계산시 참고사항

1. 완전제곱식: 다항식의 제곱의 꼴로 된 식 또는 이 식에 상수를 곱한 식

(1) 완전제곱식을 이용한 인수분해

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

(2) 완전제곱식이 될 조건

① $x^2 + ax + b$가 완전제곱식이 될 b의 조건

: $x^2 + ax + b = x^2 + 2 \times x \times \dfrac{a}{2} + \left(\dfrac{a}{2}\right)^2 = \left(x + \dfrac{a}{2}\right)^2 \Rightarrow b = \left(\dfrac{a}{2}\right)^2$

② $x^2 + ax + b^2$이 완전제곱식이 될 a의 조건

: $x^2 + ax + b^2 = x^2 + 2 \times x \times b + b^2 = (x + b)^2 \Rightarrow a = 2b$

2. 제곱의 차를 이용하여 인수분해하기

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

예 $x^2 - 4 = x^2 - 2^2 = (x + 2)(x - 2)$, $9a^2 - b^2 = (3a)^2 - b^2 = (3a + b)(3a - b)$

완전제곱식을 이용하여 인수분해하기

☑ **다음 식이 완전제곱식이 되도록 □ 안에 알맞은 수를 써넣어라.**

1. $x^2 - 10x + \square$

2. $x^2 - 14x + \square$

3. $a^2 + 18ab + \square b^2$

4. $x^2 + \square x + 25$

5. $a^2 + \square a + 36$

6. $x^2 + \square x + \dfrac{1}{4}$

7. $x^2 + 8x + \boxed{}$

8. $x^2 + 14x + \boxed{}$

9. $x^2 + \boxed{} x + 81$

10. $x^2 - 4x + \boxed{}$

11. $x^2 - 12x + \boxed{}$

12. $x^2 + \boxed{} x + 100$

13. $a^2 + 12ab + \boxed{} b^2$

14. $9x^2 + 6xy + \boxed{}y^2$

15. $25a^2 + \boxed{}ab + b^2$

16. $9x^2 + \boxed{}xy + 4y^2$

17. $4x^2 - 28xy + \boxed{}y^2$

18. $a^2 - 24ab + \boxed{}b^2$

19. $64x^2 - \boxed{}xy + y^2$

20. $16x^2 - \boxed{}xy + 25y^2$

21. $x^2 - 18xy + \boxed{}y^2$

22. $x^2 + \boxed{}xy + 64y^2$

23. $25x^2 + 30xy + \boxed{}y^2$

24. $9x^2 - \boxed{}xy + 16y^2$

◪ 다음 식을 인수분해하여라.

