

Dividing Rational Expressions

April-24-19
1:35 PM

PRE-CALCULUS 11 RATIONAL EXPRESSIONS DIVIDING RATIONAL EXPRESSIONS

A. Dividing Fractions

1) Simplify the following.

$$\begin{aligned} \text{a) } & \frac{3}{4} \div \frac{2}{5} \\ & \frac{3}{4} \times \frac{5}{2} \\ & = \boxed{\frac{15}{8}} \end{aligned}$$

$$\begin{aligned} \text{b) } & \frac{15}{32} \div \frac{-18}{24} \\ & \frac{15}{32} \times \frac{24}{-18} \\ & = \frac{-15}{24} = \boxed{\frac{-5}{8}} \end{aligned}$$

B. Multiplying & Dividing Rational Expressions

1) State the non-permissible values then simplify.

$$\begin{aligned} \text{a) } & \frac{2m^3}{5n} \div \frac{4m}{3n} \quad m \neq 0, n \neq 0 \\ & \frac{2m^3}{5n} \times \frac{3n}{4m} \\ & = \boxed{\frac{3m^2}{10}} \end{aligned}$$

$$\begin{aligned} \text{b) } & \frac{5a^4}{-2} \div \frac{(5a)^2}{25a^2} \quad a \neq 0 \\ & \frac{5a^4}{-2} \times \frac{6}{25a^2} \\ & = \frac{3a^2}{-5} = \boxed{\frac{-3a^2}{5}} \end{aligned}$$

c) $\frac{2(x+1)}{3x} \div \frac{4(x+1)}{x(x-2)}$ $x \neq 0, 2, -1$

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

1 → (x-2)
2 → 2

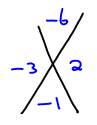
$$= \frac{x-2}{6}$$

d) $\frac{2y-4}{y+2} \div \frac{y^2-4}{y^2-y-6}$ $y = -2, 3, 2$

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

$$\frac{2(\cancel{y-2}) \cdot (\cancel{y+2})(y-2)}{y+2 \cdot (y-3)(\cancel{y+2})}$$

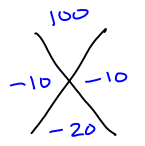
2 → (y-3)
1 → (y+2)



$$= \frac{2(y-3)}{y+2} \text{ or } \frac{2y-6}{y+2}$$

e) $\frac{4x-10}{x+3} \div \frac{12x^2-60x+75}{2x^2-18}$

$$\frac{4x-10}{x+3} \div \frac{3(4x^2-20x+25)}{2(x^2-9)}$$



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

$$\frac{2(\cancel{2x-5}) \cdot 2(\cancel{x+3})(x-3)}{x+3 \cdot 3(\cancel{2x-5})(2x-5)}$$

2 → 2
1 → 3(2x-5)

$$= \frac{4(x-3)}{3(2x-5)} \text{ or } \frac{4x-12}{6x-15}$$

Assignment: Division of Rational Expressions Assignment #1 - 4

Assignment

1. Simplify. State the restrictions on the variables.

$$\text{a) } \frac{3a^2bc}{10bc^2} + \frac{12a^2b^2c}{6bc}$$

$$\text{b) } \frac{8x^2y^3}{-9x^3y} + \frac{-15x^2y}{14y^3} + \frac{7x}{-6xy^4}$$

$$\text{c) } \frac{\frac{2xy}{5x^2y^2}}{\frac{10x^2y}{15y}}$$

$$\text{d) } \frac{-5m^3n}{2p} + \left(\frac{8p^3}{10m} + \frac{4p}{15n} \right)$$

2. Simplify. State the nonpermissible values.

$$\text{a) } \frac{(3x+5)^2}{x^2-49} + \frac{(3x+5)(x+1)}{x-7}$$

$$\text{b) } \frac{4y+20}{5y-20} + \frac{2y^2-50}{y^2-16}$$

$$\text{c) } \frac{(p-6)(p+2)}{p(p+1)} + \frac{36-p^2}{p^2+p}$$

$$\text{d) } \frac{\frac{a^2-81}{9a}}{(a-9)^2}$$

3. Simplify

$$\text{a) } \frac{a^2 - 3a - 10}{a^2 - 5a + 6} + \frac{a^2 + a - 30}{a^2 + 4a - 12}$$

$$\text{b) } \frac{x^2 + 13x + 36}{x^2 - 4} + \frac{x^2 - 6x - 40}{x^2 - 8x - 20}$$

