

B4. Frazioni algebriche - Esercizi

SEMPLIFICARE LE SEGUENTI FRAZIONI ALGEBRICHE

- 1) $\frac{5a^2xy}{10a^2x}$, $\frac{28ab^2c^2}{7abc^2}$ $[\frac{y}{2}; 4b]$
- 2) $\frac{12a^3bx^3}{18ab^2x^5}$, $\frac{9a}{12a}$ $[\frac{2a^2}{3bx^2}; \frac{3}{4}]$
- 3) $\frac{16a^3b^2c}{30ab^5c}$, $\frac{12ax^5y}{28ax^6y^2}$ $[\frac{8a^2}{15b^3}; \frac{3}{7xy}]$
- 4) $\frac{8a^3bc^2}{16a^4bc^2}$, $\frac{12xyz}{12xy^2z}$ $[\frac{1}{2a}; \frac{1}{y}]$
- 5) $\frac{120a^2b^3c}{48a^3b^2c^3}$, $\frac{25a^2bx}{10ab^4x^3}$, $\frac{70xy}{35xy^2}$ $[\frac{5b}{2ac^2}; \frac{5a}{2b^3x^2}; \frac{2}{y}]$
- 6) $\frac{121x^3y^4z^5}{33x^4y^3z^4}$, $\frac{24x^2y}{40xy^2}$ $[\frac{11yz}{3x}; \frac{3x}{5y}]$
- 7) $\frac{2x^2+5x-3}{x^2-x-12}$, $\frac{4x^2-4}{2x+2}$, $\frac{x^2-2x+1}{3-3x}$ $[\frac{2x-1}{x-4}; 2(x-1); \frac{-x-1}{3}]$
- 8) $\frac{3ax^2-3ax+x-1}{9a^2x^2-1}$, $\frac{a^3-a^2}{a^2-1}$, $\frac{ax^2-2ax+a}{a-ax}$ $[\frac{x-1}{3ax-1}; \frac{a^2}{a+1}; 1-x]$
- 9) $\frac{4b^2+4b+1}{2bx-2b+x-1}$, $\frac{4x^2-1}{2x^2+3x-2}$, $\frac{x^2-6x-27}{x^2-9}$ $[\frac{2b+1}{x-1}; \frac{2x+1}{x+2}; \frac{x-9}{x-3}]$
- 10) $\frac{1-a^2}{a^2-a}$, $\frac{x^2-4x+3}{9-x^2}$, $\frac{x^2+2x+1}{ax+a-x-1}$ $[\frac{-1+a}{a}; \frac{-x-1}{x+3}; \frac{x+1}{a-1}]$
- 11) $\frac{4-a^2}{a^3-2a^2}$, $\frac{x^2-8x+16}{x^2-16}$, $\frac{x^2-3x+2}{ax-bx-2a+2b}$ $[\frac{-2+a}{a^2}; \frac{x-4}{x+4}; \frac{x-1}{a-b}]$
- 12) $\frac{-x^3+x}{x^2+3x-4}$, $\frac{3x^2-11x-4}{x^2-16}$, $\frac{x^2}{2x-x^2}$ $[\frac{-x(x+1)}{x+4}; \frac{3x+1}{x+4}; \frac{x}{2-x}]$
- 13) $\frac{a^2-4a+4}{4-a^2}$, $\frac{b-2a+b^2-2ab}{b^3-2ab^2}$ $[\frac{-a-2}{2+a}; \frac{1+b}{b^2}]$
- 14) $\frac{a^3-a^2b}{2a^2-5a-2ab+5b}$, $\frac{x^2-6x+9}{9-x^2}$ $[\frac{a^2}{2a-5}; \frac{-x-3}{x+3}]$
- 15) $\frac{x^2-4x+4}{3x^2-5x-2}$, $\frac{9b^2-6b+1}{9b^2-1}$ $[\frac{x-2}{3x+1}; \frac{3b-1}{3b+1}]$
- 16) $\frac{a^3-3a^2+3a-1}{a^2-a}$, $\frac{x^3+y^3}{x^3+3x^2y+3xy^2+y^3}$ $[\frac{(a-1)^2}{a}; \frac{x^2-xy+y^2}{(x+y)^2}]$
- 17) $\frac{x^3-1}{x^3+x^2+x}$, $\frac{3x^2+4x}{9x^2-16}$ $[\frac{x-1}{x}; \frac{x}{3x-4}]$
- 18) $\frac{8x^3-4x^2y-2xy^2+y^3}{4x^2-y^2}$, $\frac{x^2-1}{x+1}$ $[2x-y; x-1]$
- 19) $\frac{x^2-5x+6}{x^2-4x+4}$, $\frac{x^2-2x-8}{x^2-3x-4}$, $\frac{x^2+x+2}{5x^2+5x+10}$ $[\frac{x-3}{x-2}; \frac{x+2}{x+1}; \frac{1}{5}]$
- 20) $\frac{x^2+x-2}{x^2+5x+6}$, $\frac{x^2-121}{x^2-x-110}$, $\frac{x^3-7x+6}{3x^2-3x}$ $[\frac{x-1}{x+3}; \frac{x+11}{x+10}; \frac{(x+3)(x-2)}{3x}]$
- 21) $\frac{5a-10b}{4b^2-a^2}$, $\frac{x^3-3ax^2+3a^2x-a^3}{x^2-2ax+a^2}$ $[\frac{-5}{a+2b}; x-a]$
- 22) $\frac{5ax+5x^2-2a-2x}{25x^2-10x}$, $\frac{a^4-b^4}{a^3-ba^2+ab^2-b^3}$ $[\frac{a+x}{5x}; a+b]$
- 23) $\frac{a^6-b^6}{a^2-b^2}$, $\frac{a^6-b^6}{a^3+b^3}$ $[a^4+a^2b^2+b^4; a^3-b^3]$