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

26. $a^2 + 14ab + 49b^2$

27. $4x^2 + 4x + 1$

28. $9x^2 + 12x + 4$

29. $a^2 - 6a + 9$

30. $x^2 - 16x + 64$

31. $a^2 + 4a + 4$

32. $x^2 + 6x + 9$

33. $x^2 + 8x + 16$

34. $4x^2 + 12x + 9$

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

36. $-x^2 + 6x - 9$

37. $3x^2 + 12xy + 12y^2$

38. $2x^2 - 12xy + 18y^2$

39. $a^2 - 8a + 16$

40. $x^2 - 12x + 36$

41. $x^2 + 2xy + y^2$

42. $4x^2 + 4x + 1$

43. $4x^2 + 20xy + 25y^2$

44. $x^2 + x + \dfrac{1}{4}$

45. $x^2 - 14xy + 49y^2$

46. $9x^2 - 6x + 1$

47. $25x^2 - 30xy + 9y^2$

48. $x^2 - \dfrac{2}{3}xy + \dfrac{1}{9}y^2$

49. $9x^2 + 24xy + 16y^2$

50. $4x^2 - 28xy + 49y^2$

51. $\dfrac{4}{9}x^2 - xy + \dfrac{9}{16}y^2$

52. $x^2 + 16x + 64$

53. $25x^2 - 10x + 1$

54. $x^2 - \dfrac{1}{2}xy + \dfrac{1}{16}y^2$

55. $25 + 20x + 4x^2$

56. $4x^2 - 2x + \dfrac{1}{4}$

57. $49x^2 - 28x + 4$

58. $9x^2 + 24xy + 16y^2$

59. $\dfrac{1}{9}a^2 - \dfrac{1}{2}a + \dfrac{9}{16}$

60. $49x^2 + 28x + 4$

61. $81x^2 - 18x + 1$

62. $64 + 16x + x^2$

63. $121 - 22x + x^2$

64. $\dfrac{1}{9}x^2 - \dfrac{2}{3}x + 1$

65. $x^2 + 24xy + 144y^2$

66. $9x^2 + 30xy + 25y^2$

67. $4x^2 - 12xy + 9y^2$

68. $3x^2 - 12xy + 12y^2$

69. $x^2 + \dfrac{1}{2}xy + \dfrac{1}{16}y^2$

🔖 제곱의 차를 이용하여 인수분해하기

◪ 다음 식을 인수분해하여라.

70. $x^2 - 25$

71. $x^2 - 1$

72. $x^2 - 9$

73. $x^2 - 16$

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

75. $x^2 - 36y^2$

76. $x^2 - 49y^2$

77. $4x^2 - 1$

78. $9x^2 - 1$

79. $16x^2 - 1$

80. $64x^2 - y^2$

81. $81x^2 - y^2$

82. $100x^2 - y^2$

83. $x^2 - \dfrac{1}{4}$

84. $x^2 - \dfrac{16}{9}$

85. $x^2 - 64y^2$

86. $a^2 - 49b^2$

87. $25x^2 - 9y^2$

88. $x^2 - \dfrac{9}{4}y^2$

89. $16a^2 - \dfrac{25}{81}b^2$

90. $\dfrac{1}{4}a^2 - 81b^2$

91. $3a^2 - 3$

92. $2x^2 - 8$

93. $5x^2 - 20y^2$

94. $12x^2 - 27y^2$

95. $16x^2 - 4y^2$

96. $a - a^3$

97. $8a - 50a^3$

98. $9x^2y - 4y^3$

99. $-5x^2 + 45y^2$

100. $x^2y^2 - 9$

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

102. $9x^2 - 25$

103. $16x^2 - 9$

104. $4x^2 - 9y^2$

105. $16x^2 - 25y^2$

106. $64x^2 - 81y^2$

107. $3x^2 - 48$

108. $4x^2 - 4$

109. $6x^2 - 54y^2$

110. $\dfrac{1}{2}x^2 - \dfrac{1}{8}$

111. $\dfrac{1}{9}x^2 - \dfrac{1}{4}y^2$

112. $\dfrac{1}{25}x^2 - \dfrac{1}{36}y^2$

113. $\dfrac{25}{16}x^2 - \dfrac{4}{49}y^2$

114. $\dfrac{9}{4}x^2 - \dfrac{16}{9}y^2$

115. $16x^2 - 49y^2$

116. $\dfrac{4}{9}x^2 - \dfrac{4}{49}y^2$

117. $4x^2 - 64y^2$

118. $\dfrac{1}{3}x^2 - \dfrac{1}{27}y^2$

119. $4x^2 - 49$

120. $-12x^2 + 27y^2$

정답 및 해설

1) 25
$\Rightarrow x^2 - 2 \times x \times 5 + (5^2)$

2) 49
$\Rightarrow x^2 - 2 \times x \times 7 + (7^2)$

3) 81
$\Rightarrow a^2 + 2 \times a \times 9b + (9^2)b^2$

4) ± 10
$\Rightarrow x^2 + (\pm 2 \times 5)x + 5^2$

5) ± 12
$\Rightarrow a^2 + (\pm 2 \times 6)a + 6^2$

6) ± 1
$\Rightarrow x^2 + \left(\pm 2 \times \frac{1}{2}\right)x + \left(\frac{1}{2}\right)^2$

7) 16
$\Rightarrow x^2 + 8x + \boxed{} = x^2 + 2 \times x \times 4 + \boxed{4^2}$

8) 49
$\Rightarrow x^2 + 14x + \boxed{} = x^2 + 2 \times x \times 7 + \boxed{7^2}$

9) 18
$\Rightarrow x^2 + \boxed{}x + 81 = (x+9)^2 = x^2 + 2 \times x \times 9 + 9^2$
$= x^2 + \boxed{18}x + 81$

