Solving linear equations with fractions calculator

Print this page In grade 7, teaching time should focus on four critical areas: (1) develop understanding and application of proportional relationships; (2) develop understanding of operations with rational numbers and work with linear expressions and equations; (3) solve problems involving drawings of scale and informal geometric constructions, and work with two-dimensional and three-dimensional shapes to solve problems involving the area, surface area and volume; and (4) draw inferences on populations based on samples. Students extend their understanding of relationships and develop understanding of proportionality to solve mono and multi-step problems. Students use their understanding of relationships and proportionality to solve a wide range of problems per cent, including those involving discounts, interests, taxes, tips, and percent increase or decrease. Students solve problems on scale drawings, relationing the corresponding lengths between objects or using the fact that the length ratios within an object are stored in similar objects. Students sign proportional relationships and include the unit rate informally as a measure of the steep line, called the slope. Distinguish proportional relations from other relations. Students develop a unified understanding of the number, recognizing fractions, decimals (which have a finite or repetitive decimal representation), and percent as different representations of rational numbers. Students extend the addition, subtraction, multiplication and division to all rational numbers, maintaining the properties of operations and relationships between addition and subtraction, and multiplication and division. By applying these properties, and displaying negative numbers in terms of daily contexts (e.g., due amounts or temperatures below zero), students explain and interpret the rules for adding, subtraction, multiplication and division with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in a variable and use these equations to solve problems. Students continue their work with area from grade 6, solving problems involving the area and circumference of a circle and surface of three-dimensional objects. In preparation for the work of congruence and likeness in grade 8, we think of relationships between two-dimensional figures using drawings of scale and informal geometric constructions, and we gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating to two-dimensional figures by examining cross sections. They solve real and mathematical problems involving area, surface and volume of two-dimensional and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and just prisms. Students rely on their previous work with individual data distributions to compare two data distributions and address questions about population differences. They begin an informal work with random sampling to generate data sets and learn about the importance of representative samples for designing inferences. Grade 7 Overview Ratios and proportional relationships Analyze proportional relationships and use them to solve real and mathematical problems. The Number System Apply and extend the previous knowledge of transactions with fractions to add, subtract, multiply and divide rational numbers. Expressions and equations Use the properties of operations to generate equivalent expressions. Solve real and mathematical problems using numerical and algebraic expressions and equations. Geometry Draw, build and describe geometric figuresDescribe relationships between them. Solve real and mathematical problems involving corner measurement, area, surface and volume. Statistics and probability Use random sampling to draw inferences on a population. Informal informal comparative design about two populations. Investigate probability processes and develop, use and evaluate probability patterns. Mathematical practices Make sense of trouble and persevere in solving them. Abstract and quantitative reason. Build feasible arguments and criticize others' reasoning. Model with math. Use appropriate tools strategically. Participate in precision. Search and use the structure. Look for and express regularity in repeated reasoning. Learning goals Use equality properties to solve basic linear equations. Clear equations. Set and solve linear equations. Identify linear inequalities and control solutions. Solve linear inequalities and express solutions graphically on a number line and in range notation. Prerequisite skills Before you start, take this quiz prerequisite. 1. Simplify \(2-6(4-7)^2\) without using a calculator. Click here to check the \(-52\) If you have lost this problem, check here. (Note that this will open a different text book in a new window.) 