Esercizi di consolidamento

Semplifica le seguenti espressioni togliendo le parentesi in una sola volta.

1 $a^2 - 1 + \left\{-x^2 - \left[\frac{1}{2}a^2 + \left(-x^2 + \frac{1}{2}a^2\right) + 1\right] + 2a^2\right\}$ $[2a^2 - 2]$

2 $\frac{1}{5}a^2b - \left[3x + a^2b - \left(\frac{1}{3}x + \frac{1}{2}a^2b\right)\right] + \frac{8}{3}x$ $\left[-\frac{3}{10}a^2b\right]$

3 $\left(\frac{5}{6}ab - \frac{1}{4}a^2b + \frac{3}{5}a^2b^2\right) - \left(\frac{1}{3}ab + \frac{3}{4}ab^2 - \frac{1}{4}a^2b\right) - \left(\frac{5}{2}ab^2 + \frac{1}{10}a^2b^2\right)$ $\left[\frac{1}{2}a^2b^2 - \frac{13}{4}ab^2 + \frac{1}{2}ab\right]$

4 $\left(\frac{1}{2}a^4 + 3a^3b^2 - \frac{5}{4} + 3a\right) - \left(-\frac{3}{5}a^4 - 1 + \frac{13}{6}a\right) + \left(-\frac{4}{3}a^3b^2 + \frac{1}{4} - \frac{5}{6}a\right)$ $\left[\frac{11}{10}a^4 + \frac{5}{3}a^3b^2\right]$

5 $\left(\frac{1}{4} + 2x^2 + a\right) - \left(\frac{3}{5}a^2x - \frac{1}{3}a\right) - \left[-\left(-2x^2 + \frac{1}{2}\right) + \left(\frac{1}{3}a^2x - \frac{1}{6}a\right)\right]$ $\left[\frac{3}{4} + \frac{3}{2}a - \frac{14}{15}a^2x\right]$

6 $(2x - 3y) - \left\{-\left[x^2 - (2x - y) + \left(5y - \frac{3}{4}x^2\right)\right] + \left(2x + \frac{3}{2}y\right)\right\}$ $\left[\frac{1}{4}x^2 - 2x + \frac{3}{2}y\right]$

7 $\left(a^2 + \frac{2}{3}b^2 + c^3\right) - \left[+\left(\frac{1}{3}a^2 - \frac{1}{3}b^2 + \frac{3}{4}c^3\right) - \left(\frac{1}{6}a^2 + \frac{1}{2}b^2 - \frac{1}{4}c^3\right)\right]$ $\left[\frac{5}{6}a^2 + \frac{3}{2}b^2\right]$

8 $\left(\frac{5}{12}x^2yz + \frac{19}{9}xy^2 + \frac{1}{10}x^3yz\right) - \left(-\frac{20}{9}xy^2z\right) - \left(\frac{4}{5}x^3yz + \frac{5}{3}xy^2z\right) - \left[\left(\frac{1}{2}x^2yz + \frac{1}{9}xy^2 + \right.\right.$

$\left.\left. - \frac{3}{10}x^3yz\right) + \left(\frac{5}{9}xy^2z - \frac{3}{4}x^2yz - \frac{2}{5}x^3yz + \frac{2}{3}x^2yz\right)\right]$ $[2xy^2]$

9 $\left(\frac{4}{3}yz^2 - \frac{1}{3}yz + \frac{2}{3}x^2z^3\right) - \left(xy - \frac{1}{2}y^2 - \frac{2}{5}yz + \frac{3}{20}y^2\right) - \left[\left(\frac{2}{3}yz^2 + \frac{4}{5}yz^2\right) - \left(\frac{2}{15}yz - x^2z^3 + \right.\right.$

$\left.\left. + \frac{1}{3}x^2z^3\right) - \left(-\frac{1}{5}yz\right) - \left(xy + \frac{1}{4}y^2 - \frac{3}{5}y^2\right)\right]$ $\left[-\frac{2}{15}yz^2\right]$

