

1. Adding Fractions
2. You should be familiar with expanding and factoring polynomials, combining like terms and reducing fractions. In this lesson, we will add and subtract fractions involving polynomials.
3. Recall that fractions are based on the notion that some standard unit is divided in equal-sized pieces, in this case, each circle is divided into five equal pieces. When we add one piece to two pieces, we get three pieces.
4.
 - (a) When the denominators are not equal, we need to cut the pieces smaller.
 - (b) In this case, we can cut each circle into six pieces. The one-half becomes three pieces out of six and the one-third becomes two pieces out of six, for a total of five-sixths.
 - (c) Mathematically, we supply missing factors to each fraction in order to arrive at a common denominator.
 - (a) One approach is to think of the numerators and denominators as rows and columns of a rectangular grid.
 - (b) The first fraction is represented by one of the six rows, the second fraction by 3 of the 7 columns.
 - (c) One row is 7 of the 42 boxes and 3 columns are 18 of the 42 boxes, making a total of 25 boxes.
 - (d) Again, the process is to find a common denominator by multiplying the two denominators.
 - (a) There may be a smaller denominator.
 - (b) We can apply the same technique here
 - (c) to find the answer $\frac{6}{8}$
 - (d) or we may notice that we can find a common denominator merely by multiplying the first fraction, top and bottom, by 2.
5. In general, the process is as follows. First, factor each denominator. There may be some factors in common already. Next, supply the missing factors. Fractions are then added by adding the numerators over a common denominator. The numerator can be expanded and like terms combined, which may lead to additional factoring. At this point, common factors may cancel.
6.
 - (a) Here is a first example.
 - (b) Missing factors are supplied
 - (c) the numerators are expanded
 - (d) and like terms are combined to arrive at a single fraction.

7.
 - (a) Here is a second example.
 - (b) First, the denominators are factored. There is no need to factor the numerators, since you will want to expand them later.
 - (c) Missing factors are supplied. Notice that these two fractions are subtracted.
 - (d) It may be easier to change the minus sign to a plus sign, and multiply one of the factors by -1.
 - (e) the numerators are expanded
 - (f) and like terms are combined to arrive at a single fraction. At this point, you should check to see if the numerator will factor and cancel common factors if possible.
8. To recap: The process is to first factor each denominator. Next, supply the missing factors. Fractions are then added by adding the numerators over a common denominator. The numerator can be expanded and like terms combined, which may lead to additional factoring. At this point, common factors may cancel.