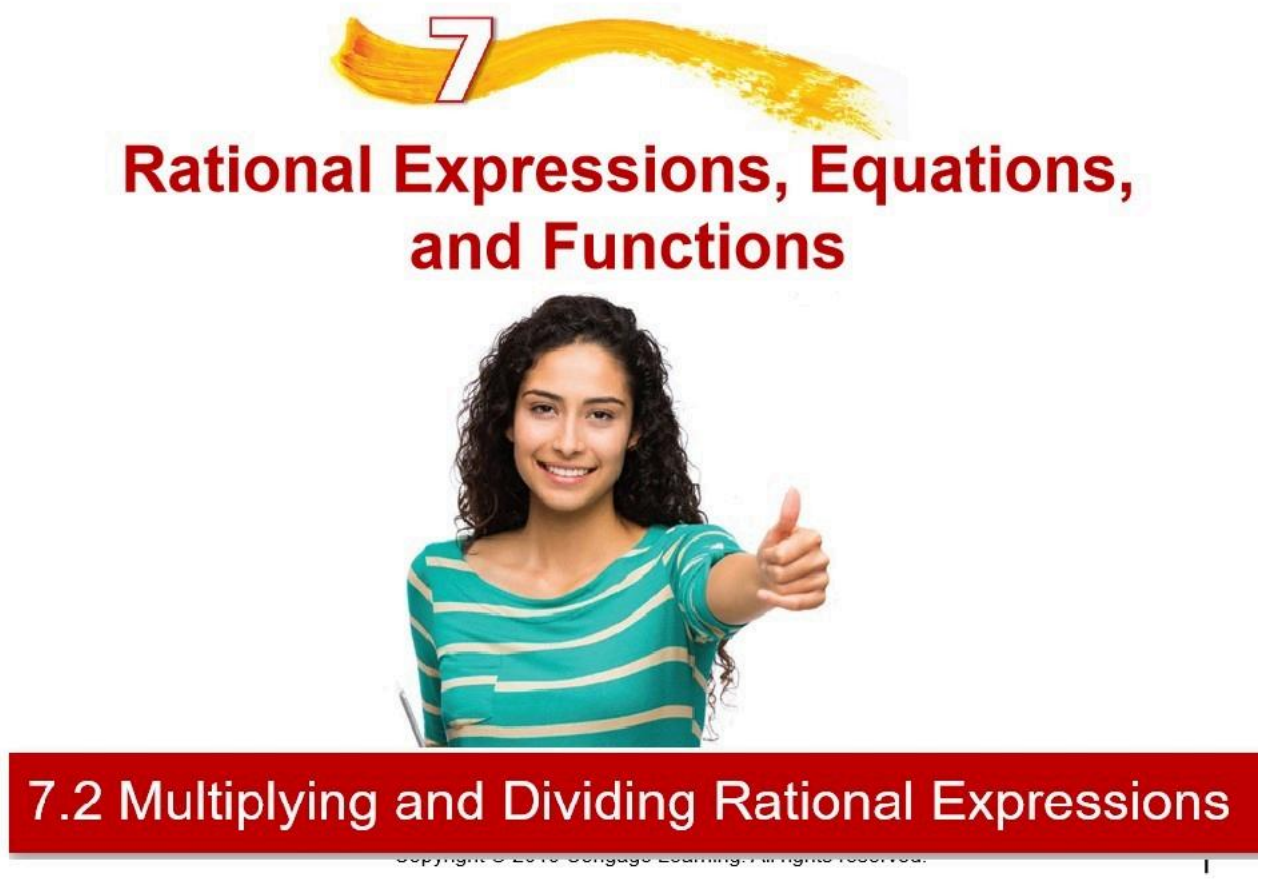
Lesson 7.2 Multiplying and Dividing Rational Expressions

Monday, April 14, 2025 9:17 PM

Click the link below for the interactive Pear Deck PowerPoint

https://app.peardeck.com/student/taclccmdf

Lesson 7.2 Multiplying



7.2 Multiplying and Dividing Rational Expressions

Example 1 – Multiplying Rational Expressions

Multiply the rational expressions. $\frac{4x^3y}{3xy^4} \cdot \frac{-6x^2y^2}{10x^4}$

Solution:

$\frac{4x^3y}{3xy^4} \cdot \frac{-6x^2y^2}{10x^4} = \frac{(4x^3y) \cdot (-6x^2y^2)}{(3xy^4) \cdot (10x^4)}$ Multiply numerators and denominators.

$\frac{-24x^5y^3}{30x^5y^4}$

$\frac{y \cdot y \cdot y}{y \cdot y \cdot y \cdot y}$ Simplify.

