Rational Expressions

Name: Key

I. Multiply.

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

Restrictions: $x=-3, x=-4$

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

Restrictions: $x=1, x=-3, x=-2$

II. Divide.

3. $\frac{5x^6}{x^2y} \div \frac{10x^2}{y} = \frac{1x^4}{2x^2} = \frac{1x^2}{2}$

Restrictions: $x=0, y=0$

4. $\frac{x^2-2x-8}{x^2-2x-15} \div \frac{2x^2-8x}{2x^2-10x} = \frac{x+2}{x+3}$

Restrictions: $x=5, x=-3, x=0, x=-4$

Ex. 4: Adding Rational Expressions

Add.

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

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

Restrictions: $x=1, x=-4$

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

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

Restrict: $x=-2, 2$

Ex. 5: Subtracting Rational Expressions

Subtract. .

$\frac{2x^2-30}{x^2-9} - \frac{x+5}{x+3}$

$\frac{2x^2-30}{(x+3)(x-3)} - \frac{(x^2+2x-15)}{(x+3)(x-3)} = \frac{x^2-2x-15}{(x+3)(x-3)} = \frac{(x-5)(x+3)}{(x+3)(x-3)} = \frac{x-5}{x-3}$

Restrict: $x=3, -3$

Ex. 6: Simplifying Complex Fractions

A. $\frac{\frac{x+2}{x-1}}{\frac{x-3}{x+5}}$

$\frac{x+2}{x-1} \cdot \frac{x+5}{x-3} = \frac{(x+2)(x+5)}{(x-1)(x-3)}$

Restrict: $x=1, -5$

B. $\frac{\frac{3}{x} + \frac{x}{2}}{\frac{x-1}{x}}$

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

Restrict $x=0$

9.6: SOLVING RATIONAL EQUATIONS NAME _____

Ex. 7: Solve for x. $\frac{-2}{x^2-2} = \frac{2}{x-4}$

$2x^2-4 = -2x+8$

$+2x-8 \quad +2x-8$

$2x^2+2x-12=0$

$2(x^2+x-6)=0$

$2(x+3)(x-2)=0$

$2 \neq 0$ | $x=-3$ | $x=2$

Restrict: $x \neq \pm\sqrt{2}, 4$

Ex. 8: Solve for x. LCD = x

Solve the equation $x - \frac{18}{x} = 3$. $\cdot x$

$\frac{x}{x} \cdot \frac{1}{1}$ $\quad \frac{1}{1} \cdot x$

$\frac{x^2-18}{x} = \frac{3x}{x}$

$x^2-3x-18=0$

$(x-6)(x+3)=0$

$x=6$ | $x=-3$

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

Restrict: $x \neq -2$

No solution

10. LCD: $x(x+1)$

$(x+1)\frac{4}{x} - \frac{3}{x+1} = \frac{1}{x(x+1)}(x(x+1))$

Restrict $x \neq 0, -1$

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

$x=2, -2$

$x+4 = x^2+1x-4$

$-x \quad -4 \quad -x$

$0 = x^2-4$

$(x+2)(x-2)$

$x=-2$ | $x=2$

11. Restrict: $x \neq 3, x \neq -3$

$(x+3)\frac{6}{x-3} = \frac{8x^2}{x^2-9} - \frac{4x}{x+3}(x-3)$

$6x+18 = 8x^2 - (4x^2-12x)$

$6x+18 = 8x^2-4x^2+12x$

$6x+18 = 4x^2+12x-18$

$-6x \quad -6x$

$0 = 4x^2+6x-18$

$0 = 2(2x^2+3x-9)$

$0 = 2(2x-3)(x+3)$

$x = \frac{3}{2}$ | $x \neq -3$

12. $3 \cdot \frac{3}{3 \cdot 5x} - \frac{5 \cdot 4}{5 \cdot 3x} = \frac{1}{3} \cdot 5x$

$\frac{9}{15x} - \frac{20}{15x} = \frac{5x}{15x}$

$\frac{-11}{5} = \frac{5x}{5}$

$x = -\frac{11}{5}$