

Simplifying linear expressions worksheet answer key

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© 2022 Kuta Software. All rights reserved. One to one maths interventions built for KS4 success Weekly online one to one GCSE maths revision lessons now available Learn more Here is everything you need to know about simplifying algebraic expressions for GCSE maths (Edexcel, AQA and OCR). You'll learn how to collect like terms, write and simplify expressions, and how to simplify algebraic fractions. Look out for the simplifying expressions worksheets with correct answers, word problems and exam questions at the end. Simplifying an algebraic expression is when we use a variety of techniques to make algebraic expressions more efficient and compact – in their simplest form – without changing the value of the original expression. Get your free simplifying expressions worksheet of 20+ questions and answers. Includes reasoning and applied questions. DOWNLOAD FREE x Get your free simplifying expressions worksheet of 20+ questions and answers. Includes reasoning and applied questions. DOWNLOAD FREE To simplify expressions first expand any brackets, next multiply or divide any terms and use the laws of indices if necessary, then collect like terms by adding or subtracting and finally rewrite the expression. For example to simplify 2Collect like terms
$$8x + 6x = 14x$$
 4-9&=-5
$$\begin{aligned} & \\ & \end{aligned}$$
 3Rewrite the expression
$$8x + 4 + 3(2x - 3) = 14x - 5$$
end{aligned}
$$\begin{aligned} & \\ & \end{aligned}$$
 In order to simplify an algebraic expression we need to 'collect the like terms' by grouping together the terms that are similar: When we highlight the like terms, we must include the sign in front of the term and where necessary identify the negative numbers. Like terms have the same combination of variables and/or numbers as each other, but the coefficients could be different. For example... 4 and 9 are like terms ✓ 3x and 5x are like terms ✓ 2ab and -5ab are like terms ✓ BUT 8 and 3x are not like terms ✗ 4y and 2x are not like terms ✗ x² and x are not like terms ✗ Example of collecting like terms 1 Identify the like terms The terms involving x are like terms. The terms involving y are like terms. The constant terms are like terms. The plus (or minus) sign belongs to the term before it. 2 Group the like terms 3 Combine the like terms by adding or subtracting
$$\begin{aligned} & \\ & \end{aligned}$$
 5 x-2 x=3
$$\begin{aligned} & \\ & \end{aligned}$$
 3 y+4-3 y=1
$$\begin{aligned} & \\ & \end{aligned}$$
 4-7=-3
$$\begin{aligned} & \\ & \end{aligned}$$
 So,
$$\begin{aligned} & \\ & \end{aligned}$$
 5 x+3 y+4-2 x+8 y-7
$$\begin{aligned} & \\ & \end{aligned}$$
 =3 x+11 y-3
$$\begin{aligned} & \\ & \end{aligned}$$
 Step-by-step guide: Collecting like terms Example of multiplying and dividing algebra
$$\frac{3a \times b \times 4a}{2a}$$
 1 Simplify the numerator (3 a b times 4 a =12 a² b c) 2 Divide by the denominator (12 a² b c div 2 a=6 a b c) So,
$$\frac{3a \times b \times 4a}{2a} = 6ab$$
 Example of expanding brackets: 1 Multiply the term outside of the bracket by the first term inside the bracket 2 Multiply the term outside the bracket by the second term inside the bracket. So, Step-by-step guide: Expanding brackets See also: Expand and simplify Example of algebraic fractions Simplify 1 Find the highest common factor (HCF) of the numerator and denominator. The HCF of 12xy and 8x is 4x 2 Divide the numerator and the denominator by this value. Numerator Denominator 3 Rewrite the simplified fraction Step-by-step guide: Algebraic fractions See also: Simplifying algebraic fractions We can write algebraic fractions to help simplify problems. We will often be able to make a linear equation or a quadratic equation and solve it. Example of writing and simplifying expressions Write an expression for the perimeter of the shape. Read the question carefully and highlight the key information. Key words: Expression: a set of terms that are combined using (+, −, × and ÷) Perimeter: the distance around the edge of a shape We need to add together each of the lengths of the shape. 2Write an expression and simplify. We then simplify the following expression by adding and subtracting the terms.
