



◇「콘텐츠산업 진흥법 시행령」제33조에 의한 표시

1) 제작연월일 : 2018-03-05

2) 제작자 : 교육지대(주)

3) 이 콘텐츠는 「콘텐츠산업 진흥법」에 따라 최초 제작일부터 5년간 보호됩니다.

◇「콘텐츠산업 진흥법」외에도「저작권법」에 의하여 보호되는 콘텐츠의 경우, 그 콘텐츠의 전부 또는 일부를 무단으로 복제하거나 전송하는 것은 콘텐츠산업 진흥법 외에도 저작권법에 의한 법적 책임을 질 수 있습니다.

**01** / 인수분해 공식 - 문자가 2개일 때,

(1)  $a^3 + 3a^2b + 3ab^2 + b^3 = (a+b)^3$ ,

$a^3 - 3a^2b + 3ab^2 - b^3 = (a-b)^3$

(2)  $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ ,

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

(3)  $a^4 + a^2b^2 + b^4 = (a^2 + ab + b^2)(a^2 - ab + b^2)$

■ 다음 식을 인수분해하여라.

1.  $a^3 + 8$

2.  $y^3 + 27$

3.  $x^3 + 27y^3$

4.  $8x^3 + 1$

5.  $a^3 + 1$

6.  $64x^3 + 27y^3$

7.  $27x^3 + y^3$

8.  $x^3 + 64y^3$

9.  $8x^3 + 125y^3$

10.  $8x^3 + 27y^3$

11.  $x^3 + 8y^3$

12.  $2a^3 + 250$

13.  $8a^4 + a$

14.  $x^3 - 27$

15.  $64x^3 - y^3$

16.  $8x^3 - 1$

17.  $x^3 - 8$

18.  $8x^3 - y^3$

19.  $8a^4b - 27ab^4$

20.  $x^3 - 27y^3$

21.  $x^3 - 8y^3$

22.  $a^3 - 8$

23.  $a^3 - 1$

24.  $27a^3 - 64b^3$

25.  $27x^3 - 8y^3$

26.  $x^5 - 8x^2y^3$

27.  $a^3 - 64$

28.  $8x^5y - 27x^2y^4$

29.  $8x^3 - 125y^3$

30.  $27x^5y + 8x^2y^4$

■ 다음 식을 인수분해하여라.

