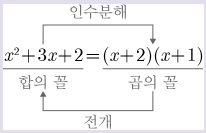
01 인수분해

1. 인수분해

하나의 다항식을 두 개 이상의 다항식의 곱의 꼴로 나타내는 것



2. 인수분해 기본공식

(1) $ma+mb=m(a+b)$, $ma-mb=m(a-b)$

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

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

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

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

◪ **다음 식을 인수분해하여라.**

1. $-abc+a$

2. $ax+bx$

3. $x-xy$

4. $2ab^2+6b$

5. ax^2y+axy^2

6. a^3-16ab^2

7. $ay+by-cy$

8. $(a-b)c+b(b-a)$

9. $a(x-y)-b(y-x)$

10. $1-m-n+mn$

11. $ac-bd-ad+bc$

12. $ab+a+b+1$

13. $(x+1)y^2+(x+1)y$

14. $a(b-1)-b+1$

15. $(a+b)^2+2(a+b)$

16. $ax+by-ay-bx$

17. $3ab-6a^2b+15a^2b^2$

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18. $(x-y)^2-3y(y-x)$

19. $x^2y+y^2z-y^3-x^2z$

20. $x^2-y^2+xz-yz$

21. x^3y-xy^3

22. $xy+y^2-xz-yz$

23. $(x-1)a+(x-1)$

24. x^3y-x^3

25. $1-m-n+mn$

26. $16a^2-24ab+9b^2$

27. $9x^2+6x+1$

28. x^2-16y^2

29. $16x^2-y^2$

30. $25x^2-y^2$

31. $27a^2-12b^2$

32. $(x+2)^2-(x-1)^2$

33. $64x^2-9y^2$

34. x^2-4

35. a^2-4b^2

36. x^2-9

37. $9a^2-16b^2$

38. a^4-b^4

39. $a^2-(b-c)^2$

40. $a^2+2ab+b^2-c^2$

41. a^2-9b^2

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42. $-25x^2+1$

43. $\frac{1}{4}x^2-y^2$

44. $6a^2-13a-5$

45. $x^2+10x+21$

46. x^2+3x+2

47. $2x^2-x-3$

48. x^2-8x+7

49. $3a^2+4a-7$

50. $x^2-10x+21$

51. $x^2-2xy-8y^2$

52. $13a^2-8ab-5b^2$

53. $x^2+12x+36$

54. $9x^2-6x+1$

55. $3a^2+4ab-7b^2$

56. $2x^2+xy-3y^2$

57. $9x^2-24xy+16y^2$

58. $a^2+10ab+25b^2$

59. $x^2-2+\frac{1}{x^2}$

60. $x^2-10x+25$

61. $x^2+x+\frac{1}{4}$

62. $4x^2+4x+1$

63. $x^2-\frac{2}{5}x+\frac{1}{25}$

64. $5x^2+x-18$

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65. a^2+2a+1

66. x^2+4x+3

67. $a^2-ab-20b^2$

68. $5a^2-8ab-4b^2$

69. $x^2-6xy+8y^2$

70. $a^2+10ab+21b^2$

71. $4x^2+3x-1$

72. $3x^2+11xy-4y^2$

73. x^2-6x+8

74. $x^2+\frac{2}{3}x+\frac{1}{9}$

75. $4a^2+28ab+49b^2$

76. $25x^2-30xy+9y^2$

77. x^2+6x+9

78. $25a^2-10a+1$

79. $x^2-8x+16$

80. $4x^2+12xy+9y^2$

81. $x^2-5xy+\frac{25}{4}y^2$

82. $4abx^2-4ab^2xy+ab^3y^2$

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정답 및 해설

1) $a(1-bc)$

2) $x(a+b)$

3) $x(1-y)$

4) $2b(ab+3)$

5) $axy(x+y)$

6) $a(a+4b)(a-4b)$

⇨ $a^3-16ab^2=a(a^2-16b^2)=a(a+4b)(a-4b)$

7) $y(a+b-c)$

8) $-(a-b)(b-c)$

⇨ $(a-b)c+b(b-a)=(a-b)(c-b)$
$=-(a-b)(b-c)$

9) $(a+b)(x-y)$

