

Section 10.3

Dividing Rational Expressions

Division of rational expressions, similar to the division of fractions, is done by multiplying the first fraction by the reciprocal of the second fraction. Once numerators and denominators are multiplied, reduce to lowest terms.

Example: Divide $\frac{-3a^6}{8} \div \frac{6a^2}{7}$

“Flip” (find reciprocal of) second fraction, reduce, and multiply what’s left.

$$\frac{-3a^6 \cdot 7}{8 \cdot 6a^2}$$

$$\frac{-3 \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot 7}{8 \cdot 2 \cdot 3 \cdot a \cdot a} = \frac{7a^4}{16}$$

Example: Divide $\frac{-12+4z}{3} \div \frac{-6+2z}{6}$

Flip second fraction, factor, and reduce:

$$\frac{4(-3+z)}{3} \cdot \frac{6}{2(-3+z)} = \frac{4(-3+z) \cdot 6}{3 \cdot 2(-3+z)} = \frac{2 \cdot 2 \cdot (-3+z) \cdot 2 \cdot 3}{3 \cdot 2 \cdot (-3+z)} = \frac{4}{1} = 4$$

Example: Divide $\frac{x^2+11x+28}{x^2+5x-14} \div \frac{-x^2-7x-12}{x^2+x-6}$

Flip second fraction, factor and reduce:

$$\frac{(x+4)(x+7)}{(x+7)(x-2)} \cdot \frac{(x+3)(x-2)}{-(x+3)(x+4)} = -1$$

(-1 was factored out of the right denominator, making the trinomial positive, and the answer negative)

Practice:

Divide.

1. $\frac{4a^5}{7} \div \frac{-6a}{5}$

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

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

2. $\frac{8}{x^7} \div \frac{12}{x^2}$

9. $\frac{x-6}{8x} \div \frac{x^2-36}{4x^2}$

15. $\left(\frac{2a-5}{3}\right)^5 \div \left(\frac{2a-5}{3}\right)^4$

3. $\frac{12x^8}{5} \div 7x^2$

10. $\frac{19}{5x-10} \div \frac{38x+57}{3x-6}$

16. $\left(\frac{7}{x+5}\right) \div \left(\frac{7}{x+5}\right)^3$

4. $\frac{-6+2y}{10} \div \frac{y-12}{6}$

11. $\frac{x^2-5x+6}{x-3} \div (x-3)$

17. $\frac{x^2+x-6}{x^2-x-30} \div \frac{x^2-x-12}{x^2+3x-10}$

5. $\frac{-10+5m}{6} \div \frac{-12+3m}{10}$

12. $\frac{1-y}{y^2-2y-1} \div (y-1)$

18. $\frac{a^2-a-20}{a^2+7a+12} \div \frac{a^2-10a+25}{a^2+6a+9}$

6. $\frac{x-3}{x+5} \div \frac{4x-12}{x+3}$

13. $(2-a) \div \frac{a^2-4}{a-7}$

19. $\frac{2a^2-7a+3}{2a^2+3a-2} \div \frac{6a^2-5a+1}{3a^2+5a-2}$