31.  $a^3 + 3a^2 + 3a + 1$

32.  $x^3 + 6x^2y + 12xy^2 + 8y^3$

33.  $8x^3 + 36x^2 + 54x + 27$

34.  $a^3 + 9a^2b + 27ab^2 + 27b^3$

35.  $x^3 - 12x^2 + 48x - 64$

36.  $8x^3 - 12x^2 + 6x - 1$

37.  $27x^3 - 108x^2y + 144xy^2 - 64y^3$

38.  $x^3 - 15x^2 + 75x - 125$

39.  $64x^3 - 48x^2y + 12xy^2 - y^3$

40.  $8x^3 - 36x^2y + 54xy^2 - 27y^3$

41.  $a^3 - 9a^2 + 27a - 27$

42.  $27x^3 - 27x^2 + 9x - 1$

43.  $x^3 + 9x^2 + 27x + 27$

44.  $-8a^3 + 36a^2b - 54ab^2 + 27b^3$

45.  $2a^3 + 12a^2 + 24a + 16$

46.  $x^3 + 9x^2 + 27x + 27$

47.  $a^3b + 6a^2b^2 + 12ab^3 + 8b^4$

48.  $3x^4 + 18x^3y + 36x^2y^2 + 24xy^3$

49.  $x^3 + 6x^2 + 12x + 8$

50.  $8x^3 + 12x^2 + 6x + 1$

51.  $x^3 + 12x^2y + 48xy^2 + 64y^3$

52.  $27x^3 + 27x^2y + 9xy^2 + y^3$

53.  $64a^3 + 48a^2b + 12ab^2 + b^3$

54.  $a^3 - 9a^2b + 27ab^2 - 27b^3$

55.  $8a^3 - 36a^2b + 54ab^2 - 27b^3$

56.  $8x^3 - 12x^2y + 6xy^2 - y^3$

57.  $192a^3 - 144a^2b + 36ab^2 - 3b^3$

**02** / 인수분해 공식 - 문자가 3개일 때,

(1)  $a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = (a + b + c)^2$

(2)  $a^3 + b^3 + c^3 - 3abc$

$= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

$= \frac{1}{2}(a + b + c)\{(a - b)^2 + (b - c)^2 + (c - a)^2\}$

■ 다음 식을 인수분해하여라.

58.  $x^2 + y^2 + z^2 - 2xy - 2yz + 2zx$

59.  $a^2 + 4b^2 + 4ab - 2a - 4b + 1$

60.  $a^2 + b^2 + 2ab - 2a - 2b + 1$

61.  $a^2 + b^2 + 4c^2 + 2ab + 4bc + 4ca$

62.  $a^2 + b^2 + 1 - 2ab - 2b + 2a$

63.  $a^2 + b^2 + 4c^2 + 2ab + 4bc + 4ca$

64.  $a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$

65.  $x^2 + y^2 + z^2 - 2xy + 2yz - 2zx$

66.  $x^2 + y^2 + 9z^2 + 2xy + 6yz + 6zx$

67.  $4x^2 + 4y^2 + z^2 - 8xy - 4yz + 4zx$

68.  $x^2 + 4y^2 + 9z^2 - 4xy - 12yz + 6zx$

69.  $a^2 + b^2 + 2ab - 6a - 6b + 9$

70.  $x^2 + 4y^2 + z^2 + 4xy - 4yz - 2zx$

■ 다음 식을 인수분해하여라.

