

7.2 Practice - Adding & Subtracting Rational Expressions

① x^2y, xy^3

LCM: x^2y^3

② a^2b^3c, abc^4

LCM: $a^2b^3c^4$

③ $x+1, x+3$

LCM: $(x+1)(x+3)$

④ $g-1, g^2+3g-4$

$g-1, (g+4)(g-1)$
LCM: $(g-1)(g+4)$

⑤ $2r+2, r^2+r, r+1$

$2(r+1), r(r+1), r+1$
LCM: $2r(r+1)$

⑥ $3, 4w+2, 4w^2-1$

$3, 2(2w+1), (2w+1)(2w-1)$
LCM: $6(2w+1)(2w-1)$

⑦ $x^2+2x-8, x+4$

$(x+4)(x-2), (x+4)$
LCM: $(x+4)(x-2)$

⑧ x^2-x-6, x^2+6x+8

$(x-3)(x+2), (x+4)(x+2)$
LCM: $(x-3)(x+2)(x+4)$

⑨ $d^2+6d+9, 2(d^2-9)$

$(d+3)(d+3), 2(d-3)(d+3)$
LCM: $2(d+3)^2(d-3)$

$$\textcircled{10} \frac{5}{6ab} - \frac{7}{8a} \quad \text{LCD: } 24ab$$

$$(4) \frac{5}{6ab} - \frac{7(3b)}{8a(3b)}$$

$$(4) \frac{5}{6ab} - \frac{7a(3b)}{8a(3b)}$$

$$\frac{20}{24ab} - \frac{21b}{24ab}$$

$$\rightarrow \boxed{\frac{20-21b}{24ab} \quad \begin{matrix} a \neq 0 \\ b \neq 0 \end{matrix}}$$

$$\textcircled{11} \frac{5}{12x^4y} - \frac{1}{5x^2y^3} \quad \text{LCD: } 60x^4y^3$$

$$\frac{5(5y^2)}{12x^4y(5y^2)} - \frac{1(12x^2)}{5x^2y^3(12x^2)}$$

$$\frac{25y^2}{60x^4y^3} - \frac{12x^2}{60x^4y^3}$$

$$\frac{25y^2}{60x^4y^3} - \frac{12x^2}{60x^4y^3}$$

$$\rightarrow \boxed{\frac{25y^2-12x^2}{60x^4y^3} \quad \begin{matrix} x \neq 0 \\ y \neq 0 \end{matrix}}$$

$$\textcircled{12} \frac{1}{6c^2d} + \frac{3}{4cd^3} \quad \text{LCD: } 12c^2d^3$$

$$\frac{1(2d^2)}{6c^2d(2d^2)} + \frac{3(3c)}{4cd^3(3c)}$$

$$\frac{2d^2}{12c^2d^3} + \frac{9c}{12c^2d^3}$$

$$\frac{2d^2}{12c^2d^3} + \frac{9c}{12c^2d^3}$$

$$\rightarrow \boxed{\frac{2d^2+9c}{12c^2d^3} \quad \begin{matrix} c \neq 0 \\ d \neq 0 \end{matrix}}$$

$$\textcircled{13} \frac{4m}{3mn} + \frac{2}{1} \quad \text{LCD: } 3mn$$

$$\frac{4m}{3mn} + \frac{2(3mn)}{1(3mn)}$$

$$\frac{4m}{3mn} + \frac{6mn}{3mn}$$

$$\rightarrow \frac{4m+6mn}{3mn} \rightarrow \frac{2m(2m+3n)}{3mn}$$

$$\boxed{\frac{2(2m+3n)}{3n} \quad \begin{matrix} m \neq 0 \\ n \neq 0 \end{matrix}}$$

