Rational Expressions with Unlike Denominators

FACTOR → IDENTIFY LCM → NPVs → SIMPLIFY

Factor each denominator first. The LCD contains every required factor, but only as many copies as necessary. Simplify completely and state all NPVs.

MILD — *Unlike linear denominators*

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

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

MEDIUM — *Shared and repeated factors*

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

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

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

SPICY — *Factor denominators to reveal the LCD*

6. $\frac{2}{x^2-9} - \frac{3}{x^2+5x+6}$

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

8. $\frac{x+1}{x^2-x-6} - \frac{x-4}{x^2+x-2}$

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

EXTRA SPICY — *Repeated factors, sign reversal, and final cancellation*

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

11. $\frac{7}{2x^2-5x-3} + \frac{5}{(3-x)(x+2)}$

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

13. A learner claims that the LCD of $\frac{2}{(x+1)(x-3)} + \frac{3}{(x+1)(x+5)}$ must be $(x+1)^2(x-3)(x+5)$. Is this a valid common denominator? Is it the least common denominator? Explain.