71.  $x^3 + y^3 - 3xy + 1$

72.  $x^3 + y^3 - 8 + 6xy$

73.  $x^3 + y^3 + 9xy - 27$

74.  $x^3 - y^3 - z^3 - 3xyz$

75.  $a^3 + b^3 - c^3 + 3abc$

76.  $x^3 + y^3 + z^3 - 3xyz$

77.  $a^3 - b^3 + c^3 + 3abc$

78.  $a^3 + b^3 + 27c^3 - 9abc$

79.  $x^3 - 27y^3 + 36xy + 64$

80.  $8x^3 + 27y^3 + 18xy - 1$

81.  $x^3 + 8y^3 - 12xy + 8$

82.  $a^3 + 8b^3 + c^3 - 6abc$

83.  $a^3 + 8b^3 - 27c^3 + 18abc$

84.  $a^3 - b^3 - 27c^3 - 9abc$



## 정답 및 해설

1)  $(a+2)(a^2-2a+4)$

$\Rightarrow a^3+8=a^3+2^3=(a+2)(a^2-2a+4)$

2)  $(y+3)(y^2-3y+9)$

$\Rightarrow y^3+27=y^3+3^3=(y+3)(y^2-3y+9)$

3)  $(x+3y)(x^2-3xy+9y^2)$

$\Rightarrow x^3+27y^3=x^3+(3y)^3=(x+3y)(x^2-3xy+9y^2)$

4)  $(2x+1)(4x^2-2x+1)$

$\Rightarrow 8x^3+1=(2x)^3+1^3=(2x+1)(4x^2-2x+1)$

5)  $(a+1)(a^2-a+1)$

$\Rightarrow a^3+1=a^3+1^3=(a+1)(a^2-a+1)$   
 $= (a+1)(a^2-a+1)$

6)  $(4x+3y)(16x^2-12xy+9y^2)$

$\Rightarrow 64x^3+27y^3=(4x)^3+(3y)^3$   
 $= (4x+3y)(16x^2-12xy+9y^2)$

7)  $(3x+y)(9x^2-3xy+y^2)$

$\Rightarrow 27x^3+y^3=(3x)^3+y^3$   
 $= (3x+y)(9x^2-3xy+y^2)$

8)  $(x+4y)(x^2-4xy+16y^2)$

$\Rightarrow x^3+64y^3=x^3+(4y)^3$   
 $= (x+4y)(x^2-4xy+16y^2)$

9)  $(2x+5y)(4x^2-10xy+25y^2)$

$\Rightarrow 8x^3+125y^3=(2x)^3+(5y)^3$   
 $= (2x+5y)(4x^2-10xy+25y^2)$

10)  $(2x+3y)(4x^2-6xy+9y^2)$

$\Rightarrow 8x^3+27y^3=(2x)^3+(3y)^3$   
 $= (2x+3y)(4x^2-6xy+9y^2)$

11)  $(x+2y)(x^2-2xy+4y^2)$

$\Rightarrow x^3+8y^3=x^3+(2y)^3=(x+2y)(x^2-2xy+4y^2)$

12)  $2(a+5)(a^2-5a+25)$

$\Rightarrow 2a^3+250=2(a^3+125)=2(a+5)(a^2-5a+25)$

13)  $a(2a+1)(4a^2-2a+1)$

$\Rightarrow 8a^4+a=a(8a^3+1)$   
 $= a(2a+1)(4a^2-2a+1)$

14)  $(x-3)(x^2+3x+9)$

$\Rightarrow x^3-27=x^3-3^3=(x-3)(x^2+3x+9)$   
 $= (x-3)(x^2+3x+9)$

15)  $(4x-y)(16x^2+4xy+y^2)$

$\Rightarrow 64x^3-y^3=(4x)^3-y^3$   
 $= (4x-y)(16x^2+4xy+y^2)$

16)  $(2x-1)(4x^2+2x+1)$

$\Rightarrow 8x^3-1=(2x)^3-1^3=(2x-1)(4x^2+2x+1)$

17)  $(x-2)(x^2+2x+4)$

$\Rightarrow x^3-8=x^3-2^3=(x-2)(x^2+2x+4)$

18)  $(2x-y)(4x^2+2xy+y^2)$

$\Rightarrow 8x^3-y^3=(2x)^3-y^3=(2x-y)(4x^2+2xy+y^2)$

19)  $ab(2a-3b)(4a^2+6ab+9b^2)$

$\Rightarrow 8a^4b-27ab^4=ab(8a^3-27b^3)=ab\{(2a)^3-(3b)^3\}$   
 $= ab(2a-3b)(4a^2+6ab+9b^2)$