$$\textcircled{14} \frac{2x-5}{1} - \frac{x-8}{x+4}$$

$$\text{LCD: } (x+4)$$

$$\frac{2x-5(x+4)}{1(x+4)} - \frac{x-8}{x+4}$$

$$\frac{2x^2 + 8x - 5x - 20 - (x-8)}{x+4}$$

$$\frac{2x^2 + 3x - 20 - x + 8}{x+4}$$

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

$$\rightarrow \frac{2(x^2 + x - 6)}{(x+4)}$$

$$\rightarrow \frac{2(x+3)(x-2)}{x+4} \quad x \neq -4$$

$$\textcircled{15} \frac{4}{a-3} + \frac{9}{a-5}$$

$$\text{LCD: } (a-3)(a-5)$$

$$\frac{4(a-5)}{(a-3)(a-5)} + \frac{9(a-3)}{(a-5)(a-3)}$$

$$\frac{4a-20+9a-27}{(a-3)(a-5)}$$

$$\rightarrow \frac{13a-47}{(a-3)(a-5)} \quad \begin{array}{l} a \neq 3 \\ a \neq 5 \end{array}$$

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

$$\text{LCD: } (x+4)(x-4)$$

$$\frac{16}{(x+4)(x-4)} + \frac{2}{(x+4)}$$

$$\frac{16}{(x+4)(x-4)} + \frac{2(x-4)}{(x+4)(x-4)}$$

$$\frac{16+2x-8}{(x+4)(x-4)}$$

$$\rightarrow \frac{2x+8}{(x+4)(x-4)}$$

$$\rightarrow \frac{2(x+4)}{(x+4)(x-4)}$$

$$\rightarrow \frac{2}{x-4} \quad \begin{array}{l} x \neq 4 \\ x \neq -4 \end{array}$$

$$\textcircled{17} \frac{2-5m}{m-9} + \frac{4m-5}{9-m}$$

$$\frac{-5m+2}{m-9} + \frac{4m-5}{-m+9}$$

$$\frac{-5m+2}{m-9} + \frac{4m-5}{-(m-9)} \quad \text{LCD: } -(m-9)$$

$$= \frac{-5m+2}{-(m-9)} + \frac{4m-5}{-(m-9)}$$

$$\frac{5m-2+4m-5}{-(m-9)} \rightarrow \frac{9m-7}{-(m-9)} \text{ or } \frac{-9m+7}{m-9} \quad m \neq 9$$

$$\textcircled{18} \frac{y-5}{y^2-3y-10} + \frac{y}{y^2+y-2}$$

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

$$\text{LCD: } (y-5)(y+2)(y-1)$$

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

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

$$\frac{2y^2-11y+5}{(y-5)(y+2)(y-1)} \rightarrow \frac{(y-5)(2y-1)}{(y-5)(y+2)(y-1)} \rightarrow \frac{2y-1}{(y+2)(y-1)} \quad \begin{matrix} y \neq 5 \\ y \neq -2 \\ y \neq 1 \end{matrix}$$

$$(19) \frac{5}{2x-12} - \frac{20}{x^2-4x-12}$$

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

$$\text{LCD: } 2(x-6)(x+2)$$

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

$$\frac{5x+10-40}{2(x-6)(x+2)} \rightarrow \frac{5x-30}{2(x-6)(x+2)} \rightarrow \frac{5(x-6)}{2(x-6)(x+2)} \rightarrow \boxed{\frac{5}{2(x+2)} \quad \begin{array}{l} x \neq 6 \\ x \neq -2 \end{array}}$$

$$(20) \frac{2p-3}{p^2-5p+6} - \frac{5}{p^2-9}$$

$$\frac{2p-3}{(p-3)(p-2)} - \frac{5}{(p-3)(p+3)}$$

$$\text{LCD: } (p-3)(p-2)(p+3)$$

$$\frac{(2p-3)(p+3)}{(p-3)(p-2)(p+3)} - \frac{5(p-2)}{(p-3)(p-2)(p+3)}$$

$$\frac{2p^2+6p-3p-9-5p+10}{(p-3)(p-2)(p+3)}$$

$$\frac{2p^2-2p+1}{(p-3)(p-2)(p+3)}$$

$2p^2-2p+1$	$p \neq 3$	$p \neq -3$
$(p-3)(p-2)(p+3)$	$p \neq 2$	

$$\textcircled{21} \quad \frac{1}{5n} - \frac{3}{4} + \frac{7}{10n} \quad \text{LCD: } 20n$$

