4.5   How can I rewrite it?

Adding and Subtracting Rational Expressions

So far in this course you have learned a lot about rational expressions. You have learned how to simplify complex algebraic fractions by factoring the numerators and denominators. You have also learned how to multiply and divide rational expressions. What else is there? Today you will develop a method to add and subtract algebraic fractions.

- **3-97.** With your team, read your directions for Monica's sister from homework problem 3-92. Verify that everyone obtained the same answer and be prepared to share how you added the fractions with the class.

$$\frac{1}{3} + \frac{2}{5}$$

   a. Now Monica's sister wants to know *why*? Why does she have to do all of those steps with the common denominator? What is a fraction anyway, and why does adding them have to be so complicated? Draw some pictures or diagrams or make up some situations that will help her to know what fractions like $\frac{1}{3}$ and $\frac{2}{5}$ mean.

   b. Now use your ideas from part (a) to show Monica *why* she needs a common denominator to add the two fractions.

- **3-98.** Extend the procedures your class developed for numerical fractions to add these algebraic fractions.

$$\frac{2x}{x-1} + \frac{3}{x+5}$$

- **3-99.** Now add the fractions below. After you have added them, be sure to check to see if the numerator can be factored. You may be able get a simpler answer.

   a. $\dfrac{x}{3x+1} + \dfrac{2x^2-2}{(x-5)(3x+1)}$

   b. $\dfrac{9-3x}{(x+3)(x-3)} + \dfrac{2x}{x+3}$

- **3-100.** Examine the expression below.

$$\frac{2x-1}{3x^2+13x+4} + \frac{x+3}{x^2-3x-28}$$

a.   With your team, decide how you can alter the expression so that the fractions have a common denominator. Be ready to share your idea with the class.

b.   If you have not already do so, add the fractions. Then simplify the result, if possible.

c.   Repeat the process to subtract the expressions below. Simplify the result, if possible.

$$\frac{2}{x+4} - \frac{4x-x^2}{x^2-16}$$