20)  $(x-3y)(x^2+3xy+9y^2)$

$\Rightarrow x^3-27y^3=x^3-(3y)^3$   
 $= (x-3y)(x^2+3xy+9y^2)$

21)  $(x-2y)(x^2+2xy+4y^2)$

$\Rightarrow x^3-8y^3=(x-2y)(x^2+2xy+4y^2)$

22)  $(a-2)(a^2+2a+4)$

$\Rightarrow a^3-8=a^3-2^3=(a-2)(a^2+2a+4)$

23)  $(a-1)(a^2+a+1)$

$\Rightarrow a^3-1=a^3-1^3=(a-1)(a^2+a+1)$

24)  $(3a-4b)(9a^2+12ab+16b^2)$

$\Rightarrow 27a^3-64b^3=(3a)^3-(4b)^3$   
 $= (3a-4b)(9a^2+12ab+16b^2)$

25)  $(3x-2y)(9x^2+6xy+4y^2)$

$\Rightarrow 27x^3-8y^3=(3x)^3-(2y)^3$   
 $= (3x-2y)(9x^2+6xy+4y^2)$

26)  $x^2(x-2y)(x^2+2xy+4y^2)$

$\Rightarrow x^5-8x^2y^3=x^2(x^3-8y^3)$   
 $= x^2(x-2y)(x^2+2xy+4y^2)$

27)  $(a-4)(a^2+4a+16)$

$\Rightarrow a^3-64=a^3-4^3=(a-4)(a^2+4a+16)$

28)  $x^2y(2x-3y)(4x^2+6xy+9y^2)$

$\Rightarrow 8x^5y-27x^2y^4=x^2y(8x^3-27y^3)$   
 $= x^2y(2x-3y)(4x^2+6xy+9y^2)$

29)  $(2x-5y)(4x^2+10xy+25y^2)$

$\Rightarrow 8x^3-125y^3=(2x)^3-(5y)^3$   
 $= (2x-5y)(4x^2+10xy+25y^2)$

30)  $x^2y(3x+2y)(9x^2-6xy+4y^2)$

$\Rightarrow 27x^5y+8x^2y^4=x^2y(27x^3+8y^3)$   
 $= x^2y(3x+2y)(9x^2-6xy+4y^2)$

31)  $(a+1)^3$

$$\begin{aligned}\Rightarrow a^3 + 3a^2 + 3a + 1 \\ = a^3 + 3 \cdot a^2 \cdot 1 + 3 \cdot a \cdot 1^2 + 1^3 \\ = (a+1)^3\end{aligned}$$

$$\begin{aligned}32) (x+2y)^3 \\ \Rightarrow x^3 + 6x^2y + 12xy^2 + 8y^3 \\ = x^3 + 3 \cdot x^2 \cdot 2y + 3 \cdot x \cdot (2y)^2 + (2y)^3 = (x+2y)^3\end{aligned}$$

$$\begin{aligned}33) (2x+3)^3 \\ \Rightarrow 8x^3 + 36x^2 + 54x + 27 \\ = (2x)^3 + 3 \cdot (2x)^2 \cdot 3 + 3 \cdot 2x \cdot 3^2 + 3^3 \\ = (2x+3)^3\end{aligned}$$

$$34) (a+3b)^3$$

$$\begin{aligned}35) (x-4)^3 \\ \Rightarrow x^3 - 12x^2 + 48x - 64 \\ = x^3 - 3 \cdot x^2 \cdot 4 + 3 \cdot x \cdot 4^2 - 4^3 = (x-4)^3\end{aligned}$$

$$\begin{aligned}36) (2x-1)^3 \\ \Rightarrow 8x^3 - 12x^2 + 6x - 1 \\ = (2x)^3 - 3 \cdot (2x)^2 \cdot 1 + 3 \cdot 2x \cdot 1^2 - 1^3 = (2x-1)^3\end{aligned}$$

$$\begin{aligned}37) (3x-4y)^3 \\ \Rightarrow 27x^3 - 108x^2y + 144xy^2 - 64y^3 \\ = (3x)^3 - 3 \cdot (3x)^2 \cdot 4y + 3 \cdot 3x \cdot (4y)^2 - (4y)^3 \\ = (3x-4y)^3\end{aligned}$$

$$\begin{aligned}38) (x-5)^3 \\ \Rightarrow x^3 - 15x^2 + 75x - 125 \\ = x^3 - 3 \cdot x^2 \cdot 5 + 3 \cdot x \cdot 5^2 - 5^3 = (x-5)^3\end{aligned}$$

$$\begin{aligned}39) (4x-y)^3 \\ \Rightarrow 64x^3 - 48x^2y + 144xy^2 - 64y^3 \\ = (4x)^3 - 3 \cdot (4x)^2 \cdot y + 3 \cdot 4x \cdot y^2 - y^3 = (4x-y)^3\end{aligned}$$

$$\begin{aligned}40) (2x-3y)^3 \\ \Rightarrow 8x^3 - 36x^2y + 54xy^2 - 27y^3 \\ = (2x)^3 - 3 \cdot (2x)^2 \cdot 3y + 3 \cdot 2x \cdot (3y)^2 - (3y)^3 \\ = (2x-3y)^3\end{aligned}$$