PRODOTTO E DIVISIONE DI FRAZIONI ALGEBRICHE

- 24) $\frac{7a^3b^5}{84b^4x^2} \cdot \frac{6a^5bx^2}{ab}$, $\frac{12a^2b}{40ab^5x^3} \cdot \frac{32x^3c^2b^4}{18a}$ $[\frac{a^7b}{2}; \frac{8c^2}{15}]$
- 25) $\frac{15abc^3}{10a^4bc} \cdot \frac{42a^3}{63c^2}$, $\frac{33x^2y}{24xy^2} \cdot \frac{22x^2y^2}{8xy^3}$ $[1; \frac{1}{2}]$
- 26) $\frac{50abc^6}{40a^2bc} \cdot \frac{21c^4a}{28a^3b}$, $\frac{a}{b} \cdot \frac{a}{b}$, $\frac{x}{2y} \cdot \frac{x}{y}$ $[\frac{5abc}{3}; 1; \frac{x^2}{2y^2}]$
- 27) $\frac{27a^2b}{25x^2b} \cdot \frac{45a^3}{125abx^2}$, $\frac{a^2}{ab} \cdot \frac{b^2}{ab}$, $\frac{a^2}{b} \cdot \frac{a}{b^2}$ $[3b; 1; \frac{a^3}{b^3}]$
- 28) $\frac{2ax}{9by} \cdot \frac{3ay}{4bx} \cdot \frac{b^2}{a^2}$, $\frac{10a^2b^3}{24abc^2} \cdot \frac{12b^2c^2}{5a^3b^4}$ $[\frac{1}{6}; \frac{1}{a^2}]$

