

# Homework 5.3: Simplifying Rational Expressions

Math 3

Name: Key!

**Directions:** Simplify the following rational expressions. Be sure to state any restrictions on the variables. Find common denominators for addition and subtraction problems ONLY! **Show work on a separate piece of paper.**

1.  $\frac{5}{4x} + \frac{7}{12x}$

$$\frac{11}{6x} \quad x \neq 0$$

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

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

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

$$\frac{10x-3}{(x+1)(x+5)} \quad x \neq -1, -5$$

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

$$\frac{9x}{4} \quad x \neq 0, 2$$

5.  $\frac{x^2-5x-6}{2x+6} \div \frac{x^2-3x-4}{4x+12}$

$$\frac{2(x-6)}{x-4} \quad x \neq -3, -1, 4$$

6.  $\frac{2x+3}{5x-30} - \frac{3x+4}{x-6}$

$$\frac{-1(13x+17)}{5(x-6)} \quad x \neq 6$$

7.  $\frac{15x^2}{45x^3} \div \frac{5x^6}{9x^4}$

$$\frac{3}{5x^3} \quad x \neq 0$$

8.  $\frac{2}{5x} - \frac{3}{10x}$

$$\frac{1}{10x} \quad x \neq 0$$

9.  $\frac{x^2-x-12}{4x+12} \div \frac{x^2-6x+8}{6}$

$$\frac{3}{2(x-2)} \quad x \neq -3, 2, 4$$

10.  $\frac{3}{y+5} + \frac{y}{y^2+7y+10}$

$$\frac{2(2y+3)}{(y+5)(y+2)} \quad y \neq -5, -2$$

$$11. \frac{7}{x+2} - \frac{4}{3x+6}$$

$$\frac{17}{3(x+2)} \quad x \neq -2$$

$$12. \frac{15x^2}{45x^3} \div \frac{5x^6}{9x^4}$$

$$\frac{3}{5x^3} \quad x \neq 0$$

$$13. \frac{2}{4x+12} + \frac{7}{x+3}$$

$$\frac{15}{2(x+3)} \quad x \neq -3$$

$$14. \frac{x+3}{5x+20} \cdot \frac{x^2+3x+2}{x^2+5x+6}$$

$$\frac{(x+1)}{5(x+4)} \quad x \neq -4, -3, -2$$

$$15. \frac{7}{x+2} - \frac{4}{x-5}$$

$$\frac{3x-43}{(x-5)(x+2)} \quad x \neq 5, -2$$

$$16. \frac{6x-30}{x^2-7x+10} \cdot \frac{7x-14}{6x}$$

$$\frac{7}{x} \quad x \neq 0, 2, 5$$

$$17. \frac{3x-21}{x^2-3x-28} \cdot \frac{5x+20}{2x+8}$$

$$\frac{15}{2(x+4)} \quad x \neq -4, 7$$

$$18. \frac{7x+4}{x^2+3x+2} - \frac{3x-2}{x^2+3x+2}$$

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

$$19. \frac{2}{x-5} + \frac{3}{x-7}$$

$$\frac{5x-29}{(x-5)(x-7)} \quad x \neq 5, 7$$

$$20. \frac{x^2-x-12}{3x+9} \div \frac{x^2+x-20}{x+5}$$

$$\frac{1}{3} \quad x \neq -3, -5, 4$$

## Homework 5.3

CD 1.  $\frac{5(3) + 7}{4x(3) \cdot 12x} = \frac{15+7}{12x \cdot 12x} = \frac{22}{6x} \quad x \neq 0$

2.  $\frac{\cancel{x+3}}{(x-2)(x-2)} \cdot \frac{(\cancel{x-2})(x+1)}{(\cancel{x+3})(x+1)} = \frac{1}{x-2} \quad x \neq -1, -3, 2$

CD 3.  $\frac{6x-7}{(x+5)(x+1)} + \frac{4(x+1)}{(x+5)(x+1)} = \frac{6x-7+4x+4}{(x+1)(x+5)} = \frac{10x-3}{(x+1)(x+5)} \quad x \neq -1, -5$

