

12.4 Simplify Rational Expressions

pp. 794–800

EXAMPLE

Simplify $\frac{x^2 - 3x - 18}{x^2 + 11x + 24}$. State the excluded values.

$$\begin{aligned} \frac{x^2 - 3x - 18}{x^2 + 11x + 24} &= \frac{(x + 3)(x - 6)}{(x + 3)(x + 8)} && \text{Factor numerator and denominator.} \\ &= \frac{\cancel{(x + 3)}(x - 6)}{\cancel{(x + 3)}(x + 8)} && \text{Divide out common factor.} \\ &= \frac{x - 6}{x + 8} && \text{Simplify.} \end{aligned}$$

► The excluded values are -8 and -3 .

EXERCISES

Find the excluded values, if any, of the expression.

16. $\frac{x + 3}{2x - 4}$

17. $\frac{3}{y^2 - 4y - 12}$

18. $\frac{8z}{9z^2 - 1}$

Simplify the expression, if possible. State the excluded values.

19. $\frac{5m^3 - 15m^2}{20m^2}$

20. $\frac{3n^2 - n - 2}{2n^2 - 3n + 1}$

21. $\frac{4 - r^2}{r^2 - r - 2}$

EXAMPLES 1, 2, 3, and 4

on pp. 794–796
for Exs. 16–21

12.5 Multiply and Divide Rational Expressions

pp. 802–809

EXAMPLE

Find the quotient $\frac{5x^2 + 3x - 2}{4x} \div (5x - 2)$.

$$\begin{aligned} \frac{5x^2 + 3x - 2}{4x} \div (5x - 2) &= \frac{5x^2 + 3x - 2}{4x} \div \frac{5x - 2}{1} && \text{Rewrite polynomial as fraction.} \\ &= \frac{5x^2 + 3x - 2}{4x} \cdot \frac{1}{5x - 2} && \text{Multiply by multiplicative inverse.} \\ &= \frac{5x^2 + 3x - 2}{4x(5x - 2)} && \text{Multiply numerators and denominators.} \\ &= \frac{\cancel{(5x - 2)}(x + 1)}{4x\cancel{(5x - 2)}} && \text{Factor and divide out common factor.} \\ &= \frac{x + 1}{4x} && \text{Simplify.} \end{aligned}$$

EXERCISES

Find the product or quotient.

22. $\frac{-x^3}{x^2 + 5x - 14} \cdot (2 - x)$

23. $\frac{6v^8}{2v^5} \div \frac{8v}{14v^5}$

24. $\frac{w^2 - 9}{2w + 1} \div \frac{w + 3}{4w^2 - 1}$

EXAMPLES 3 and 4

on pp. 803–804
for Exs. 22–24