- 29) $\frac{x^2+2x+1}{10x} \cdot \frac{5x^2}{x+1}; \quad \frac{4-x^2}{2x^2+4x} \cdot \frac{4x}{2x^2-8x+8}$ $[\frac{x(x+1)}{2}; \quad \frac{1}{2-x}]$
- 30) $\frac{9x^2-16}{3ax+4a} \cdot \frac{9a^2+18a}{3ax+6x+4a+8}$ $[\frac{9(3x-4)}{3x+4}]$
- 31) $\frac{x^3-6x^2y+12xy^2-8y^3}{x^2+3x-2xy-6y} \cdot \frac{x^2+4x+3}{x^2-4xy+4y^2}$ $[x+1]$
- 32) $\frac{a-x}{ax+2a} \cdot \frac{a^2x^2-a^2x-6a^2}{ax^2+a^3-2a^2x}$ $[\frac{x-3}{x-a}]$
- 33) $\frac{4x^2y^2-4xy+1}{2x^2y+2xy-x-1} \cdot \frac{x^3+2x^2+x}{2x^3y-x^2}$ $[\frac{x+1}{x}]$
- 34) $\frac{a^4-2a^2b^2+b^4}{2a+2b-a^2-ab} \cdot \frac{a^2-5a+6}{a^2-2ab+b^2}; \quad \frac{a^2-a}{a^2-2a+1} \cdot \frac{a^2+a}{a^2-1}$ $[-(a+b)(a-3); \quad 1]$
- 35) $\frac{x^4-2x^2}{x^3-x^2} \cdot \frac{x^2+x-x\sqrt{2}-\sqrt{2}}{x^2-1}; \quad \frac{x^2-x-6}{x^2+4x+4} \cdot \frac{x^2+x-2}{x^2-4x+3}$ $[x+\sqrt{2}; \quad 1]$
- 36) $\frac{x^2-x-30}{x^2+8x+15} \cdot \frac{x^2-14x+48}{x^2-5x-24}; \quad \frac{9x^2-1}{x^2-3x-10} \cdot \frac{3x^2+5x-2}{9x^2-6x+1}$ $[1; \quad \frac{3x+1}{x-5}]$
- 37) $\frac{4ax+2a-2x^2-x}{2ax+a} \cdot \frac{4a^2-x^2}{4ax^2+4ax+a}$ $[\frac{(2x+1)^2}{2a+x}]$
- 38) $\frac{x^2-10x+25}{x^2+10x+16} \cdot \frac{x^3-15x^2+75x-125}{x^2-3x-10}$ $[\frac{1}{x+8}]$
- 39) $\frac{x^3-x^2-x-2}{x^3-4x^2+4x} \cdot \frac{x^3-1}{x^2-3x+2}$ $[\frac{1}{x}]$
- 40) $\frac{x^2-2x+1}{x^2-1} \cdot \frac{x+1}{x-1}; \quad \frac{a^2}{a-b} \cdot \frac{a^2-ab}{a^2-2ab+b^2}$ $[1; \quad a]$
- 41) $\frac{x^2y-xy^2}{x^4-x^2y^2} \cdot \frac{x^2+xy}{xy-y^2}; \quad \frac{x^2+x-2}{x^2-4} \cdot \frac{x^2-4x+4}{x^2-4x+3}$ $[\frac{1}{x-y}; \quad \frac{x-2}{x-3}]$
- 42) $\frac{9x^2+16-24x}{3x^2-4x} \cdot \frac{2x^3-3x^2}{4x^3+9x-12x^2}$ $[\frac{3x-4}{2x-3}]$
- 43) $\frac{9x^2-1}{3x^2-2x-1} \cdot \frac{x-1}{9x^2-6x+1}$ $[\frac{1}{3x-1}]$
- 44) $\frac{x^3-6x^2+12x-8}{x^3-4x} \cdot \frac{4-x^2}{x^3+4x^2+4x}$ $[-(x-2)]$
- 45) $\frac{xy+bx-ay-ab}{y^2+by} \cdot \frac{ay+xy}{2a^2-2x^2}$ $[-\frac{1}{2}]$
- 46) $\frac{ax+2bx-a-2b}{x^2-x} \cdot \frac{ax+2bx+a+2b}{x^2+x}$ $[1]$
- 47) $\frac{1-3x+3x^2-x^3}{x^2+x-2} \cdot \frac{x+2}{x^2-1}$ $[-\frac{(1-x)}{x+1}]$
- 48) $\frac{x^3+4x^2+x-6}{x+2} \cdot \frac{x^2+2x-3}{x^2+6x+9}$ $[(x-1)^2]$
- 49) $\frac{x^3-9x^2+27x-27}{x^3-2x^2-3x} \cdot \frac{x^2-6x+9}{x^3-x}$ $[x-1]$