⇨ $a(x-y)-b(y-x)=a(x-y)+b(x-y)$
$=(a+b)(x-y)$

10) $(1-m)(1-n)$

⇨ $1-m-n+mn=1-m-n(1-m)$
$=(1-m)(1-n)$

11) $(c-d)(a+b)$

⇨ $ac-bd-ad+bc=a(c-d)+b(c-d)=(c-d)(a+b)$

12) $(a+1)(b+1)$

13) $y(x+1)(y+1)$

14) $(a-1)(b-1)$

15) $(a+b)(a+b+2)$

16) $(a-b)(x-y)$

17) $3ab(1-2a+5ab)$

18) $(x-y)(x+2y)$

⇨ $(x-y)^2-3y(y-x)=(x-y)\{(x-y)+3y\}$
$=(x-y)(x+2y)$

19) $(x+y)(x-y)(y-z)$

⇨ $x^2y+y^2z-y^3-x^2z=x^2(y-z)-y^2(y-z)$
$=(y-z)(x^2-y^2)$
$=(x+y)(x-y)(y-z)$

20) $(x-y)(x+y+z)$

⇨ $x^2-y^2+xz-yz=(x+y)(x-y)+z(x-y)$
$=(x-y)(x+y+z)$

21) $xy(x+y)(x-y)$

22) $(x+y)(y-z)$

⇨ $xy+y^2-xz-yz$
$=y(x+y)-z(x+y)=(x+y)(y-z)$

23) $(x-1)(a+1)$

24) $x^3(y-1)$

25) $(1-m)(1-n)$

⇨ $1-m-n+mn=(1-m)-n(1-m)$
$=(1-m)(1-n)$

26) $(4a-3b)^2$

⇨ $16a^2-24ab+9b^2=(4a)^2-2\cdot4a\cdot3b+(3b)^2$
$=(4a-3b)^2$

27) $(3x+1)^2$

⇨ $9x^2+6x+1=(3x)^2+2\cdot3x\cdot1+1^2$
$=(3x+1)^2$

28) $(x+4y)(x-4y)$

29) $(4x+y)(4x-y)$

30) $(5x+y)(5x-y)$

⇨ $25x^2-y^2=(5x)^2-y^2$
$=(5x+y)(5x-y)$

31) $3(3a+2b)(3a-2b)$

⇨ $27a^2-12b^2=3(9a^2-4b^2)=3\{(3a)^2-(2b)^2\}$
$=3(3a+2b)(3a-2b)$

32) $3(2x+1)$

⇨ $(x+2)^2-(x-1)^2=(x+2+x-1)(x+2-x+1)$
$=3(2x+1)$

33) $(8x+3y)(8x-3y)$

34) $(x+2)(x-2)$

35) $(a+2b)(a-2b)$

36) $(x+3)(x-3)$

37) $(3a+4b)(3a-4b)$

38) $(a-b)(a+b)(a^2+b^2)$

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

39) $(a+b-c)(a-b+c)$

40) $(a+b+c)(a+b-c)$

41) $(a+3b)(a-3b)$

42) $-(5x+1)(5x-1)$

43) $\left(\frac{1}{2}x+y\right)\left(\frac{1}{2}x-y\right)$

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44) $(3a+1)(2a-5)$

45) $(x+3)(x+7)$

46) $(x+1)(x+2)$

47) $(2x-3)(x+1)$

48) $(x-1)(x-7)$

49) $(3a+7)(a-1)$

50) $(x-3)(x-7)$

51) $(x-4y)(x+2y)$

52) $(13a+5b)(a-b)$

53) $(x+6)^2$

54) $(3x-1)^2$

55) $(3a+7b)(a-b)$

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

57) $(3x-4y)^2$

58) $(a+5b)^2$

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

60) $(x-5)^2$

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

62) $(2x+1)^2$

63) $\left(x-\frac{1}{5}\right)^2$

64) $(x+2)(5x-9)$

65) $(a+1)^2$

66) $(x+1)(x+3)$

67) $(a+4b)(a-5b)$

68) $(5a+2b)(a-2b)$

69) $(x-2y)(x-4y)$

70) $(a+3b)(a+7b)$

71) $(4x-1)(x+1)$

72) $(3x-y)(x+4y)$

73) $(x-2)(x-4)$

74) $\left(x+\frac{1}{3}\right)^2$

75) $(2a+7b)^2$

76) $(5x-3y)^2$

77) $(x+3)^2$

78) $(5a-1)^2$

79) $(x-4)^2$

80) $(2x+3y)^2$

81) $\left(x-\frac{5}{2}y\right)^2$

82) $ab(2x-by)^2$

⇨ $4abx^2-4ab^2xy+ab^3y^2=ab(4x^2-4bxy+b^2y^2)$
$=ab(2x-by)^2$