계산력 연습

[영역] 2.문자와 식



중 2 과정

2-1-1.지수법칙





◇ 「콘텐츠산업 진흥법 시행령」제33조에 의한 표시

1) 제작연월일 : 2016-02-16

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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. 지수의 합과 곱

m, n이 자연수 일 때,

- (1) 지수의 합: $a^m \times a^n = a^{m+n} \Rightarrow$ 지수끼리 더한다.
- (2) 지수의 곱: $(a^m)^n = a^{mn} \implies$ <u>지수끼리 곱한다.</u>

2. 지수의 차

 $a \neq 0$, m, n이 자연수 일 때,

- (1) m > n이면 $a^m \div a^n = a^{m-n}$
- (2) m = n이면 $a^m \div a^n = 1$
- (3) m < n이면 $a^m \div a^n = \frac{1}{a^{n-m}}$

3. 지수의 분배

n이 자연수 일 때

(1)
$$(ab)^n = a^n b^n$$

(2)
$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$
(단, $b \neq 0$)



ullet l, m, n이 자연수 일 때, $\{(a^l)^m\}^n = a^{lmn}$

$$\bullet \ (-a)^n = \begin{cases} a^n & (n \circ) & \overset{\text{자수}}{\hookrightarrow} \\ -a^n & (n \circ) & \overset{\text{X}}{\cong} \overset{\text{X}}{\hookrightarrow} \end{cases}$$



지수의 합과 곱

- 1. $a^2 \times a^3$
- 2. $x^2 \times x^3 \times x^4$
- 3. $3^3 \times 3^5$
- 4. $2^3 \times 2^4$
- 5. $5\times5^6\times5^4$
- 6. $7^3 \times 7^5 \times 7^2$

7.
$$(-a)^3 \times (-a)^5$$

8.
$$(-2)^2 \times (-2)^4 \times (-2)^5$$

9.
$$x^5 \times x^2$$

10.
$$3^2 \times 3^4$$

11.
$$a \times a^3 \times a^5$$

12.
$$b^2 \times b^3 \times b^4$$

13.
$$5^3 \times 5^4 \times 5^6$$

- 14. $2^2 \times 3^4 \times 3^6 \times 2^3$
- 15. $x^2 \times y^5 \times x \times y^3$
- 16. $(-2)^3 \times (-2)^2$
- 17. $a^4 \times b \times a^3 \times b^2$
- 18. $x^3 \times y^3 \times x^6$
- 19. $x^6 \times x^3$
- 20. $y \times y^7$
- 21. $a^4 \times a^8$
- 22. $b^5 \times b$
- 23. $a^2 \times a^3 \times a^5$
- 24. $x^4 \times x^2 \times x^7$
- 25. $a^7 \times x^2 \times a^2 \times x^6$
- 26. $a^2 \times b^6 \times a^5 \times c^2$
- 27. $a^4 \times b^3 \times a^2 \times b$
- 28. $a \times a^2 \times b \times b^3$

- 29. $x \times y^3 \times x^4 \times y^2$
- 30. $a \times a \times a^2 \times b \times b^3$
- 31. $a^2 \times b^3 \times a^3 \times b^5 \times a^4$
- 32. $(x^2)^7$
- 33. $(a^6)^3$
- 34. $(a^4)^4$
- 35. $(a^3)^2$
- 36. $(b^5)^3$
- 37. $(5^2)^8$
- 38. $(2^4)^2$
- 39. $(2^7)^3$
- 40. $a^3 \times a^4$
- 41. $\left(\frac{a}{b^2}\right)^3$
- 42. $\left(\frac{y^2}{x}\right)^2$

