1. Multiplying and Dividing Fractions

2. You should be familiar with factoring polynomials and reducing fractions. In this lesson, we will multiply and divide fractions involving polynomials.

3. (a) When multiplying fractions, we can think of building a rectangle where the number of rows and number of columns are the two denominators.

   (b) the fraction 5/6 is represented by the fact that five of the six rows are shaded.

   (c) Within each shaded row, if we color two of the five boxes pink, then we have two-fifths of five-sixth, which is the multiplication we wish to perform. Notice that the pink region is a rectangle with five rows of two, which are the two numerators.

   (d) Mathematically, the procedure for multiplying fractions is to multiply the numerators to get the numerator of the product, and multiply the denominators to get the denominator of the product.

   (e) In this case, the fraction can be reduced.

   (f) Notice that the factors of the original fractions combine to make the factors of the product.

4. (a) The same holds true for polynomials. The factors in the product come from factoring the individual numerators and denominators.

   (b) In this case, the second denominator factors as a difference of squares.

   (c) Common factors can then be cancelled to simplify the answer.

5. (a) To divide fractions, we multiply by the reciprocal.

   (b) At this point, we have a standard multiplication problem. The next step is to factor.

   (c) Once we have the factors, we cancel the common factors

   (d) to arrive at the simplified answer.

6. To recap: Begin by factoring the individual numerators and denominators. The product merely combines the factors in the numerators to make the numerator of the product and similarly for the denominator. Division is multiplication by the reciprocal.