계산시 참고사항

1. 다항식과 다항식의 곱셈

다항식과 다항식의 곱셈은 분배법칙을 이용하여 전개한 후 동류항끼리 모아서 간단히 한다.

$$(a+b)(c+d)=\underset{①}{ac}+\underset{②}{ad}+\underset{③}{bc}+\underset{④}{bd}$$

2. 완전제곱식

(1) 합의 제곱: $(a+b)^2=(a+b)(a+b)=a^2+ab+ba+b^2=a^2+2ab+b^2$

(2) 차의 제곱: $(a-b)^2=(a-b)(a-b)=a^2-ab-ba+b^2=a^2-2ab+b^2$

3. 합과 차의 공식

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

(다항식)×(다항식) 계산시

◉ 동류항끼리 모아서 간단히 한 후 한 문자에 대하여 내림차순으로 식을 정리한다.

서로 같은 제곱식

◉ $(-a-b)^2=(a+b)^2$

◉ $(-a+b)^2=(a-b)^2$

◉ $(-a-b)(-a+b)=a^2-b^2$

◉ $(-a+b)(a+b)=b^2-a^2$

다항식과 다항식의 곱셈

◪ 다음 식을 전개하여라.

1. $(a+b)(c-3d)$
2. $(a-2b)(c-5)$
3. $(a-5)(b-2)$
4. $(x+y)(3z-2)$
5. $(x+3)(2y+1)$
6. $(a+2)(b+4)$
7. $(x-1)(y+3)$
8. $(x+1)(y+2)$
9. $(2a-3)(b+5)$
10. $(-3a+2)(2b+3c)$
11. $(2a-b)(2a-3)$
12. $(a-b)(c-d)$
13. $(3a+b)(c-2d)$
14. $(2x+3y)(3x-4y)$
15. $(a-2)(b+7)$

16. $(2a-b)(c+2d)$

17. $(x+3y)(z-2y)$

18. $(-3x+4y)(x-2y+1)$

19. $(4a-3b)(a+5b+c)$

20. $(x+4y)(3x-y+3)$

21. $(5a-1)(3a+b-2)$

22. $(x+2y)(x-5y-9)$

23. $(2x-3y+8)(4x+5y)$

완전제곱식

◪ 다음 □안에 알맞은 양수를 써넣어라.

24. $(a+\square)^2=a^2+2a+\square$

25. $(x-\square)^2=x^2-4x+\square$

26. $(2x+\square)^2=4x^2+4x+\square$

27. $(3x-\square y)^2=9x^2-12xy+\square y^2$

28. $(x-\square)^2=x^2-\square x+81$

29. $(x-\square y)^2=x^2-\square xy+16y^2$

30. $(-2x+\square)^2=4x^2-\square x+25$

31. $(4a-\square b)^2=16a^2-\square ab+9b^2$

◪ 다음 식을 전개하여라.

