

8.4 Multiply and Divide Rational Expressions

pp. 573–580

EXAMPLE

Divide: $\frac{3x + 27}{6x - 48} \div \frac{x^2 + 9x}{x^2 - 4x - 32}$

$$\frac{3x + 27}{6x - 48} \div \frac{x^2 + 9x}{x^2 - 4x - 32} = \frac{3x + 27}{6x - 48} \cdot \frac{x^2 - 4x - 32}{x^2 + 9x}$$

Multiply by reciprocal.

$$= \frac{3(x + 9)}{6(x - 8)} \cdot \frac{(x + 4)(x - 8)}{x(x + 9)}$$

Factor.

$$= \frac{\cancel{3}(x + \cancel{9})(x + 4)(x - \cancel{8})}{2(\cancel{3})(x - \cancel{8})(x)(x + \cancel{9})}$$

Divide out common factors.

$$= \frac{x + 4}{2x}$$

Simplified form

EXERCISES

Perform the indicated operation. Simplify the result.

19. $\frac{80x^4}{y^3} \cdot \frac{xy}{5x^2}$

20. $\frac{x - 3}{2x - 8} \cdot \frac{6x^2 - 96}{x^2 - 9}$

21. $\frac{16x^2 - 8x + 1}{x^3 - 7x^2 + 12x} \div \frac{20x^2 - 5x}{15x^3}$

22. $\frac{x^2 - 13x + 40}{x^2 - 2x - 15} \div (x^2 - 5x - 24)$

EXAMPLES

3, 4, 6, and 7

 on pp. 575–577
 for Exs. 19–22

8.5 Add and Subtract Rational Expressions

pp. 582–588

EXAMPLE

Add: $\frac{x}{6x + 24} + \frac{x + 2}{x^2 + 9x + 20}$

The denominators factor as $6(x + 4)$ and $(x + 4)(x + 5)$, so the LCD is $6(x + 4)(x + 5)$. Use this result to rewrite each expression with a common denominator, and then add.

$$\begin{aligned} \frac{x}{6x + 24} + \frac{x + 2}{x^2 + 9x + 20} &= \frac{x}{6(x + 4)} + \frac{x + 2}{(x + 4)(x + 5)} \\ &= \frac{x}{6(x + 4)} \cdot \frac{x + 5}{x + 5} + \frac{x + 2}{(x + 4)(x + 5)} \cdot \frac{6}{6} \\ &= \frac{x^2 + 5x}{6(x + 4)(x + 5)} + \frac{6x + 12}{6(x + 4)(x + 5)} \\ &= \frac{x^2 + 11x + 12}{6(x + 4)(x + 5)} \end{aligned}$$

EXERCISES

Perform the indicated operation and simplify.

23. $\frac{5}{6(x + 3)} + \frac{x + 4}{2x}$

24. $\frac{5x}{x + 8} + \frac{4x - 9}{x^2 + 5x - 24}$

25. $\frac{x + 2}{x^2 + 4x + 3} - \frac{5x}{x^2 - 9}$

EXAMPLES

3 and 4

 on pp. 583–584
 for Exs. 23–25