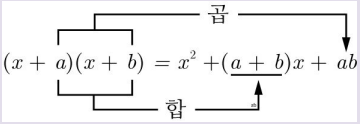
계산시 참고사항

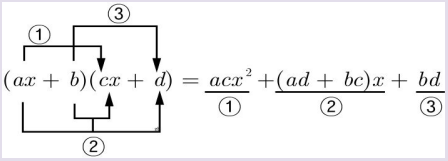
1. x의 계수가 1인 두 일차식의 곱

$(x+a)(x+b)=x^2+(a+b)x+ab$



2. x의 계수가 1이 아닌 두 일차식의 곱

$(ax+b)(cx+d)=acx^2+(ad+bc)x+bd$



3. 복잡한 식의 전개

(1) 공통부분을 하나의 문자로 치환한다.
(2) 곱셈공식을 이용하여 식을 전개한다.
(3) (1)에서 치환한 식을 전개한 (2)의 식에 대입한다.
(4) 전개한 후 동류항끼리 정리한다.

x의 계수가 1인 두 일차식의 곱

◪ 다음 □안에 알맞은 양수를 써넣어라.

1. $(x+5)(x-\square)=x^2+\square x-15$

2. $(x+\square)(x-2)=x^2+6x-\square$

◪ 다음 식을 전개하여라.

3. $(x+5)(x+3)$

4. $(x+1)(x+2)$

5. $(x+5)(x+2)$

6. $(x-1)(x+7)$

7. $(y+3)(y+5)$

8. $(y-4)(y-6)$

9. $(a+3)(a+4)$

10. $(x+6)(x-4)$

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11. $(b-6)(b-3)$

12. $(a+1)(a-4)$

13. $(y-5)(y+4)$

14. $(x+3)(x+7)$

15. $(x+2)(x+6)$

16. $(x-5)(x-3)$

17. $(x+2)(x+3)$

18. $(x-7)(x-2)$

19. $(x-5)(x+8)$

20. $(x-2)(x+10)$

21. $(a+5)(a-3)$

22. $(y-4)(y+3)$

23. $(x+2y)(x+y)$

24. $(x-3y)(x+2y)$

25. $(x+3y)(x-5y)$

26. $(x-6y)(x+2y)$

27. $(a+6b)(a-9b)$

28. $(a-5b)(a-7b)$

29. $(x-8y)(x-2y)$

30. $(x+y)(x+2y)$

31. $(a-3b)(a+b)$

32. $(x-3y)(x-4y)$

33. $(a+6b)(a-2b)$

34. $(x-2y)(x+5y)$

35. $(a-3b)(a-b)$

36. $\left(x-\frac{1}{2}\right)\left(x-\frac{3}{2}\right)$

37. $\left(x-\frac{1}{2}\right)\left(x+\frac{1}{3}\right)$

38. $\left(a-\frac{1}{3}b\right)\left(a+\frac{2}{3}b\right)$

39. $\left(x+\frac{1}{3}y\right)\left(x-\frac{1}{4}y\right)$

x의 계수가 1이 아닌 두 일차식의 곱

◪ 다음 □안에 알맞은 양수를 써넣어라.

40. $(2x-1)(3x+\square)=6x^2+\square x-4$

41. $(3a-\square)(4a-7)=12a^2-41a+\square$

42. $(\square x-3y)(x+2y)=4x^2+\square xy-6y^2$

43. $(a-6b)(a-\square b)=a^2-10ab+\square b^2$

◪ 다음 식을 전개하여라.