10 $\frac{5}{2}x^2y - \frac{1}{4}xy + \frac{1}{2}xy^3z - \frac{3}{4}x^2y - \left(\frac{1}{4}xy + \frac{1}{12}xy^3z\right) + \left[\left(\frac{1}{3}xy^3 - 2x^4y - \frac{3}{8}x^2y\right) - \left(\frac{3}{8}x^2y + x^2y\right)\right] +$

$- \left(\frac{5}{12}xy^3z - \frac{1}{2}xy + \frac{1}{3}xy^3 - 3x^4y\right)$ $[x^4y]$

11 $\left(yz^2 + \frac{1}{2}xy + x^2y^2\right) - \left[\left(\frac{1}{2}x^2y^2 + \frac{2}{3}x^2y\right) + \left(\frac{2}{15}x^2z + \frac{1}{5}x^2y^2 + \frac{2}{3}yz^2\right)\right] - \left[\left(\frac{1}{3}yz^2 - \frac{2}{9}x^2y + \right.\right.$

$\left.\left. + \frac{1}{4}xy\right) + \left(\frac{3}{10}x^2y^2 - \frac{1}{3}x^2y\right) - \left(\frac{2}{15}x^2z - \frac{1}{4}xy\right)\right]$ $\left[-\frac{1}{9}x^2y\right]$

Semplifica le seguenti espressioni contenenti prodotti notevoli.

12 $[(2y-1)^2+(0{,}5x+2y-1)(0{,}5x-2y+1)] : \left(\frac{1}{8}x^2\right)$ $[2]$

13 $\left[(3a^2b-4ab^2)^2-\left(3a^2b+\frac{1}{2}ab^2\right)\left(3a^2b-\frac{1}{2}ab^2\right)+24a^3b^3\right] : (-2ab)$ $\left[-\frac{65}{8}ab^3\right]$

14 $\left\{[(-2x+3y)(2x+3y)(4x^2+9y^2)+16(x^2-2y^2)(x^2+2y^2)] : (-17y^2)\right\}^2$ $[y^4]$

15 $(2x-y)^2+(2x+y)^2-[(3y-2x)(3y+2x)-9y^2] : (-2x)-x(8x-2)$ $[2y^2]$

16 $\left[\left(a-\frac{1}{3}b\right)^2-a^2\right] : \left(-\frac{1}{3}b\right)\left(2a+\frac{1}{3}b\right)+\left(-\frac{2}{3}\right)\left(\frac{9}{4}a^2-\frac{1}{6}b^2\right)$ $\left[\frac{5}{2}a^2\right]$

17 $(2x-1)(2x+1)+(6x^2y-3xy) : (-3xy)+(12x^3y^2-6x^2y^3+8x^4y^2) : (-2x^2y^2)$ $[3y-8x]$

18 $\left[\left(\frac{2}{3}x+\frac{9}{4}y\right)^2-\left(-\frac{9}{4}y\right)^2\right] : \left(\frac{2}{3}x\right)-\left(\frac{1}{3}x+1\right)^2+1$ $\left[\frac{9}{2}y-\frac{1}{9}x^2\right]$

19 $\left[\left(10x^2y^3-\frac{1}{3}x^4y^2+5x^5y^3\right) : \left(\frac{5}{3}x^2y^2\right)-3y(2-x^3)\right] : \left(-\frac{1}{5}x^2\right)+30xy$ $[1]$

20 $[(3x+2y)(2x-3y)-6(x-y)(x+y)] : (-5xy)+8-\left(\frac{2}{3}x-3\right)\left(\frac{2}{3}x+3\right)$ $\left[18-\frac{4}{9}x^2\right]$

21 $\left\{-\left[\frac{1}{5}x(5+10x)-7x^6 : \left(\frac{7}{2}x^4\right)\right]\cdot 2x^3-4+(x^2+2)^2\right\} : (-2x)^2$ $\left[1-\frac{1}{4}x^2\right]$