$$\begin{aligned}41) (a-3)^3 \\ \Rightarrow a^3 - 9a^2 + 27a - 27 \\ = a^3 - 3 \cdot a^2 \cdot 3 + 3 \cdot a \cdot 3^2 - 3^3 \\ = (a-3)^3\end{aligned}$$

$$\begin{aligned}42) (3x-1)^3 \\ \Rightarrow 27x^3 - 27x^2 + 9x - 1 \\ = (3x)^3 - 3 \cdot (3x)^2 \cdot 1 + 3 \cdot 3x \cdot 1^2 - 1^3 = (3x-1)^3\end{aligned}$$

$$\begin{aligned}43) (x+3)^3 \\ \Rightarrow x^3 + 9x^2 + 27x + 27 = x^3 + 3 \cdot x^2 \cdot 3 + 3 \cdot x \cdot 3^2 + 3^3 \\ = (x+3)^3\end{aligned}$$

$$44) (-2a+3b)^3$$

$$\begin{aligned}\Rightarrow -8a^3 + 36a^2b - 54ab^2 + 27b^3 \\ = (-2a)^3 + 3 \cdot (-2a)^2 \cdot 3b + 3 \cdot (-2a) \cdot (3b)^2 + (3b)^3 \\ = (-2a+3b)^3\end{aligned}$$

$$\begin{aligned}45) 2(a+2)^3 \\ \Rightarrow 2a^3 + 12a^2 + 24a + 16 = 2(a^3 + 6a^2 + 12a + 8) \\ = 2(a+2)^3\end{aligned}$$

$$\begin{aligned}46) (x+3)^3 \\ \Rightarrow x^3 + 9x^2 + 27x + 27 \\ = x^3 + 3 \cdot x^2 \cdot 3 + 3 \cdot x \cdot 3^2 + 3^3 = (x+3)^3\end{aligned}$$

$$\begin{aligned}47) b(a+2b)^3 \\ \Rightarrow a^3b + 6a^2b^2 + 12ab^3 + 8b^4 = b(a^3 + 6a^2b + 12ab^2 + 8b^3) \\ = b(a+2b)^3\end{aligned}$$

$$\begin{aligned}48) 3x(x+2y)^3 \\ \Rightarrow 3x^4 + 18x^3y + 36x^2y^2 + 24xy^3 \\ = 3x(x^3 + 6x^2y + 12xy^2 + 8y^3) \\ = 3x(x+2y)^3\end{aligned}$$

$$49) (x+2)^3$$

$$50) (2x+1)^3$$

$$\begin{aligned}51) (x+4y)^3 \\ \Rightarrow x^3 + 12x^2y + 48xy^2 + 64y^3 \\ = x^3 + 3 \cdot x^2 \cdot 4y + 3 \cdot x \cdot (4y)^2 + (4y)^3 = (x+4y)^3\end{aligned}$$

$$\begin{aligned}52) (3x+y)^3 \\ \Rightarrow 27x^3 + 27x^2y + 9xy^2 + y^3 \\ = (3x)^3 + 3 \cdot (3x)^2 \cdot y + 3 \cdot 3x \cdot y^2 + y^3 = (3x+y)^3\end{aligned}$$

$$\begin{aligned}53) (4a+b)^3 \\ \Rightarrow 64a^3 + 48a^2b + 12ab^2 + b^3 \\ = (4a)^3 + 3 \cdot (4a)^2 \cdot b + 3 \cdot 4a \cdot b^2 + b^3 = (4a+b)^3\end{aligned}$$

$$\begin{aligned}54) (a-3b)^3 \\ \Rightarrow a^3 - 9a^2b + 27ab^2 - 27b^3 \\ = a^3 - 3 \cdot a^2 \cdot 3b + 3 \cdot a \cdot (3b)^2 - (3b)^3 = (a-3b)^3\end{aligned}$$