POTENZA DI FRAZIONI ALGEBRICHE

- 50) $(\frac{x+1}{2a})^2; \quad (\frac{2a+b}{x-1})^2$ $[\frac{x^2+2x+1}{4a^2}; \quad \frac{4a^2+4ab+b^2}{x^2-2x+1}]$
- 51) $(\frac{-3x}{2a-1})^2; \quad (\frac{a+b}{x})^3$ $[\frac{9x^2}{4a^2-4a+1}; \quad \frac{a^3+3a^2b+3ab^2+b^3}{x^3}]$
- 52) $(\frac{-1}{2a})^3; \quad (\frac{a-2}{x-2})^2$ $[-\frac{1}{8a^3}; \quad \frac{a^2-4a+4}{x^2-4x+4}]$
- 53) $(\frac{-a}{b})^5; \quad (\frac{a-1}{a})^4$ $[-\frac{a^5}{b^5}; \quad \frac{a^4-4a^3+6a^2-4a+1}{a^4}]$
- 54) $(\frac{x+y+1}{2a-b})^2; \quad (\frac{a-3b}{x})^2$ $[\frac{x^2+y^2+1+2xy+2x+2y}{4a^2-4ab+b^2}; \quad \frac{a^2-6ab+9b^2}{x^2}]$
- 55) $(\frac{x+\sqrt{5}}{a-2b+3c})^2; \quad (\frac{4a}{2x-1})^3$ $[\frac{x^2+2x\sqrt{5}+5}{a^2+4b^2+9c^2-4ab+6ac-12bc}; \quad \frac{64a^3}{8x^3-6x^2+12x-1}]$
- 56) $(\frac{3-x-2y}{2a})^2; \quad (\frac{-2a}{3x^2})^4$ $[\frac{9+x^2+4y^2-6x-12y+4xy}{4a^2}; \quad \frac{16a^4}{81x^8}]$