22 $[(2x+3)(4x^2-6x+9)-(2x+3)^3] : (-18x)+(x-1)(x+2)-1$ $[x^2+3x]$

23 $\left\{(-2a)^5 : (2a)^4+(a+2)^2-2[(-2a)^3]^2 : [(-2a)^2]^2-2(a+2)\right\}^2-(-7a)^2$ $[49a^4-49a^2]$

24 $\left(\frac{3}{4}a^2x-\frac{1}{2}ax\right) : \left(-\frac{1}{2}ax\right)+\left(\frac{1}{5}a^3x^2-\frac{1}{2}a^2x^3-\frac{2}{5}a^2x^2\right) : \left(+\frac{2}{5}a^2x^2\right)$ $\left[-a-\frac{5}{4}x\right]$

25 $\left\{\left[\left(2a^2b^3-\frac{1}{4}a^5\right)(-4a)+(2ab+1)(4a^2b^2-2ab+1)\right]^2-1\right\} : a^6$ $[a^6+2]$

26 $[y^3+3y(x-1)(x-1+y)] : (-2y)+3\left[\left(x+\frac{1}{2}y\right)\left(\frac{1}{2}x-1\right)+\frac{1}{2}\right]$ $\left[-\frac{1}{2}y^2-\frac{3}{4}xy\right]$

27 $\left\{\left[(x^2+y^2)^2+x^2y^2-2xy(x^2+y^2)-(x^4+y^4)\right] : (-xy)-2(x^2+y^2)\right\} : (-xy)$ $[3]$

28 $\left\{[(2a+t)^3-(2a+t)(4a^2-2at+t^2)] : (-6at)+t\right\} : (-2a)$ $[1]$

29 $\left\{[(x-y)^2(x+y)-(x-y)(x+y)^2] : (-2y)+y^2\right\}^2 : (-x)^4$ $[1]$

30 $[(a+2b)^2+4(a^2-3b^2)-2(a+2b)(a-2b)+3a(-a+3b)] : \left(-\frac{13}{5}ab\right)$ $[-5]$

31 $\left[3x^2-\frac{2}{3}x\left(3x-\frac{3}{4}y\right)-\frac{1}{3}y(x+6y)\right](x-3y)-(x-6y)(x^2-y^2)$ $\left[\frac{19}{6}x^2y-\frac{3}{2}xy^2\right]$

32 $[(2a-b)(2a+b)+1]^2-(a^2+b^2-1)^2-5a^2(3a^2+2)$ $[-10a^2b^2]$

33 $(2a+3b-1)(2a-3b+1)-2\left[(a-2)(a+2)+(b-2)^2\right]+(3b+2)^2-2(a-b)(a+b)$ $[26b+3]$

34 $(a-2x+1)(a+2x-1)+(2x-1)^2+a^2(2a+1)(2a-1)$ $[4a^4]$

35 $\left[(x-2)(x+2)(x^2+4)\right]^2-\left[(2x-1)(2x+1)(4x^2+1)\right]^2-20(3-4x^4)(3+4x^4)$ $[65x^8+75]$

Semplifica le seguenti espressioni riassuntive.

36 $\left(\frac{3}{2}a+b\right)\left(\frac{1}{2}b+1\right)+a\left(\frac{5}{2}+a\right)-\left[(a-b)(a+2b-1)+\left(-\frac{1}{4}ab\right)\right]$ $\left[5a+\frac{5}{2}b^2\right]$

37 $\left(y-\frac{2}{3}\right)\left(\frac{1}{2}x+1\right)+\frac{2}{3}-\left[(2y+1)\left(\frac{5}{2}+\frac{1}{4}x\right)+\left(1-\frac{5}{12}\right)(-x)\right]$ $\left[-4y-\frac{5}{2}\right]$

