

Name: _____

Date: _____

PCH: Simplifying Rational Expressions

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Do Now: Express each fraction in simplest form.

$$1. \frac{6x^2 + 6x + 3}{8x^2 + 8x + 4} = \frac{3(2x^2 + 2x + 1)}{4(2x^2 + 2x + 1)} = \frac{3}{4}$$

$2x^2 + 2x + 1 \neq 0$
 $d = 2^2 - 4(2)(1)$
 $d < 0$
 so we don't need restriction

$$2. \frac{x^3 - 8}{x^4 - 16} = \frac{(x-2)(x^2 + 2x + 4)}{(x^2 + 4)(x-2)(x+2)} = \frac{x^2 + 2x + 4}{(x^2 + 4)(x+2)} \quad x \neq \pm 2$$

$$3. \frac{6hg - 3h^2}{3h^2 - 13hg + 14g^2} = \frac{3h(2g - h)}{(3h - 7g)(h - 2g)} = \frac{-3h}{(3h - 7g)}$$

Rest
 $h - 2g = 0$
 $h \neq 2g$
 $3h - 7g = 0$
 $h \neq \frac{7g}{3}$

$$4. \frac{2s^2 - 5st + 2t^2}{s^2 + st - 6t^2} = \frac{(2s - t)(s - 2t)}{(s + 3t)(s - 2t)}$$

$\frac{2s - t}{s + 3t}$ $s \neq 2t, -3t$

Classwork:

Express each fraction in simplest form.

$$1. \frac{u^4 - v^4}{u^4 + 2u^2v^2 + v^4} = \frac{(u^2 + v^2)(u+v)(u-v)}{(u^2 + v^2)^2} = \frac{(u+v)(u-v)}{u^2 + v^2}$$

u and v can't both be 0 at the same time

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

$x - y = 0$
 $x \neq y$
 $x + y + 4 = 0$
 $x \neq -y - 4$

$$3. \frac{(x^2+y^2)^2 - x^2y^2}{x^3+y^3} = \frac{x^4+x^2y^2+y^4+x^2y^2-x^2y^2}{(x+y)(x^2-xy+y^2)}$$

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

$$\frac{x^2+xy+y^2}{x+y}$$

$$\begin{aligned} &\underline{R} \\ &x \neq -y \\ &x^2-xy+y^2 \neq 0 \end{aligned}$$

$$\begin{array}{r} \underline{11} \quad 1 \quad 2 \quad -11 \quad 8 \\ \quad \quad 1 \quad 3 \quad -8 \quad 0 \\ \hline \end{array}$$

$$11. \frac{x^3+2x^2-11x+8}{x^2-6x+5} = \frac{(x-1)(x^2+3x-8)}{(x-5)(x-1)}$$

$$\frac{x^2+3x-8}{x-5} \quad x \neq 5, 1$$

$$12. \frac{6a^3-7a^2-14a+15}{a^2-8a+7} = \frac{(a-1)(6a^2-a-15)}{(a-7)(a-1)}$$

$$\begin{array}{r} \underline{11} \quad 6 \quad -7 \quad -14 \quad 15 \\ \quad \quad 6 \quad -1 \quad -15 \\ \hline 6 \quad -1 \quad -15 \quad 0 \end{array}$$

$$\frac{6a^2-a-15}{a-7} \quad a \neq 7, 1$$

$$13. \frac{y^3-7y-6}{y^2-y-6} = \frac{(y-3)(y^2+3y+2)}{(y-3)(y+2)} = \frac{(y+2)(y+1)}{y+2}$$

$$y+1, \quad y \neq 3, -2$$

$$\begin{array}{r} \underline{31} \quad 1 \quad 0 \quad -7 \quad -6 \\ \quad \quad 3 \quad 9 \quad 6 \\ \hline 1 \quad 3 \quad 2 \quad 0 \end{array}$$