

Goal: simplify rational expressions

Due: Wednesday May 1, 2012

Topic: Multiplying and Dividing
Rational Expressions

Question: Compare multiplication and division
for rational expressions and
rational numbers.

What is a rational number?

$$\frac{a}{b}$$

ex. $\frac{1}{2}$, $\frac{5}{6}$, $\frac{2}{1}$

rational expressions.

$$\frac{a}{b}$$

ex. $\frac{2x+3y}{z+m}$

Warm-Up
Simplify

$$1.) \frac{42}{60} = \frac{1\cancel{2}\cdot\cancel{3}\cdot 7}{1\cancel{2}\cdot\cancel{3}\cdot 2\cdot 5} = \frac{7}{10}$$

$$2.) \frac{1}{2} \cdot \frac{2}{3} = \frac{1\cdot\cancel{2}}{2\cdot 3} = \frac{2}{6} = \frac{1}{3}$$

$$3.) \frac{4}{9} \div \frac{2}{3} = \frac{4}{9} \cdot \frac{3}{2} = \frac{12}{18} = \frac{2}{3}$$

$$4.) \frac{\frac{4}{9}}{\frac{2}{3}} = \frac{4}{9} \div \frac{2}{3}$$

complex
fraction

Example 1.)

Simplify

$$\frac{2x(\cancel{x-5})}{(\cancel{x-5})(x^2-1)}$$

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

Example 2.)

Simplify $\frac{z^2w - z^2}{z^3 - z^3w}$

$$\frac{z^2}{z^3} = \frac{\cancel{z} \cdot \cancel{z}}{\cancel{z} \cdot \cancel{z} \cdot z}$$

$$\frac{z^2(w-1)}{z^3(1-w)}$$

$$\frac{\cancel{z}^2(w-1)}{\cancel{z}^3 \cdot -1(w-1)}$$

$$\boxed{\frac{1}{-z}}$$

$$\begin{aligned} & -1(w-1) \\ & -w+1 \\ & 1-w \end{aligned}$$

Example 3.)

Simplify $\frac{4a}{5b} \cdot \frac{15b^2}{16a^3}$

$$\boxed{\frac{3b}{4a^2}}$$

$$\frac{4a \cdot 15b^2}{5b \cdot 16a^3}$$

$$\frac{60ab^2}{80a^3b}$$

$$\frac{2 \cdot 3 \cdot 5 \cdot 2a \cdot b \cdot b}{2 \cdot 2 \cdot 2 \cdot 5 \cdot 2 \cdot a \cdot a \cdot a \cdot b}$$

$$\boxed{\frac{3b}{4a^2}}$$

Example 4.)

Simplify

$$\frac{8t^2s}{5r^2} \cdot \frac{15sr}{12t^3s^2}$$

$$\frac{120t^2s^2r}{60r^2t^3s^2}$$

$$\frac{5 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot t \cdot t \cdot s \cdot s \cdot r}{5 \cdot 2 \cdot 2 \cdot 3 \cdot r \cdot r \cdot t \cdot t \cdot t \cdot s \cdot s}$$

$$\frac{2}{rt}$$

Example 5.)

Simplify

$$\frac{4x^2y}{15a^3b^3} \div \frac{2xy^2}{5ab^3}$$

$$\frac{4x^2y}{15a^3b^3} \cdot \frac{5ab^3}{2xy^2}$$

$$\frac{20x^2yab^3}{30xy^2a^3b^3}$$

$$\frac{2x}{3ya^2}$$

Example 6.)

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

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

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

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

Example 7.)

Simplify $\frac{a+2}{a+3} \div \frac{a^2+a-12}{a^2-9}$

$$\frac{a+2}{a+3} \cdot \frac{a^2-9}{a^2+a-12}$$

$$\frac{(a+2)(a^2-9)}{(a+3)(a^2+a-12)}$$

$$\frac{(a+2)(\cancel{a-3})(\cancel{a+3})}{(\cancel{a+3})(a+4)(\cancel{a-3})}$$

$$\boxed{\frac{a+2}{a+4}}$$

Step 1: Change to multiplication of the multiplicative inverse of the second term

Step 2: Multiply the numerators; multiply the denominators

Step 3: Factor

Example 8.)

simplify

$$\frac{\frac{r^2}{r^2 - 25s^2}}{\frac{r}{5s - r}}$$

$$\frac{r^2}{r^2 - 25s^2} \div \frac{r}{5s - r}$$

$$\frac{r^2}{r^2 - 25s^2} \cdot \frac{5s - r}{r}$$

$$\frac{(r^2)(5s - r)}{(r + 5s)(r - 5s)(r)}$$

$$\frac{(r^2)(-1)(r - 5s)}{(r + 5s)(r - 5s)(r)}$$

$$\boxed{\frac{-r}{r + 5s}} \text{ or } \boxed{\frac{r}{-r - 5s}}$$

Step 1: Rewrite the quotient with a division symbol

Step 2: Change to multiplication of the multiplicative inverse of the second term

Step 3: Multiply the numerators; Multiply the denominators

Step 4: Factor

Step 5: Simplify common multiples

Due: Wednesday

homework:

pages 476 - 477

#13 - 43 odd

Ex 62. #14 - 44 even

Exit Ticket

Simplify

$$\frac{2d+6}{d^2+d-2} \div \frac{d+3}{d^2+3d+2}$$