38 $\frac{1}{3}a(3a-5)+a^2b^2+(ab-1)\left(\frac{2}{3}ab+\frac{3}{4}\right)-\left[\left(a+\frac{1}{3}\right)(a-2)+\frac{1}{12}(5ab+4)(4ab-3)\right]$ $\left[\frac{11}{12}\right]$

39 $(a+b)\left(\frac{1}{2}a-\frac{1}{2}b+2\right)-(2b+1)\left(\frac{1}{4}a+3\right)+\left(-\frac{1}{2}\right)(a+b)(a-b)+4b+3$ $\left[\frac{7}{4}a-\frac{1}{2}ab\right]$

40 $\frac{4}{3}a^2+(x-3a)(x+2a)-\left(\frac{1}{2}x^2-a\right)\left(\frac{2}{3}a+1\right)-\left[(x+a)\left(\frac{1}{2}x-3a\right)-\frac{1}{3}a(x^2-3)\right]$ $\left[\frac{3}{2}xa-a^2\right]$

41 $\left(x-\frac{1}{2}a\right)(x+1)-ax-\left[\frac{1}{2}(2x+a)(x-a)+(x+1)(-ax)\right]-a\left(x^2-\frac{1}{2}\right)$ $\left[x+\frac{1}{2}a^2\right]$

42 $(x+y)\left(\frac{2}{3}z-3\right)+x\left(-\frac{8}{3}z+1+4x\right)-\left[2(2x+z)(x-z)-2x+\frac{2}{3}y(z-3)\right]$ $[2z^2-y]$

43 $(a+x)(a-x)+\left(2a-\frac{1}{2}x\right)^2-\left[\frac{1}{4}(5a-x)(4a+x)-9a-\frac{1}{2}(x-1)^2\right]-9a\left(1-\frac{1}{4}x\right)$ $\left[\frac{1}{2}-x\right]$

44 $\left\{(3x+a)(x-a)+a^2(1-2x^2)-\left[(x+1)(3x-1)-(-2xa)^2\right]+2x(a+1)\right\}(2a^2x^2-1)$ $[4a^4x^4-1]$

45 $\left(x-\frac{1}{2}\right)\left(x+\frac{1}{2}\right)-5ax+(a+1)^2-\left[(2x-a)^2-(x-1)\left(\frac{2}{3}x+2a\right)-\frac{1}{3}x(7x+2)\right]$ $\left[ax+\frac{3}{4}\right]$

46 $\frac{1}{4}x^2y+(6y+2)\left(1+\frac{4}{3}y^2\right)-\left\{\left(\frac{1}{2}xy+1\right)\left(2+\frac{1}{2}x\right)-\left[(-2y)^3+\frac{1}{2}x+(-3y)\left(\frac{8}{9}y+2\right)\right]\right\}$ $[-xy]$

47 $\left(ax-\frac{1}{2}b+1\right)\left(ax-1+\frac{1}{2}b\right)-\left(ax-1+\frac{1}{2}b\right)^2-(2-b)\left(ax-1+\frac{1}{2}b\right)$ $[0]$

48 $\left(1+\frac{5}{4}ay^2\right)(y-2)+y\left[x\left(\frac{1}{8}y^2+a\right)+y\left(\frac{5}{2}a-1\right)\right]-\frac{11}{8}-\left[(x+2a)\left(\frac{1}{2}y\right)^3+(ay-1)(y^2+x)+\right.$
$\left.+\left(-\frac{3}{2}\right)^3\right]$ $[x+y]$

49 $4\left(\frac{2}{3}y^2-\frac{1}{2}\right)+(4xy-1)^2+x[1-x(4y^2+9)-y]-\left[\left(\frac{9}{2}x^2+1\right)\left(\frac{8}{3}y^2-2\right)-xy\right]$ $[x-8xy+1]$

