

Multiplying and Dividing Rational Expressions

Find the products and any excluded values.

2. $\frac{x}{\cancel{3x-6}} \cdot \frac{\cancel{x+2}}{x+9}$
 $3(\cancel{x-2})$

$$\frac{x}{3(x+9)}, x \neq 2, -9$$

3. $\frac{5x(\cancel{x+5})}{\cancel{5x^2+25x}} \cdot \frac{\cancel{2x}}{\cancel{x+5}}$

$$10x^2, x \neq -5$$

4. $\frac{x^2-2x-15}{10x+30} \cdot \frac{3}{x^2-3x-10}$

$$\frac{(\cancel{x-5})(\cancel{x+3})}{10(\cancel{x+3})} \cdot \frac{3}{(\cancel{x-5})(x+2)}$$
$$\frac{3}{10(x+2)}, x \neq -3, 5, -2$$

5. $\frac{x^2-1}{x^2+5x+4} \cdot \frac{x^2}{x^2-x}$

$$\frac{(\cancel{x+1})(\cancel{x-1})}{(\cancel{x+1})(x+4)} \cdot \frac{x^2}{x(\cancel{x-1})}$$
$$\frac{x}{(x+4)}, x \neq -4, -1, 0, 1$$

Find the quotients and any excluded values.

8. $\frac{5x^2+10x}{x^2+2x+1} \div \frac{20x+40}{x^2-1}$

$$\frac{x(x-1)}{4(x+1)}, x \neq -1, 1, -2$$

10. $\frac{-x^2+x+20}{5x^2-25x} \div \frac{x+4}{2x-14}$

$$\frac{-2(x-7)}{5x}, x \neq 0, 5, -4, 7$$

9. $\frac{x^2-9x+18}{x^2+9x+18} \div \frac{x^2-36}{x^2-9}$

$$\frac{(x-3)^2}{(x+6)^2}, x \neq -6, -3, 6, 3$$

11. $\frac{x+3}{x^2+8x+15} \div \frac{x^2-25}{x-5}$

$$\frac{1}{(x+5)^2}, x \neq -5, -3, 5$$

Let $p(x) = \frac{1}{x+1}$ and $q(x) = \frac{1}{x-1}$. Find the result and determine whether the result of performing each operation is another rational expression.

16. $p(x) \cdot q(x) = \frac{1}{x+1} \cdot \frac{1}{x-1} = \frac{1}{(x+1)(x-1)}$ *yes, still rational*

17. $p(x) \div q(x) = \frac{1}{x+1} \div \frac{1}{x-1}$
 $\frac{1}{x+1} \cdot \frac{x-1}{1} = \frac{x-1}{x+1}$, *yes*

21. Explain the Error Maria finds an equivalent expression to

$$\frac{x^2 - 4x - 45}{3x - 15} \div \frac{6x^2 - 150}{x^2 - 5x}$$

Her work is shown. Find and correct Maria's mistake.

$$\frac{x^2 - 4x - 45}{3x - 15} \div \frac{6x^2 - 150}{x^2 - 5x} = \frac{(x-9)(x+5)}{3(x-5)} \div \frac{6(x+5)(x-5)}{x(x-5)}$$

$$= \frac{6(x-9)(x+5)(x+5)(x-5)}{3x(x-5)(x-5)}$$

She forgot to multiply by reciprocal

$$= \frac{2(x-9)(x-5)^2}{x(x-5)}$$

$$\frac{x(x-9)}{18(x-5)}$$

$x \neq 5, 0, -5$

Review

Simplify or evaluate the following

1. $\sqrt[3]{64a^6b^3c}$

$$\boxed{4a^2b\sqrt[3]{c}}$$

2. $24^{\frac{2}{3}}$

$$\sqrt[3]{24^2}$$

$$\sqrt[3]{576}$$

$$\begin{array}{c} 24 \quad 24 \\ \wedge \quad \wedge \\ 8 \quad 3 \quad 8 \quad 3 \\ \uparrow \quad \uparrow \\ \textcircled{222} \quad \textcircled{222} \end{array}$$

$$\boxed{4\sqrt[3]{9}}$$

3. $\frac{5\sqrt{3}}{2\sqrt{3}} \cdot \frac{2\sqrt{3}}{2\sqrt{3}}$

$$\frac{5\sqrt{3}}{6 \cdot 12}$$

$$\boxed{\frac{5\sqrt{3}}{6}}$$

4. $\sqrt[3]{-81}$

$$\frac{\overset{9}{\cancel{33}} \cdot 9}{-3\sqrt[3]{3}}$$