



◇ 「콘텐츠산업 진흥법 시행령」 제33조에 의한 표시
1) 제작연월일 : 2016-01-12
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.

계산시 참고사항

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

(1) 완전제곱식을 이용한 인수분해

$$\textcircled{1} a^2 \pm 2ab + b^2 = (a \pm b)^2 \quad \textcircled{2} a^2 - 2ab + b^2 = (a - b)^2$$

(2) 완전제곱식이 될 조건

① $x^2 + ax + b$ 가 완전제곱식이 될 b 의 조건

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

② $x^2 + ax + b^2$ 이 완전제곱식이 될 a 의 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) $a^2 - b^2 = (a + b)(a - b)$

$$\textcircled{예} x^2 - 4 = x^2 - 2^2 = (x + 2)(x - 2), \quad 9a^2 - b^2 = (3a)^2 - b^2 = (3a + b)(3a - b)$$



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

7. $x^2 + 8x + \square$

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

9. $x^2 + \square x + 81$

10. $x^2 - 4x + \square$

11. $x^2 - 12x + \square$

12. $x^2 + \square x + 100$

13. $a^2 + 12ab + \square b^2$

14. $9x^2 + 6xy + \square y^2$

15. $25a^2 + \square ab + b^2$

16. $9x^2 + \square xy + 4y^2$

17. $4x^2 - 28xy + \square y^2$

18. $a^2 - 24ab + \square b^2$

19. $64x^2 - \square xy + y^2$

20. $16x^2 - \square xy + 25y^2$

21. $x^2 - 18xy + \square y^2$

22. $x^2 + \square xy + 64y^2$

23. $25x^2 + 30xy + \square y^2$

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

▣ 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. $x^2 + x + \frac{1}{4}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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. $\frac{1}{2}x^2 - \frac{1}{8}$

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

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

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

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

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

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

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

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

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

$$\Rightarrow x^2 + 8x + \square = x^2 + 2 \times x \times 4 + \square^{2^2}$$

8) 49

$$\Rightarrow x^2 + 14x + \square = x^2 + 2 \times x \times 7 + \square^{7^2}$$

9) 18

$$\begin{aligned} \Rightarrow x^2 + \square x + 81 &= (x+9)^2 = x^2 + 2 \times x \times 9 + 9^2 \\ &= x^2 + \square^{18}x + 81 \end{aligned}$$

10) 4

$$\Rightarrow x^2 - 4x + \square = x^2 - 2 \times x \times 2 + \square^{2^2}$$

11) 36

$$\Rightarrow x^2 - 12x + \square = x^2 - 2 \times x \times 6 + \square^{6^2}$$

12) ± 20

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

13) 36

$$\begin{aligned} \Rightarrow a^2 + 12ab + \square b^2 &= a^2 + 2 \times a \times 6b + (6b)^2 \\ &= a^2 + 12ab + \square^{36}b^2 \end{aligned}$$

14) 1

$$\begin{aligned} \Rightarrow 9x^2 + 6xy + \square y^2 &= (3x)^2 + 2 \times 3x \times y + y^2 \\ &= 9x^2 + 6xy + \square^1y^2 \end{aligned}$$

15) ± 10

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

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

16) ± 12

17) 49

$$\begin{aligned} \Rightarrow 4x^2 - 28xy + \square y^2 &= (2x)^2 - 2 \times 2x \times 7y + (7y)^2 \\ &= 4x^2 - 28xy + \square^{49}y^2 \end{aligned}$$

18) 144

$$\begin{aligned} \Rightarrow a^2 - 24ab + \square b^2 &= a^2 - 2 \times a \times 12b + (12b)^2 \\ &= a^2 - 24ab + \square^{144}b^2 \end{aligned}$$

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

$$\begin{aligned} \Rightarrow x^2 - 18xy + \square y^2 &= x^2 - 2 \times x \times 9y + (9y)^2 \\ &= x^2 - 18xy + \square^{81}y^2 \end{aligned}$$

22) ± 16

23) 9

$$\begin{aligned} \Rightarrow 25x^2 + 30xy + \square y^2 &= (5x)^2 + 2 \times 5x \times 3y + (3y)^2 \\ &= 25x^2 + 30xy + \square^9y^2 \end{aligned}$$

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) $-(x-3)^2$

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

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

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

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

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

$$39) (a-4)^2$$

$$40) (x-6)^2$$

$$41) (x+y)^2$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$52) (x+8)^2$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$62) (8+x)^2$$

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

$$63) (11-x)^2$$

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

$$= (11-x)^2$$

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

$$\begin{aligned}\Rightarrow \frac{1}{9}x^2 - \frac{2}{3}x + 1 &= \left(\frac{1}{3}x\right)^2 - 2 \times \frac{1}{3}x \times 1 + 1^2 \\ &= \left(\frac{1}{3}x - 1\right)^2\end{aligned}$$

$$\begin{aligned}65) (x+12y)^2 \\ \Rightarrow x^2 + 24xy + 144y^2 &= x^2 + 2 \times x \times 12y + (12y)^2 \\ &= (x+12y)^2\end{aligned}$$

$$\begin{aligned}66) (3x+5y)^2 \\ \Rightarrow 9x^2 + 30xy + 25y^2 &= (3x)^2 + 2 \times 3x \times 5y + (5y)^2 \\ &= (3x+5y)^2\end{aligned}$$

$$\begin{aligned}67) (2x-3y)^2 \\ \Rightarrow 4x^2 - 12xy + 9y^2 \\ &= (2x)^2 - 2 \times 2x \times 3y + (3y)^2 \\ &= (2x-3y)^2\end{aligned}$$

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

$$\begin{aligned}69) \left(x + \frac{1}{4}y\right)^2 \\ \Rightarrow x^2 + \frac{1}{2}xy + \frac{1}{16}y^2 \\ &= x^2 + 2 \times x \times \frac{1}{4}y + \left(\frac{1}{4}y\right)^2 = \left(x + \frac{1}{4}y\right)^2\end{aligned}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$84) \left(x + \frac{4}{3}\right)\left(x - \frac{4}{3}\right)$$

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

$$85) (x+8y)(x-8y)$$

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

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

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

$$87) (5x+3y)(5x-3y)$$

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

$$88) \left(x + \frac{3}{2}y\right)\left(x - \frac{3}{2}y\right)$$

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

$$89) \left(4a + \frac{5}{9}b\right)\left(4a - \frac{5}{9}b\right)$$

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

$$90) \left(\frac{1}{2}a + 9b\right)\left(\frac{1}{2}a - 9b\right)$$

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

$$91) 3(a+1)(a-1)$$

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

$$92) 2(x+2)(x-2)$$

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

$$93) 5(x+2y)(x-2y)$$

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

$$94) 3(2x+3y)(2x-3y)$$

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

$$95) 4(2x+y)(2x-y)$$

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

$$96) a(1+a)(1-a)$$

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

$$97) 2a(2+5a)(2-5a)$$

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

$$98) y(3x+2y)(3x-2y)$$

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

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

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

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

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

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

$\Rightarrow (x+1)^2 - y^2 = (x+1+y)(x+1-y)$
 $= (x+y+1)(x-y+1)$

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

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

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

$\Rightarrow 16x^2 - 9 = (4x)^2 - 3^2 = (4x+3)(4x-3)$

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

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

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

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

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

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

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

$\Rightarrow 3x^2 - 48 = 3(x^2 - 16) = 3(x+4)(x-4)$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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