

7.2

Friday, August 24, 2012
10:53 AM

Multiplying Rational Expressions

For a, b, c, d reals.

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

(ex) $\frac{x}{2} \cdot \frac{-3x}{8} = \frac{-3x^2}{16}$

$\frac{4x^2}{3y} \cdot \frac{5}{y^2} = \frac{20x^2}{3y^3}$

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

Can simplify after multiplying (canceling)

(ex) $\frac{16x^2y}{2y^2z} \cdot \frac{2xyz}{8x^3z} = \frac{x^2yz}{x^3z^2} \cdot \frac{2xyz}{16x^3y^2z^3} = \frac{2z^{-2}}{z^2}$

(ex) $\frac{x+2}{7x} \cdot \frac{2x-1}{4x+8} = \frac{x+2}{7x} \cdot \frac{2x-1}{4(x+2)}$

$\frac{2x-1}{7x \cdot 4(x+2)}$
 $\frac{2x-1}{28x(x+2)}$

Multiplying a rational expression by a polynomial
 remember, you can divide anything by 1 without changing its value, use this.

(ex) $\frac{x^2+3x}{x^2+8x^2} \cdot \frac{x^2+7x-8}{1} = \frac{(x^2+3x)(x^2+7x-8)}{(x^3+8x^2) \cdot 1}$

$= \frac{x(x+3)(x+8)(x-1)}{x^2(x+8)}$

$= \frac{(x+3)(x-1)}{x}$

Dividing Rational Expressions

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} \quad \text{or} \quad \frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \cdot \frac{d}{c} \quad (\text{no } \div \text{ by } 0)$$

ex. $\frac{16x}{13y} \div \frac{2xy}{5xy} =$

$$\frac{\cancel{16} \cdot \cancel{5} \cdot x}{13y \cdot \cancel{2} \cdot \cancel{5} \cdot x} = \frac{8 \cdot 5 \cdot x}{13}$$

ex. $\frac{\frac{x+2}{3x+5}}{\frac{3x+6}{x+1}} = \frac{x+2}{3x+5} \cdot \frac{3x+6}{x+1}$

$$= \frac{40x}{13}$$

If you're dividing by a Polynomial do the dividing by 1 trick.

ex. $\frac{3-x}{6-x} \div \frac{2x^2-5x-3}{1} =$

$$= \frac{3-x}{(6-x)(2x^2-5x-3)}$$

$$= \frac{3-x}{(6-x)(2x+1)(x-3)} = \frac{-(-3+x)}{(6-x)(2x+1)(x-3)}$$

$$= \frac{-(x-3)}{(6-x)(2x+1)(x-3)} = \frac{-1}{(6-x)(2x+1)}$$