10) 4
$\Rightarrow x^2 - 4x + \boxed{} = x^2 - 2 \times x \times 2 + \boxed{2^2}$

11) 36
$\Rightarrow x^2 - 12x + \boxed{} = x^2 - 2 \times x \times 6 + \boxed{6^2}$

12) ± 20
$\Rightarrow x^2 + (\pm 2 \times 10)x + 100$

13) 36
$\Rightarrow a^2 + 12ab + \boxed{}b^2 = a^2 + 2 \times a \times 6b + (6b)^2$
$= a^2 + 12ab + \boxed{36}b^2$

14) 1
$\Rightarrow 9x^2 + 6xy + \boxed{}y^2 = (3x)^2 + 2 \times 3x \times y + y^2$
$= 9x^2 + 6xy + \boxed{1}y^2$

15) ± 10
$\Rightarrow (5a)^2 + (\pm 2 \times 5)a \times b + b^2$

$= 25a^2 + \boxed{10}ab + b^2$

16) ± 12

17) 49
$\Rightarrow 4x^2 - 28xy + \boxed{}y^2 = (2x)^2 - 2 \times 2x \times 7y + (7y)^2$
$= 4x^2 - 28xy + \boxed{49}y^2$

18) 144
$\Rightarrow a^2 - 24ab + \boxed{}b^2 = a^2 - 2 \times a \times 12b + (12b)^2$
$= a^2 - 24ab + \boxed{144}b^2$

19) ± 16
$\Rightarrow (8x)^2 - (\pm 2 \times 8x \times y) + y^2$

20) ± 40
$\Rightarrow (4x)^2 - (\pm 2 \times 4x \times 5y) + (5y)^2$

21) 81
$\Rightarrow x^2 - 18xy + \boxed{}y^2 = x^2 - 2 \times x \times 9y + (9y)^2$
$= x^2 - 18xy + \boxed{81}y^2$

22) ± 16

23) 9
$\Rightarrow 25x^2 + 30xy + \boxed{}y^2 = (5x)^2 + 2 \times 5x \times 3y + (3y)^2$
$= 25x^2 + 30xy + \boxed{9}y^2$

24) ± 24

25) $(x+5)^2$

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

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

28) $(3x+2)^2$

29) $(a-3)^2$

30) $(x-8)^2$

31) $(a+2)^2$

32) $(x+3)^2$

33) $(x+4)^2$

34) $(2x+3)^2$

35) $(x-5)^2$

36) $-(x-3)^2$
$\Rightarrow -x^2 + 6x - 9 = -(x^2 - 6x + 9) = -(x-3)^2$

37) $3(x+2y)^2$

$\Rightarrow 3x^2+12xy+12y^2=3(x^2+4xy+4y^2)=3(x+2y)^2$

38) $2(x-3y)^2$

$\Rightarrow 2x^2-12xy+18y^2=2(x^2-6xy+9y^2)=2(x-3y)^2$

39) $(a-4)^2$

40) $(x-6)^2$

41) $(x+y)^2$

42) $(2x+1)^2$

$\Rightarrow 4x^2+4x+1=(2x)^2+2\times 2x\times 1+1^2=(2x+1)^2$

43) $(2x+5y)^2$

$\Rightarrow 4x^2+20xy+25y^2=(2x)^2+2\times 2x\times 5y+(5y)^2$
$\quad =(2x+5y)^2$

44) $\left(x+\dfrac{1}{2}\right)^2$

$\Rightarrow x^2+x+\dfrac{1}{4}=x^2+2\times x\times \dfrac{1}{2}+\left(\dfrac{1}{2}\right)^2=\left(x+\dfrac{1}{2}\right)^2$

45) $(x-7y)^2$

46) $(3x-1)^2$

$\Rightarrow 9x^2-6x+1=(3x)^2-2\times 3x\times 1+1^2=(3x-1)^2$

47) $(5x-3y)^2$

$\Rightarrow 25x^2-30xy+9y^2=(5x)^2-2\times 5x\times 3y+(3y)^2$
$\quad =(5x-3y)^2$

48) $\left(x-\dfrac{1}{3}y\right)^2$

$\Rightarrow x^2-\dfrac{2}{3}xy+\dfrac{1}{9}y^2=x^2-2\times x\times \dfrac{1}{3}y+\left(\dfrac{1}{3}y\right)^2$
$\quad =\left(x-\dfrac{1}{3}y\right)^2$

