




Objective: Multiplying and dividing rational expressions

Homework RF-2 – NYA p.679 #1, 3, 4, 7, 8, 13, 15, 17, 19, 21, 25, 27

Do Now: Simplify 1. $y = \frac{15x + 30}{6x + 12}$ 2. $y = \frac{x^2 + 6x + 8}{x^2 + 3x + 2}$

Exam Prep: Which values are not in the domain of $y = \frac{(x + 1)(x - 3)}{(x - 2)(x - 5)}$?

- a) -1 and 3 b) 1 and -3 c) 2 and 5 d) -2 and -5

	<p>Rational Functions look ugly but they have an inner beauty. Here there is nothing new again... just a lot of stuff together. My bowtie is quite lovely, isn't it?</p>
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Here you will multiply and divide algebraic fractions. You must make sure the products or quotients are in simplest form. Nothing here is new; follow normal rules for algebra and fraction multiplication/division.

Part 1: Simple Multiplication

$\frac{3}{x} \cdot \frac{4}{x^2} = \frac{12}{x^3}$	$\frac{x}{x+4} \cdot \frac{x-3}{x-2} = \frac{x(x-3)}{(x+4)(x-2)}$	<p>Multiply numerators and denominators. Leave in factored form.</p>
Practice	1. $\frac{6}{a^2} \cdot \frac{-2}{a^3} =$	2. $\frac{x-5}{x+3} \cdot \frac{x-7}{x} =$

Part 2: Using Factoring with Multiplication

$\frac{2x+1}{3} \cdot \frac{6x}{4x^2-2}$	$= \frac{2x+1}{3} \cdot \frac{6x}{(2x+1)(2x-1)}$	$= \frac{1}{1} \cdot \frac{2x}{(2x-1)}$	$= \frac{2x}{2x-1}$
Original Problem	Factored Denominator	Divide Out Factors	Simplified Expression
Practice	Multiply $\frac{x-2}{8x}$ and $\frac{-8x-16}{x^2-4}$		

Part 3: Multiplying a Rational Expression by a Polynomial

$\frac{3x + 2}{2x + 4} \cdot (x^2 + 5x + 6) =$	$\frac{3x + 2}{2x + 4} \cdot \frac{x^2 + 5x + 6}{1} =$	$\frac{3x + 2}{2(x + 2)} \cdot \frac{(x + 2)(x + 3)}{1} =$	$\frac{(3x + 2)(x + 3)}{2}$
Original Problem	Put Polynomial Over 1 and Simplify	Factor and Divide Out	Simplified Expression
Practice	1. $\frac{3}{c} \cdot (c^3 - c)$	2. $\frac{2v}{v + 3} \cdot (v^2 - 2v - 15)$	3. $(m - 1) \cdot \frac{4m + 8}{m^2 - 1}$

Part 4: Dividing by Rational Expressions

$\frac{a^2 + 7a + 10}{a - 6} \div \frac{a + 5}{a^2 - 36} =$	$\frac{a^2 + 7a + 10}{a - 6} \cdot \frac{a^2 - 36}{a + 5} =$	$\frac{(a + 2)(a + 5)}{a - 6} \cdot \frac{(a - 6)(a + 6)}{a + 5} =$ See Below	
Original Problem	Multiply by the Reciprocal	Factor and Simplify	
		Answer = $(a + 2)(a + 6)$	
Practice	1. $\frac{a - 2}{ab} \div \frac{a - 2}{a}$	2. $\frac{5m + 10}{2m - 20} \div \frac{7m + 14}{14m - 20}$	3. $\frac{6n^2 - 7n - 3}{2n^2 + n - 3} \div \frac{2n - 3}{n - 1}$

Part 5: Dividing a Rational Expression by a Polynomial

$\frac{x^2 + 3x + 2}{4x} \div (5x^2 + 5x) =$	$\frac{x^2 + 3x + 2}{4x} \cdot \frac{1}{5x^2 + 5x} =$	$\frac{(x + 1)(x + 2)}{4x} \cdot \frac{1}{5x(x + 1)} =$	$\frac{x + 2}{20x^2}$
Original Problem Use Reciprocal ($\div \rightarrow \cdot$)	Put 1 Over the Polynomial and Simplify	Factor and Divide Out	Ans
Practice	1. $\frac{3x^3}{2} \div (-15x^5)$	2. $\frac{y + 3}{y + 2} \div (y + 2)$	3. $\frac{z^2 + 2z - 15}{z^2 + 9z + 20} \div (z + 3)$