50 $-\frac{1}{2}ax+\left(\frac{1}{3}x-\frac{1}{2}a\right)\left(\frac{3}{2}a-\frac{4}{3}bx\right)-\left[\left(\frac{1}{4}a+3x\right)\left(-3a+\frac{8}{3}bx\right)-b\left(\frac{2}{3}x\right)^2\right]-[3x(3a+2bx)+$
$-2b(x-2)(x+2)]$ $[-8b-12bx^2]$

51 $[(a+b)(a+2b-1)-3ab]\left[\frac{1}{2}a-(a+1)(b-2)\right]-\frac{1}{2}a^3(5-2b)+\frac{1}{2}(a+5b)(a-2b)+$
$+2b^2(b-1)(a+1)+2(b+1)^2+2a(1-2b^2)$ $[2b+2]$

52 $(x+2a)^3+\left(\frac{3}{4}x^2-1\right)\left(2a-\frac{1}{2}x+2\right)-\left[\left(\frac{1}{2}x+a\right)^2\left(\frac{5}{2}x+8a+6\right)-6\left(a+\frac{1}{2}\right)^2+3ax\left(x+\frac{1}{2}a-2\right)\right]$
$\left[4a+\frac{1}{2}x-\frac{1}{2}\right]$

53 $3(x^2+1)+(x-2)(x-1)+x(ax-1)(ax-3)-\left[2(x-2)^2+x(ax-3)^2+(2x+5)(x-1)\right]$
$[2ax^2-4x+2]$

54 $\left[(x-a)(x+a)-(x-a)^2+(2a)^2\right]^2-\left\{(2a^2+x^2)^2-x\left[(-2a)^3+x^3+2\right]\right\}$ $[2x]$

55 $(ax-1)^3-(x+2)^3-\left[(ax+3)(2ax-3)-x(x+4)(x+3)+(2ax)^2\left(\frac{1}{4}ax-\frac{3}{2}\right)\right]-x^2(a-1)(1+a)$
$[2x^2]$

56 $\left(\frac{1}{3}ax-\frac{2}{3}\right)^2(-9a)+(x+a^2)(x-a^2)-[(a^2-1)(4x-a^2)-4a+x^2(1-a^3)]$ $[4x-a^2]$

57 $2\left[(a^3-x)^2+2a^2(2+ax)-(x-2a)(2a+x)\right]-\left[(a+x-1)(a+1-x)+(x-1)^2\right]^3-(-4a)^2$ $[a^6]$

58 $\left(x+\frac{1}{2}\right)(x^2+2x+2)-\left[\left(x-\frac{1}{3}\right)\left(x+\frac{1}{3}\right)-\frac{1}{3}(5ax-2a^2)+\frac{3}{4}\right]-\left[\left(x+\frac{1}{2}\right)^3+x+\right.$
$\left.-\frac{1}{3}(2a+x)(a-3x)+\frac{1}{9}-\left(x-\frac{1}{2}\right)^2\right]$ $\left[\frac{1}{4}x+\frac{3}{8}\right]$

59 $(x+y+z)^2-(x-y-z)^2-2x^2(y+z)+(x-y)^3-\{4xz-2x(-2y+xz+2y^2)+$
$-[(x^2-3y)(x^2-2y)+y(5x-y)(2x-y)]\}$ $[x^3+x^4+6y^2]$

60 $\left[\left(x+\frac{1}{3}a\right)^2-\frac{1}{9}a^2\right]\left(x^2-\frac{2}{3}ax\right)+\left[(ax+1)(ax-2)-a^2x^2\right]^2-[(x-a)(a+x)(2a^2+x^2)+$
$+4(ax+1)-\left(-\frac{2}{3}ax\right)^2\Big]$ $[2a^4]$

