

Adding + Subtracting Algebraic Fractions

mnemonic device : memory aid



①
$$\frac{3}{(x-3)} - \frac{2x}{x^2-9}$$

AB
Factor + cancel within fractions

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

(You can't "cross-cancel")

CD $(x-3)(x+3)$

EF

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

M
Multiply top

$$\frac{3x+9}{c.d.} - \frac{2x}{c.d.}$$

A/s
+/- (put together)

$$\frac{3x+9-2x}{c.d.}$$

S
Simplify (Add up Like terms)

$$\frac{x+9}{(x-3)(x+3)}$$

ANSWER

AB
→ Factor if possible + cancel

② $\frac{m-5}{m^2-11m+28} + \frac{m-5}{m^2-2m-35}$

AB $\frac{(m-5)}{(m-4)(m-7)} + \frac{(m-5)}{(m-7)(m+5)}$

CD $(m-4)(m-7)(m+5)$ ** Never more than 3 terms in c.d.!*

EF $\frac{(m-5)(m+5)}{(m-4)(m-7)(m+5)} + \frac{(m-5)(m-4)}{(m-7)(m+5)(m-4)}$

M $\frac{m^2-25}{c.d.} + \frac{m^2-9m+20}{c.d.}$

A/s $\frac{m^2-25 + m^2-9m+20}{c.d.}$
Combine

S $\frac{2m^2-9m-5}{c.d.}$

AB $\frac{(2m+1)(m-5)}{(m-4)(m-7)(m+5)}$
Answer

$2m^2-9m-5$
prod = -10
 $(2m^2-10m) + (m-5)$ sum = -9
 $2m(m-5) + 1(m-5)$ -10, +1
 $(2m+1)(m-5)$

$$3. \quad \frac{d}{(z+d)} + \frac{2z}{(z-d)} - \frac{d(3z-d)}{z^2-d^2}$$

$$\boxed{AB} \quad \frac{d}{(z+d)} + \frac{2z}{(z-d)} - \frac{d(3z-d)}{(z-d)(z+d)}$$

$$\boxed{CD} \quad (z+d)(z-d)$$

\boxed{EF}

$$\frac{d(z-d)}{(z+d)(z-d)} + \frac{2z(z+d)}{(z-d)(z+d)} - \frac{d(3z-d)}{(z-d)(z+d)}$$

$$\boxed{M} \quad \frac{dz-d^2}{C.D.} + \frac{2z^2+2dz}{C.D.} - \frac{(3dz-d^2)}{C.D.}$$

$$\boxed{A/S} \quad \frac{\cancel{1}d\cancel{z} - \cancel{1}d^2 + 2z^2 + \cancel{2}d\cancel{z} - \cancel{3}d\cancel{z} + \cancel{1}d^2}{C.D.}$$

1 line

$$\boxed{S} \quad \frac{2z^2}{(z+d)(z-d)}$$

ANS

4.

$$\frac{2}{p^2 - 2p - 24} - \frac{5p}{p+4}$$

$$\boxed{AB} \quad \frac{2}{(p-6)(p+4)} - \frac{5p}{(p+4)}$$

$$\boxed{CD} \quad (p-6)(p+4)$$

$$\boxed{EF} \quad \frac{2}{(p-6)(p+4)} - \frac{5p(p-6)}{(p+4)(p-6)}$$

$$\boxed{M} \quad \frac{2}{c.d.} - \frac{(5p^2 - 30p)}{c.d.}$$

$$\boxed{A|S} \quad \frac{2 - 5p^2 + 30p}{c.d.}$$

ans:
$$\frac{-5p^2 + 30p + 2}{(p-6)(p+4)}$$

$$\begin{aligned} \text{prod} &= -10 \\ \text{sum} &= +30 \end{aligned}$$

No
Such
numbers

$$5. \quad \frac{1}{x+y} + \frac{2y}{x^2-y^2}$$

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

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

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

(M)
none

(A/S) $\frac{x-y+2y}{\text{C.D.}}$

(S) $\frac{1(\cancel{x+y})}{(x-y)(\cancel{x+y})} = \frac{1}{x-y}$ ANS

$$\textcircled{6} \quad \frac{6}{x^2-16} - \frac{1}{(x+4)} + \frac{2}{(x+4)}$$

$$\boxed{AB} \quad \frac{6}{(x-4)(x+4)} - \frac{1}{(x+4)} + \frac{2}{(x+4)}$$

$$\boxed{CD} \quad (x-4)(x+4)$$

$$\boxed{EF} \quad \frac{6}{(x-4)(x+4)} - \frac{1(x-4)}{(x+4)(x-4)} + \frac{2(x-4)}{(x+4)(x-4)}$$

$$\boxed{M} \quad \frac{6}{c.d.} - \frac{(x-4)}{c.d.} + \frac{2x-8}{c.d.}$$

$$\boxed{A/s} \quad \frac{6 - x + 4 + 2x - 8}{c.d.}$$

$$\boxed{S} \quad \frac{x+2}{(x-4)(x+4)} \quad \text{ANS}$$

7.
$$\frac{4}{x^2+4x+4} - \frac{2}{x-2} - \frac{3}{x+2}$$

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

$(x+2)^2$

\therefore **CD** $(x+2)^2(x-2)$

EF
$$\frac{4(x-2)}{(x+2)^2(x-2)} - \frac{2(x+2)^2}{(x-2)(x+2)^2} - \frac{3(x+2)(x-2)}{(x+2)(x+2)(x-2)}$$