2. Evaluate \(6x−4\) when \(x=−2\). Click here to check the \(-16\) If you have lost this problem, check here. (Note that this will open a different text book in a new window.) 3. Evaluate \(-5x^2−x+9\) when \(x=-3\). Click here to check the \(-33\) If you have lost this problem, check here. (Note that this will open a different text book in a new window.) 4. Simplify \(7x−1−4x+5\). Click here to check the \(3x+4\) reply If you've lost this problem, check this out. (Note that this will open a different text book in a new window.) An equation129 is a statement indicating that two algebraic expressions are equal. A linear equation with a variable130, \(x\), is an equation that can be written in the standard form \(ax + b = 0\) where \(a\) and \(b\) are real numbers and \(a ∞ 0\). For example \(3 x - 12 = 0\) A solution131 to a linear equation is any value that can replace the variable to produce a true affirmation. The variable in the linear equation \(3x − 12 = 0\) is \(x\) and the solution is \(x = 4\). To verify, replace the \(4\) value in \(x\) and verify that you get a real statement. \\ Alternatively, when an equation is equal to a constant, we can check a solution by replacing the value in for the variable and showing that the result is equal to the constant one. In this sense, we say that the solutions "satisfy the equation." Example \(\PageIndex{1}\): \(a=−\frac{1}{2}\) a \(−10a+5=25\) solution? Recall that when evaluating expressions, it is a good practice to replace first all variables with brackets, and then replace the appropriate values. By using brackets, we avoid some common mistakes when working the order of operations. \(\begin{align*} - 10 a + 5 &= 25 \\ - 10 (=Cerulean}{-\frac { 1 } { 2 }} \color{Black}{) +} 5 & = 25 \\ 5 & = 25 \\ 10 &eq 25\:\:\:\: \color{red}{\end{align*}\) Answer: No, \(a=−\frac{1}{2}\) does not meet the equation. Developing techniques to solve various algebra equations is one of our main objectives in algebra. This section examines the basic techniques used to solve linear equations with a variable. We begin by defining equivalent equations132 as equations with the same set solution. \(\left. \begin{aligned} 3 x - 5 & = 16 \\ 3 x & = 21 \\ x & = 7 \end{aligned}Equivalent: Equations} Here we can see that the three linear equations are equivalent because they share the same solution set, ie, ({7). To get equivalent equations, use the following equality properties133. Consider algebraic expressions (A) and (B), where (c) is a non-zero number: additional property of equality: if (a = b), then {Cerulean} {+ c} color {# b i color {cerulean} {+ c}) subtrinight subtraction of parity: if (a = b) then (a color {cerulean} {- c} color {black} {-} b i color {cerulean} {- c} Equality: if (a = b) then (color {cerulean} {c} color {black} {a} = color {cerulean} {c} of the division: if (a = b), then (frac {a} {color {cerulean} {c}} C}) Table 1.1.1 The multiplication or division of both sides of an equation is carefully prevents a (0). The division of (0) is not defined and multiplies the two sides for the results (0) in the equation (0 = 0). We solve algebraic equations by isolating the variable with a coefficient of 1. If given a linear equation of the shape (AX + B = C), then we can solve it in two phases. First, use the proper equality of adding or subtraction equality to isolate the variable term. Subsequently, isolate the variable using the properties of multiplication or division equality. Check the solution in the following examples is left to the reader. Example (PageIndex {2}): Solve: (7x Â '2 = 19). Solution (Cerulean} {divide: both: sides: 7.} x & = 3 end {aligned} Answer: The solution is (3). Example (PageIndex {3} : Resolve: (56 = 8 + 12y). Solution When no sign precedes the term, it is intended to be positive. In other words, think of this as (56 = +8 + 12y). So, Let's start by subtracting (8) on both sides of the same sign. \ ^ No matter which part we choose to isolate the variable because the symmetrical property134 states that (4 = y) is equivalent to (y = 4). Answer: the solution is (4). Example (PageIndex {4}): resolve: (frac {5} {3} x + 2 = - 8). Solution isolate the t Ermine variable using the added property of equality, and then multiply both sides of the equation for mutual coefficient (5} {3}). Begin {aligned} frac {5} {3} x + 2 & = - 8f of frac {5} {3} x + 2 color {- It is something wrong. Execution of the procedure C.C.A., n. } ,,,,,,,,,,,,,,, ,,,,,,,,o ,,,, Italy .,,,,,Ra ,...,,,, ,o, ,o, means of allaby of and by . ,,,,,,, (Cerulean} {frac {3} {delete {5}}} color {black} {cdot } (\ overset {-2} {\ cancel {-10}}) \ quad \ color {example \: \: \\: \ ____ Answer: The solution is \ (â 6 \). In summary, To keep equivalent equations, we need to perform the same operation on both sides of the equation. Exercise (PageIndex {1}) Resolve: \ _ = - frac {5} {6}). reply