

# Adding & Subtracting Rationals

## Common Denominators

Ex 1  $\frac{x}{x+4} + \frac{5}{x+4} = \boxed{\frac{x+5}{x+4}}$  Restrictions:  $x \neq -4$

Ex 2  $\frac{2a}{3x} + \frac{4a}{3x} = \frac{3 \div 6a}{3 \div 3x} = \boxed{\frac{2a}{x}}$   $x \neq 0$

Ex 3  $\frac{2x+4}{x^2+13x+12} - \frac{x+3}{x^2+13x+12} = \frac{2x+4 - (x+3)}{x^2+13x+12}$   
 $= \frac{2x+4-x-3}{x^2+13x+12} = \frac{x+1}{x^2+13x+12}$   
 $= \frac{\cancel{x+1}}{(\cancel{x+1})(x+12)} = \boxed{\frac{1}{x+12}}$   $x \neq -12, -1$

Ex 4  $\frac{9x}{x-y} - \frac{9y}{x-y} = \frac{9x-9y}{x-y} = \frac{9(\cancel{x-y})}{\cancel{x-y}} = \boxed{9}$

★ Weird Restriction!  $x \neq y$   
Cool :)

# Unlike Denominators

Ex 1

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

$$\frac{4}{x(x-3)} + \frac{6x}{(x-3)x} = \frac{4}{x(x-3)} + \frac{6x}{x(x-3)} = \frac{4+6x}{x(x-3)}$$
$$= \boxed{\frac{2(2+3x)}{x(x-3)}}$$

$x \neq 3, 0$

Ex 2

$$\frac{2x+1}{6x^2 - 7x - 5} - \frac{3}{3x-5}$$

$$\frac{2x+1}{(2x+1)(3x-5)} - \frac{3(2x+1)}{3x-5(2x+1)} = \frac{2x+1 - [3(2x+1)]}{(2x+1)(3x-5)}$$

$$= \frac{2x+1 - 6x - 3}{(2x+1)(3x-5)} = \frac{-4x - 2}{(2x+1)(3x-5)}$$

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

Restrictions:  
( $x \neq -\frac{1}{2}, 3$ )