44. $(2a+1)(3a+2)$

45. $(2x+5)(3x+4)$

46. $(2x+5)(x+2)$

47. $(3x-1)(4x+3)$

48. $(4x-1)(2x-7)$

49. $(3x-8)(5x-2)$

50. $(2x-9)(3x-5)$

51. $(3x+1)(2x+5)$

52. $(4a+3)(5a-1)$

53. $(-2x+3)(6x+5)$

54. $(3x-2)(4x+5)$

55. $(3x+4)(2x-7)$

56. $(2x-5y)(3x-4y)$

57. $(5x+3y)(3x-2y)$

58. $(2x+y)(4x-7y)$

59. $(2x+9y)(3x-5y)$

60. $(4a+b)(5a-3b)$

61. $(3x+4)(2x-3)$

62. $(2x-7)(5x+1)$

63. $(2a+7b)(5a-3b)$

64. $(a-b)(2a-3b)$

65. $(a+b)(2a-3b)$

66. $(5a+6b)(3a-8b)$

67. $(2x-y)(3x+y)$

68. $(-x+y)(3x-2y)$

69. $(3x+2y)(-2x+3y)$

70. $(-3a+2b)(-2a-4b)$

71. $(3x+2)(4x+3)$

72. $(2x+5)(3x+6)$

73. $(-3x+1)(2x-3)$

74. $(2x+5y)(3x-2y)$

75. $(3x-5y)(2x+y)$

76. $(-4x+3y)(3x-2y)$

77. $\left(\frac{1}{3}x+4\right)(6x+3)$

78. $(3x+2y)(4x+3y)$

79. $(2x+6y)(5x-3y)$

80. $(5x-9y)(3x+2y)$

81. $\left(\frac{1}{2}y-3\right)\left(\frac{1}{3}y-4\right)$

82. $\left(\frac{1}{2}a-3b\right)\left(\frac{1}{3}a+4b\right)$

83. $\left(\frac{1}{3}a+4b\right)\left(\frac{1}{4}a-3b\right)$

복잡한 식의 계산

◪ 다음 식을 전개하여라.