32. $(a+2)^2$

33. $(x+1)^2$

34. $(x-2)^2$

35. $(y-4)^2$

36. $(a-7)^2$

37. $(x-9)^2$

38. $(2a-3)^2$

39. $(y+3)^2$

40. $(a+6)^2$

41. $(x+5)^2$

42. $(2a+1)^2$

43. $(4x-1)^2$

44. $(3x+2)^2$

45. $(a+3b)^2$

46. $(x+y)^2$

47. $(x+7)^2$

48. $(x-5)^2$

49. $(-x+2)^2$

50. $(-y+5)^2$

51. $(2x+y)^2$

52. $\left(x+\frac{1}{4}y\right)^2$

53. $\left(-x-\frac{1}{2}\right)^2$

54. $\left(x+\frac{1}{2}\right)^2$

55. $(-a-9b)^2$

56. $\left(x-\frac{1}{5}y\right)^2$

57. $\left(\frac{1}{2}a-3\right)^2$

58. $(x+4y)^2$

59. $(x+5y)^2$

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

61. $(x-3)^2$

62. $(a-5b)^2$

63. $\left(x-\frac{1}{6}y\right)^2$

64. $\left(\frac{3}{2}x-\frac{1}{3}y\right)^2$

65. $(-5a+b)^2$

66. $\left(-\frac{1}{3}x+\frac{1}{4}y\right)^2$

67. $(-a-2b)^2$

68. $(3x+1)^2$

69. $(4x-3y)^2$

70. $(3x+4)^2$

71. $(6a-7)^2$

72. $(2a+3b)^2$

73. $(-4x-5y)^2$

74. $\left(5x+\frac{1}{2}y\right)^2$

75. $\left(\frac{1}{3}x+y\right)^2$

76. $\left(\frac{1}{2}x+3y\right)^2$

77. $(-4a+3b)^2$

78. $(-2y-5)^2$

79. $\left(\frac{1}{4}a+1\right)^2$

80. $(5a-1)^2$

합과 차의 공식

◪ 다음 식을 전개하여라.

81. $(a+2)(a-2)$

82. $(x+1)(x-1)$

83. $(y+2)(y-2)$

84. $(a+8)(a-8)$

85. $(x+5y)(x-5y)$

86. $(a+7)(-a+7)$

87. $(-a+5)(a+5)$

88. $(1+2a)(1-2a)$

89. $(a+7)(a-7)$

90. $(4+x)(4-x)$

91. $(-x+6)(-x-6)$

92. $(9-a)(-9-a)$

93. $(x+3y)(x-3y)$

94. $(3a+5b)(-3a+5b)$

95. $(7x+y)(7x-y)$

96. $(-x+6)(-x-6)$

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

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

99. $(x+5y)(-x+5y)$

100. $(2x+y)(2x-y)$

101. $(2a+5b)(2a-5b)$

102. $(-3a+1)(-3a-1)$

103. $(-9+x)(9+x)$

104. $(-7x+y)(-7x-y)$

105. $(2a^2+7)(2a^2-7)$

106. $(2a+3b)(2a-3b)$

107. $(3a+7)(-3a+7)$

108. $(-x+5)(-x-5)$

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

110. $(-3x+4y)(-3x-4y)$

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

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

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

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

115. $\left(a+\frac{1}{5}\right)\left(a-\frac{1}{5}\right)$

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

117. $\left(\frac{1}{2}x+6y\right)\left(\frac{1}{2}x-6y\right)$

118. $\left(\frac{2}{3}x+\frac{3}{4}y\right)\left(\frac{2}{3}x-\frac{3}{4}y\right)$

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

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

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

122. $\left(-4x+\frac{1}{6}y\right)\left(-4x-\frac{1}{6}y\right)$

123. $\left(-\frac{1}{5}a+\frac{1}{8}b\right)\left(\frac{1}{5}a+\frac{1}{8}b\right)$

124. $\left(-\frac{2}{5}x+\frac{1}{3}y\right)\left(-\frac{2}{5}x-\frac{1}{3}y\right)$

125. $(x+2)(x-2)(x^2+4)$

126. $(a-2)(a+2)(a^2+4)$

127. $(x-3)(x+3)(x^2+9)$

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

129. $\left(a+\frac{1}{2}\right)\left(a-\frac{1}{2}\right)\left(a^2+\frac{1}{4}\right)$

