

1. A complex fraction is where the numerator, the denominator, or both contain a fraction

$$3. \frac{2 - \frac{1}{3}}{4 + \frac{11}{3}} = \frac{6 - 1}{12 + 11} = \frac{5}{23}$$

$$5. \frac{3 - \frac{2}{3}}{5 + \frac{5}{6}} = \frac{18 - 4}{30 + 5} = \frac{14}{35} = \frac{2}{5}$$

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

$$9. \frac{q - 2}{\frac{4}{q} - 9} = \frac{q^2 - 2q}{4 - 9q^2} = \frac{q(q-2)}{(2-q)(2+q)} = \frac{-q}{2+q}$$

$$11. \frac{2 + \frac{1}{q}}{4 - \frac{1}{q^2}} = \frac{2q^2 + q}{4q^2 - 1} = \frac{q(2q+1)}{(2q-1)(2q+1)} = \frac{q}{2q-1}$$

$$13. \frac{x - \frac{1}{x}}{x + \frac{1}{x}} = \frac{x^2 - 1}{x^2 + 1} = \frac{(x+1)(x-1)}{x^2 + 1}$$

$$15. \frac{\frac{1}{a^2} - \frac{1}{a}}{\frac{1}{a^2} + \frac{1}{a}} = \frac{1 - a}{1 + a}$$

$$17. \frac{2 - \frac{4}{x+2}}{5 - \frac{10}{x+2}} = \frac{2(x+2) - 4}{5(x+2) - 10} = \frac{2x+4-4}{5x+10-10} = \frac{2}{5}$$

$$19. \frac{\frac{3}{2a-3} + 2}{-\frac{6}{2a-3} - 4} = \frac{3 + 2(2a-3)}{-6 - 4(2a-3)} = \frac{3 + 4a - 6}{-6 - 8a + 12} = \frac{4a - 3}{-8a + 6} = \frac{4a - 3}{-2(4a - 3)} = -\frac{1}{2}$$

$$\begin{aligned}
 21. \quad \frac{1 - \cancel{x-4}}{1 - \cancel{6} \over x+1} &= \frac{x-4-1}{x-4} = \frac{x-5}{x-4} \\
 &= \frac{x+1-6}{x+1} = \frac{x-5}{x+1} \\
 &= \frac{x+1}{x-4}
 \end{aligned}$$

$$\begin{aligned}
 23. \quad \frac{1 - \cancel{2}x-3}{1 + \cancel{3} \over 2-x} &= \frac{x-3-2}{x-3} = \frac{x-5}{x-3} \\
 &= \frac{2-x+3}{2-x} = \frac{5-x}{2-x} \\
 &= \frac{-(2-x)}{x-3} = \frac{x-2}{x-3}
 \end{aligned}$$

$$25. \quad \frac{x-4 + \frac{9}{2x+3}}{x+3 - \frac{5}{2x+3}} = \frac{(x-4)(2x+3) + 9}{(x+3)(2x+3) - 5}$$

$$= \frac{2x^2 - 5x - 12 + 9}{2x^2 + 9x + 9 - 5}$$

$$= \frac{2x^2 - 5x - 3}{2x^2 + 9x - 4} = \frac{(x-3)(2x+1)}{(x+4)(2x+1)}$$

$$= \frac{x-3}{x+4}$$

$$27. \frac{x-3 + \frac{10}{x+4}}{x+7 + \frac{16}{x-3}} = \frac{(x-3)(x+4) + 10}{x+4} \cdot \frac{(x+7)(x-3) + 16}{x-3}$$

$$= \frac{x^2 + x - 12 + 10}{x+4}$$

$$\frac{x^2 + 4x - 2 + 16}{x-3}$$

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

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

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

$$\begin{aligned}
 29. \quad \frac{1 - \frac{1}{x} - \frac{6}{x^2}}{1 - \frac{4}{x} + \frac{3}{x^2}} &= \frac{x^2 - x - 6}{x^2 - 4x + 3} \\
 &= \frac{(x-3)(x+2)}{(x-3)(x-1)} \\
 &= \frac{x+2}{x-1}
 \end{aligned}$$

$$\begin{aligned}
 31. \quad \frac{1 + \frac{1}{x} - \frac{12}{x^2}}{\frac{9}{x^2} + \frac{3}{x} - 2} &= \frac{x^2 + x - 12}{9 + 3x - 2x^2} \\
 &= \frac{(x-3)(x+4)}{-(x-3)(2x+3)} = \frac{x+4}{-(2x+3)}
 \end{aligned}$$

$$\begin{aligned}
 33. \quad \frac{\frac{1}{y^2} - \frac{1}{xy} - \frac{2}{x^2}}{\frac{1}{y^2} - \frac{3}{xy} + \frac{2}{x^2}} &= \frac{x^2 - xy - 2y^2}{x^2 - 3xy + 2y^2} \\
 &= \frac{-(2y-x)(y+x)}{(2y-x)(y-x)} \\
 &= \frac{-y-x}{y-x}
 \end{aligned}$$

$$\begin{aligned}
 35. \quad \frac{\frac{x}{x+1} - \frac{1}{x}}{\frac{x}{x+1} + \frac{1}{x}} &= \frac{x(x+1) \cdot \frac{x^2+x}{x^2+x+1}}{x(x+1) \cdot \frac{x^2+x+1}{x^2+x+1}} \\
 &= \frac{x^2 - x - 1}{x^2 + x + 1}
 \end{aligned}$$

$$\begin{aligned}
 37. \quad \frac{\frac{1}{a} - \frac{3}{a-2}}{\frac{2}{a} + \frac{5}{a-2}} &= \frac{a-2-3a}{2a-4+5a} = \frac{-2-2a}{7a-4} \\
 &= \frac{-2-2a}{7a-4}
 \end{aligned}$$

$$\begin{aligned}
 39. \quad \frac{\frac{x-1}{x+1} - \frac{x+1}{x-1}}{\frac{x-1}{x+1} + \frac{x+1}{x-1}} &= \frac{(x-1)(x-1) - (x+1)(x+1)}{(x-1)(x-1) + (x+1)(x+1)} \\
 &= \frac{x^2 - 2x + 1 - x^2 - 2x - 1}{x^2 - 2x + 1 + x^2 + 2x + 1}
 \end{aligned}$$

$$\frac{-4x}{2x^2 + 2}$$

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

$$41. \quad a + \frac{a}{a + \frac{1}{a}} = a + \frac{a^2}{a^2 + 1}$$