4.  $\frac{6(x-2)}{4x^2} \cdot \frac{3x^3}{2(x-2)} = \frac{18x^3}{8x^2} = \frac{9x}{4} \quad x \neq 0, 2$

K.C.F 5.  $\frac{(x-6)(x+1)}{2(x+3)} \cdot \frac{4(x+3)}{(x-4)(x+1)} = \frac{4(x-6)}{2(x-4)} = \frac{2(x-6)}{(x-4)} \quad x \neq -3, -1, 4$

CD 6.  $\frac{2x+3}{5(x-6)} + \frac{-5(3x+4)}{5(x-6)} = \frac{2x+3-15x-20}{5(x-6)} = \frac{-13x-17}{5(x-6)} = -\frac{1(13x+17)}{5(x-6)}$

KCF 7.  $\frac{15x^2}{45x^3} \cdot \frac{9x^4}{5x^6} = \frac{135x^6}{225x^9} = \frac{3}{5x^3} \quad x \neq 0$

CD 8.  $\frac{2(2)}{5x(2)} + \frac{-3}{10x} = \frac{4-3}{10x} = \frac{1}{10x} \quad x \neq 0$

KCF 9.  $\frac{(x-4)(x+3)}{4(x+3)} \cdot \frac{6}{(\cancel{x-4})(x-2)} = \frac{6}{4(x-2)} = \frac{3}{2(x-2)} \quad x \neq -3, 4, 2$

$$\text{CD 10. } \frac{3(y+2)}{(y+5)(y+2)} + \frac{y}{(y+5)(y+2)} = \frac{3y+6+y}{(y+5)(y+2)} = \frac{4y+6}{(y+5)(y+2)} = \frac{2(2y+3)}{(y+5)(y+2)}$$

$y \neq -5, -2$

$$\text{CD 11. } \frac{7(3)}{3(x+2)} + \frac{-4}{3(x+2)} = \frac{21-4}{3(x+2)} = \frac{17}{3(x+2)} \quad x \neq -2$$

$$\text{KCF 12. } \frac{15x^2}{45x^3} \cdot \frac{9x^4}{5x^6} = \frac{135x^6}{225x^9} = \frac{3}{5x^3} \quad x \neq 0$$

$$\text{CD 13. } \frac{2}{4(x+3)} + \frac{7(4)}{(x+3)4} = \frac{2+28}{4(x+3)} = \frac{30}{4(x+3)} = \frac{15}{2(x+3)} \quad x \neq -3$$

$$14. \frac{(x+3)(x+2)(x+1)}{5(x+4)(x+2)(x+3)} = \frac{x+1}{5(x+4)} \quad x \neq -4, -3, -2$$

$$\text{CD 15. } \frac{7(x-5)}{(x+2)(x-5)} + \frac{-4(x+2)}{(x-5)(x+2)} = \frac{7x-35-4x-8}{(x-5)(x+2)} = \frac{3x-43}{(x-5)(x+2)} \quad x \neq -5, -2$$

$$16. \frac{6(x-5) \cdot 7(x-2)}{(x-5)(x-2)(6x)} = \frac{42}{6x} = \frac{7}{x} \quad x \neq 0, 5, 2$$

$$17. \frac{3(x-7)5(x+4)}{(x-7)(x+4)(2)(x+4)} = \frac{15}{2(x+4)} \quad x \neq -4, 7$$

$$18. \frac{(7x+4)}{(x+2)(x+1)} + \frac{-(3x-2)}{(x+2)(x+1)} = \frac{7x+4-3x+2}{(x+2)(x+1)} = \frac{4x+6}{(x+2)(x+1)}$$

$x \neq -2, -1$

$$\text{CD 19. } \frac{2(x-7)}{(x-5)(x-7)} + \frac{3(x-5)}{(x-7)(x-5)} = \frac{2x-14+3x-15}{(x-5)(x-7)} = \frac{5x-29}{(x-5)(x-7)}$$

$$x \neq 5, 7$$

$$\text{KCF 20. } \frac{(x-4)(x+3)}{3(x+3)} \cdot \frac{(x+5)}{(x+5)(x-4)} = \frac{1}{3} \quad x \neq -3, -5, 4$$