

12-4 Dividing Rational Expressions (Pages 660–664)

To divide algebraic rational expressions, multiply by the reciprocal of the divisor (the second fraction).

Example

Find $\frac{x^2 - 4}{5x} \div \frac{x + 2}{x - 2}$.

$$\frac{x^2 - 4}{5x} \div \frac{x + 2}{x - 2} = \frac{x^2 - 4}{5x} \cdot \frac{x - 2}{x + 2}$$

$$= \frac{\cancel{(x+2)}(x-2)}{5x} \cdot \frac{x-2}{\cancel{x+2}}$$

$$= \frac{(x-2)(x-2)}{5x} \text{ or } \frac{x^2 - 4x + 4}{5x} \text{ Multiply.}$$

The reciprocal of $\frac{x+2}{x-2}$ is $\frac{x-2}{x+2}$.

Factor. Then divide by the common factor $x + 2$.

Try These Together

1. Find $\frac{5m^2}{10} \div \frac{3m^5}{12}$.

2. Find $\frac{3a - 15}{a + 4} \div (a - 5)$.

HINT: First rewrite, multiplying by the reciprocal of the second fraction. Then divide by the greatest common factor.

HINT: The reciprocal of $a - 5$ is $\frac{1}{a - 5}$.

Practice

Find each quotient. Assume that no denominator has a value of 0.

3. $\frac{8x}{3yz^2} \div \frac{4xy}{3yz}$

4. $10bc^2 \div \frac{2abc}{8b}$

5. $\frac{x - 5}{8} \div \frac{x - 5}{32}$

6. $\frac{x - 8}{x + 3} \div \frac{x + 2}{x + 2}$

7. $\frac{4x^2 + 4}{2} \div \frac{x^3 + x}{x}$

8. $\frac{b^2 - 25}{4} \div (b + 5)$

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

10. $\frac{4b^5}{b + 3} \div \frac{4b^2}{5b + 15}$

11. $\frac{2k + 10}{k - 3} \div \frac{2}{k - 3}$

12. $\frac{8}{y + 2} \div \frac{y - 2}{y^2 - 4}$

13. $\frac{x + 1}{x^2 + 8x + 7} \div \frac{4}{2x + 14}$

14. $\frac{x^2 + x - 6}{2x} \div \frac{x + 3}{4x^2 + 8x}$

15. $\frac{n^2 - 9}{n - 3} \div \frac{n + 3}{n^2 + 7n + 12}$

16. $\frac{x + 1}{x^2 + 2x + 1} \div \frac{x - 3}{x + 1}$

17. $\frac{4m}{m - 6} \div \frac{m^2 + 2m}{m^2 - 4m - 12}$

18. **Standardized Test Practice** Find the quotient $\frac{x + 1}{2} \div \frac{x^2 + 6x + 5}{4}$.

A $\frac{2}{x + 5}$

B $2(x + 5)$

C $\frac{1}{2}(x + 5)$

D $\frac{x + 5}{2}$

Answers: 1. $\frac{m^3}{2}$ 2. $\frac{a+4}{3}$ 3. $\frac{yz}{2}$ 4. $\frac{40bc}{a}$ 5. 4 6. $\frac{x-8}{8}$ 7. 2 8. $\frac{b-5}{4}$ 9. $n^2 - 1$ 10. $5b^3$ 11. $k + 5$ 12. 8 13. $\frac{2}{1}$ 14. $2x^2 - 8$ 15. $n^2 + 7n + 12$ 16. $\frac{x-3}{1}$ 17. 4 18. A