49) $(3x+4y)^2$

$\Rightarrow 9x^2+24xy+16y^2=(3x)^2+2\times 3x\times 4y+(4y)^2$
$\quad =(3x+4y)^2$

50) $(2x-7y)^2$

$\Rightarrow 4x^2-28xy+49y^2=(2x)^2-2\times 2x\times 7y+(7y)^2$
$\quad =(2x-7y)^2$

51) $\left(\dfrac{2}{3}x-\dfrac{3}{4}y\right)^2$

$\Rightarrow \dfrac{4}{9}x^2-xy+\dfrac{9}{16}y^2=\left(\dfrac{2}{3}x\right)^2-2\times \dfrac{2}{3}x\times \dfrac{3}{4}y+\left(\dfrac{3}{4}y\right)^2$

$\quad =\left(\dfrac{2}{3}x-\dfrac{3}{4}y\right)^2$

52) $(x+8)^2$

53) $(5x-1)^2$

54) $\left(x-\dfrac{1}{4}y\right)^2$

$\Rightarrow x^2-\dfrac{1}{2}xy+\dfrac{1}{16}y^2=x^2-2\times x\times \dfrac{1}{4}y+\left(\dfrac{1}{4}y\right)^2$

$\quad =\left(x-\dfrac{1}{4}y\right)^2$

55) $(5+2x)^2$

$\Rightarrow 25+20x+4x^2=5^2+2\times 5\times 2x+(2x)^2=(5+2x)^2$

56) $\left(2x-\dfrac{1}{2}\right)^2$

$\Rightarrow 4x^2-2x+\dfrac{1}{4}=(2x)^2-2\times 2x\times \dfrac{1}{2}+\left(\dfrac{1}{2}\right)^2=\left(2x-\dfrac{1}{2}\right)^2$

57) $(7x-2)^2$

$\Rightarrow 49x^2-28x+4=(7x)^2-2\times 7x\times 2+2^2=(7x-2)^2$

58) $(3x+4y)^2$

$\Rightarrow 9x^2+24xy+16y^2=(3x)^2+2\times 3x\times 4y+(4y)^2$
$\quad =(3x+4y)^2$

59) $\left(\dfrac{1}{3}a-\dfrac{3}{4}\right)^2$

$\Rightarrow \dfrac{1}{9}a^2-\dfrac{1}{2}a+\dfrac{9}{16}=\left(\dfrac{1}{3}a\right)^2-2\times \dfrac{1}{3}a\times \dfrac{3}{4}+\left(\dfrac{3}{4}\right)^2$

$\quad =\left(\dfrac{1}{3}a-\dfrac{3}{4}\right)^2$

60) $(7x+2)^2$

$\Rightarrow 49x^2+28x+4=(7x)^2+2\times 7x\times 2+2^2$
$\qquad\qquad\qquad =(7x+2)^2$

61) $(9x-1)^2$

$\Rightarrow 81x^2-18x+1=(9x)^2-2\times 9x\times 1+1^2$
$\qquad\qquad\qquad =(9x-1)^2$

62) $(8+x)^2$

$\Rightarrow 64+16x+x^2=8^2+2\times 8\times x+x^2=(8+x)^2$

63) $(11-x)^2$

$\Rightarrow 121-22x+x^2=11^2-2\times 11\times x+x^2$
$\qquad\qquad\qquad =(11-x)^2$

64) $\left(\dfrac{1}{3}x-1\right)^2$

$=\left(\dfrac{2}{3}x-\dfrac{3}{4}y\right)^2$

$\Rightarrow \dfrac{1}{9}x^2 - \dfrac{2}{3}x + 1 = \left(\dfrac{1}{3}x\right)^2 - 2 \times \dfrac{1}{3}x \times 1 + 1^2$
$\qquad\qquad\qquad\quad = \left(\dfrac{1}{3}x - 1\right)^2$

65) $(x+12y)^2$
$\Rightarrow x^2 + 24xy + 144y^2 = x^2 + 2 \times x \times 12y + (12y)^2$
$\qquad\qquad\qquad\qquad = (x+12y)^2$