$y^{3-4} = y^{-1}$

Factor and divide out common factors. $\frac{1}{y}$

$\frac{-4}{5y}$ Simplified form

Example 2 – Multiplying Rational Expressions

Multiply the rational expressions.

a. $\frac{x}{5x^2 - 20x} \cdot \frac{x - 4}{2x^2 + x - 3}$

$5x(x-4)$ $(x-1)(2x+3)$

$\frac{x(x-4)}{5x(x-4)(x-1)(2x+3)}$

b. $\frac{4x^2 - 4x}{x^2 + 2x - 3} \cdot \frac{x^2 + x - 6}{4x}$

-6, -2, 1

Solution:

Solution:

A) $\frac{1}{5(x-1)(2x+3)}$

$2x^2-2x+3x-3$

$2x(x-1)+3(x-1)$

Multiply numerators and denominators.

Example 2 – Multiplying Rational Expressions cont'd

$= \frac{x(x-4)}{5x(x-4)(x-1)(2x+3)}$ Factor.

$= \frac{x(x-4)}{5x(x-4)(x-1)(2x+3)}$ Divide out common factors.

$= \frac{1}{5(x-1)(2x+3)}, \ x \neq 0, x \neq 4$ Simplified form

b. $\frac{4x^2-4x}{x^2+2x-3} \cdot \frac{x^2+x-6}{4x}$

$4x(x-1)$

$= \frac{4x(x-1)(x+3)(x-2)}{(x-1)(x+3)(4x)}$ Multiply and factor.

$= \frac{4x(x-1)(x+3)(x-2)}{(x-1)(x+3)(4x)}$ Divide out common factors.

$= x-2, \ x \neq 0, \ x \neq 1, \ x \neq -3$ Simplified form

Example 3 – Multiplying Rational Expressions

Multiply the rational expressions.

a. $\frac{x-y}{y^2-x^2} \cdot \frac{x^2-xy-2y^2}{3x-6y}$

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

Solution:

$(x-y)$

$(y-x)$

Multiply and factor.

Divide out common factors.

Example 4 – Dividing Rational Expressions

Divide the rational expressions.

a. $\dfrac{x}{x+3} \div \dfrac{4}{x-1}$ b. $\dfrac{2x}{3x-12} \div \dfrac{x^2-2x}{x^2-6x+8}$

Solution:

a. $\dfrac{x}{x+3} \div \dfrac{4}{x-1} = \dfrac{x}{x+3} \cdot \dfrac{x-1}{4}$ Invert divisor and multiply.

$\dfrac{x(x-1)}{4(x+3)}$ Multiply numerators and denominators.

Simplified form

Example 5 – Dividing Rational Expressions

a. $\dfrac{x^2-y^2}{2x+2y} \div \dfrac{2x^2-3xy+y^2}{6x+2y}$

$2x^2-2x-1x+1$

$2x(x-1)-1(x-1)$

$2 \quad -1$

$-2 \quad -3$

$= \dfrac{x^2-y^2}{2x+2y} \cdot \dfrac{6x+2y}{2x^2-3xy+1y^2}$ Invert divisor and multiply.

$\dfrac{(x+y)(x-y)}{2(x+1)} \cdot \dfrac{2(3x+y)}{(x-1)(2x-1y)}$ Factor.

$\frac{3x+y}{2x-y}$

Divide out common factors.

Simplified form

Example 5 – Dividing Rational Expressions cont'd

b. $\frac{x^2 - 14x + 49}{x^2 - 49} \div \frac{3x - 21}{x^2 + 2x - 35}$

$\frac{x^2-14x+49}{x^2-49} \times \frac{x^2+2x-35}{3x-21}$

Invert divisor and multiply.

Factor.

$\frac{(x-7)(x-7)}{(x+7)(x-7)} \quad \frac{(x+7)(x-5)}{3(x-7)}$

Divide out common factors.

$\frac{x-5}{3}$

Simplified form

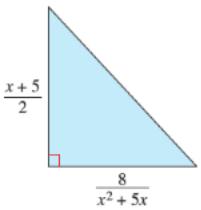
Example 6 – Geometry: Analyzing Dimensions 1

The base and height of a triangle are given by

$\frac{8}{x^2 + 5x}$ and $\frac{x + 5}{2}$

respectively. (Assume x > 0.)

a. Write an expression for the area of the triangle in terms of x. Simplify the expression.



$A = \frac{1}{2}bh = \frac{1}{2}\cdot\frac{8}{x^2+5x}\cdot\frac{x+5}{2}$

Example 6 – Geometry: Analyzing Dimensions 3

$= \frac{1}{2}\cdot\frac{8}{x^2+5x}\cdot\frac{x+5}{2}$	Substitute. $\frac{8(x+5)}{4x(x+5)}$
$= \frac{2(4)(x+5)}{4(x)(x+5)}$	Factor.
$= \frac{2(4)(x+5)}{4(x)(x+5)}$	Divide out common factors.
$= \frac{2}{x}$	Simplify. $\frac{2}{x}$