61 $\left(x-\frac{3}{2}z\right)\left(x+\frac{1}{2}z\right)-\frac{2}{9}y(-2y+6x-3z)-2z^2\left(z-\frac{1}{2}\right)-\left[\left(x-\frac{2}{3}y-\frac{1}{2}z\right)^2+(x+z)^3+\right.$
$\left.-(x^2+z^2)(3z+3x)\right]$ $[2x^3]$

62 $(x-z)^2+\left(\frac{1}{2}y+x-z\right)\left(\frac{1}{2}y+z-x\right)-\left[\left(x+\frac{3}{2}z\right)\left(x+\frac{1}{2}z\right)-(x+3z)(x-z)+\right.$

$\left.+\left(\frac{1}{2}y-2z\right)\left(\frac{1}{2}y+2z\right)\right]$ $\left[\frac{1}{4}z^2\right]$

63 $\left\{\left[\left(x+\frac{4}{5}y\right)\left(x-\frac{5}{4}y\right)+y^2\right]:x\right\}^2-\left(x-\frac{5}{4}y\right)^2-\frac{2}{5}y\left(4x-\frac{7}{5}y\right)$ $\left[-\frac{4}{5}y^2\right]$

64 $(x+2a)^3+(x+2a)(2x+a)-\left[\left(\frac{3}{2}x+a\right)^2-\left(\frac{1}{2}x-a\right)\left(\frac{1}{2}x+a\right)\right]-x\left[(x+6a)(x+2a)-2a(x-1)\right]$

$[8a^3]$

65 $\left[\left(\frac{3}{5}ab^2-\frac{1}{10}ab\right):\left(\frac{1}{2}ab-\frac{1}{5}ab\right)\right]^2-(6ab-a)\left(2ab+\frac{1}{3}a\right):(3a^2)$ $\left[\frac{2}{9}-\frac{4}{3}b\right]$

66 $\left\{\left[\left(\frac{1}{3}a-b\right)^2\left(\frac{1}{3}a+b\right)^2-b^4\right]:\left(+\frac{1}{9}a^2\right)+\left(2b-\frac{1}{3}a\right)\left(2b+\frac{1}{3}a\right)\right\}:\left(-\frac{1}{2}b\right)$ $[-4b]$

67 $\left[(a^2x^2+1)(a^2x^2-1)+1\right]:\left(\frac{1}{3}a^3x^3\right)+\left[(ax-1)(ax+a)-a(ax-x-1)\right]:(ax)$ $[4ax]$

68 $\left\{5\left[(ab)^3:(a^2b^3)\right]+2b\right\}^2+\left[\left(a-\frac{2}{5}ab^2\right)(5a-2ab^2)-5a^2\right]:\left(\frac{1}{2}ab\right)-(a+2b)(5a+2b)$

$\left[20a^2+\frac{8}{5}ab^3\right]$

69 $\left\{\left[(x+2)^3-8\right]:x-\frac{1}{2}\left(\frac{1}{2}x+3\right)(x+4)-6\right\}:\left(\frac{1}{4}x\right)-(2x-3)^2$ $[15x-4x^2+5]$

70 $\left[(ab-ac)^2(bc)^2\right]:\left[(abc-1)^2+\frac{1}{2}(2abc-1)(2abc+3)+\frac{1}{2}\right]+\frac{2}{3}bc$ $\left[\frac{1}{3}b^2+\frac{1}{3}c^2\right]$

71 $\left[4a(1-ax)+\left(\frac{1}{3}ax-\frac{2}{3}\right)^2(-9a)+(x+a^2)(x-a^2)-x^2\right]:\left(-\frac{1}{2}a^3\right)-2\left(x-\frac{1}{2}a\right)\left(x+\frac{1}{2}a\right)$

$\left[2a+\frac{1}{2}a^2\right]$

72 $\left[(ax+bx)\left(ax-\frac{1}{2}bx\right)^2-\frac{1}{4}b^3x^3\right]:\left[\frac{1}{2}(xa)^5:(2a^4x^2)\right]+(2b-3a)(3a+2b)$ $[b^2-5a^2]$