The solve them requires additional steps. When resolving linear equations, the goal is to determine what value, where appropriate, produce a real statement when replaced in the original equation. Make it by isolating the variable using the following steps: Step 1: Simplify both sides of the equation using the order of operations and combine all similar terms in the same part of the same sign. Step 2: Use the appropriate properties of equality to combine as terms on opposite sides Equal sign. The goal is to obtain the term variable from one side of the equation and the term constant from the other. Step 2a: Add or subtract according to the need to isolate the variable. Step 2B: divide or multiply as necessary to isolate the variable. Step 3: Check if the answer resolves the original equation. We will often meet linear equations where where on each side of the equal sign can be simplified. If this is the case, then it is better to simplify each side before solving. Normally this involves the combination of similar terms. Note At this point of our study of algebra Use of the properties of equality should seem routine. Therefore, by displaying these steps in this text, usually in blue, it becomes optional. Example \ (\ PageDex {5} \): Fix: \ (- 4 A + 2 - A = 1 \). The solution first combines similar terms on the left side of the equal sign. \ (\ Begin {allined} - 4 A + 2 - A = 1 & \ Quad \ Color {Ceruleo} {Combine \: Same-Side \: as \: terms.}\ - 5 A + 2 = 1 & \ Quad \ Color {Ceruleo} {Sottrai \: 2 \: on \: Both \: sides.}\: 5 A = - 1 & \ quad \ color {cerelean} {divid\: Both \: its \: by \ : - 5.}}} A = \ frac {- 1} {- 5} = \ frac {1} {5} \ end {allineato}} Always use the original equation to check if the solution is correct. {5}{\}{\\ {'œ "}\ end {allined}} \) Answer: the solution is \ (\ frac {1} {5} \). Given a linear equation in the \ module (AX + B = CX + D \), we begin the resolution process by combining as terms on opposite sides of the equal sign. To do this, use the addition or subtraction of property of equality to place the terms on the same side so that they can be combined. In the examples remaining, the control is left to the reader. Example \ (\ PageDex {6} \): Fix: \ (â'2y Â '3 = 5Y + 11 \). Subtract solution \ (5Y \) on both sides so that we can combine the terms involving y on the left side. \ (\ begin {array} {- 2 y - 3 \ Color {cerulean} {- 5 y}} color {black} {=} 5 y + 11 \ Color {cerulean} {- 5 y}} \ {- 7 y - 3 = 11} \ end {array} \) From here, solve using the techniques developed previously. \ (\ Begin {allined} - 7 y - 3 & = 11 \ quad \ color {cerelean} {Add \: 3 \: a \: Both \: sides.}\ - 7 y & = 14 \\ y & = \ frac {14} {- 7} \\ quad \ \\ color {cerelean} {divide \: Both \: its \: by \ = 7}\ \) Answer: The solution is \ (â'2 \). The resolution will often require the application of the distribution property. Example \ (\ PageDex {7} \): fix: \ (- \ frac {1} {2} (10 x-2) + 3 = 7 (1 - 2 x) \). The solution simplifies linear expressions on both sides of the same sign. \ (\ Begin {allined} - \ frac {1} {2} (10 x-2) + 3 = 7 (1 - 2 x) & \ quad \ color {cerelean} {distribution}\ - 5 x + 1 + 3 = 7 - 14 x & \ quad \ Color {cerulean} {Combina \: same-side \: as \: terms {\}\ - 5 x + 4 = 7 - 14 x {Combine \: opposite side \: as \: terms.}\ 9 x = 3 & \ quad \ color {cerulean} {resolve.}} X = \ < } } } } } } } } } } } } } } } } } } } { } } } } } } } } } } } } } } } } } } { } { } Answer: the solution is \ (\ frac {1} {3} \). Example \ (\ PageDex {8} \): fix: \ (5 (3â'a) â'2 (5â'2a) = 3 \). The solution begins by applying the distribution property. \ (\ Begin {allined} 5 (3 - A) - 2 (5 - 2 A) & = 3 \\ 15 - 5 A - 10 + 4 A & = 3 \\ 5 - A & = 3 \\ - a & = 2 \ end {allined} \) Here we point out that \ (â'a \) is equivalent to \ (â'1a \); Therefore, we choose to divide both sides of the equation from \ (â'1 \). (\ begin {array} {-A = 2} {A = \ frac {- 1 A} {\ Color {CERULEAN} {- 1}}\ Color {BLACK} {=}\ FRAC {- 2} {\ Color {Cerulean} {- 1}}} {A = 2}\ end {array}}}{\}{\'}{array}}{\'} \) Alternatively, we can multiply both sides of negative \ (â'a = â'2 \) and get the same result. \ (\ Begin {aligned} - A & = - 2 \\\{Cerulean} {(- 1)} Color {black} {() - 2) A & = 2 End {aligned}}) Answer: The solution is (2). Operating (Answer (x = 1) www.youtube.com/v/naiazrfjuo The coefficients of linear equations can be any real number, including decimals and fractions. Fractions. This is the case in which it is possible to use the multiplication properties of equality to cancel the fractionated coefficients and obtain entire coefficients in a single pass. If fractionated coefficients have been provided, then multiply both sides of the equity multiple of the denominators (LCD). Example (PageDex {9}): solve: (Solution Delete fractions by multiplying both sides from the minimum multiple minimum denominators. In this case, it is the (LCD (3, 5) = 15). « Color {ceruleo} {15} color {black} {clot} left (frac {1} {5} x - 1 right) quad color {cerulean} {Multiply: both : By 15.