3.2.3 How can I rewrite it?

Multiplying and Dividing Rational Expressions

You know how to multiply and divide fractions. But what if the fractions have variables in them? That is, what if they are rational expressions? Is the process the same? Today you will learn how to multiply and divide rational expressions and will continue to practice simplifying rational expressions.

3-85. Review your work from yesterday by simplifying the rational expression below using a "Giant One." What are the excluded values of x? (That is, what values can x not be?)

$$\frac{3x^2+11x-4}{2x^2+11x+12}$$

3-86. With your team, review your responses to homework problem 3-82. Verify that everyone obtained the same answers and be prepared to share with the class how you multiplied and divided the fractions below.

$$\frac{2}{3} \cdot \frac{9}{14} \qquad \frac{3}{5} \div \frac{12}{25}$$

3-87. Use your understanding of multiplying and dividing fractions to rewrite the expressions below. Then look for "Giant Ones" and simplify. For each rational expression, also state any values of the variables that would make the denominator zero.

a. $\frac{4x+3}{x-5} \cdot \frac{x-5}{x+3}$

b. $\frac{x+2}{9x-1} \div \frac{2x+1}{9x-1}$

c. $\frac{2m+3}{3m-2} \cdot \frac{7+4m}{3+2m}$

d. $\frac{(y-2)^3}{3y} \cdot \frac{y+5}{(y+2)(y-2)}$

e. $\frac{15x^3}{3y} \div \frac{10x^2y}{4y^2}$

f. $\frac{(5x-2)(3x+1)}{(2x-3)^2} \div \frac{(5x-2)(x-4)}{(x-4)(2x-3)}$

3-88. PUTTING IT ALL TOGETHER

Multiply or divide the expressions below. Leave your answers as simplified as possible. For each rational

expression, assume the denominator is not zero.

a. $\frac{20}{22} \cdot \frac{14}{35}$

b. $\frac{12}{40} \div \frac{15}{6}$

c. $\frac{5x-15}{3x^2+10x-8} \div \frac{x^2+x-12}{3x^2-8x+4}$

d. $\frac{12x-18}{x^2-2x-15} \cdot \frac{x^2-x-12}{3x^2-9x-12}$

e. $\frac{5x^2+34x-7}{10x} \cdot \frac{5x}{x^2+4x-21}$

f. $\frac{2x^2+x-10}{x^2+2x-8} \div \frac{4x^2+20x+25}{x+4}$

3-89. LEARNING LOG

In your Learning Log, explain how to multiply and divide rational expressions. Be sure to include an example of each. Title this entry "Multiplying and Dividing Rational Expressions" and include today's date.

3-90. Multiply or divide the expressions below. Simplify your results. Help (Html5)⇔Help (Java)

a. $\frac{x-7}{9(2x-1)} \div \frac{(x+5)(x-7)}{6x(x+5)}$

b. $\frac{6x^2-x-1}{3x^2+25x+8} \cdot \frac{x^2+4x-32}{2x^2+7x-4}$

3-91. For each rational expression below, state any values of the variables that would make the denominator zero. Then complete each part. Help (Html5)⇔Help (Java)

a. Use the fact that $(x + 4)^2 = (x + 4)(x + 4)$ to rewrite $\frac{(x+4)^2}{(x+4)(x-2)}$. Then look for "ones" and simplify.

b. Use the strategy you used in part (a) to simplify the expression $\frac{8(x+2)^3(x-3)^3}{4(x+2)^2(x-3)^5}$.

3-92. Monica's younger sister is just learning how to add fractions, and she is confused. She has to add $\frac{1}{3} + \frac{2}{5}$.

Help Monica explain to her by writing a detailed step-by-step explanation of exactly what she needs to do. Help (Html5)⇔Help (Java)

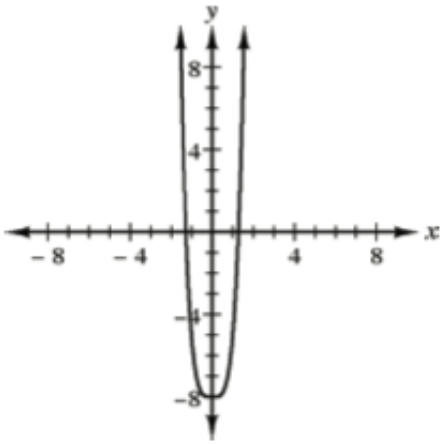
3-93. Solve the systems of equations below using any method. Help (Html5)⇔Help (Java)

a. $3x - 3 = y$
$6x - 5y = 12$

b. $3x - 2y = 30$
$2x + 3y = -19$

3-94. Janelle conducted an experiment by mistake when she left her bologna sandwich at school over winter break. When she got back, her sandwich was much larger than it was when she left it. Her science teacher explained that the sandwich had produced large quantities of a rare bacterium, Bolognicus sandwichae. Based on a sample taken from the sandwich, Janelle determined that there were approximately 72 million bacteria present. Her science teacher explained that this is not very surprising, since the number of this bacteria triples every 24 hours. Since the sandwich had been made only 15 days ago, Janelle was sure that she could sue the meat company. The foodindustry standard for the most bacteria a sandwich-sized portion can have at the time of production is 100. Find out how many of the bacteria were present when the sandwich was made to determine if Janelle has a case. Help (Html5)⇔Help (Java)

3-95. Determine if the function shown on the graph at right is odd or even or neither? Explain how you decided. Help (Html5)⇔Help (Java)



3-96. Solve the equations below. Check your solution(s). Help (Html5)⇔Help (Java)

a. $\frac{m}{6} = \frac{m+1}{5}$

b. $\frac{3x-5}{2} = \frac{4x+1}{4}$

c. $\frac{8}{k} = \frac{14}{k+3}$

d. $\frac{x}{9} = 10$