

Algebra 2
Adding/Subtracting Rational Expressions – Day 2

Name KEY

Date _____ Period _____

Learning Target: I can add and subtract rational expressions and state restriction(s) on the variable.

Add or subtract. Simplify where possible. State the excluded values (restrictions).

$$1. \frac{x}{3x+9} - \frac{8}{x^2+3x}$$

$$\times \frac{x}{3(x+3)} - \frac{8}{x(x+3)} \cdot \frac{3}{3}$$

$$\frac{x^2}{3x(x+3)} - \frac{24}{3x(x+3)}$$

$$\boxed{\frac{x^2 - 24}{3x(x+3)}}$$

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

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

$$\frac{x}{2(x-6)} - \frac{6}{2(x-6)}$$

$$\frac{(x-6)}{2(x-6)} = \boxed{\frac{1}{2}}$$

$$5. \frac{1}{x^2+5x+4} + \frac{5x}{3x+3}$$

$$\times \frac{1}{(x+4)(x+1)} + \frac{5x}{3(x+1)} \cdot \frac{(x+4)}{(x+4)}$$

$$\frac{3}{3(x+1)(x+4)} + \frac{5x^2+20x}{3(x+1)(x+4)}$$

$$\boxed{\frac{5x^2+20x+3}{3(x+1)(x+4)}}$$

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

$$\times \frac{5x}{(x-3)(x+2)} - \frac{4}{(x+2)(x+2)} \cdot \frac{(x-3)}{(x-3)}$$

$$\frac{5x^2+10x}{(x+2)(x-3)(x+2)} - \frac{(4x-12)}{(x+2)(x-3)(x+2)}$$

$$\boxed{\frac{5x^2+6x+12}{(x-3)(x+2)(x+2)}}$$

$$2. \frac{8x}{8x-40} + \frac{6x}{x+5}$$

$$\times \frac{8x}{8(x-5)} + \frac{6x}{(x+5)} \cdot \frac{8(x-5)}{8(x-5)}$$

$$\frac{8x^2+40x}{8(x+5)(x-5)} + \frac{48x^2-200x}{8(x+5)(x-5)}$$

$$\frac{56x^2-160x}{8(x+5)(x-5)} \rightarrow \frac{8x(7x-20)}{8(x+5)(x-5)}$$

$$4. \frac{3}{7x^2y} + \frac{4}{21xy^2} \cdot \frac{x}{x} = \boxed{\frac{x(7x-20)}{(x+5)(x-5)}}$$

$$\frac{9y}{21x^2y^2} + \frac{4x}{21x^2y^2}$$

$$\boxed{\frac{9y+4x}{21x^2y^2}}$$

$$6. \frac{1}{3x^2+21x+30} + \frac{4x}{3x+15}$$

$$\frac{1}{3(x+5)(x+2)} + \frac{4x}{3(x+5)} \cdot \frac{(x+2)}{(x+2)}$$

$$\frac{1}{3(x+5)(x+2)} + \frac{4x^2+8x}{3(x+5)(x+2)}$$

$$\boxed{\frac{4x^2+8x+1}{3(x+5)(x+2)}}$$

$$8. \frac{x}{x^2-x-20} + \frac{2}{x+4}$$

$$\frac{x}{(x-5)(x+4)} + \frac{2}{(x+4)} \cdot \frac{(x-5)}{(x-5)}$$

$$\frac{x}{(x-5)(x+4)} + \frac{2x-10}{(x+4)(x-5)}$$

$$\boxed{\frac{3x-10}{(x+4)(x-5)}}$$

Perform the required operation. Simplify where possible. State the excluded values (restrictions).

$$9. \frac{1}{x^2-9x+20} - \frac{5}{x^2-10x+25}$$

$$\frac{(x-5)}{(x-5)(x-4)} - \frac{5}{(x-5)(x-5)}$$

$$\frac{x-5}{(x-4)(x-5)(x-5)} - \frac{(5x-20)}{(x-4)(x-5)(x-5)}$$

$$\boxed{\frac{-4x+15}{(x-4)(x-5)(x-5)}}$$

$$10. \frac{2}{x^2-2x-24} + \frac{4x}{x-6}$$

$$\frac{2}{(x-6)(x+4)} + \frac{4x}{(x-6)} \cdot \frac{(x+4)}{(x+4)}$$

$$\frac{2}{(x-6)(x+4)} + \frac{4x^2+16x}{(x-6)(x+4)}$$

$$\boxed{\frac{4x^2+16x+2}{(x-6)(x+4)}}$$

$$11. \frac{x+1}{x-1} + \frac{x+2}{x-2} + \frac{x}{x^2-3x+2}$$

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

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

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

$$12. \frac{5x-2}{3x^2-x-14} - \frac{3}{4x+8}$$

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

$$\frac{20x-8}{4(3x-7)(x+2)} - \frac{(9x-21)}{4(3x-7)(x+2)}$$

$$\boxed{\frac{11x+13}{4(3x-7)(x+2)}}$$

$$13. \frac{x^2+5x+6}{x^2-x-20} \cdot \frac{x^2+3x-4}{x^2+x-2}$$

$$\frac{(x+3)(x+2)}{(x-5)(x+4)} \cdot \frac{(x+4)(x-1)}{(x+2)(x-1)}$$

$$\boxed{\frac{(x+3)}{(x-5)}}$$

$$14. \frac{x^2+20x+99}{x^2+14x+33} \div \frac{3}{x+3}$$

$$\frac{(x+11)(x+9)}{(x+11)(x+3)} \cdot \frac{(x+3)}{3}$$

$$\boxed{\frac{(x+9)}{3}}$$

$$15. \frac{x^2+3x+2}{4x} \div (5x^2+5x)$$

$$\frac{(x+2)(x+1)}{4x} \cdot \frac{1}{5x(x+1)}$$

$$\boxed{\frac{(x+2)}{20x^2}}$$

$$16. \frac{3x+2}{2x+4} \cdot (x^2+5x+6)$$

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

$$\boxed{\frac{(3x+2)(x+3)}{2}}$$