$$\begin{aligned} & \\ & \end{aligned}$$
 Perimeter=
$$\begin{aligned} & \\ & \end{aligned}$$
 2x+
$$\begin{aligned} & \\ & \end{aligned}$$
 2x+
$$\begin{aligned} & \\ & \end{aligned}$$
 3x+
$$\begin{aligned} & \\ & \end{aligned}$$
 2x-
$$\begin{aligned} & \\ & \end{aligned}$$
 2x=
$$\begin{aligned} & \\ & \end{aligned}$$
 6x-
$$\begin{aligned} & \\ & \end{aligned}$$
 2x=4x
$$\begin{aligned} & \\ & \end{aligned}$$
 Example of collecting like terms (6x)
$$\begin{aligned} & \\ & \end{aligned}$$
 +2
$$\begin{aligned} & \\ & \end{aligned}$$
 Simplify Underline the similar terms in the expression and combine them.
$$\begin{aligned} & \\ & \end{aligned}$$
 8x-2x=6x
$$\begin{aligned} & \\ & \end{aligned}$$
 5+6=11
$$\begin{aligned} & \\ & \end{aligned}$$
 2Rewrite the expression.
$$\begin{aligned} & \\ & \end{aligned}$$
 8x+5-2x+6
$$\begin{aligned} & \\ & \end{aligned}$$
 =6x+11
$$\begin{aligned} & \\ & \end{aligned}$$
 Simplify Underline the similar terms in the expression
$$\begin{aligned} & \\ & \end{aligned}$$
 5xy-2xy=3xy
$$\begin{aligned} & \\ & \end{aligned}$$
 3xy+4-3xy=4
$$\begin{aligned} & \\ & \end{aligned}$$
 Example of expanding brackets: 3 x times 5 x² =15 x³ So,
$$\begin{aligned} & \\ & \end{aligned}$$
 3 x(5x²+y+5x²)=15x³+3xy+15x³
$$\begin{aligned} & \\ & \end{aligned}$$
 9x-6xy+15x³
$$\begin{aligned} & \\ & \end{aligned}$$
 Find the highest common factor (HCF) of the numerator and denominator. The HCF of 9x²y and 15x³ is Divide the numerator and the denominator by this value. Numerator (9 x² y div 3 x²) =3 y) Denominator (15 x³ div 3 x²) =5 x) Rewrite the simplified fraction
$$\frac{3xy}{5x}$$
 Simplify
$$\frac{8x^3 - 6xy}{4x^2 y}$$
 (15x³)
$$\frac{8x^3 - 6xy}{4x^2 y}$$
 Find the highest common factor (HCF) of the numerator and denominator. The HCF of 8x³-6xy and 4x²y is 2x Divide the numerator and the denominator by this value. Numerator (8x³-6xy) (4x²y) =2xy) We will need to factorise quadratics to simplify this algebraic fraction Fully factorise the numerator and the denominator Numerator (x²-2x-15)=(x+3)(x-5) Denominator (4x²-3y) (2xy) Rewrite the simplified fraction
$$\frac{(x+3)(x-5)}{(x-3)}$$
 Rewrite the simplified fraction
$$\frac{(x-2)(x-15)}{(x-2)(x-9)}$$
 Step-by-step guide: Factorising quadratics Step-by-step guide: Difference of two squares Write an expression for the area of the shape. Read the question carefully and highlight the key information. Key words: Expression: a set of terms that are combined using (+, −, × and ÷) Area: the 2D space inside a shape. This shape is a triangle. We know the formula to find the area of a triangle is:
$$\frac{1}{2} \times \text{base} \times \text{height}$$
 We need to multiply the base and height of the shape then divide by 2. Write an expression and simplify.