43.
$$\left(\frac{y^2}{x^3}\right)^4$$

44.
$$\left(-\frac{x}{y}\right)^3$$

$$45. \quad \left(-\frac{x^3}{y^2}\right)^5$$

$$46. \quad \left(-\frac{x^2}{3y^3}\right)^2$$

47.
$$(x^3)^4 \times y^2 \times (x^2)^5 \times (y^2)^3$$

48.
$$(a^2)^2 \times a^3 \times (a^4)^3$$

49.
$$(5^3)^3 \times 5 \times (5^2)^4$$

50.
$$(x^3)^2 \times (y^2)^4 \times x^5 \times (y^3)^3$$

51.
$$(-5)^2 \times x^4 \times (y^2)^3$$

52.
$$(a^2)^4 \times (a^3)^2$$

53.
$$(x^2)^3 \times x^4 \times (x^3)^4$$

54.
$$(x^2)^4 \times (y^2)^3 \times x^4 \times (y^2)^4$$

55.
$$(2^3)^4 \times (5^2)^3 \times (2^2)^5 \times 5$$

56.
$$(-3)^3 \times (-3)^2 \times (-3)^2$$

57.
$$(-1)^2 \times (-1)^3 \times (-1)^5 \times (-1)^7$$

% 지수의 차

58.
$$a^6 \div a^3$$

59.
$$a^2 \div a^8$$

60.
$$a^5 \div a^3$$

61.
$$2^6 \div 2^2$$

62.
$$x^3 \div x^3$$

63.
$$x^9 \div x^5$$

64.
$$b^4 \div b^4$$

65.
$$a^5 \div a^2$$

66.
$$b^7 \div b^3$$

- 67. $a^9 \div a^9$
- 68. $a^5 \div a^8$
- 69. $b^3 \div b^6$
- 70. $x^{10} \div x^4$
- 71. $7^5 \div 7^5$
- 72. $x^6 \div x^{10}$
- 74. $x^2 \div x^5$
- 75. $y^5 \div y^{10}$
- 76. $\frac{a^4}{a^2}$
- $77. \quad \frac{x^9}{x^6}$
- $78. \quad \frac{b^5}{b^5}$

- 80. $(x^5)^3 \div (x^3)^4$
- 81. $(x^2)^3 \div (x^4)^4$
- 82. $a^6 \div a^3 \div a^2$
- 83. $(y^5)^2 \div y \div (y^3)^4$
- 84. $a^8 \div a \div a^4$
- 85. $b^5 \div b^2 \div b^3$

- 86. $(x^5)^3 \div x^4 \times (x^3)^2$
- 87. $(a^2)^4 \div a^3 \div a$
- 88. $(x^2)^2 \div x^3 \div (x^5)^2$
- 89. $x^3 \times x^5 \div (x^4)^2$
- 90. $(y^3)^2 \times y^4 \div (y^5)^3$
- 91. $a^8 \div (a^2)^2 \times a^5$
- 92. $(b^4)^3 \div (b^3)^2 \times b^3$



지수의 분배

93.
$$(xy)^3$$

94.
$$(x^2y)^3$$

95.
$$(x^2y^4)^2$$

96.
$$(3a^2)^3$$

97.
$$(a^5b^3)^2$$

98.
$$(x^2y^4)^4$$

99.
$$(3x^4)^3$$

100
$$(5a^4b^2)^2$$

101.
$$(a^2b^4c^3)^5$$

$$102 \cdot (2x^2y^7z^5)^3$$

103.
$$(xy^2z^3)^4$$

104.
$$(-x^2y^2)^4$$

$$105 \cdot (-ab^3)^5$$

$$106 \cdot (-2a^2b)^2$$

$$107. \quad (-3x^2y^5)^3$$

$$108. \ (-a^5b^2c)^7$$

$$109_{s} \left(-7x^{3}y^{2}z^{7}\right)^{2}$$

$$110_{\circ} (-2x^2)^3$$

111.
$$\left(\frac{b}{a}\right)^4$$

$$112 \left(\frac{b^2}{a^3}\right)^3$$

$$113_{a} \left\{ \frac{(b^3)^2}{a^3} \right\}^3$$

$$114_{\circ} \left(\frac{y^2}{2x}\right)^3$$

$$115 \cdot \left(\frac{y^3}{x^2}\right)^2$$

- $116 \cdot \left(\frac{3a}{b^3}\right)^3$
- $117 \left(\frac{a^3b}{c^4}\right)^2$
- $118 \cdot \left(\frac{2x^4}{y^3z}\right)^4$
- $119 \left(-\frac{b}{a^4}\right)^3$
- $120. \left(-\frac{5x}{y^4}\right)^2$
- $121 \left(-\frac{a^2b^3}{c^4}\right)^4$
- $122 \left(-\frac{x^3y}{2z^2}\right)^3$



