NAME

Module 15 Simplifying Rational Expressions
Lesson 2 Simplifying Rational Expressions

Simplify the following rational expressions.

1. $\frac{24x}{8x^2}$ $\frac{3}{x}$
2. $\frac{14y^2z^4}{21xy^2z}$ $\frac{2z^3}{3x}$
3. $\frac{8m^2n^4}{40mn^8p}$ $\frac{m}{5n^4p}$
4. $\frac{20d^2 - 5d}{4d - 1}$ $5d$
5. $\frac{8p^2 - 32p}{16p^2 - 64p}$ $\frac{1}{2}$
6. $\frac{t^2 + 3t}{8t^2 + 24t}$ $\frac{1}{8}$
7. $\frac{2y - 8}{y^2 - 4y}$ $\frac{2}{y}$
8. $\frac{y - 3}{3 - y}$ -1
9. $\frac{x^2 + 5}{x^2}$ $\frac{x^2 + 5}{x^2}$
10. $\frac{4r^3 - 12r}{6 - 2r^2}$ $-2r$
11. $\frac{p^2 + 4p}{8p + 32}$ $\frac{p}{8}$
12. $\frac{6k + 12}{8k + 16}$ $\frac{3}{4}$
13. $\frac{s - 2}{s^2 - 5s + 6}$ $\frac{1}{s - 3}$
14. $\frac{d^2 + 4d - 32}{d - 4}$ $d + 8$
15. $\frac{f^2 + 2f - 15}{f^2 - 8f + 15}$ $\frac{f + 5}{f - 5}$
16. $\frac{y^2 + y - 12}{y^2 + 3y - 18}$ $\frac{y + 4}{y + 6}$
17. $\frac{g^2 - 25}{g^2 - 7g + 10}$ $\frac{g + 5}{g - 2}$
18. $\frac{x^2 + 12x + 27}{x^2 - 81}$ $\frac{x + 3}{x - 9}$
19. $\frac{2b^2 + 7b - 4}{4b^2 + 8b - 5}$ $\frac{b + 4}{2b + 5}$
20. $\frac{5h^3 + 13h^2 - 6h}{2h^3 + 5h^2 - 3h}$ $\frac{5h - 2}{2h - 1}$

Journal

1. Michael believes the expression $\frac{y + 8}{y + 4}$ simplifies to two. Is he correct? Explain.
2. Explain how a student would simplify $\frac{14x - 7}{2x^2 + 3x - 2}$.
3. Explain why $\frac{m - 6}{6 - m}$ is equal to negative one.
4. Find a rational expression that will simplify to $\frac{x + 2}{x - 1}$. Explain.

Cumulative Review

State the restricted values of each rational expression.

1. $\frac{5}{x}$ 0
2. $\frac{v}{v + 3}$ -3
3. $\frac{5b + 3}{4}$ no restricted values
4. $\frac{r - 1}{3r}$ 0

5. $\frac{y-4}{2y+8}$ **-4**

6. $\frac{5z-3}{2z+1}$ **$-\frac{1}{2}$**

7. $\frac{3t-4}{t^2+2t-8}$ **$-4, 2$**

8. $\frac{3b^2+11b-20}{6b^2-11b-35}$ **$\frac{7}{2}, -\frac{5}{3}$**

Simplify. State all restricted values.

9. $\frac{a+4}{2a+8}$ **$\frac{1}{2}, a \neq -4$**

10. $\frac{2x^2}{6x-4}$ **$\frac{x^2}{3x-2}, x \neq \frac{2}{3}$**

Possible Journal Answers

1. In order to simplify a rational expression, a common factor must be used. Because $y + 8$ and $y + 4$ have no common factors, this rational expression is already in simplest form. Michael did not realize this expression was already in simplest form.
2. To simplify $\frac{14x-7}{2x^2+3x-2}$, factor seven out of the numerator to arrive at $7(2x - 1)$. Then, factor the denominator into a product of two binomials to obtain $(2x - 1)(x + 2)$. The resulting rational expression is $\frac{7(2x-1)}{(2x-1)(x+2)}$. Cancel the common factors, $(2x - 1)$. The simplified form is $\frac{7}{x+2}$.
3. When the numerator of $\frac{m-6}{6-m}$ is factored, it becomes $-1(6 - m)$. The $6 - m$ in the numerator then cancels with the $6 - m$ in the denominator leaving negative one.
4. Answers will vary. Since multiplying by the same value in the numerator and denominator is the same as multiplying by one, the simplest way to find an expression that will simplify to be $\frac{x+2}{x-1}$ is to multiply both the numerator and the denominator by an integer factor. For example, if both the numerator and denominator are multiplied by two, the expression becomes $\frac{2x+4}{2x-2}$. The numerator and denominator of this expression, however, could be multiplied by any polynomial.