84. $3(2a-b)^2$

85. $(a+b)(a-2b+1)$

86. $(x+2y+1)(3x-y)$

87. $(2a-b+2)(a-3b)$

88. $(x+2y)^2-3xy$

89. $(a+b)(a-b)-b^2$

90. $(x+3)^2+(x-2)(x-5)$

91. $(2x-1)^2-(x-7)(x-3)+(-5-x)(-5+x)$

92. $2(a+5)(a-5)-(a-4)(a-1)-(a+1)^2$

93. $(x-y)^2-(x+y)^2$

94. $(x-4)^2-(x-2)$

95. $(2x-3y)^2-2(x-2y)(x+2y)$

96. $(2a+b)(3a+2b+4)$

97. $(x+3y)(x-4y-7)$

98. $(-4x+3y-5)(2x-3y)$

99. $(a-3)(a-4)-(2a-3)$

100. $(x+5y)(x-5y)-(2x-3y)^2$

101. $(x-y+1)(x+y+1)$

102. $(x+3y-1)(x-3y+1)$

103. $(a-b+1)(a-b+5)$

104. $(x-y)(x-y-2)$

105. $(x-y+2)(x-y-2)$

106. $(a-b+4)^2$

107. $(x+2y-1)^2$

108. $(x-2)^2-(x-3)^2$

109. $(2x-y+3)(2x-y-3)$

110. $(x-y+1)(-x-y-1)$

정답 및 해설

1) $3, 2$

⇨ $(x+5)(x-A)=x^2+Bx-15$로 놓으면

$x^2+(5-A)x-5A=x^2+Bx-15$

즉, $5-A=B, -5A=-15$ 이므로 $A=3, B=2$

2) $8, 16$

⇨ $(x+A)(x-2)=x^2+6x-B$로 놓으면

$x^2+(A-2)x-2A=x^2+6x-B$

즉, $A-2=6, -2A=-B$ 이므로 $A=8, B=16$

3) $x^2+8x+15$

4) x^2+3x+2

5) $x^2+7x+10$

6) x^2+6x-7

7) $y^2+8y+15$

8) $y^2-10y+24$

⇨ $(y-4)(y-6)$

$=y^2-6y-4y+24$

$=y^2-10y+24$

9) $a^2+7a+12$

10) $x^2+2x-24$

11) $b^2-9b+18$

12) a^2-3a-4

13) y^2-y-20

⇨ $(y-5)(y+4)$

$=y^2+4y-5y-20$

$=y^2-y-20$

14) $x^2+10x+21$

15) $x^2+8x+12$

⇨ $(x+2)(x+6)=x^2+(2+6)x+2\times6=x^2+8x+12$

16) $x^2-8x+15$

17) x^2+5x+6

18) $x^2-9x+14$

19) $x^2+3x-40$

20) $x^2+8x-20$

21) $a^2+2a-15$

22) y^2-y-12

23) $x^2+3xy+2y^2$

24) $x^2-xy-6y^2$

25) $x^2-2xy-15y^2$

26) $x^2-4xy-12y^2$

27) $a^2-3ab-54b^2$

28) $a^2-12ab+35b^2$

29) $x^2-10xy+16y^2$

30) $x^2+3xy+2y^2$

31) $a^2-2ab-3b^2$

32) $x^2-7xy+12y^2$

⇨ $(x-3y)(x-4y)=x^2+(-3y-4y)x+(-3y)\times(-4y)$

$=x^2-7xy+12y^2$

33) $a^2+4ab-12b^2$

⇨ $(a+6b)(a-2b)$

$=a^2+(6b-2b)a+6b\times(-2b)$

$=a^2+4ab-12b^2$

34) $x^2+3xy-10y^2$

⇨ $(x-2y)(x+5y)$

$=x^2+(-2y+5y)x+(-2y)\times5y$

$=x^2+3xy-10y^2$

35) $a^2-4ab+3b^2$

⇨ $(a-3b)(a-b)$

$=a^2+(-3b-b)a+(-3b)\times(-b)$

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

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

⇨ $\left(x-\frac{1}{2}\right)\left(x-\frac{3}{2}\right)$

$=x^2-\left(\frac{1}{2}+\frac{3}{2}\right)x+\frac{1}{2}\times\frac{3}{2}$

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

37) $x^2-\frac{1}{6}x-\frac{1}{6}$

⇨ $\left(x-\frac{1}{2}\right)\left(x+\frac{1}{3}\right)$

$=x^2+\left(-\frac{1}{2}+\frac{1}{3}\right)x+\left(-\frac{1}{2}\right)\times\frac{1}{3}$

$=x^2-\frac{1}{6}x-\frac{1}{6}$

38) $a^2+\frac{1}{3}ab-\frac{2}{9}b^2$

⇨ (주어진 식) $=a^2+\left(-\frac{1}{3}+\frac{2}{3}\right)ab+\left(-\frac{1}{3}\times\frac{2}{3}\right)b^2$

$=a^2+\frac{1}{3}ab-\frac{2}{9}b^2$

39) $x^2+\frac{1}{12}xy-\frac{1}{12}y^2$

⇨ $\left(x+\frac{1}{3}y\right)\left(x-\frac{1}{4}y\right)$

$=x^2+\left(\frac{1}{3}-\frac{1}{4}\right)xy+\left\{\frac{1}{3}\times\left(-\frac{1}{4}\right)\right\}y^2$