$$\text{c) } \frac{\frac{y^3 + 4y^2 - 32y}{y^2 - 64}}{y - 4}$$

$$\text{d) } \frac{\frac{x^2 + 14x + 49}{x^2 + 5x - 14}}{x^2 - 2x}$$

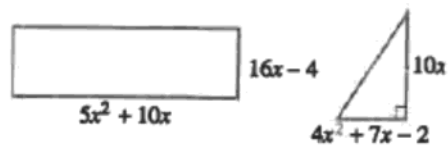
4. Simplify

$$\text{a) } \frac{2a^2 - 3a - 9}{8a^2 + 14a + 3} + \frac{3a^2 - 7a - 6}{8a^2 + 14a + 3}$$

$$\text{b) } \frac{16x^2 + 8x + 1}{x^2 + 6x - 27} + \frac{8x^2 + 22x + 5}{2x^2 - x - 15}$$

632 Rational Expressions Lesson #6: Division of Rational Expressions

5. The rectangle shown has length $5x^2 + 10x$ cm and width $16x - 4$ cm. The triangle has base $4x^2 + 7x - 2$ cm and height $10x$ cm.



Write and simplify an expression that represents the ratio of the area of the rectangle to the area of the triangle.

6. Simplify.

a) $\frac{5 - \frac{1}{a}}{5 + \frac{1}{a}}$

b) $\frac{8 + \frac{4}{x}}{4 - \frac{1}{x^2}}$

c) $\frac{\frac{3}{p^2} - \frac{1}{p^2 - 4}}{1 - \frac{6}{p^2}}$

7. Simplify. State the nonpermissible values.

a) $\frac{a-1}{a+4} + \frac{a^2+6a+5}{a^2-1} \times \frac{a^2+3a-4}{a^2-2a+1}$ b) $\frac{a-1}{a+4} + \left(\frac{a^2+6a+5}{a^2-1} \times \frac{a^2+3a-4}{a^2-2a+1} \right)$

Extension Question.

11. Simplify

$$\text{a) } \frac{a^2 - 9y^2}{a^2 - 2ay - 3y^2} + \frac{a^2 + 3ay}{4a^2 + 7ay + 3y^2} \quad \text{b) } \frac{x^4 - 5x^2y^2 + 4y^4}{x^2 + 3xy + 2y^2} + \frac{x^2 - 4xy + 4y^2}{5x - 10y}$$

Answer Key

1. a) $\frac{3}{20bc}, a \neq 0, b \neq 0, c \neq 0$ b) $\frac{32y^8}{45x^3}, x \neq 0, y \neq 0$
 c) $\frac{3}{5x^3y}, x \neq 0, y \neq 0$ d) $\frac{5m^4}{6p^3}, m \neq 0, n \neq 0, p \neq 0$
2. a) $\frac{3x+5}{(x+7)(x+1)}, x \neq \pm 7, -\frac{5}{3}, -1$ b) $\frac{2y+8}{5(y-5)}, y \neq \pm 5, \pm 4$
 c) $\frac{-p-2}{p+6}, p \neq \pm 6, -1, 0$ d) $\frac{a+9}{9a(a-9)}, a \neq 9, 0$
3. a) $\frac{a+2}{a-3}, a \neq -6, 2, 3, 5$ b) $\frac{x+9}{x-2}, x \neq \pm 2, -4, 10$
 c) $\frac{y}{y-8}, y \neq \pm 8, 4$ d) $x(x+7), x \neq -7, 0, 2$
4. a) $\frac{2a+3}{3a+2}, a \neq -\frac{3}{2}, -\frac{2}{3}, -\frac{1}{4}, 3$ b) $\frac{4x+1}{x+9}, x \neq -9, -\frac{5}{2}, -\frac{1}{4}, 3$
5. 4 to 1 6. a) $\frac{5a-1}{5a+1}, a \neq 0, -\frac{1}{5}$ b) $\frac{4x}{2x-1}, x \neq \pm \frac{1}{2}, 0$ c) $\frac{2}{p^2-4}, p \neq \pm 2, \pm\sqrt{6}, 0$
7. a) $\frac{a-1}{a+5}, a \neq -5, -4, \pm 1$ b) $\frac{(a-1)^3}{(a+4)^2(a+5)}, a \neq -5, -4, \pm 1$
8. a) $\frac{x^2+9}{2(x+1)(3-x)}, x \neq -1, 3$ 9. C 10.

8			
---	--	--	--
11. a) $\frac{(4a+3y)}{a}, a \neq \pm 3y, -y, -\frac{3}{4}y, 0$ b) $5(x-y), x \neq \pm 2y, -y$