SOMMA E SOTTRAZIONE DI FRAZIONI ALGEBRICHE

- 57) $\frac{a-2b}{a} + \frac{2a-b}{b}$; $\frac{xy-y}{x} + \frac{x^2+x}{y} - \frac{xy-y}{x}$ $[\frac{2(a-b)(a+b)}{ab}; \frac{x^2+x}{y}]$
- 58) $\frac{3a-ab+a+b}{a^2} + \frac{a+b}{a}$; $\frac{5-x}{2x} - \frac{2x+3}{x^2}$ $[\frac{a+3}{a}; \frac{-x^2+x-6}{2x^2}]$
- 59) $\frac{a+b}{ab} - \frac{c+b}{bc} - \frac{c-a}{ac}$; $\frac{y-x^2}{x^2y} + \frac{y^2-x}{xy^2} + \frac{x-y}{xy}$ $[0; \frac{y^2-x^2}{x^2y^2}]$
- 60) $\frac{3a-2b}{2a} - \frac{3a+2b}{3b} + \frac{b^3-a^2}{ab^2}$; $\frac{x+y}{4xy} - \frac{x+1}{3x} + \frac{4y-3}{12y}$ $[\frac{5ab^2-6a^2b-6a^2}{6ab^2}; \frac{-y}{12x}]$
- 61) $\frac{a+1}{a} - \frac{a^2-1}{a^2} - \frac{a^2-1}{a^3}$; $\frac{1-2ab}{2ab} - \frac{3a+b}{8a^2} + 1$ $[\frac{a+1}{a^3}; \frac{4a-3ab-b^2}{8a^2b}]$
- 62) $2 - \frac{b-a^2}{a^2b} - \frac{4b+2}{2b}$; $\frac{8a+1}{4a} - 3 + \frac{6b+1}{6b}$ $[-\frac{1}{a^2}; \frac{3b+2a}{12ab}]$
- 63) $\frac{9a^2+2b^2}{18ab} + \frac{6a-2b}{24a} - \frac{b+2a}{4b}$; $1 - \frac{a+b}{ab} + \frac{a+c}{ac}$ $[\frac{b}{36a}; \frac{bc+b-c}{bc}]$
- 64) $\frac{2+y}{3xy} - \frac{y^2+6y}{9xy^2} + \frac{-4x}{18x^2}$; $\frac{x}{x-y} - \frac{y}{x+y}$ $[0; \frac{x^2+y^2}{(x-y)(x+y)}]$
- 65) $\frac{x+y}{x^2+x} - \frac{x-y}{x^2-x} + \frac{2x-2y}{x^2-1}$; $\frac{a+2}{3a-3} - \frac{a-2}{5a-5} - \frac{2a+10}{15a-15}$ $[\frac{2}{x+1}; \frac{2}{5}]$
- 66) $\frac{x}{x-1} + \frac{2x}{1-x}$; $\frac{2a-1}{a-b} - \frac{2a-6b}{3a-3b} + \frac{2b-1}{b-a}$ $[\frac{-x}{x-1}; \frac{4a}{3(a-b)}]$
- 67) $\frac{x}{1-3x} + \frac{1-3x^2}{9x^2-1} + \frac{2x}{3x+1}$; $\frac{a+2}{a^2} - \frac{1}{a-2}$ $[-\frac{1}{3x+1}; \frac{-4}{a^2(a-2)}]$
- 68) $\frac{3x+1}{4x^2-1} + \frac{2x-3}{6x-3}$; $\frac{2a+x}{a+x} - \frac{x-2a}{x-a} - \frac{2a^2}{a^2-x^2}$ $[\frac{x(4x+5)}{3(2x-1)(2x+1)}; \frac{-2a}{a-x}]$
- 69) $\frac{a}{a-1} - \frac{2a^2-3a}{a^2-2a+1} + 1$; $\frac{8a^2}{6a^2-6} - \frac{a-3}{3-3a} - \frac{2a+1}{a+1}$ $[\frac{1}{(a-1)^2}; \frac{-a}{3(a+1)}]$
- 70) $\frac{3a}{a-b} + \frac{2a}{a+b} - \frac{b^2+ab+4a^2}{a^2-b^2}$ $[1]$
- 71) $\frac{4a-b}{3a+12b} + \frac{8ab}{a^2-16b^2} + \frac{7a+5b}{20b-5a}$ $[\frac{-a^2-64ab-40b^2}{15(a-4b)(a+4b)}]$
- 72) $\frac{2}{x^3-x} + \frac{2x+1}{x^2+x} + \frac{x-3}{1-x^2}$; $\frac{a+5b}{a-5b} - \frac{a+15b}{a+5b} + 1$ $[\frac{x+1}{x(x-1)}; \frac{a^2+75b^2}{(a-5b)(a+5b)}]$
- 73) $\frac{1-a^3}{a+1} + a^2 - a + 1$ $[\frac{2}{a+1}]$
- 74) $\frac{1}{a^2-4ab+4b^2} + \frac{1}{a^2-4b^2} - \frac{1}{a^2+4ab+4b^2}$ $[\frac{a^2+8ab-4b^2}{(a+2b)^2(a-2b)^2}]$
- 75) $\frac{b-c}{(a+b)(a+c)} + \frac{c-a}{(a+b)(b+c)} + \frac{a-b}{(a+c)(b+c)}$ $[0]$
- 76) $\frac{4b^2-4ab}{a^2-2ab+b^2} + \frac{2a+4b}{a-b} - \frac{4a+b}{2a-2b}$ $[\frac{-b}{2(a-b)}]$
- 77) $[\frac{x-2}{x^2+2x-3} + \frac{3-x}{x^2+3x} + \frac{2-x}{x-x^2} + \frac{5}{x^3+2x^2-3x}]$ $[\frac{x+4}{x(x+3)}]$
- 78) $\frac{-2a^2}{a^2+2ab} - \frac{4ab}{a^2+4ab+4b^2} + 2$ $[\frac{8b^2}{(a+2b)^2}]$
- 79) $\frac{5-xy}{3xy-3} + \frac{3xy-19}{6x^2y^2-6} - \frac{3-xy}{2xy+2}$ $[\frac{xy}{6(xy+1)}]$
- 80) $\frac{x}{x^2+3x-10} - \frac{x-2}{x^2-3x+2} + \frac{6}{x^2+4x-5}$ $[\frac{2}{(x-2)(x+5)}]$
- 81) $-\frac{2x^2+10x+8}{x^3+3x^2+3x+1} + \frac{1-x}{x^2+2x+1} - \frac{x}{x+1} + 1$ $[\frac{-2(x+3)}{(x+1)^2}]$
- 82) $(\frac{a-b}{a+b} - \frac{a+b}{a-b}) : (\frac{-2a^2}{(a-b)^2} + \frac{2a}{a-b})$ $[\frac{2(a-b)}{a+b}]$
- 83) $\frac{a-2}{3a-5} - \frac{a+8}{5+3a} - \frac{9a^2+25+20a}{25-9a^2}$ $[\frac{9a^2+55}{(3a-5)(3a+5)}]$
- 84) $\frac{1}{a-b} + \frac{a}{b^2-ab} - \frac{1}{a-2b} - \frac{a}{2b^2-ab}$ $[\frac{-1}{a-2b}]$
- 85) $\frac{2a-1}{a^2+3a+2} + \frac{a-2}{a^2+a} + \frac{a^3+3a+4}{a^3+3a^2+2a}$ $[1]$

