW Syllabus Outcomestage 5.2: Factorise algebraic expressions by taking a common algebraic factor (ACMNA230)Stage 5.3: Factorise monic and non-monic quadratic expressions (ACMNA269)common factors grouping in pairs for four-term expressionsa difference of two squares of perfect square quadomonic trinomials (monic and non-monic)Supposed knowledge Students should be familiar with basic algebraic techniques, including expanding special binomial products and simple arithmetic. There is also knowledge of the smallest multiple multiples (LCM) and the highest common factors (HCF) required.1. Common factorsThis is the simplest form of factoring and includes taking the highest common factor (HCF) out of two or more terms. Note that the HCF may be a term in parentheses as well. Step 1: Find the HCF of all the terms in the expression. Step 2: Remove the HCF and introduce brackets to form a product. After the common factor has been taken, the terms that remain in the brackets should not have other factors in common. Note For Student factorising is the opposite of expanding, always checking if you've factored in correctly by expanding your result to see if it matches what you started.2. Factorising by grouping in pairsSomely, there may not be an HCF for every term in algebraic expression. In these cases, we group the terms into so the first few terms have an HCF and the remaining few terms have another HCF. It is important that you group the terms correctly to lead to a successful factorization. After extracting the respective HCF from each pair, you will find another common factor. Take this out to produce your final factorised answer. Example: Factorising by grouping in ParenFactorize the algebraic expression by grouping in pairs \(2xy+3yz-4x-6z \)SolutionStep 1: Regroup the terms in such a way that each pair has an HCF. \(2xy+3yz)-(4x+6z)\)Step 2: Remove the HCF from each pair. \(=y(2x+3z)-2(2x+3z) \)Step 3: Extract the resulting common factor. \(2x+3z)(y-2) \)Note to studentsThe order that the terms are written in the brackets does not matter. \(a+b)(c+d)=(c+d)(a+b)\). This is an example of the commutative law of multiplication.3. Difference of two squares There are three special factoring identities that will help you factor different types of algebraic expressions. The first is known as the difference of two squares. By expanding, we can demonstrate that \(x-y)(x+y)=x{^2}-y{^2} \). Hence, to factor the difference of two squares:\(x{^2}-y{^2}=(x-y)(x+y)\)Example: Factoring difference of two squaresFactorise the following alreadyGebra expressions:(i)\(x{^2}-9y{^2}\) (ii)\(4x{^2}-81y{^2} \)Solution for (i))Step 1: Rewrite the expression as a difference between two squares.\(x{^2}-9y{^2}=(x){^2}-(3y){^2}\)Step 2: Factorise with the rule.\((x){^2}-(3y){^2}=(x-3y)(x+3y)\)Solution for (ii)Step 1 : Rewrite the expression as a difference between two squares.\(4x{^2}-81y{^2}=(2x){^2}-(9y){^2} \)Step 2: Factorise with the rule.\(2x){^2}-(9y){^2}=(2x-9y)(2x+9y) \)4. Perfect squarea perfect square is an algebraic product that can be written in the form \((x+y){^2}\) or \(x-y){^2} \). When we expand a perfect square, we get the following result:\(x \pm y){^2}=x{^2} \pm 2xy+y{^2} \)From this we can see that the middle term \(2xy\) is twice the product of the numbers \(x \)and \(y \)in the bracket and the first and third terms are perfect squares of them. This identity is what we will use to factorise perfect squares. Example: Factorising Perfect SquaresFactorise the following algebraic expressions:(i) \(a{^2}+6a+9 \)(ii) \(16a{^2}+40a+25\)Solution for (i)Step 1: Make sure it's a perfect square. From the first and third terms we know that \(x=a\) and \(y=3\). Therefore\ (2xy=2(a)(3)=6a \), the middle term in the expression. Step 2: Factorise:\(a{^2}+6a+9=(a+3){^2}\)Solution for (ii)Step 1: Make sure it's a perfect square. From the first and third terms we know that \(x=4a \) and \(y=5 \). Therefore\ (2xy=2(4a)(5)=40a \), the middle term in the expression. Hence this expression is a perfect square. Step 2: \(16a{^2}+40a+25=(4a+5){^2}\)5. Monic Quadratic TrinomialA quadratic trinomial is an expression of the form \(ax{^2}+bx+c\) where \(a \) and \(b \) get numbers. An eonic trinomial is when the leading co-efficient, \(a = 1 1 we expand \(x+ \alpha) (x+ \beta) \), we get \(x{^2}+(\alpha + \beta)x+\alpha \beta\) . The coefficient of \(\alpha + \beta) \) and the coefficient of the constant is \(\alpha\beta\) . To factor a monic quadratic trinomial, we need to reverse the process by finding two numbers whose sum is the coefficient of x and product the constant termExample: Factorising Monic Quadratic TrinomialFactorise the algebraic expression \(x{^2}-5x+6\). Solution Find two numbers whose sum is -5 and whose product is +6.De only possible numbers are -3 and -2.Therefore \(x{^2}-5x+6=(x-3)(x-2) \)Note For students At times, it may be necessary to extract an HCF from the expression before the four-language trinomial is calculated using these strategies. For example, the expression \(3x{^2}-15x+18 \) can be factored in by first removing the HCF of 3.\(3(x{^2}-5x+6)=3(x-3)(x-2) \).6. Non-Monic Quadratic TrinomialsA non-monic quadratic trinomial is an expression of the form \(ax{^2}+bx+c \) where \(a e 0 \). There are three main strategies for factoring this type of expression: The coupling method, the fraction method, and Cross method. The example uses the link method. To factor a non-monic quadratic trinomial, look for two numbers of which:Sum the coefficient of \(x \)Product is the product of the coefficient of \(x{^2} \) and the constant Example: Factorising Non-monic Quadratic TrinomialFactorise the algebraic expression \(3x{^2}+5x+2\). SolutionStep 1: Find the product of the coefficient of \(x{^2} \) and the constant. It's 6.Step 2: Find two numbers whose sum is 5 and whose product is 6.De only possible numbers are 2 and 3.Step 3: Use these two numbers to split the middle term and then factorise by grouping in pairs.\(1 3x{^2}+5x+2 = (3x+2)(x+1)\)Note for studentsThe three methods are taught in Matrix theory lessons to expose students to a variety of strategies for factoring non-monic quadratic trinomials. Different schools will teach different methods, but students will need to select the method that best suits their learning style and practice the strategy until they have mastered it. Year 9 Algebra worksheet – Factorization techniquesCheck your factorization skills with the following 10 exercises!1. \(4ab{^2}c-6abc{^2}+12a{^2}bc{^2} \) 2. \(a+3b){^2}-9(a+3b)(a-3b) \) 3. \(x{^3}-3x{^2}+2x-6\) 4. \((3x+4y){^2}-(2x+y){^2}\) 5. \(16x{^4}-81y{^4} \) 6. \(k{^2}-18k+81 \) 7. \(t{^2}-17t-60 \) 8. \(5m{^2}n-20mn-105n\) 9. \(3x{^2}-11x-20 \) 10. \(3-10x-8x{^2}\)Solutions1. \(2abc(2b-3c+6ac) \) 2. \(2(a+3b)(15b-4a) \) 3. \(x{^2}+2)(x-3) 4. \(5(x+y)(x+3y) \) \) 5. \(4x{^2}+9y{^2})(2x+3y)(2x-3y) \) 6. \(k-9){^2} \) 7. \(t-20)(t+3) \) 8. \(5n(m-7)(m+3)\) 9. \(3x+4)(x-5) \) 10. \(-(4x-1)(2x+3) \) Want to take your Math skills from year 9 to the next level Looking to prepare for your Maths exam? 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