130. $(2a+3b)(2a-3b)(4a^2+9b^2)$

정답 및 해설

1) $ac-3ad+bc-3bd$

2) $ac-5a-2bc+10b$

3) $ab-2a-5b+10$

4) $3xz-2x+3yz-2y$

5) $2xy+x+6y+3$

6) $ab+4a+2b+8$

7) $xy+3x-y-3$

8) $xy+2x+y+2$

9) $2ab+10a-3b-15$

10) $-6ab-9ac+4b+6c$

11) $4a^2-6a-2ab+3b$

12) $ac-ad-bc+bd$

13) $3ac-6ad+bc-2bd$

14) $6x^2+xy-12y^2$

15) $ab+7a-2b-14$

16) $2ac+4ad-bc-2bd$

17) $xz-2xy+3yz-6y^2$

18) $-3x^2+10xy-8y^2-3x+4y$

19) $4a^2+17ab-15b^2+4ac-3bc$

20) $3x^2+11xy+3x-4y^2+12y$
⇨ $(x+4y)(3x-y+3)$
$=3x^2-xy+3x+12xy-4y^2+12y$
$=3x^2+11xy+3x-4y^2+12y$

21) $15a^2+5ab-13a-b+2$
⇨ $(5a-1)(3a+b-2)=15a^2+5ab-10a-3a-b+2$
$=15a^2+5ab-13a-b+2$

22) $x^2-3xy-10y^2-9x-18y$
⇨ $(x+2y)(x-5y-9)$
$=x^2-5xy-9x+2xy-10y^2-18y$
$=x^2-3xy-10y^2-9x-18y$

23) $8x^2-2xy-15y^2+32x+40y$
⇨ $(2x-3y+8)(4x+5y)$
$=8x^2+10xy-12xy-15y^2+32x+40y$
$=8x^2-2xy-15y^2+32x+40y$

24) 1, 1

25) 2, 4

26) 1, 1

27) 2, 4

28) 9, 18

29) 4, 8

30) 5, 20

31) 3, 24

32) a^2+4a+4

33) x^2+2x+1

34) x^2-4x+4

35) $y^2-8y+16$

36) $a^2-14a+49$

37) $x^2-18x+81$

38) $4a^2-12a+9$
⇨ $(2a-3)^2=(2a)^2-2\times2a\times3+3^2=4a^2-12a+9$

39) y^2+6y+9

40) $a^2+12a+36$

41) $x^2+10x+25$

42) $4a^2+4a+1$
⇨ $(2a+1)^2=(2a)^2+2\times2a\times1+1^2=4a^2+4a+1$

43) $16x^2-8x+1$
⇨ $(4x-1)^2=(4x)^2-2\times4x\times1+1^2=16x^2-8x+1$

44) $9x^2+12x+4$
⇨ $(3x+2)^2=(3x)^2+2\times3x\times2+2^2=9x^2+12x+4$

45) $a^2+6ab+9b^2$

46) $x^2+2xy+y^2$

47) $x^2+14x+49$

48) $x^2-10x+25$

49) x^2-4x+4

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

50) $y^2-10y+25$

⇨ $(-y+5)^2=(y-5)^2=y^2-2\times y\times 5+5^2$
$=y^2-10y+25$

51) $4x^2+4xy+y^2$

52) $x^2+\frac{1}{2}xy+\frac{1}{16}y^2$

53) $x^2+x+\frac{1}{4}$

54) $x^2+x+\frac{1}{4}$

55) $a^2+18ab+81b^2$

56) $x^2-\frac{2}{5}xy+\frac{1}{25}y^2$

57) $\frac{1}{4}a^2-3a+9$

⇨ $\left(\frac{1}{2}a-3\right)^2=\left(\frac{1}{2}a\right)^2-2\times\frac{1}{2}a\times 3+3^2$
$=\frac{1}{4}a^2-3a+9$

58) $x^2+8xy+16y^2$

59) $x^2+10xy+25y^2$

⇨ $(x+5y)^2=x^2+2\times x\times 5y+(5y)^2=x^2+10xy+25y^2$

60) x^2+6x+9

⇨ $(-x-3)^2=(x+3)^2=x^2+2\times x\times 3+3^2$
$=x^2+6x+9$

61) x^2-6x+9

62) $a^2-10ab+25b^2$

63) $x^2-\frac{1}{3}xy+\frac{1}{36}y^2$

⇨ $\left(x-\frac{1}{6}y\right)^2=x^2-2\times x\times\frac{1}{6}y+\left(\frac{1}{6}y\right)^2$
$=x^2-\frac{1}{3}xy+\frac{1}{36}y^2$