66) $(3x+5y)^2$
$\Rightarrow 9x^2 + 30xy + 25y^2 = (3x)^2 + 2 \times 3x \times 5y + (5y)^2$
$\qquad\qquad\qquad\qquad = (3x+5y)^2$

67) $(2x-3y)^2$
$\Rightarrow 4x^2 - 12xy + 9y^2$
$\quad = (2x)^2 - 2 \times 2x \times 3y + (3y)^2$
$\quad = (2x-3y)^2$

68) $3(x-2y)^2$
$\Rightarrow 3x^2 - 12xy + 12y^2$
$\quad = 3(x^2 - 4xy + 4y^2)$
$\quad = 3\{x^2 - 2 \times x \times 2y + (2y)^2\} = 3(x-2y)^2$

69) $\left(x + \dfrac{1}{4}y\right)^2$
$\Rightarrow x^2 + \dfrac{1}{2}xy + \dfrac{1}{16}y^2$
$\quad = x^2 + 2 \times x \times \dfrac{1}{4}y + \left(\dfrac{1}{4}y\right)^2 = \left(x + \dfrac{1}{4}y\right)^2$

70) $(x+5)(x-5)$

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

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

73) $(x+4)(x-4)$

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

75) $(x+6y)(x-6y)$

76) $(x+7y)(x-7y)$

77) $(2x+1)(2x-1)$

78) $(3x+1)(3x-1)$

79) $(4x+1)(4x-1)$

80) $(8x+y)(8x-y)$

81) $(9x+y)(9x-y)$

82) $(10x+y)(10x-y)$

83) $\left(x + \dfrac{1}{2}\right)\left(x - \dfrac{1}{2}\right)$

$\Rightarrow x^2 - \dfrac{1}{4} = x^2 - \left(\dfrac{1}{2}\right)^2 = \left(x + \dfrac{1}{2}\right)\left(x - \dfrac{1}{2}\right)$

84) $\left(x + \dfrac{4}{3}\right)\left(x - \dfrac{4}{3}\right)$
$\Rightarrow x^2 - \dfrac{16}{9} = x^2 - \left(\dfrac{4}{3}\right)^2 = \left(x + \dfrac{4}{3}\right)\left(x - \dfrac{4}{3}\right)$

85) $(x+8y)(x-8y)$
$\Rightarrow x^2 - 64y^2 = x^2 - (8y)^2 = (x+8y)(x-8y)$

86) $(a+7b)(a-7b)$
$\Rightarrow a^2 - 49b^2 = a^2 - (7b)^2 = (a+7b)(a-7b)$

87) $(5x+3y)(5x-3y)$
$\Rightarrow 25x^2 - 9y^2 = (5x)^2 - (3y)^2 = (5x+3y)(5x-3y)$

88) $\left(x + \dfrac{3}{2}y\right)\left(x - \dfrac{3}{2}y\right)$
$\Rightarrow x^2 - \dfrac{9}{4}y^2 = x^2 - \left(\dfrac{3}{2}y\right)^2 = \left(x + \dfrac{3}{2}y\right)\left(x - \dfrac{3}{2}y\right)$

89) $\left(4a + \dfrac{5}{9}b\right)\left(4a - \dfrac{5}{9}b\right)$
$\Rightarrow 16a^2 - \dfrac{25}{81}b^2 = (4a)^2 - \left(\dfrac{5}{9}b\right)^2 = \left(4a + \dfrac{5}{9}b\right)\left(4a - \dfrac{5}{9}b\right)$

90) $\left(\dfrac{1}{2}a + 9b\right)\left(\dfrac{1}{2}a - 9b\right)$
$\Rightarrow \dfrac{1}{4}a^2 - 81b^2 = \left(\dfrac{1}{2}a\right)^2 - (9b)^2 = \left(\dfrac{1}{2}a + 9b\right)\left(\dfrac{1}{2}a - 9b\right)$

91) $3(a+1)(a-1)$
$\Rightarrow 3a^2 - 3 = 3(a^2 - 1) = 3(a+1)(a-1)$

92) $2(x+2)(x-2)$
$\Rightarrow 2x^2 - 8 = 2(x^2 - 4) = 2(x+2)(x-2)$

93) $5(x+2y)(x-2y)$
$\Rightarrow 5x^2 - 20y^2 = 5(x^2 - 4y^2) = 5(x+2y)(x-2y)$

94) $3(2x+3y)(2x-3y)$
$\Rightarrow 12x^2 - 27y^2 = 3(4x^2 - 9y^2) = 3(2x+3y)(2x-3y)$

