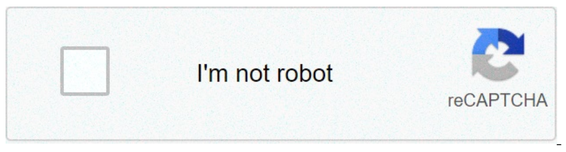

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Operations involving fractions

Fractions represent numbers and, as numbers, they can be combined by addition, subtraction, multiplication, and division. Addition and subtraction of fractions present no problems when the fractions have the same denominator. For example We are adding like fractional parts, so we ignore the denominators and add the numerators. The same holds for subtraction. When the fractions have the same denominator we can subtract the numerators and ignore the denominators. For example To add and subtract fractions with unlike denominators, the numbers have to be renamed. For example, the problem requires us to change the fractions so that they have the same denominator. We try to find the lowest common denominator since this makes the calculation easier. If we write and the problem becomes Similarly, with subtraction of fractions that do not have the same denominator, they have to be renamed. needs to become which leaves Now consider: which is known as an improper fraction. It is said to be improper because the numerator is bigger than the denominator. Often an improper fraction is renamed as a mixed number which is the sum of a whole number and a fraction. Take six of the parts to make a whole (1) and show the part left over as A fraction is not changed if you can do the same operation to the numerator as to the denominator. Both the numerator and denominator of can be divided by four to reduce the fraction to Both terms can also be multiplied by the same number and the number represented by the fraction does not change. This idea is helpful in understanding how to do division of fractions which will be considered next. When multiplying fractions the terms above the line (numerators) are multiplied, and then the terms below the line (denominators) are multiplied, e.g., We can also show this graphically. What we are asking is if I have half of something, (e.g., half a yard) what is of that? The answer is of a yard. It was mentioned earlier that a fraction can be thought of as a division problem. Division of fractions such as may be shown as one large division problem The easiest problem in the division of fractions is dividing by one because in any fraction that has one as the denominator, e.g., we can ignore the denominator because we have 7 wholes. So in our division problem, the question becomes what can we do to get 1 in the denominator? The answer is to multiply by its reciprocal and it will cancel out to one. What we do to the denominator we must do to the numerator. The new equation becomes We can also show this graphically. What we want to know is how many times will a piece of cord fit into a piece that is The answer is Fractions are of immense use in mathematics and physics and the application of these to modern technology. They are also of use in daily life. If you understand fractions you know that is bigger than so that shutter speed in photography becomes understandable. A screw of is smaller than one of so tire sizes shown in fractions become meaningful rather than incomprehensible. It is more important to understand the concepts than to memorize operations of fractions. Barrow, J.D. Pi in the Sky. New York: Oxford University Press, 1992. Hamilton, Johnny E., and Margaret S. Hamilton. Math to Build On: A Book for Those Who Build. Clinton, NC: Construction Trades Press, 1993. Savin, Steve. All the Math You'll Ever Need. New York: John Wiley & Sons, 1989. Now, we have to learn, how to add and subtract the fractions. Certain methods are to be followed for doing these operations. Addition and subtraction of like fractions For adding and subtracting like fractions, we follow these steps: Step 1. Add/subtract the numerators with common denominator. Step 2. Reduce the fraction to its lowest term. Step 3. If the result is an improper fraction, convert it into a mixed fraction. Read More: A fraction compares two numbers by division. To conduct basic operations, keep in mind that any number except 0 divided by itself is 1, and 1 times any number is itself. That is, , and 1 × 5 = 5. Thus, any number divided or multiplied by a fraction equal to one will be itself. For example, and .When multiplying fractions, the numerators (top numbers) are multiplied together and the denominators (bottom numbers) are multiplied together. So . And .To divide fractions, rewrite the problem as multiplying by the reciprocal (multiplicative inverse) of the divisor. So .To add fractions that have the same, or a common, denominator, simply add the numerators, and use the common denominator. The figure below illustrates why this is true.However, fractions cannot be added until they are written with a common denominator. The figure below shows why adding fractions with different denominators is incorrect.To correctly add ½ and ⅓, common denominator must first be found. Usually, the least common multiple of the denominators (also called the least common denominator) is the best choice for the common denominator. In the example below, the least common multiple of the two denominators—2 and 3—is 6, so the least common denominator is 6. To convert the fractions, multiply ½ by (which is equivalent to 1) to get . Similarly, multiply ⅓ by (which is equivalent