- 86) $\left(\frac{a+x}{a-2b} + \frac{a+2b}{a-x}\right) \cdot \left(\frac{5a^2-3x^2-8b^2}{2a^2-x^2-4b^2} - 2\right)$ $\left[\frac{(2b-x)(2b+x)(a+x)}{(a-2b)(2a^2-x^2-4b^2)}\right]$
- 87) $\frac{1-x}{x^2+y^2-2xy} + \frac{1+x}{x^2+y^2+2xy} - \frac{2}{x^2-y^2}$ $\left[\frac{4y(y-x^2)}{(x-y)^2(x+y)^2}\right]$
- 88) $-\frac{10x+22}{x^3+4x^2+x-6} - \frac{x+1}{x^2+5x+6} - \frac{2}{1-x}$ $\left[\frac{x-3}{(x-1)(x+2)}\right]$
- 89) $\frac{a^2-b^2}{a^2+ab+b^2} - \frac{a+b}{a-b} + \frac{a^3-b^3+6ab^2}{a^3-b^3}$ $\left[\frac{-3ab}{a^2+ab+b^2}\right]$
- 90) $\left(\frac{5-3x}{2x^2+3x-2} + \frac{3x}{x^2+4x+4} - \frac{1}{2x-1}\right) \cdot \left(\frac{x}{x-1} - \frac{5}{2x-2} + \frac{x}{x-3} + \frac{19}{2x-6}\right)$ $\left[\frac{2}{x+2}\right]$