

Multiplying and Dividing Rational Expressions

1. Look to see if you can factor in any numerator or denominator.
2. If you are dividing: keep, change, flip first to turn the expression into a multiplication problem.
3. Check to see if anything cancels on top and bottom.
4. Multiply what is left.
5. Simplify if you can.

Simplify:

$$1) \frac{x^2 - 4x + 4}{x^2 - 4} = \frac{(x-2)(\cancel{x-2})}{(x+2)(\cancel{x-2})} \cdot \frac{\cancel{24}^x}{\cancel{36}_y}$$

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

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

$$3) \frac{x^3 - x^2 - 6x}{4x^2 - 12x}$$

$\frac{-6}{-3} \cdot \frac{2}{-1}$

$$\frac{x(x^2 - x - 6)}{4x(x-3)} = \frac{x(x-3)(x+2)}{4x(x-3)} = \frac{x+2}{4}$$

Multiply or divide.

$$4) \frac{10x}{15x^2} \cdot \frac{5x^3}{6x} = \frac{50x^4}{90x^3}$$

$\frac{5}{9x}$

$$5) \frac{3x}{2x^2} \cdot \frac{4x}{6} = \frac{12x^2}{12x^2} = 1$$

$$6) \frac{12x-4y}{16} \cdot \frac{4x-4y}{x^2-y^2}$$

$$\frac{\cancel{4}(3x-y)}{\cancel{16}} \cdot \frac{\cancel{4}(x-y)}{(x+y)(\cancel{x-y})}$$

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

$$7) \frac{x^2 - x - 20}{x^2 + 7x + 12} \cdot \frac{x^2 + 9x + 18}{x^2 - 7x + 10}$$

$$\frac{(\cancel{x-5})(\cancel{x+4})}{(\cancel{x+3})(\cancel{x+4})} \cdot \frac{(\cancel{x+6})(\cancel{x+3})}{(\cancel{x-5})(x-2)}$$

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

$$8) \frac{8x^2}{27s} \div \frac{16x^2y}{12s^2}$$

Keep
change
flip

$$\frac{8x^2}{27s} \cdot \frac{12s^2}{16x^2y} = \frac{96x^2s^2}{432sx^2y}$$

$\frac{2s}{9y}$

$$9) \frac{2(x-4)}{5(x-2)} \div \frac{5(x-4)}{x-7}$$

$$\frac{2(\cancel{x-4})}{5(x-2)} \cdot \frac{(x-7)}{5(\cancel{x-4})}$$

$\frac{2(x-7)}{25(x-2)}$

$$10) \frac{x^2+x}{x} \div \frac{x^2-1}{3x-3}$$

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