

MULTIPLYING RATIONAL EXPRESSIONS



SECTION 11.5

How to multiply



Multiply the top (numerator)

Multiply the bottom (denominator)

Factor the top and bottom

Simplify

Examples



$$1. \frac{4x^2}{3x} \cdot \frac{2x}{6x^4} = \frac{8x^3}{18x^5}$$

$$\frac{4}{9x^2}$$

$$2. \frac{6x^2}{3x^5} \cdot \frac{12x}{3x^2} = \frac{72x^3}{9x^7} =$$

$$\frac{8}{x^4}$$

Examples

33

$$3. \frac{3x}{4x-8} \cdot \frac{x^2-4}{x}$$

$$\frac{3x(x^2-4)}{x(4x-8)} = \frac{3x(x-2)(x+2)}{4x(x-2)}$$

$$\boxed{\frac{3(x+2)}{4}}$$

$$4. \frac{4x^2-8x}{12x} \cdot \frac{3x}{x-2} = \frac{3x(4x-8)}{12x(x-2)}$$

$$\frac{12x^2(x-2)}{12x(x-2)} = \boxed{x}$$

Examples

$$5. \frac{x}{x^2 - 5x + 6} \cdot \frac{x^2 - 4}{x+2}$$

Handwritten annotations:

- Top fraction: $(x-2)(x+2)$ is crossed out.
- Bottom fraction: $x^2 - 5x + 6$ is factored into $(x-2)(x-3)$.
- Bottom fraction: $x+2$ is crossed out.
- Final result: $(x-3)(x+3) \cdot 3x^4$

$$6. \frac{x^2 - 9}{x^2 - 3x^3} \cdot \frac{3x^4}{x^2 + 6x + 9}$$

Handwritten annotations:

- Top fraction: $x^2 - 9$ is factored into $(x-3)(x+3)$.
- Bottom fraction: $x^2 - 3x^3$ is crossed out.
- Bottom fraction: $x^2 + 6x + 9$ is factored into $(x+3)(x+3)$.
- Final result: $x^3(x^2 - 3) (x-3)(x+3)$

$$\boxed{\begin{array}{c} x \\ x-3 \end{array}}$$

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

DIVIDING
RATIONAL
EXPRESSIONS



SECTION 11.5

How to divide



Flip the second fraction

Make the division sign multiplication

Multiply the top (numerator)

Multiply the bottom (denominator)

Factor the top and bottom

Simplify

Examples

3

$$1. \frac{4x^2}{3x} \div \frac{2x^3}{6x^4}$$

$$2. \frac{6x^2}{3x^5} \div \frac{12x^4}{3x^2}$$

$$\frac{4x^2}{3x} \cdot \frac{6x^4}{2x^3} = \frac{24x^6}{6x^4}$$

$$\boxed{4x^2}$$

$$\frac{6x^2}{3x^5} \cdot \frac{3x^2}{12x^4} = \frac{18x^4}{36x^9}$$

$$\boxed{\frac{1}{2x^5}}$$

Examples

33

$$3. \frac{3x^2 - 12}{x^5} \div \frac{4x - 8}{x^2}$$

$$3(x^2 - 4)$$

$$\frac{4x^2 - 12x}{12x} \div \frac{x - 3}{3x}$$

$$\frac{3x^2 - 12}{x^5} \cdot \frac{x^2}{4x - 8} = \frac{x^3(3x^2 - 12)}{x^5(4x - 8)}$$

$$\frac{4x(x - 3)}{12x} \cdot \frac{3x}{x - 3}$$

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

$$\frac{12x^4(x - 3)}{12x(x - 3)} = \boxed{x}$$

Examples

3

$$5. \frac{x}{x^2 - 5x + 6} \div \frac{x^2 - x}{(x+3)(x^2 - 9)}$$

$$\begin{aligned} & \frac{x}{\cancel{x^2 - 5x + 6}} \cdot \frac{\cancel{x^2 - 9}}{(x+3)(\cancel{x^2 - 9})} \\ & \frac{x}{(x-2)(x-3)} \cdot \frac{x(x-1)}{x(x-1)} \\ & \boxed{\frac{(x+3)}{(x-2)(x-1)}} \end{aligned}$$

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

$4x$

Classwork



Pg 673 # 4-11

Homework



Pg 673 # 13-31 odd