Esercizi sui prodotti notevoli

$(a+b)^2 = a^2 + 2ab + b^2$	**quadrato di un binomio**
$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$	**quadrato di un trinomio**
$(a+b)(a-b) = a^2 - b^2$	**differenza di quadrati**
$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$	**cubo di un binomio**
$(a+b)(a^2 - ab + b^2) = a^3 + b^3$	**somma di cubi**
$(a-b)(a^2 + ab + b^2) = a^3 - b^3$	**differenza di cubi**

Semplificare *le seguenti* **espressioni**:

57. $(a-3b)(a+3b)(a^2+9b^2)-9(a^4-9b^4)$. $[-8a^4]$

58. $(a+b)(a-b)-a(a-2b)$. $[2ab-b^2]$

59. $(p^2+1)(p+1)(p-1)-p^3(p-1)+(1-p)(p^2+p+1)$. $[0]$

60. $(2a+1)^2+(3a-1)^2-(a+2)(a-2)-2(3-a)$. $[12a^2]$

61. $(3b+2a)(3b-2a)+(3a-b)(3a+b)-2(b-a)(a+b)$. $[7a^2+6b^2]$

62. $(x^2+1)(x+1)(x-1)-x^3(x-1)+x-(x-1)(x^2+x+1)$. $[x]$

63. $(x^2-xy+y^2)(x^2+xy+y^2)-x^2(x^2+y^2)$. $[y^4]$

64. $(x+y)(x^2-xy+y^2)+(x-y)(x^2+xy+y^2)$. $[2x^3]$

65. $3(t-1)+(t^2-1)(t^2+1)-t(t^3+3)$. $[-4]$

66. $(a+1)(a+2)(a+3)-(a+1)(a+2)-a^3-4(2a+1)$. $[5a^2]$

67. $3(a+2b)^2-2(a+2b)(a-2b)+(a-2b)^2-8b(a+2b)$. $[2a^2+8b^2]$

68. $(2x+3y)^2-\left(\frac{1}{2}x+\frac{1}{3}y\right)^2+(2x-3y)^2-\frac{31}{4}x^2-\frac{161}{9}y^2$. $\left[-\frac{1}{3}xy\right]$

69. $(x^2+x+1)(x^2-x+1)-x^2(x^2+1)+(x+1)(x-1)$. $[x^2]$

70. $(x^6+1)(x^2-1)(x^4+x^2+1)-(x^4-1)^3-3x^8$. $[-3x^4]$

71. $(2p-5q)(2p+5q)+(p-3q)^2+(p+4q)(-p+4q)$. $[4p^2-6pq]$

72. $(a+b)^2-(a-b)^2+a(a-4b)$; $\quad(u+v^2)^2(u-v^2)^2-(u^2-v^4)^2$. $[a^2;\ 0]$

73. $(t^2-1)(1+t^2)-(t^2-2)^2+[(t+1)(t-1)]^2-(t^2-2)(t^2+2)$. $[2t^2]$

74. $(m^4z^4+n^2)^3-3(m^4nz^4)^2-(m^6z^6+n^3)(m^6z^6-n^3)-3(mnz)^4-3n^6$. $[-n^6]$

75. $(x+y+z)^2+(x+y-z)^2+(x-y+z)^2+(-x+y+z)^2-4(x^2+y^2+z^2)$. $[0]$

76. $(a^2-4b^2+b^4)^2-(a^2+b^4)^2-8b^2(a+b^2)(a-b^2)+(4ab-b^4)(4ab+b^4)$. $[16b^4-b^8]$

77. $\left(\frac{1}{2}a+\frac{9}{8}ab^2-1\right)(2a+3)-\left(a+\frac{3}{2}ab\right)^2-3ab\left(\frac{9}{8}b-a\right)$. $\left[-\frac{1}{2}a-3\right]$

78. $(m+2mn+n^3)^2-4mn\left(m+\frac{1}{2}n^2+n^3\right)-n^4(n^2-4m^2)+(m-2mn^2)^2$. $[2m^2+8m^2n^4]$