정답 및 해설

- 1) a^5
- $\Rightarrow a^{2+3} = a^5$
- 2) x^9
- $\Rightarrow x^{2+3+4} = x^9$
- 3) 3^8
- 4) 2^7
- 5) 5¹¹
- 6) 7^{10}
- 7) a^{8}
- $\Rightarrow (-a)^{3+5} = (-a)^8 = a^8$
- 8) -2^{11}
- $\Rightarrow (-2)^{2+4+5} = (-2)^{11} = -2^{11}$
- 9) x^{7}
- 10) 3⁶
- 11) a^9
- $\Rightarrow a \times a^3 \times a^5 = a^{1+3+5} = a^9$
- 12) b^9
- $\Rightarrow b^2 \times b^3 \times b^4 = b^{2+3+4} = b^9$
- 13) 5^{13}
- $\Rightarrow 5^3 \times 5^4 \times 5^6 = 5^{3+4+6} = 5^{13}$
- 14) $2^5 \times 3^{10}$
- $\Rightarrow 2^{2+3} \times 3^{4+6} = 2^5 \times 3^{10}$
- 15) x^3y^8
- $\Rightarrow x^{2+1} \times y^{5+3} = x^3 y^8$
- 16) -2^5
- $\Rightarrow (-2)^3 \times (-2)^2 = (-2)^{3+2} = -2^5$
- 17) a^7b^3
- $\Rightarrow a^4 \times b \times a^3 \times b^2 = a^4 \times a^3 \times b \times b^2 = a^7 b^3$
- 18) x^9y^3
- $\Rightarrow x^3 \times y^3 \times x^6 = x^3 \times x^6 \times y^3 = x^9 y^3$

- 19) x^9
- $\Rightarrow x^6 \times x^3 = x^{6+3} = x^9$
- 20) y^8
- $\Rightarrow y \times y^7 = y^{1+7} = y^8$
- 21) a^{12}
- $\Rightarrow a^4 \times a^8 = a^{4+8} = a^{12}$
- 22) b^6
- $\Rightarrow b^5 \times b = b^{5+1} = b^6$
- 23) a^{10}
- $\Rightarrow a^2 \times a^3 \times a^5 = a^{2+3+5} = a^{10}$
- 24) x^{13}
- $\Rightarrow x^4 \times x^2 \times x^7 = x^{4+2+7} = x^{13}$
- 25) a^9x^8
- $\Rightarrow a^7 \times x^2 \times a^2 \times x^6 = a^7 \times a^2 \times x^2 \times x^6 = a^9 x^8$
- 26) $a^7b^6c^2$
- $\Rightarrow a^2 \times b^6 \times a^5 \times c^2 = a^2 \times a^5 \times b^6 \times c^2 = a^7 b^6 c^2$
- 27) a^6b^4
- \Rightarrow (주어진 식)= $a^{4+2} \times b^{3+1} = a^6 b^4$
- 28) a^3b^4
- 29) x^5y^5
- 30) a^4b^4
- 31) a^9b^8
- $\Rightarrow a^2 \times b^3 \times a^3 \times b^5 \times a^4 = a^2 \times a^3 \times a^4 \times b^3 \times b^5$ $= a^{2+3+4} \times b^{3+5}$ $= a^9 b^8$
- 32) x^{14}
- $\Rightarrow (x^2)^7 = x^{2 \times 7} = x^{14}$
- 33) a^{18}
- $\Rightarrow (a^6)^3 = a^{6 \times 3} = a^{18}$
- 34) a^{16}
- $\Rightarrow (a^4)^4 = a^{4 \times 4} = a^{16}$
- 35) a^6
- 36) b^{15}
- $\Rightarrow (b^5)^3 = b^{5 \times 3} = b^{15}$

[영역] 2.문자와 식 2-1-1.지수법칙

37)
$$5^{16}$$

$$\Rightarrow (5^2)^8 = 5^{2 \times 8} = 5^{16}$$

38)
$$2^8$$

39)
$$2^{21}$$

$$\Rightarrow (2^7)^3 = 2^{7 \times 3} = 2^{21}$$

40)
$$a^7$$

41)
$$\frac{a^3}{b^6}$$

42)
$$\frac{y^4}{x^2}$$

43)
$$\frac{y^8}{x^{12}}$$

$$\Rightarrow \left(\frac{y^2}{x^3}\right)^4 = \frac{y^{2\times 4}}{x^{3\times 4}} = \frac{y^8}{x^{12}}$$