$$\frac{1(4)}{5n(4)} - \frac{3(5n)}{4(5n)} + \frac{7(2)}{10n(2)}$$

$$\frac{4}{20n} - \frac{15n}{20n} + \frac{14}{20n}$$

$$\frac{-15n+18}{20n} \rightarrow \boxed{\frac{-3(5n-6)}{20n} \quad n \neq 0}$$

$$\textcircled{22} \quad \frac{2a}{a-3} - \frac{2a}{a+3} + \frac{36}{a^2-9}$$

$$\frac{2a}{a-3} - \frac{2a}{a+3} + \frac{36}{(a+3)(a-3)} \quad \text{LCD: } (a+3)(a-3)$$

$$\frac{2a(a+3)}{(a+3)(a-3)} - \frac{2a(a-3)}{(a+3)(a-3)} + \frac{36}{(a+3)(a-3)}$$

$$\frac{2a^2+6a-2a^2+6a+36}{(a+3)(a-3)}$$

$$\frac{12a+36}{(a+3)(a-3)}$$

$$\frac{12a+36}{(a+3)(a-3)} \rightarrow \frac{12(a+3)}{(a+3)(a-3)} \rightarrow \boxed{\frac{12}{a-3} \quad \begin{matrix} a \neq -3 \\ a \neq 3 \end{matrix}}$$

$$23) \frac{\frac{2}{x-y} + \frac{1}{x+y}}{\frac{1}{x-y}}$$

$$\text{top: } \frac{2}{x-y} + \frac{1}{x+y}$$

$$\text{LCD: } (x-y)(x+y)$$

$$\frac{2(x+y)}{(x-y)(x+y)} + \frac{1(x-y)}{(x-y)(x+y)}$$

$$\frac{2x+2y+x-y}{(x-y)(x+y)} \rightarrow \frac{3x+y}{(x-y)(x+y)} \quad \begin{array}{l} x \neq y \\ x \neq -y \end{array}$$

$$\frac{3x+y}{(x-y)(x+y)} \cdot \frac{1}{(x-y)}$$

$$\frac{3x+y}{\cancel{(x-y)}(x+y)} \cdot \frac{\cancel{(x-y)}}{1} \rightarrow \boxed{\frac{3x+y}{x+y} \quad \begin{array}{l} x \neq y \\ x \neq -y \end{array}}$$

$$24) \frac{\frac{r+6}{r} - \frac{1}{r+2}}{\frac{r^2+4r+3}{r^2+2r}}$$

$$\text{top: } \frac{r+6}{r} - \frac{1}{r+2} \quad \text{LCD: } r(r+2)$$

$$\frac{(r+6)(r+2)}{r(r+2)} - \frac{1r}{r(r+2)}$$

$$\frac{r^2+8r+12-r}{r(r+2)} \rightarrow \frac{r^2+7r+12}{r(r+2)} \rightarrow \frac{(r+4)(r+3)}{r(r+2)}$$

$$\text{bottom: } \frac{r^2+4r+3}{r^2+2r}$$

$$\frac{(r+3)(r+1)}{r(r+2)}$$

$$\frac{(r+4)(r+3)}{r(r+2)} \cdot \frac{r(r+2)}{(r+3)(r+1)}$$

$$\frac{\cancel{(r+4)}\cancel{(r+3)}}{\cancel{r}\cancel{(r+2)}} \cdot \frac{\cancel{r}\cancel{(r+2)}}{\cancel{(r+3)}\cancel{(r+1)}} \rightarrow \boxed{\frac{r+4}{r+1} \quad \begin{array}{l} r \neq 0 \\ r \neq -2 \end{array} \quad \begin{array}{l} r \neq -3 \\ r \neq -1 \end{array}}$$