

# Adding & Subtracting Rationals

$$\text{Ex 1)} \quad \frac{x+10}{3x-15} - \frac{3x+15}{6x-30}$$

$$\frac{2(x+10)}{2(3(x-5))} - \frac{3(x+5)}{6(x-5)} = \frac{2x+20}{6(x-5)} - \frac{3(x+5)}{6(x-5)}$$

$$\frac{2x+20-3x-15}{6(x-5)} = \frac{-x+5}{6(x-5)}$$

$$= \frac{-1(x-5) \div (x-5)}{6(x-5) \div (x-5)} = \left(\frac{-1}{6}\right) \{x \neq 5\}$$

$$\text{Ex 2)} \quad \frac{3y+1}{2y-10} + \frac{1}{y^2-2y-15}$$

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

$$\frac{3y^2 + y + 9y + 3 + 2}{2(y+3)(y-5)} = \boxed{\frac{3y^2 + 10y + 5}{2(y+3)(y-5)}}$$

$$\{y \neq 5, -3\}$$

$$\begin{aligned}
 \text{Ex 3)} \quad \frac{-3x}{x^2-9} + \frac{4}{2x-6} &= \frac{(2)-3x}{(2)(x+3)(x-3)} + \frac{4}{2(x-3)(x+3)} \\
 &= \frac{-6x + 4x + 12}{2(x-3)(x+3)} = \frac{-2x + 12}{2(x-3)(x+3)} = \frac{\cancel{-2}(x-6)}{\cancel{2}(x-3)(x+3)} \\
 &= \boxed{\frac{-(x-6)}{(x-3)(x+3)}} \quad \{x \neq 3, -3\}
 \end{aligned}$$

$$\begin{aligned}
 \text{Ex 4)} \quad \frac{5x}{x^2-x-6} - \frac{4}{x^2+4x+4} &= \frac{(x+2)5x}{(x+2)(x+2)(x-3)} - \frac{4(x-3)}{(x+2)(x+2)(x-3)} \\
 &= \frac{5x^2 + 10x - 4x + 12}{(x+2)(x+2)(x-3)} = \boxed{\frac{5x^2 + 6x + 12}{(x+2)^2(x-3)}} \\
 &\quad \{x \neq -2, 3\}
 \end{aligned}$$

$$\begin{aligned}
 \text{Ex 5)} \quad 7 - \frac{4}{x-4} &= \frac{7(x-4)}{x-4} - \frac{4}{x-4} \\
 &= \frac{7x - 28 - 4}{x-4} = \boxed{\frac{7x - 32}{x-4}} \quad \{x \neq 4\}
 \end{aligned}$$