$$55) (2a-3b)^3$$

$$56) (2x-y)^3$$

$$\begin{aligned}57) 3(4a-b)^3 \\ \Rightarrow 192a^3 - 144a^2b + 36ab^2 - 3b^3 \\ = 3(64a^3 - 48a^2b + 12ab^2 - b^3) = 3(4a-b)^3\end{aligned}$$

$$\begin{aligned}58) (x-y+z)^2 \\ \Rightarrow x^2 + y^2 + z^2 - 2xy - 2yz + 2zx \\ = x^2 + (-y)^2 + z^2 + 2x \cdot (-y) + 2 \cdot (-y) \cdot z + 2zx \\ = (x-y+z)^2\end{aligned}$$

$$59) (a+2b-1)^2$$

$$\begin{aligned} &\Rightarrow a^2 + 4b^2 + 4ab - 2a - 4b + 1 \\ &= a^2 + 4b^2 + 1 + 4ab - 4b - 2a \\ &= a^2 + (2b)^2 + (-1)^2 + 2 \cdot a \cdot 2b + 2 \cdot 2b \cdot (-1) + 2 \cdot (-1) \cdot a \\ &= (a + 2b - 1)^2 \end{aligned}$$

$$\begin{aligned} 60) \quad &(a+b-1)^2 \\ \Rightarrow &a^2 + b^2 + 2ab - 2a - 2b + 1 \\ &= a^2 + b^2 + 1 + 2ab - 2b - 2a \\ &= a^2 + b^2 + (-1)^2 \\ &\quad + 2 \cdot a \cdot b + 2 \cdot b \cdot (-1) + 2 \cdot (-1) \cdot a \\ &= (a+b-1)^2 \end{aligned}$$

$$\begin{aligned} 61) \quad &(a+b+2c)^2 \\ \Rightarrow &a^2 + b^2 + 4c^2 + 2ab + 4bc + 4ca \\ &= a^2 + b^2 + (2c)^2 + 2ab + 2 \cdot b \cdot 2c + 2 \cdot 2c \cdot a \\ &= (a+b+2c)^2 \end{aligned}$$

$$\begin{aligned} 62) \quad &(a-b+1)^2 \\ \Rightarrow &a^2 + b^2 + 1 - 2ab - 2b + 2a \\ &= a^2 + (-b)^2 + 1^2 + 2a(-b) + 2(-b) \cdot 1 + 2 \cdot 1 \cdot a \\ &= \{a + (-b) + 1\}^2 = (a-b+1)^2 \end{aligned}$$

$$63) \quad (a+b+2c)^2$$

$$64) \quad (a-b+c)^2$$

$$\begin{aligned} 65) \quad &(x-y-z)^2 \\ \Rightarrow &x^2 + y^2 + z^2 - 2xy + 2yz - 2zx \\ &= x^2 + (-y)^2 + (-z)^2 \\ &\quad + 2 \cdot x \cdot (-y) + 2 \cdot (-y) \cdot (-z) + 2 \cdot (-y) \cdot (-z) \\ &= (x-y-z)^2 \end{aligned}$$

$$\begin{aligned} 66) \quad &(x+y+3z)^2 \\ \Rightarrow &x^2 + y^2 + 9z^2 + 2xy + 6yz + 6zx \\ &= x^2 + y^2 + (3z)^2 + 2 \cdot x \cdot y + 2 \cdot y \cdot 3z + 2 \cdot 3z \cdot x \\ &= (x+y+3z)^2 \end{aligned}$$

$$\begin{aligned} 67) \quad &(2x-2y+z)^2 \\ \Rightarrow &4x^2 + 4y^2 + z^2 - 8xy - 4yz + 4zx \\ &= (2x)^2 + (-2y)^2 + z^2 \\ &\quad + 2 \cdot 2x \cdot (-2y) + 2 \cdot (-2y) \cdot z + 2 \cdot z \cdot 2x \\ &= (2x-2y+z)^2 \end{aligned}$$

