Canceling Terms in Fractions

Once a fraction is in reduced form, you may begin trying to cancel terms. Only when factors in the numerator match *exactly* with factors in the denominator can the terms be canceled. One of the most consistent ways to ensure that your cancellations are appropriate is to factor the numerator and denominator into smaller pieces before attempting to cancel.

Example 1: Simplify $\frac{4x^2+2x}{6x^3+4x}$

Solution: $\frac{4x^2+2x}{6x^3+4x}=\frac{2x(2x+1)}{2x(3x^2+2)}=\frac{(2x+1)}{(3x^2+2)}$

In Example 1, we can factor 2x from both the numerator and denominator. Thus, we can cancel the 2x terms from the expression. A common mistake made by students is to "cancel" pieces that are not factors.

Bad Example 1: Simplify $\frac{2x^2+x}{2x^2+x+3}$

Bad Solution: $\frac{2x^2+x}{2x^2+x+3}=\frac{(2x^2+x)}{(2x^2+x)+3}=\frac{1}{3}$

In this bad example, the term $2x^2+x$ is a factor of the numerator, but it is *not* a factor of the denominator. This cancellation is therefore invalid. (verify this by plugging in a numerical value for *x*.)

The Least Common Denominator

You should already be familiar with the standard technique for adding fractions together. Generally, we find a common denominator between the terms in our expression. In order to ensure that the fraction we get as a result of addition (or subtraction) is in reduced form, we are interested in finding the least common denominator (LCD) for our sum. To find the LCD, write the denominator of each fraction as a product of its prime factors. The LCD will be the smallest number that is a multiple of each denominator.

Example 2: Find the LCD for $\frac{1}{(x+1)(x+2)}+\frac{2}{(x+2)(x+3)}-\frac{3}{(x+3)(x+1)}$

The LCD of this sum is $(x+1)(x+2)(x+3)$.