

$$\frac{\cancel{k+9}}{\cancel{(k-8)}(k-7)} \cdot \frac{\cancel{k-8}}{\cancel{k+9}} = \boxed{\frac{1}{k-7}}$$

When the denominator = 0, we get an error on the calculator. ∴ So, we must include restrictions!

Restrictions: $k \neq 8, 7, -9$

Adding Rational Expressions

Middle School ☺ : $\frac{4}{9} + \frac{1}{9} = \frac{5}{9}$

① Add the top
② Keep denominator

Ex 1

$$\frac{4}{9x} + \frac{3}{9x} = \boxed{\frac{7}{9x}}$$

Restrictions: $x \neq 0$

↑
What makes denom = 0?

$$\frac{9x}{9} = \frac{0}{9} \quad x = 0$$

Ex 2

$$\frac{6}{7y} - \frac{9}{7y} = \boxed{\frac{-3}{7y}}$$

Restrictions $y \neq 0$

$$\frac{7y}{7} = \frac{0}{7} \quad y = 0$$

Ex 3 $\frac{3}{a+5} + \frac{4a}{a+5} = \boxed{\frac{3+4a}{a+5}}$ Restrictions: $a \neq -5$

$$\begin{array}{r} a+5 = 0 \\ -5 \quad -5 \\ \hline a = -5 \end{array}$$

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

$$\begin{array}{r} x+y = 0 \\ -y \quad -y \\ \hline x = -y \end{array}$$

Restrictions: $x \neq -y$

Subtracting Rational Expressions

Middle School $\ddot{\smile}$: $\frac{9}{7} - \frac{6}{7} = \frac{3}{7}$

① Subtract the top
② Keep denominator

Ex 1 $\frac{19}{4g} - \frac{1}{4g} = \frac{2 \div 18}{2 \div 4g} = \boxed{\frac{9}{2g}}$ Restrictions: $g \neq 0$

$$\frac{4g}{4} = \frac{0}{4} \quad g = 0$$

Ex 2

$$\frac{x+8}{x-2} - \frac{10}{x-2} = \frac{x+8-10}{x-2} = \frac{x-2}{x-2} = \boxed{1}$$

$$\begin{array}{r} x-2=0 \\ +2 \quad +2 \\ \hline x=2 \end{array}$$

Restrictions:
 $x \neq 2$

Ex 3

$$\frac{2x+4}{x^2+13x+12} - \frac{x+3}{x^2+13x+12}$$

$$= \frac{2x+4-x-3}{x^2+13x+12} = \frac{x+1}{x^2+13x+12}$$

$$= \frac{\cancel{x+1}}{(\cancel{x+1})(x+12)} = \boxed{\frac{1}{x+12}}$$

$$x^2+13x+12=0$$

$$(x+1)(x+12)=0$$

$$x = -1, -12$$

Restrictions:
 $x \neq -1, -12$