$$\begin{aligned} 68) \quad &(x-2y+3z)^2 \\ \Rightarrow &x^2 + 4y^2 + 9z^2 - 4xy - 12yz + 6zx \\ &= x^2 + (-2y)^2 + (3z)^2 \\ &\quad + 2 \cdot x \cdot (-2y) + 2 \cdot (-2y) \cdot 3z + 2 \cdot 3z \cdot x \\ &= (x-2y+3z)^2 \end{aligned}$$

$$\begin{aligned} 69) \quad &(a+b-3)^2 \\ \Rightarrow &a^2 + b^2 + 2ab - 6a - 6b + 9 \\ &= a^2 + b^2 + 9 + 2ab - 6b - 6a \\ &= a^2 + b^2 + (-3)^2 + 2 \cdot a \cdot b + 2 \cdot b \cdot (-3) + 2 \cdot (-3) \cdot a \\ &= (a+b-3)^2 \end{aligned}$$

$$\begin{aligned} 70) \quad &(x+2y-z)^2 \\ \Rightarrow &x^2 + 4y^2 + z^2 + 4xy - 4yz - 2zx \end{aligned}$$

$$\begin{aligned} &= x^2 + (2y)^2 + (-z)^2 + 2 \cdot x \cdot 2y + 2 \cdot 2y \cdot (-z) + 2 \cdot (-z) \cdot x \\ &= (x+2y-z)^2 \end{aligned}$$

$$\begin{aligned} 71) \quad &(x+y+1)(x^2+y^2-xy-x-y+1) \\ \Rightarrow &x^3 + y^3 - 3xy + 1 \\ &= x^3 + y^3 + 1 - 3xy \\ &= x^3 + y^3 + 1^3 - 3 \cdot x \cdot y \cdot 1 \\ &= (x+y+1)(x^2+y^2-xy-x-y+1) \end{aligned}$$

$$\begin{aligned} 72) \quad &(x+y-2)(x^2+y^2+4-xy+2y+2x) \\ \Rightarrow &x^3 + y^3 - 8 + 6xy \\ &= x^3 + y^3 + (-2)^3 - 3xy(-2) \\ &= (x+y-2)(x^2+y^2+4-xy+2y+2x) \end{aligned}$$

$$\begin{aligned} 73) \quad &(x+y-3)(x^2+y^2-xy+3x+3y+9) \\ \Rightarrow &x^3 + y^3 + 9xy - 27 \\ &= x^3 + y^3 + (-3)^3 - 3 \cdot x \cdot y \cdot (-3) \\ &= (x+y-3)(x^2+y^2-xy+3x+3y+9) \end{aligned}$$

$$\begin{aligned} 74) \quad &(x-y-z)(x^2+y^2+z^2+xy-yz+zx) \\ \Rightarrow &x^3 - y^3 - z^3 - 3xyz \\ &= x^3 + (-y)^3 + (-z)^3 - 3 \cdot x \cdot (-y) \cdot (-z) \\ &= \{x + (-y) + (-z)\} \\ &\quad \times \{x^2 + (-y)^2 + (-z)^2 - x(-y) - (-y) \cdot (-z) - (-z) \cdot x\} \\ &= (x-y-z)(x^2+y^2+z^2+xy-yz+zx) \end{aligned}$$

$$\begin{aligned} 75) \quad &(a+b-c)(a^2+b^2+c^2-ab+bc+ca) \\ \Rightarrow &a^3 + b^3 - c^3 + 3abc \\ &= a^3 + b^3 + (-c)^3 - 3 \cdot a \cdot b \cdot (-c) \\ &= (a+b-c)(a^2+b^2+c^2-ab+bc+ca) \end{aligned}$$