64) $\frac{9}{4}x^2-xy+\frac{1}{9}y^2$

⇨ $\left(\frac{3}{2}x-\frac{1}{3}y\right)^2=\left(\frac{3}{2}x\right)^2-2\times\frac{3}{2}x\times\frac{1}{3}y+\left(\frac{1}{3}y\right)^2$
$=\frac{9}{4}x^2-xy+\frac{1}{9}y^2$

65) $25a^2-10ab+b^2$

66) $\frac{1}{9}x^2-\frac{1}{6}xy+\frac{1}{16}y^2$

⇨ $\left(-\frac{1}{3}x+\frac{1}{4}y\right)^2$
$=\left(-\frac{1}{3}x\right)^2+2\times\left(-\frac{1}{3}x\right)\times\frac{1}{4}y+\left(\frac{1}{4}y\right)^2$
$=\frac{1}{9}x^2-\frac{1}{6}xy+\frac{1}{16}y^2$

67) $a^2+4ab+4b^2$

⇨$(-a-2b)^2$
$=(-a)^2+2\times(-a)\times(-2b)+(-2b)^2$
$=a^2+4ab+4b^2$

68) $9x^2+6x+1$

69) $16x^2-24xy+9y^2$

70) $9x^2+24x+16$

⇨ $(3x+4)^2=(3x)^2+2\times 3x\times 4\times 4^2=9x^2+24x+16$

71) $36a^2-84a+49$

⇨ $(6a-7)^2=(6a)^2-2\times 6a\times 7+7^2=36a^2-84a+49$

72) $4a^2+12ab+9b^2$

73) $16x^2+40xy+25y^2$

74) $25x^2+5xy+\frac{1}{4}y^2$

⇨ $\left(5x+\frac{1}{2}y\right)^2=(5x)^2+2\times 5x\times\frac{1}{2}y+\left(\frac{1}{2}y\right)^2$
$=25x^2+5xy+\frac{1}{4}y^2$

75) $\frac{1}{9}x^2+\frac{2}{3}xy+y^2$

⇨ $\left(\frac{1}{3}x+y\right)^2=\left(\frac{1}{3}x\right)^2+2\times\frac{1}{3}x\times y+y^2$
$=\frac{1}{9}x^2+\frac{2}{3}xy+y^2$

76) $\frac{1}{4}x^2+3xy+9y^2$

77) $16a^2-24ab+9b^2$

⇨

$(-4a+3b)^2=(-4a)^2+2\times(-4a)\times3b+(3b)^2$
$=16a^2-24ab+9b^2$

78) $4y^2+20y+25$
⇨ $(-2y-5)^2=(2y+5)^2$
$=(2y)^2+2\times2y\times5+5^2$
$=4y^2+20y+25$