$=x^2+\frac{1}{12}xy-\frac{1}{12}y^2$

40) $4, 5$

⇨ $(2x-1)(3x+A)=6x^2+Bx-4$로 놓으면

$6x^2+(2A-3)x-A=6x^2+Bx-4$

즉, $2A-3=B, -A=-4$이므로 $A=4, B=5$

41) $5, 35$

⇨ $(3a-A)(4a-7)=12a^2-41a+B$로 놓으면

$12a^2+(-21-4A)a+7A=12a^2-41a+B$

즉, $-21-4A=-41, 7A=B$이므로 $A=5, B=35$

42) $4, 5$

⇨ $(Ax-3y)(x+2y)=4x^2+Bxy-6y^2$으로 놓으면

$Ax^2+(2A-3)xy-6y^2=4x^2+Bxy-6y^2$

즉, $A=4, 2A-3=B$이므로 $A=4, B=5$

43) $4, 24$

⇨ $(a-6b)(a-Ab)=a^2-10ab+Bb^2$으로 놓으면

$a^2+(-6-A)ab+6Ab^2=a^2-10ab+Bb^2$

즉, $-6-A=-10, 6A=B$ 이므로 $A=4, B=24$

44) $6a^2+7a+2$

45) $6x^2+23x+20$

46) $2x^2+9x+10$

⇨ $(2x+5)(x+2)=2x^2+(4+5)x+10=2x^2+9x+10$

47) $12x^2+5x-3$

⇨ $(3x-1)(4x+3)=12x^2+(9-4)x-3=12x^2+5x-3$

48) $8x^2-30x+7$

49) $15x^2-46x+16$

50) $6x^2-37x+45$

⇨ $(2x-9)(3x-5)$

$=(2\times3)x^2-(2\times5+9\times3)x+(-9)\times(-5)$

$=6x^2-37x+45$

51) $6x^2+17x+5$

52) $20a^2+11a-3$

53) $-12x^2+8x+15$

⇨ $(-2x+3)(6x+5)$

$=-12x^2+(-10+18)x+15$

$=-12x^2+8x+15$

54) $12x^2+7x-10$

55) $6x^2-13x-28$

56) $6x^2-23xy+20y^2$

⇨ $(2x-5y)(3x-4y)=6x^2+(-8y-15y)x+20y^2$

$=6x^2-23xy+20y^2$

57) $15x^2-xy-6y^2$

58) $8x^2-10xy-7y^2$

59) $6x^2+17xy-45y^2$

60) $20a^2-7ab-3b^2$

⇨ $(4a+b)(5a-3b)$

$=20a^2+(-12b+5b)a-3b^2$

$=20a^2-7ab-3b^2$

61) $6x^2-x-12$

62) $10x^2-33x-7$

63) $10a^2+29ab-21b^2$

64) $2a^2-5ab+3b^2$

⇨ $(a-b)(2a-3b)$

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

$=2a^2-5ab+3b^2$

65) $2a^2-ab-3b^2$

66) $15a^2-22ab-48b^2$

67) $6x^2-xy-y^2$

68) $-3x^2+5xy-2y^2$

69) $-6x^2+5xy+6y^2$
⇨ $(3x+2y)(-2x+3y)$
$=-6x^2+9xy-4xy+6y^2$
$=-6x^2+5xy+6y^2$

70) $6a^2+8ab-8b^2$
⇨ $(-3a+2b)(-2a-4b)$
$=6a^2+12ab-4ab-8b^2$
$=6a^2+8ab-8b^2$

71) $12x^2+17x+6$

72) $6x^2+27x+30$

73) $-6x^2+11x-3$
⇨ $(-3x+1)(2x-3)$
$=-6x^2+9x+2x-3$
$=-6x^2+11x-3$

74) $6x^2+11xy-10y^2$

75) $6x^2-7xy-5y^2$

76) $-12x^2+17xy-6y^2$
⇨ $(-4x+3y)(3x-2y)$
$=(-4\times3)x^2+\{(-4)\times(-2)+3\times3\}xy+\{3\times(-2)\}y^2$
$=-12x^2+17xy-6y^2$

77) $2x^2+25x+12$
⇨ $\left(\frac{1}{3}x+4\right)(6x+3)$
$=\left(\frac{1}{3}\times6\right)x^2+\left(\frac{1}{3}\times3+4\times6\right)x+4\times3$
$=2x^2+25x+12$

78) $12x^2+17xy+6y^2$

79) $10x^2+24xy-18y^2$

80) $15x^2-17xy-18y^2$
⇨ $(5x-9y)(3x+2y)$
$=(5\times3)x^2+\{5\times2+(-9)\times3\}xy+\{(-9)\times2\}y^2$
$=15x^2-17xy-18y^2$

81) $\frac{1}{6}y^2-3y+12$
⇨ $\left(\frac{1}{2}y-3\right)\left(\frac{1}{3}y-4\right)$
$=\frac{1}{6}y^2+(-2-1)y+12=\frac{1}{6}y^2-3y+12$

82) $\frac{1}{6}a^2+ab-12b^2$

83) $\frac{1}{12}a^2-12b^2$
⇨ $\left(\frac{1}{3}a+4b\right)\left(\frac{1}{4}a-3b\right)$
$=\left(\frac{1}{3}\times\frac{1}{4}\right)a+\left\{\frac{1}{3}\times(-3)+4\times\frac{1}{4}\right\}ab+\{4\times(-3)\}b^2$
$=\frac{1}{12}a^2-12b^2$

84) $12a^2-12ab+3b^2$
⇨ (주어진 식)$=3(4a^2-4ab+b^2)$
$=12a^2-12ab+3b^2$

85) $a^2-ab-2b^2+a+b$

86) $3x^2+5xy-2y^2+3x-y$

87) $2a^2-7ab+3b^2+2a-6b$

88) $x^2+xy+4y^2$
⇨ (주어진 식)$=x^2+4xy+4y^2-3xy$
$=x^2+xy+4y^2$

89) a^2-2b^2
⇨ (주어진 식)$=a^2-b^2-b^2=a^2-2b^2$

90) $2x^2-x+19$
⇨ (주어진 식) $=x^2+6x+9+x^2-7x+10$
$=2x^2-x+19$

91) $2x^2+6x+5$
⇨ $(2x-1)^2-(x-7)(x-3)+(-5-x)(-5+x)$
$=4x^2-4x+1-x^2+10x-21+25-x^2$
$=2x^2+6x+5$