to 1) to get .FirstAndSo , orTo model this problem visually, divide a rectangle into halves horizontally, then into thirds vertically, creating six equal parts (see the figure below). Shade one-half in color to show ½, and then shade one-third in gray to show ⅓. Since, as the figure shows, the upper left square has been shaded twice, it must be "carried" (see arrow). Now five of six squares are shaded; therefore, .Subtraction of fractions is similar to addition, in that the fractions being subtracted must have a common denominator. So .see also Fraction.Stanislaus Noel Ting Adding FractionsIn Year 4 you learnt to add fractions with the same denominator. Now you can find equivalent fractions you can add any fractions. You must first make sure the denominators are the same (just like when ordering fractions), and then you add together the numerators.Multiplying with FractionsSometimes you need to add together lots of fractions which are the same. When we need to do this sometimes it is easier to multiply than add. For example, if I need to add together seven halves, it is easier to do 7 times one half. To multiply with fractions you need to first make sure your values are proper or improper fractions. Then multiply the numerators together, then the denominators. If you are multiplying by a whole number, the denominator of this is one.Multiplying with FractionsWhat can we do now?Now we can add and multiply more fractions, you can answer questions like these:1) Nigel had three halves of chocolate bars. How many full chocolate bars can he make?2) Sarah had one third of her birthday cake left. Billy had one sixth of the cake. How much did they have altogether?3) Which denominator would you use to add together one eigth, one quarter and one half?HYPERLINKSFollow the links below to learn more.Adding FractionsMultiplying FractionsBBC BitesizeClick here for Year 5 Maths Home PageClick here for KS2 Curriculum Dashboard (All Subjects)National CurriculumPupils should learn to:compare and order fractions whose denominators are all multiples of the same numberidentify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredthsrecognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, 5 2 + 5 4 = 5 6 = 1 5 1add and subtract fractions with the same denominator and denominators that are multiples of the same numbermultiply proper fractions and mixed numbers by whole numbers, supported by materials and diagramsread and write decimal numbers as fractions [for example, 0.71 = 100 71]recognise and use thousandths and relate them to tenths, hundredths and decimal equivalentsround decimals with two decimal places to the nearest whole number and to one decimal placeread, write, order and compare numbers with up to three decimal placessolve problems involving number up to three decimal placesrecognise the per cent symbol (%) and understand that per cent relates to ‘number of parts per hundred’, and write percentages as a fraction with denominator 100, and as a decimalsolve problems which require knowing percentage and decimal equivalents of 2 1 , 4 1 , 5 1 , 5 2 , 5 4 and those fractions with a denominator of a multiple of 10 or 25. Category:Mathematics This resource is designed to improve confidence in mathematics and was developed particularly for primary teachers and those non-specialists who teach mathematics in the lower secondary years. The resource contains a good commentary on how to teach fractions along with a number of examples and exercises suitable for use in the classroom.Fractions part A covers addition and subtraction of fractions including some very useful worded questions, ideal for testing whether students can determine what is the correct calculation to use to solve the problem.The next section considers how to teach the principles involved in performing multiplication and division of fractions. To add (or subtract) two fractions : 1) Find the least common denominator . 2) Write both original fractions as equivalent fractions with the least common denominator. 3) Add (or subtract) the numerators. 4) Write the result with the denominator. Example 1: Add 1 3 + 3 7 . The least common denominator is 21 . 1 3 + 3 7 = 1 · 7 3 · 7 + 3 · 3 7 · 3 = 7 21 + 9 21 = 16 21 To multiply two fractions: 1) Multiply the numerator by the numerator. 2) Multiply the denominator by the denominator. For all real numbers a , b , c , d (b ≠ 0 , d ≠ 0) a b · c d = a c b d Example 2: Multiply 1 4 · 5 6 . 1 4 · 5 6 = 1 · 5 4 · 6 = 5 24 To divide by a fraction, multiply by its reciprocal . For all real numbers a , b , c , d (b ≠ 0 , c ≠ , d ≠ 0) a b ÷ c d = a b · d c = a d b c Example 3: Divide 3 4 ÷ 5 7 . 3 4 ÷ 5 7 = 3 4 · 7 5 = 3 · 7 4 · 5 = 21 20 Mixed numbers can be written as an improper fraction and an improper fraction can be written as a mixed number. Example 4: Write 7 2 5 as an improper fraction. 7 2 5 = 7 1 + 2 5 = 7 · 5 1 · 5 + 2 5 = 35 5 + 2 5 = 37 5 Example 5: Write 11 7 as a mixed number in simple form. 11 7 = 11 ÷ 7 = 1 R 4 Therefore, 11 7 = 1 4 7 . A fraction is in lowest terms when the numerator and denominator have no common factor other than 1 . To write a fraction in lowest terms, divide the numerator and denominator by the greatest common factor . Example 6: Write 45 75 in lowest terms. 45 and 75 have a common factor of 15 . 45 75 = 45 ÷ 15 75 ÷ 15 = 3 5