79. $[(2x+a)(a-3b)-(x+a)^2+2b(a+3x)]^2-(-ab)^2$. $[x^4+2abx^2]$

80. $(x^2+y)(y-x)(x^2+x)-(xy^2-x^4)(x+1)-x^2y[(x+1)^2-(2x+2)]$. [0]

81. $\left[\left(\frac{1}{2}a-1\right)^2-\frac{1}{4}a^2\right]^2\cdot(1+a)^2-\left[a^2-\left(\frac{1}{2}-a\right)^2-\frac{7}{4}\right]^2\cdot(a+2)^2$. $[3(2a^2-5)]$

82. $(a+b+c)^2+(a-b)^2+(a-c)^2+(b-c)^2-3(b^2+c^2)$. $[3a^2]$

83. $[(a+b+c)^2+(a+b-c)^2][(a-b+c)^2-(a-b-c)^2]-8c(a-b)[(a+b)^2+c^2]$. [0]

84. $\left(\frac{2}{3}x^2+y^2\right)^3+\left(\frac{2}{3}x^2-y^2\right)^3-\frac{4}{3}x^2\left(\frac{2}{3}x^2+y^2\right)\left(\frac{2}{3}x^2-y^2\right)-\frac{10}{3}x^2y^4$. $[2x^2y^4]$

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

86. $(x+y+z)^2(x+y-z)^2-[(x+y)^2+z^2]^2+4z^2(x+y)^2$. [0]

87. $(4x^2+y^2)^2-[(-2x+y)(2x+y)]^2-(-4xy-1)(-4xy+1)$. [1]

88. $[(1-x+x^2-x^3)(x+1)+(x+1)(x-1)(x^2+1)]^3-x^3+(2+x)(x^2-2x+4)$. [8]

89. $[(2xy-3x^2y^2)^2-(4x^2y^2+1)(1+9x^4y^4)+(6x^3y^3+1)^2]^3$. [0]

90. $(m^3+2n)(m^3-2n)+(2n+m^2)^2-(-2m)^2n+m^4(m+1)(m-1)$. $[2m^6]$

91. $(2mn+m^2)^3-4m^3n^2(2n+3m)-m^5(m+5n)+4m^5n$. $[5m^5n]$

92. $[(x+y)^2-(x-y)^2]^1-(2x+y)^2+(y+1)^2+(2x+1)(2x-1)$. $[2y]$

93. $\left[\left(\frac{1}{3}a+\frac{2}{3}b\right)^3-\frac{1}{9}ab(2a+4b)-\frac{8}{27}b^3\right](3a)+\left(b^2-\frac{1}{3}a^2\right)\left(b^2+\frac{1}{3}a^2\right)$. $[b^4]$

94. $(t-1)^3(t+1)(t^2+1)-(t+1)^3(t-1)(t^2+1)+4t^5$. $[4t]$

95. $2\left(2a-\frac{b}{2}\right)\left(2a+\frac{b}{2}\right)+(b+2c)(b-2c)+2(c+2a)(c-2a)$. $\left[\frac{b^2}{2}-2c^2\right]$

96. $\{[(-a-2b)(-a+2b)(a^2+4b^2)+17b^4](a^4-b^4)+b^8\}^2$. $[a^{16}]$

97. $[(p+2q-1)(p-2q+1)+(2q-1)^2+1](p^2-1)+1$. $[p^4]$

98. $(a^2+b^2-ab)(a^2+b^2+ab+a+b)-(a^2+b^2)^2-(a+b)(a^2+b^2-ab)$. $[-a^2b^2]$

99. $[4a^2+(a+1)^2(a-1)^2-(a^2+1)^2](a+b)^3+a^3+b^3+3ab(a+b)-(a+b)^3$. [0]

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

101. $[(2m+an)^3-6am(2mn+an^2)]^2+2(-2amn)^3-(8m^3-a^3n^3)(8m^3+a^3n^3)$. $[2a^6n^6]$