79) $\frac{1}{16}a^2+\frac{1}{2}a+1$

80) $25a^2-10a+1$

81) a^2-4

82) x^2-1

83) y^2-4

84) a^2-64

85) x^2-25y^2

86) $49-a^2$

87) $25-a^2$
⇨ $(-a+5)(a+5)=(5-a)(5+a)=5^2-a^2=25-a^2$

88) $1-4a^2$

89) a^2-49

90) $16-x^2$

91) x^2-36

92) a^2-81
⇨ $(9-a)(-9-a)=(-a+9)(-a-9)$
$=(-a)^2-9^2=a^2-81$

93) x^2-9y^2

94) $-9a^2+25b^2$

95) $49x^2-y^2$
⇨ $(7x+y)(7x-y)=(7x)^2-y^2=49x^2-y^2$

96) x^2-36

97) x^2-4y^2

98) a^2-9b^2

99) $25y^2-x^2$

100) $4x^2-y^2$

101) $4a^2-25b^2$
⇨ $(2a+5b)(2a-5b)=(2a)^2-(5b)^2=4a^2-25b^2$

102) $9a^2-1$

103) x^2-81

104) $49x^2-y^2$

105) $4a^4-49$

106) $4a^2-9b^2$

107) $49-9a^2$
⇨ $(3a+7)(-3a+7)=(7+3a)(7-3a)$
$=7^2-(3a)^2=49-9a^2$

108) x^2-25

109) $4y^2-x^2$

110) $9x^2-16y^2$
⇨ $(-3x+4y)(-3x-4y)=(-3x^2)-(4y^2)=9x^2-16y^2$

111) $x^2-\frac{1}{4}$

112) $x^2-\frac{1}{9}$

113) $\frac{1}{9}a^2-\frac{1}{4}b^2$

114) $\frac{1}{9}x^2-4$

115) $a^2-\frac{1}{25}$

116) $\frac{1}{4}x^2-9y^2$

117) $\frac{1}{4}x^2-36y^2$
⇨ $\left(\frac{1}{2}x+6y\right)\left(\frac{1}{2}x-6y\right)=\left(\frac{1}{2}x\right)^2-(6y)^2=\frac{1}{4}x^2-36y^2$

118) $\frac{4}{9}x^2-\frac{9}{16}y^2$
⇨ $\left(\frac{2}{3}x+\frac{3}{4}y\right)\left(\frac{2}{3}x-\frac{3}{4}y\right)=\left(\frac{2}{3}x\right)^2-\left(\frac{3}{4}y\right)^2$
$=\frac{4}{9}x^2-\frac{9}{16}y^2$

119) $\frac{9}{4}a^2-\frac{1}{16}$

120) $x^2-\frac{1}{4}$

121) $4y^2-\frac{1}{9}x^2$

122) $16x^2-\frac{1}{36}y^2$

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

$=16x^2-\frac{1}{36}y^2$

123) $\frac{1}{64}b^2-\frac{1}{25}a^2$

⇨ $\left(-\frac{1}{5}a+\frac{1}{8}b\right)\left(\frac{1}{5}a+\frac{1}{8}b\right)$

$=\left(\frac{1}{8}b-\frac{1}{5}a\right)\left(\frac{1}{8}b+\frac{1}{5}a\right)=\left(\frac{1}{8}b\right)^2-\left(\frac{1}{5}a\right)^2$

$=\frac{1}{64}b^2-\frac{1}{25}a^2$

124) $\frac{4}{25}x^2-\frac{1}{9}y^2$

⇨ $\left(-\frac{2}{5}x+\frac{1}{3}y\right)\left(-\frac{2}{5}x-\frac{1}{3}y\right)$

$=\left(-\frac{2}{5}x\right)^2-\left(\frac{1}{3}y\right)^2=\frac{4}{25}x^2-\frac{1}{9}y^2$

125) x^4-16

⇨ (주어진 식)$=(x^2-4)(x^2+4)=x^4-16$

126) a^4-16

⇨ $(a-2)(a+2)(a^2+4)=(a^2-4)(a^2+4)=a^4-16$

127) x^4-81

⇨ $(x-3)(x+3)(x^2+9)=(x^2-9)(x^2+9)=x^4-81$

128) x^4-y^4

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

129) $a^4-\frac{1}{16}$

⇨ $\left(a+\frac{1}{2}\right)\left(a-\frac{1}{2}\right)\left(a^2+\frac{1}{4}\right)$

$=\left(a^2-\frac{1}{4}\right)\left(a^2+\frac{1}{4}\right)=a^4-\frac{1}{16}$

130) $16a^4-81b^4$

⇨ $(2a+3b)(2a-3b)(4a^2+9b^2)$

$=(4a^2-9b^2)(4a^2+9b^2)=16a^4-81b^4$