92) $3a-55$
⇨ $2(a+5)(a-5)-(a-4)(a-1)-(a+1)^2$
$=2a^2-50-a^2+5a-4-a^2-2a-1$
$=3a-55$

93) $-4xy$
⇨ (주어진 식)$=x^2-2xy+y^2-(x^2+2xy+y^2)$
$=-4xy$

94) $x^2-9x+18$
⇨ (주어진 식)$=x^2-8x+16-x+2$
$=x^2-9x+18$

95) $2x^2-12xy+17y^2$

⇨ $(2x-3y)^2-2(x-2y)(x+2y)$
$=4x^2-12xy+9y^2-2(x^2-4y^2)$
$=2x^2-12y+17y^2$

96) $6a^2+7ab+2b^2+8a+4b$
⇨ $(2a+b)(3a+2b+4)$
$=6a^2+4ab+8a+3ab+2b^2+4b$
$=6a^2+7ab+2b^2+8a+4b$

97) $x^2-xy-12y^2-7x-21y$
⇨ $(x+3y)(x-4y-7)$
$=x^2-4xy-7x+3xy-12y^2-21y$
$=x^2-xy-12y^2-7x-21y$

98) $-8x^2+18xy-9y^2-10x+15y$
⇨ $(-4x+3y-5)(2x-3y)$
$=-8x^2+12xy+6xy-9y^2-10x+15y$
$=-8x^2+18xy-9y^2-10x+15y$

99) $a^2-9a+15$
⇨ (주어진 식)$=a^2-7a+12-2a+3$
$=a^2-9a+15$

100) $-3x^2+12xy-34y^2$
⇨ (주어진 식)$=x^2-25y^2-(4x^2-12xy+9y^2)$
$=-3x^2+12xy-34y^2$

101) $x^2+2x+1-y^2$
⇨ $x+1=A$라 하면
$(x-y+1)(x+y+1)=(A-y)(A+y)=A^2-y^2$
$=(x+1)^2-y^2$
$=x^2+2x+1-y^2$

102) x^2-9y^2+6y-1
⇨ $3y-1=A$라 하면
$(x+3y-1)(x-3y+1)=(x+A)(x-A)=x^2-A^2$
$=x^2-(3y-1)^2$
$=x^2-(9y^2-6y+1)$
$=x^2-9y^2+6y-1$

103) $a^2-2ab+b^2+6a-6b+5$
⇨ $a-b=A$라 하면
$(a-b+1)(a-b+5)=(A+1)(A+5)=A^2+6A+5$
$=(a-b)^2+6(a-b)+5$
$=a^2-2ab+b^2+6a-6b+5$

104) $x^2-2xy+y^2-2x+2y$

105) $x^2-2xy+y^2-4$
⇨ $x-y=A$라 하면
$(x-y+2)(x-y-2)=(A+2)(A-2)$
$=A^2-4$
$=x^2-2xy+y^2-4$

106) $a^2-2ab+b^2+8a-8b+16$
⇨ $a-b=A$라 하면
$(a-b+4)^2=(A+4)^2=A^2+8A+16$
$=(a-b)^2+8(a-b)+16$
$=a^2-2ab+b^2+8a-8b+16$

107) $x^2+4xy+4y^2-2x-4y+1$
⇨ $x+2y=A$라 하면
$(x+2y-1)^2=(A-1)^2=A^2-2A+1$
$=(x+2y)^2-2(x+2y)+1$
$=x^2+4xy+4y^2-2x-4y+1$

108) $2x-5$
⇨ $x-2=A$, $x-3=B$로 치환하면
$(x-2)^2-(x-3)^2$
$=A^2-B^2=(A+B)(A-B)$
$=2x-5$

109) $4x^2-4xy+y^2-9$
⇨ $2x-y=A$라 하면
$(2x-y+3)(2x-y-3)=(A+3)(A-3)=A^2-9$
$=(2x-y)^2-9$
$=4x^2-4xy+y^2-9$

110) $-1-2x-x^2+y^2$
⇨ $(x-y+1)(-x-y-1)=\{(x+1)-y\}\{-(x+1)-y\}$
$=(A-y)(-A-y)$
$=-A^2+y^2=-x^2-2x-1+y^2$