

Name: _____
PCH: Multiplying and Dividing Rational Expressions

Date: _____
Ms. Loughran

Do Now:

1. $\frac{x^2 + 7x + 12}{x^2 + 3x + 2} \div \frac{x^2 + 6x + 9}{x^2 + 5x + 6}$

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

$$\frac{x+4}{x+1} \quad x \neq -2, -1, -3$$

2. $\frac{4y^2 - 9}{2y^2 + 9y - 18} \cdot \frac{y^2 + 5y - 6}{2y^2 + y - 3}$

$$\frac{\cancel{(2y-3)}\cancel{(2y+3)}}{\cancel{(2y-3)}(y+6)} \cdot \frac{\cancel{(y-1)}(y+6)}{\cancel{(2y+3)}(y-1)}$$

$$| \quad y \neq 1, \frac{3}{2}, -6$$

3. $\frac{x^2 + 2xy + y^2}{x^2 - y^2} \cdot \frac{2x^2 - xy - y^2}{x^2 - xy - 2y^2}$

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

$$\frac{2x+y}{x-2y} \quad x \neq \pm y, 2y$$

Classwork

$$1. \frac{3x^2 + xy - 2y^2}{3x^2 - xy - 2y^2} \div \frac{3x^2 + 7xy - 6y^2}{3x^2 - 2xy - y^2} \div \frac{3x + y}{3x + 2y}$$

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

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

$$x \neq \frac{2y}{3}, y, \frac{4}{3}, -3y$$

$$2. \frac{6a^3 - 3ab}{4a^2 - 31ab + 42b^2} \div \frac{18a^2b - 42ab^2}{12a^2 - 49ab + 49b^2} \div \frac{20a^7 - 10a^5b}{8ab^3 - 48b^4}$$

$$\frac{3a(\cancel{2a^2-b})}{(\cancel{4a-7b})(\cancel{a-6b})} \cdot \frac{\cancel{(3a-7b)}(\cancel{4a-7b})}{bab(\cancel{3a-7b})} \cdot \frac{8b^3(\cancel{a-6b})}{10a^5(\cancel{2a^2-b})}$$

$$\frac{24ab^3}{60a^4b} = \frac{2b^2}{5a^5}$$

$$a \neq \frac{7b}{4}, 6b, 0, \frac{7b}{3}$$

$$b \neq 0, 2a^2$$

$$3. \frac{r^2 + 4rs + 3s^2}{r^2 + 5rs + 6s^2} \cdot (r + 2s)^{-1} \div \frac{r + s}{r^2 + 4rs + 4s^2}$$

Homework 09-18

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

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

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

$$\left. \begin{array}{l} x^2-2x+3 \neq 0 \\ x^2+2x+3 \neq 0 \end{array} \right\}$$

* if you check using the discriminant both have imaginary roots so restriction isn't needed

$$5. \frac{x^3 + y^3}{x^4 + x^3y + x^2y^2 - x^2y^2 - xy^3 - y^4}$$

$$x^2(x^2+xy+y^2) \quad -y^2(x^2+xy+y^2)$$

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

$$\frac{(x-y)(x+y)}{(x-y)(x^2+xy+y^2)} \quad \begin{array}{l} x^2+xy+y^2 \neq 0 \\ x \neq \pm y \end{array}$$

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

$$6. \frac{6x^2 - x - 2}{9x^2 - 12x + 4}$$

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

$$\frac{2x+1}{3x-2} \quad x \neq \frac{2}{3}$$

$$7. \frac{x^3 - 8}{x^4 + 2x^3 + 4x^2 + 4x^2 + 8x + 16}$$

$$x^2(x^2 + 2x + 4) + 4(x^2 + 2x + 4)$$

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

$$\frac{x-2}{x^2+4}$$

$$x^2 + 2x + 4 \neq 0$$

$$8. \frac{(3x-2y)(3x+2y) - 4(3x-2y)}{9x^2 - 4y^2 - 12x + 8y}$$

$$\frac{9x^2 - 4y^2 + 12x - 8y}{(3x-2y)(3x+2y) + 4(3x-2y)}$$

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

$$x \neq \frac{2}{3}y, \frac{-2y-4}{3}$$

$$9. \frac{x^4 - 81}{x^3 + x^2 - 9x - 9}$$

$$x^2(x+1) - 9(x+1)$$

$$\frac{(x^2-9)(x^2+9)}{(x^2-9)(x+1)}$$

$$\frac{x^2+9}{x+1}$$

$$x \neq \pm 3, -1$$

$$\begin{array}{r} 1 \ 1 \ 4 \ 1 \ -6 \\ \underline{ } \\ 1 \ 5 \ 6 \ 0 \end{array}$$

$$10. \frac{(x-1)(x^2+5x+6)}{x^3-1} = \frac{x^2+5x+6}{x^2+x+1}$$

$$(x-1)(x^2+x+1)$$

$$x^2+x+1 \neq 0$$

$$x \neq -1$$

$$14. \frac{(p-4)(p+3)(p+2)(p-1)}{p^4 - 15p^2 - 10p + 24}$$

$$p^3 - p^2 - 12p$$

$$p(p-4)(p+3)$$

$$\frac{(p+2)(p-1)}{p}$$

$$\begin{array}{r} 4 \ 1 \ 0 \ -15 \ -10 \ 24 \\ \underline{ } \\ 4 \ 16 \ 4 \ -24 \\ \underline{ } \\ -3 \ 4 \ 1 \ -6 \ 0 \\ \underline{ } \\ 1 \ 1 \ -2 \ 0 \\ \\ p^2 + p - 2 \end{array}$$

$$p \neq 0, 4, -3$$