M
$$\frac{4x-8}{c.d.} - \frac{(2x^2+8x+8)}{c.d.} - \frac{(3x^2-12)}{c.d.}$$

A/S
$$\frac{4x-8-2x^2-8x-8-3x^2+12}{c.d.}$$

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

doesn't

prod = 20
sum = -4

$$\textcircled{8} \quad \frac{x}{x+5} - \frac{1}{x+2} + \frac{3x}{x^2+7x+10}$$

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

$$\boxed{CD} \quad (x+5)(x+2)$$

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

$$\boxed{M} \quad \frac{x^2+2x}{C.D.} - \frac{(x+5)}{C.D.} + \frac{3x}{C.D.}$$

$$\boxed{A/S} \quad \frac{x^2+2x-x-5+3x}{C.D.}$$

$$\boxed{S} \quad \frac{x^2+4x-5}{C.D.}$$

$$\boxed{AB} \quad \frac{(x+5)(x-1)}{(x+5)(x+2)}$$

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

$$\textcircled{9} \quad \frac{4a+4}{4a^2+12a+8} + \frac{a-4}{a^2+7a+10} + \frac{a+3}{a^2+5a+6}$$

$$\frac{\cancel{4}(a+1)}{\cancel{4}(a+2)\cancel{(a+1)}} + \frac{a-4}{(a+2)(a+5)} + \frac{\cancel{1}a+3}{(a+2)\cancel{(a+3)}}$$

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

$$\boxed{CD} \quad (a+2)(a+5)$$

$$\boxed{EF} \quad \frac{1(a+5)}{(a+2)(a+5)} + \frac{(a-4)}{(a+2)(a+5)} + \frac{1(a+5)}{(a+2)(a+5)}$$

$$\boxed{M} \text{ none}$$

$$\boxed{A/S} \quad \frac{1a+5+1a-4+1a+5}{C.D.}$$

$$\boxed{S} \quad \frac{3a+6}{C.D.} \quad \boxed{AB} \quad \frac{\cancel{3}(a+2)}{\cancel{(a+2)}(a+5)}$$

$$= \boxed{\frac{3}{a+5}}$$

$$\textcircled{10} \quad \frac{1}{2x^2 - x - 1} - \frac{1}{2x^2 + x - 3} + \frac{1}{4x^2 + 8x + 3}$$

$$\boxed{AB} \quad \frac{1}{(2x+1)(x-1)} - \frac{1}{(x-1)(2x+3)} + \frac{1}{(2x+3)(2x+1)}$$

$$\boxed{CD} \quad (2x+1)(x-1)(2x+3)$$

$$\boxed{EF} \quad \frac{1(2x+3)}{(2x+1)(x-1)(2x+3)} - \frac{1(2x+1)}{(x-1)(2x+3)(2x+1)} + \frac{1(x-1)}{(2x+3)(2x+1)(x-1)}$$

\boxed{M} none

$$\boxed{A/S} \quad \frac{\cancel{2}x+3 - \cancel{2}x-1 + x-1}{C.D.}$$

$$\boxed{S} \quad \frac{x+1}{(2x+1)(x-1)(2x+3)}$$

$$\textcircled{11} \quad \frac{a^2 + b^2}{(a)(b)} - \frac{a^2}{ab + b^2} - \frac{b^2}{a^2 + ab}$$

$$\boxed{AB} \quad \frac{a^2 + b^2}{(a)(b)} - \frac{a^2}{b(a+b)} - \frac{b^2}{a(a+b)}$$

$$\boxed{CD} \quad (a)(b)(a+b)$$

$$\boxed{EF} \quad \frac{(a^2 + b^2)(a+b)}{(a)(b)(a+b)} - \frac{a \cdot a}{ab(a+b)} - \frac{b^2 b}{ab(a+b)}$$

$$\boxed{M} \quad \frac{a^3 + a^2b + ab^2 + b^3}{c \cdot d} - \frac{a^3}{c \cdot d} - \frac{b^3}{c \cdot d}$$

$$\boxed{A|S} \quad \frac{\cancel{a^3} + a^2b + ab^2 + \cancel{b^3} - \cancel{a^3} - \cancel{b^3}}{c \cdot d}$$

$$\textcircled{5} \quad \frac{a^2b + ab^2}{c \cdot d} \quad \boxed{AB} \quad \frac{ab(a+b)}{ab(a+b)} = \boxed{1}$$