Algebra 2
Chapter 9 Review Pt. 2

Name: Key Hour: _____

9.4 Adding & Subtracting Rational Expressions

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

Already has a common Denominator

Distribute the negative

combine like terms

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

2. $\frac{2}{x+1}-\frac{x}{3x+3}$ (remember to factor denominators before 'sharing')

$$\frac{3}{3}\cdot\frac{2}{x+1}-\frac{x}{3(x+1)}=\frac{6}{3(x+1)}-\frac{x}{3(x+1)}=\frac{6-x}{3(x+1)}$$

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

Factoring
$2x^2+x-15$
x^2+x-30
$(x+6)(x-5)$
$(x+3)(2x-5)$

$$\frac{(x+3)}{x+3}\cdot\frac{8}{2x-5}-\frac{x+5}{(x+3)(2x-5)}=\frac{8x+24}{(x+3)(2x-5)}-\frac{x+5}{(x+3)(2x-5)}=\frac{7x+19}{(x+3)(2x-5)}$$

$8x+24-(x+5)$
$8x+24-x-5$
$7x+19$

4. $\frac{4}{x+6}+\frac{(x-2)}{3x+1}$

Distribute
Foil
$\frac{(3x+1)}{3x+1}$ $\frac{(x+6)}{x+6}$

$$\frac{12x+4}{(3x+1)(x+6)}+\frac{x^2+4x-12}{(3x+1)(x+6)}=\frac{12x+4+x^2+4x-12}{(3x+1)(x+6)}=\frac{x^2+16x-8}{(x+6)(3x+1)}$$

5. $\frac{x}{x^2+4x+4}-\frac{x-5}{x^2+5x+6}$

Distribute
Foil
$\frac{(x+3)}{x+3}$ $\frac{(x+2)}{x+2}$

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

$x^2+3x-(x^2-3x-10)=x^2+3x-x^2+3x+10$
$=6x+10$

6. $\frac{7+x}{x^2-2x}-\frac{x-6}{3x^2+5x}-\frac{x-4}{3x^2-x-10}$

$3x^2-x-10$
x^2-x-30
$(x-6)(x+5)$
$(x-2)(3x+5)$

Foil
$\frac{(3x+5)}{3x+5}$ $\frac{(7+x)}{x(x-2)}-\frac{(x-6)}{x(3x+5)}\cdot\frac{(x-2)}{x-2}-\frac{(x-4)}{(x-2)(3x+5)}\cdot\frac{x}{x}$

$$=\frac{3x^2+26x+35-(x^2-8x+12)-(x^2-4x)}{x(x-2)(3x+5)}$$

$3x^2+26x+35$
$-x^2+8x-12$
$-x^2+4x$

$$=\frac{x^2+38x+23}{x(x-2)(3x+5)}$$

9.5 Solving Rational Equations

... Cross multiply.

7. $\frac{x^2-1}{x+2} = \frac{2x-1}{2}$

$(x+2)(2x-1) = (x^2-1)\cdot 2$

$2x^2+3x-2 = 2x^2-2$

$-2x \quad +2 \quad -2x \quad +2$

$3x = 0$

$\boxed{x=0}$

8. $\frac{x^2}{2x-5} = \frac{x+8}{2}$ cross multiply

$(2x-5)(x+8) = 2x^2$

$2x^2+11x-40 = 2x^2$

$-2x^2 \quad -2x^2$

$11x-40=0$

$11x = 40$

$\boxed{x = \frac{40}{11}}$

9. $\frac{2x}{x-3} = 2 + \frac{3x}{x^2-9}$ $\quad (x+3)(x-3)$

$\frac{2x^2+6x}{x^2-9} = \frac{2x^2-18}{x^2-9} + \frac{3x}{x^2-9} \Rightarrow 2x^2+6x = 2x^2-18+3x \Rightarrow 0 = -18-3x$

$18 = -3x$

$\boxed{x=-6}$

10. $\frac{6}{x+2} + 1 = \frac{5}{x}$ $\quad \cdot \frac{x(x+2)}{x(x+2)}$ $\quad \frac{x}{x}$ $\quad \frac{x+2}{x+2}$

$\frac{6x}{x(x+2)} + \frac{x(x+2)}{x(x+2)} = \frac{5x+10}{x(x+2)} \Rightarrow 6x+x^2+2x = 5x+10$

$-5x \quad -5x \quad -10$

-10

$x^2+3x-10 = 0 \Rightarrow (x+5)(x-2)=0$

$\boxed{x=-5}, \ \boxed{x=2}$

11. $\frac{4x}{x^2+6x+9} - \frac{2}{x+3} = \frac{3}{x^2-9}$

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

$\Rightarrow 4x^2-12x-(2x^2-18) = 3x+9$

$4x^2-12x-2x^2+18 = 3x+9$

$2x^2-12x+18 = 3x+9$

$-3x \quad -9 \quad -3x \quad -9$

$2x^2-15x+9 = 0$

... This cannot factor.. So $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$a=2 \quad b=-15 \quad c=9$

$x = \frac{15 \pm \sqrt{15^2-4(2)(9)}}{4}$

$x = \frac{15 \pm \sqrt{153}}{4}$

$\boxed{x = \frac{15 \pm 3\sqrt{17}}{4}}$

12. $\frac{5}{3x} - \frac{2}{x+1} = \frac{4}{x}$ $\quad \frac{x+1}{x+1}$ $\quad \frac{3x}{3x}$ $\quad \frac{3(x+1)}{3(x+1)}$

$\frac{5x+5}{3x(x+1)} - \frac{6x}{3x(x+1)} = \frac{12(x+1)}{3x(x+1)}$

$5x+5-6x = 12x+12$

$-x+5 = 12x+12$

$+x \quad -12 \quad +x \quad -12$

$-7 = 13x \Rightarrow \boxed{x = \frac{-7}{13}}$