# Looking Ahead

Now that you have reviewed how to simplify complex rational expressions, you will be able to apply these skills to more advanced topics like the quotient of rational functions. The following example shows you how to apply the skills of this section to such a problem.

## Example Preview

Find the formula for $(g \circ f)(x)$ for the following functions.

$$f(x) = \frac{1}{x} \quad \text{and} \quad g(x) = \frac{x-2}{5}$$

**Solution**

$$\begin{aligned}(g \circ f)(x) &= g(f(x)) \\ &= g\left(\frac{1}{x}\right) \\ &= \frac{\left(\frac{1}{x}\right) - 2}{5} \\ &= \frac{\frac{1}{x} - 2}{5} \cdot \frac{x}{x} \\ &= \frac{1-2x}{5x}\end{aligned}$$

# 4.R.7 Exercises

## Concept Check

**True/False.** Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

**1.** When simplifying complex fractions, the answer should always be reduced to lowest terms.

**2.** Complex fractions are those fractions in which only the denominator consists of one or more fractions itself.

©HAWKES LEARNING

**3.** Sometimes finding the LCM of all denominators is an important first step for simplifying complex fractions.

**4.** The LCM of the denominators of $\frac{2}{x-6}$ and $\frac{x}{6}$ is 6.

## Practice

Simplify the following complex fractions.

**5.** $\dfrac{\dfrac{2x}{3y^2}}{\dfrac{5x^2}{6y}}$

**6.** $\dfrac{\dfrac{x+3}{2x}}{\dfrac{2x-1}{4x^2}}$

**7.** $\dfrac{\dfrac{3}{x}+\dfrac{5}{2x}}{\dfrac{1}{x}+4}$

**8.** $\dfrac{\dfrac{7}{x}-\dfrac{14}{x^2}}{\dfrac{1}{x}-\dfrac{4}{x^3}}$

©HAWKES LEARNING

Simplify the following complex algebraic expressions.

**9.** $\dfrac{1}{x+1}-\dfrac{3}{2x}\cdot\dfrac{4x}{x+1}$

**10.** $\dfrac{x}{x-1}-\dfrac{3}{x-1}\cdot\dfrac{x+2}{x}$

## Applications

Solve.

**11.** ***Investing:*** The average percent yield (APY) of an annuity is the annual interest rate earned in a given year that accounts for the effects of compounding. The APY acts as the interest rate for a simple interest account and is larger than the stated interest rate on the compound interest account. The formula to calculate the APY on an annuity after 2 years is

$$\text{APY}=\left(1+\frac{r}{2}\right)^2-1,$$

where $r$ is the stated interest rate.

**a.** Simplify the expression for APY and write as a single rational expression.

**b.** Using the original formula, calculate the APY for an annuity whose interest rate is 6%. Do not round.

**c.** Using the expression in Part **a.**, calculate the APY for an annuity whose interest rate is 6%. Do not round.

**d.** Does the result from Part **c.** match the result from Part **b.**? Explain why or why not.

**e.** How much larger is the APY than the interest rate?

**f.** Why do you think the APY is larger than the interest rate? Write a complete sentence.

©HAWKES LEARNING

## Writing & Thinking

**12.** Some complex fractions involve the sum (or difference) of complex fractions. Beginning with the outermost denominator, simplify each of the following expressions.

**a.** $1+\dfrac{1}{1+\dfrac{1}{1+\dfrac{1}{1+1}}}$

**b.** $2-\dfrac{1}{2-\dfrac{1}{2-\dfrac{1}{2-1}}}$

**c.** $x+\dfrac{1}{x+\dfrac{1}{x+\dfrac{1}{x+1}}}$

©HAWKES LEARNING