} color {cerulean} {15}} {black} {cdot} frac {1} {3} x + color {cerulean} {15} color {black} { cdot} frac {1} {5} & = color {cerulean} {15} color {black} {clot} frac {1} {5} x - color {ceruleo} {15} color { Black} {clot} 1 quad color {cerulean} {simplify}}} 5 x + 3 & = 3 x - 15 quad quads {cerulean} {resolve.} 2 x & = - 18 x & = frac {- 18} {2} = - 9 end {aligned}} Answer: The solution is (Ã ¢ '9). It is important to know that this technique only works for Equations. Do not try to delete fractions during simplification of expressions. As a reminder: Equation expression (Frac {1} {2} X + Frac {5} {3}) (\.) If you multiply an expression of (6), you would change the problem. However, if you multiply both sides of an equation of (6), an equivalent equation is obtained. Incorrect corrected ((\ " "-}} fine {aligned}) (begin {aligned} frac {1} {2} x + frac {5} {3} & = 0} {3} and = 0 { Cerulean} {6 cdot} color {black} {sinist (frac {1} {2} x + frac {5} {3} right)} & = color {cerulean} {6 clot} } Color {black} {0} 3 x + 10 & = 0 quads {cerulean} {Ã ¢ å "}} {aligned} table 1.1.3 Algebra simplifies the resolution process of the Real world problems. This is done using letters to represent unknown, restore problems in the form of equations and offering systematic techniques to solve these equations. To solve problems using algebra, translating the wording of the problem in mathematical statements that describe The relations between information supplied and unknowners. Usually this translation in mathematical statements is the difficult step in the process. The translation key is to read the problem carefully and identify some keywords and key phrases. Sum of the translation of keywords, increased by, more than, more, added to, total (+ difference, decreased, subtracted by, less, minus (-) product multiplied by, of times, twice (Analyze the keywords and phrases. It is important to identify the variable, Ã ¢ â,¬ Å "Let x represent ¢ â,¬ | - It was in words what is unknown quantity. This step not only makes our work more readable, but it also forces us to think about what we are looking for. Example (PAGNEX {10}): When (6) it is subtracted from twice the sum of a number and (8) the result is (5). Rappresentalo as an algebraic equation and the number. Solution Leave that N represents the â € >>> < >>>>>>>>>>>>>> > >>>>>>>> >>>>>>>>>>>>>>>> >>> >>>>>>>>>>>>>>>>>>>> Table 1.1.6 Response: \ (x = 4 â \) is a solution and \ (x = 6 \) it is not linear inequalities have infinitely many solutions or no solution. If there are multiple solutions, we graficiamo the solution set on a number line and / or express the solution using interval notation. What number would make true the inequality \ (x> 3 \)? It could be four "Thinking," (x \)? This is correct, but \ (x \) may be six, too, or 137, or even 3.0001. Any number greater than three is a solution to the inequality \ (x> 3 \). We show all the solutions to the inequality \ (x> 3 \) on the number line shading in all three numbers to the right of, to show that all of the more than three numbers are solutions. © Since the number three is not a solution, we put a parenthesis to three. We can also represent inequalities using the range notation. There's close above the solution to this inequality. In interval notation, we express \ (x> 3 \) as \ (3, \ infty) \. The \ (\ infty \) is read as â infinitoâ. It's not a real number. The figure \ (\ pageIndex {2} \) shows both the number line that the interval notation. Figure \ (\ pageIndex {2} \): The inequality \ (x> 3 \) is plotted on this line of numbers and written in interval notation. We use the symbol left parenthesis, (, to show that the end point of the inequality is not included. The symbol of the left bracket, [, would show that the endpoint is included. The inequality \ (x \ leq 1 \) means all numbers less than or equal to one. here we show that a is a solution. we do this by placing a bracket \ (x = 1 \). So ombreggiamo in all the numbers to the left of one, to show that all the numbers less than one are solutions (Figure There's no end to those numbers. We write \(x\leq 1x\leq 1 \)in interval rangeLike ((ã, 'infty, 1]. {3}): The inequality (x) is graphicated on this numerical line and written in interval notation. Figure ("PageDex {4} shows both the number line and notation 'Interval. Inequalities, numerical lines and invalid notation The notation for inequalities on a numeric line and in an interval notation Use the same symbols to express the endpoints of the intervals. Note that (infty) is, and (- INFTY, always use brackets in invalid notation, never brackets. Example (