$$76) \quad (x+y+z)(x^2+y^2+z^2-xy-yz-zx)$$

$$\begin{aligned} 77) \quad &(a-b+c)(a^2+b^2+c^2+ab+bc-ca) \\ \Rightarrow &a^3 - b^3 + c^3 + 3abc \\ &= a^3 + (-b)^3 + c^3 - 3a \cdot (-b) \cdot c \\ &= \{a + (-b) + c\} \{a^2 + (-b)^2 + c^2 - a(-b) - (-b)c - ca\} \\ &= (a-b+c)(a^2+b^2+c^2+ab+bc-ca) \end{aligned}$$

$$\begin{aligned} 78) \quad &(a+b+3c)(a^2+b^2+9c^2-ab-3bc-3ca) \\ \Rightarrow &a^3 + b^3 + 27c^3 - 9abc \\ &= a^3 + b^3 + (3c)^3 - 3 \cdot a \cdot b \cdot 3c \\ &= (a+b+3c)(a^2+b^2+9c^2-ab-3bc-3ca) \end{aligned}$$

$$\begin{aligned} 79) \quad &(x-3y+4)(x^2+9y^2+3xy-4x+12y+16) \\ \Rightarrow &x^3 - 27y^3 + 36xy + 64 \\ &= x^3 + (-3y)^3 + 4^3 - 3 \cdot x \cdot (-3y) \cdot 4 \\ &= (x-3y+4)(x^2+9y^2+3xy-4x+12y+16) \end{aligned}$$

$$\begin{aligned} 80) \quad &(2x+3y-1)(4x^2+9y^2-6xy+2x+3y+1) \\ \Rightarrow &8x^3 + 27y^3 + 18xy - 1 \\ &= 8x^3 + 27y^3 + (-1)^3 - 3 \cdot 2x \cdot 3y \cdot (-1) \\ &= (2x+3y-1)(4x^2+9y^2-6xy+2x+3y+1) \end{aligned}$$

$$81) \quad (x+2y+2)(x^2+4y^2-2xy-2x-4y+4)$$



$$\begin{aligned}
 \Rightarrow & x^3 + 8y^3 - 12xy + 8 \\
 &= x^3 + (2y)^3 + 2^3 - 3 \cdot x \cdot 2y \cdot 2 \\
 &= (x + 2y + 2)(x^2 + 4y^2 - 2xy - 2x - 4y + 4)
 \end{aligned}$$

$$\begin{aligned}
 82) & (a + 2b + c)(a^2 + 4b^2 + c^2 - 2ab - 2bc - ca) \\
 \Rightarrow & a^3 + 8b^3 + c^3 - 6abc \\
 &= a^3 + (2b)^3 + c^3 - 3 \cdot a \cdot 2b \cdot c \\
 &= (a + 2b + c)(a^2 + 4b^2 + c^2 - 2ab - 2bc - ca)
 \end{aligned}$$

$$\begin{aligned}
 83) & (a + 2b - 3c)(a^2 + 4b^2 + 9c^2 - 2ab + 6bc + 3ca) \\
 \Rightarrow & a^3 + 8b^3 - 27c^3 + 18abc \\
 &= a^3 + (2b)^3 + (-3c)^3 - 3 \cdot a \cdot 2b \cdot (-3c) \\
 &= (a + 2b - 3c)(a^2 + 4b^2 + 9c^2 - 2ab + 6bc + 3ca)
 \end{aligned}$$

$$\begin{aligned}
 84) & (a - b - 3c)(a^2 + b^2 + 9c^2 + ab - 3bc + 3ca) \\
 \Rightarrow & a^3 - b^3 - 27c^3 - 9abc \\
 &= a^3 + (-b)^3 + (-3c)^3 - 3 \cdot a \cdot (-b) \cdot (-3c) \\
 &= (a - b - 3c)(a^2 + b^2 + 9c^2 + ab - 3bc + 3ca)
 \end{aligned}$$