95) $4(2x+y)(2x-y)$
$\Rightarrow 16x^2 - 4y^2 = 4(4x^2 - y^2) = 4(2x+y)(2x-y)$

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

97) $2a(2+5a)(2-5a)$
$\Rightarrow 8a - 50a^3 = 2a(4 - 25a^2) = 2a(2+5a)(2-5a)$

98) $y(3x+2y)(3x-2y)$
$\Rightarrow 9x^2y - 4y^3 = y(9x^2 - 4y^2) = y(3x+2y)(3x-2y)$

99) $-5(x+3y)(x-3y)$

⇨ (주어진 식)$=-5(x^2-9y^2)=-5(x+3y)(x-3y)$

100) $(xy+3)(xy-3)$

⇨ $x^2y^2-9=(xy)^2-3^2=(xy+3)(xy-3)$

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

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

102) $(3x+5)(3x-5)$

⇨ $9x^2-25=(3x)^2-5^2=(3x+5)(3x-5)$

103) $(4x+3)(4x-3)$

⇨ $16x^2-9=(4x)^2-3^2=(4x+3)(4x-3)$

104) $(2x+3y)(2x-3y)$

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

105) $(4x+5y)(4x-5y)$

⇨ $16x^2-25y^2=(4x)^2-(5y)^2=(4x+5y)(4x-5y)$

106) $(8x+9y)(8x-9y)$

⇨ $64x^2-81y^2=(8x)^2-(9y)^2=(8x+9y)(8x-9y)$

107) $3(x+4)(x-4)$

⇨ $3x^2-48=3(x^2-16)=3(x+4)(x-4)$

108) $4(x+1)(x-1)$

⇨ $4x^2-4=4(x^2-1)=4(x+1)(x-1)$

109) $6(x+3y)(x-3y)$

⇨ $6x^2-54y^2=6(x^2-9y^2)=6(x+3y)(x-3y)$

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

⇨ $\frac{1}{2}x^2-\frac{1}{8}=\frac{1}{2}\left(x^2-\frac{1}{4}\right)=\frac{1}{2}\left(x+\frac{1}{2}\right)\left(x-\frac{1}{2}\right)$

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

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

112) $\left(\frac{1}{5}x+\frac{1}{6}y\right)\left(\frac{1}{5}x-\frac{1}{6}y\right)$

⇨ $\frac{1}{25}x^2-\frac{1}{36}y^2=\left(\frac{1}{5}x\right)^2-\left(\frac{1}{6}y\right)^2$
$=\left(\frac{1}{5}x+\frac{1}{6}y\right)\left(\frac{1}{5}x-\frac{1}{6}y\right)$

113) $\left(\frac{5}{4}x+\frac{2}{7}y\right)\left(\frac{5}{4}x-\frac{2}{7}y\right)$

⇨ $\frac{25}{16}x^2-\frac{4}{49}y^2=\left(\frac{5}{4}x\right)^2-\left(\frac{2}{7}y\right)^2$
$=\left(\frac{5}{4}x+\frac{2}{7}y\right)\left(\frac{5}{4}x-\frac{2}{7}y\right)$

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

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

115) $(4x+7y)(4x-7y)$

116) $\left(\frac{2}{3}x+\frac{2}{7}y\right)\left(\frac{2}{3}x-\frac{2}{7}y\right)$

117) $4(x+4y)(x-4y)$

⇨ $4x^2-64y^2=4(x^2-16y^2)=4(x+4y)(x-4y)$

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

⇨ $\frac{1}{3}x^2-\frac{1}{27}y^2=\frac{1}{3}\left(x^2-\frac{1}{9}y^2\right)=\frac{1}{3}\left(x+\frac{1}{3}y\right)\left(x-\frac{1}{3}y\right)$

119) $(2x+7)(2x-7)$

⇨ $4x^2-49=(2x)^2-7^2=(2x+7)(2x-7)$

120) $-3(2x+3y)(2x-3y)$

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