$$\frac{(2x+2)(3x+2)}{2}$$
 =
$$\frac{6x^2 + 10x + 4}{2}$$
 Sophie is x years old, Emily is three years younger than Sophie Amelia is four times older than Sophie. Write an expression for each of their ages. Read the question carefully and underline the key information. We are told that Sophie is x years old Emily is three years younger than Sophie, so three less than x is x - 3 Amelia is four times older than Sophie, so four lots of x - 3 is 4(x - 3). We need brackets because we are multiplying all of x - 3 by 4 Write an expression and simplify. Sophie is x years old Emily is x - 3 years old Amelia is 4(x - 3) = 4x - 12 years old The sign in front of the term is part of it When we underline the like terms, we must include the sign in front of the Terms with a coefficient of 1 we don't need to write the 1
$$\begin{aligned} & \\ & \end{aligned}$$
 1x&=x\ 1ab&=ab\ 1y^2&=y^2\
$$\begin{aligned} & \\ & \end{aligned}$$
 When adding and multiplying, the order in which we calculate doesn't matter and This is not the case for subtracting and dividing. In order for two terms to be 'like terms' they need the same combination of variables. 3x2and 5x2are like terms 2a2b and -5a2bare like terms BUT 3x2and 5x are not like terms 2a2b and -5ab are not like terms Using brackets (parentheses) When multiplying an expression by a value we need to use brackets so that each term is multiplied. Simplifying expressions practice questions For the constant terms, we have 7-9=-2 For the variable terms, we have 2a+6a=8a This means 7+2a-9+6a=-2+8a By considering like terms, we have 8ab-7ab=ab and -8a-3a=-11a . This means 8ab-8a-7ab-3a=ab-11a . By considering like terms, we have -2xy-6xy=-8xy and 3x^2y+5x^2y=8x^2y and 7x . This means -2xy+3x^2y+7x+5x^2y-6xy=-8xy+8x^2y+7x . By working out the missing side lengths as algebraic expressions, and adding together all side lengths we have: Perimeter =2 x+5+x+1+x+3+x+5+x+2+2 x+6 =8 x+22 The shape can be split into rectangles in more than one way (2x+5)(x+1)=2x^2+7x+5 (x+5)(x+2)=x^2+7x+10 Area=3x^2+14x+15 OR (x+1)(x+3)=x^2+4x+3 (2x+6)(x+2)=x^2+10x+12 Area=3x^2+14x+15 Steve's age = x Rachel's age = 2(x+1)=2x+2
$$\begin{aligned} & \\ & \end{aligned}$$
 Total ages = 8&=x+x+11+2x+22\
$$\begin{aligned} & \\ & \end{aligned}$$
 4x+33
$$\begin{aligned} & \\ & \end{aligned}$$
 The highest common factor of the numerator and denominator is 6 , so we divide numerator and denominator by 6 , resulting in the simplified fraction. The highest common factor of the numerator and denominator is 4ab , so we divide numerator and denominator by 4ab , resulting in the simplified fraction.
$$\frac{3a(3a-2b)}{15ab^2}$$

$$\frac{3a^2(2)-2ab}{5ab^2}$$
 The numerator can be factorised, giving
$$\frac{3a(3a-2b)}{15ab^2}$$
 after which the numerator and denominator can be divided by the highest common factor of 3a , resulting in the simplified fraction. We can factorise the numerator and denominator into double brackets, giving
$$\frac{(x+1)(x+2)}{(x+1)(2x-1)}$$
 and then cancel the common bracket from numerator and denominator, which results in the simplified fraction. 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. Simplifying expressions GCSE questions 1. Simplify: 4f - 2e + 3f + 5e (2 marks) 2. Expand and simplify: 4a(a + b) - 2(a2 - 2b) (2 marks) 4. Expand and simplify:
$$\frac{(2x^2+7x-4)(x^2+2x-8)}{1}$$
 (3 marks) Simplify and manipulate algebraic expressions to maintain equivalence by taking out common factors.Model situations or procedures by translating them into algebraic expressions.Simplify and manipulate algebraic expressions and algebraic fractions.Translate simple situations or procedures into algebraic expressions. FactorisingSolving equationsSimultaneous equationsRearranging 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 revision programme. 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

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