44)
$$-\frac{x^3}{y^3}$$

45)
$$-\frac{x^{15}}{y^{10}}$$

$$\iff \left(-\frac{x^3}{y^2}\right)^5 = (-1)^5 \frac{x^{3 \times 5}}{y^{2 \times 5}} = -\frac{x^{15}}{y^{10}}$$

46)
$$\frac{x^4}{9y^6}$$

47)
$$x^{22}y^8$$

$$\Rightarrow$$
 (주어진 식) $= x^{12} \times y^2 \times x^{10} \times y^6$ $= x^{12+10} \times y^{2+6} = x^{22}y^8$

48)
$$a^{19}$$

$$\Rightarrow$$
 (주어진 식)= $a^4 \times a^3 \times a^{12} = a^{4+3+12} = a^{19}$

49)
$$5^{18}$$

$$\Rightarrow$$
 (주어진 식)= $5^9 \times 5 \times 5^8 = 5^{9+1+8} = 5^{18}$

50)
$$x^{11}y^{17}$$

$$\Rightarrow$$
 (주어진 식)= $x^6 \times y^8 \times x^5 \times y^9 = x^{6+5} \times y^{8+9} = x^{11}y^{17}$

51)
$$25x^4y^6$$

$$\Rightarrow$$
 (주어진 식)= $25 \times x^4 \times y^6 = 25x^4y^6$

52)
$$a^{14}$$

$$\Rightarrow a^8 \times a^6 = a^{8+6} = a^{14}$$

53)
$$x^{22}$$

$$\Rightarrow x^6 \times x^4 \times x^{12} = x^{6+4+12} = x^{22}$$

54)
$$x^{12}y^{14}$$

$$\Rightarrow x^8 \times y^6 \times x^4 \times y^8 = x^{8+4} \times y^{6+8} = x^{12}y^{14}$$

55)
$$2^{22} \times 5^7$$

$$\Rightarrow 2^{12} \times 5^6 \times 2^{10} \times 5 = 2^{12+10} \times 5^{6+1} = 2^{22} \times 5^7$$

$$56) -3^7$$

$$\Rightarrow (-3)^3 \times (-3)^2 \times (-3)^2 = (-3)^{3+2+2} = -3^7$$

$$57) -1$$

$$\Rightarrow (-1)^2 \times (-1)^3 \times (-1)^5 \times (-1)^7$$

$$= (-1)^{2+3+5+7} = (-1)^{17} = -1$$

58)
$$a^3$$

$$\Rightarrow a^{6-3} = a^3$$

59)
$$\frac{1}{a^6}$$

60)
$$a^2$$

$$\Rightarrow a^{5-3} = a^2$$

61)
$$2^4$$

$$\Rightarrow 2^{6-2} = 2^4$$

$$\Rightarrow x^{3-3} = 1$$

63)
$$x^4$$

65)
$$a^3$$

$$\Rightarrow \frac{a^4}{a^2} = a^4 - a^2 = a^2$$

66) b^4

67) 1

68)
$$\frac{1}{a^3}$$

69)
$$\frac{1}{b^3}$$

70)
$$x^6$$

[영역] 2.문자와 식 2-1-1.지수법칙

72)
$$\frac{1}{r^4}$$

73)
$$y^3$$

74)
$$\frac{1}{r^3}$$

$$\Rightarrow x^2 \div x^5 = \frac{1}{x^{5-2}} = \frac{1}{x^3}$$

75)
$$\frac{1}{y^5}$$

$$\Rightarrow y^5 \div y^{10} = \frac{1}{y^{10-5}} = \frac{1}{y^5}$$

76)
$$a^2$$

77)
$$x^3$$

$$\Rightarrow \frac{x^9}{x^6} = x^{9-6} = x^3$$

$$\Rightarrow \frac{b^5}{b^5} = b^{5-5} = 1$$

79)
$$\frac{1}{u^3}$$

$$\Rightarrow \frac{y^7}{y^{10}} = \frac{1}{y^{10-7}} = \frac{1}{y^3}$$

80)
$$x^3$$

$$\Rightarrow x^{15} \div x^{12} = x^{15-12} = x^3$$

81)
$$\frac{1}{r^{10}}$$

$$\Rightarrow x^6 \div x^{16} = \frac{1}{x^{16-6}} = \frac{1}{x^{10}}$$

$$\Rightarrow a^{6-3-2} = a^1 = a$$

83)
$$\frac{1}{y^3}$$

$$\implies y^{10} \div y \div y^{12} = y^9 \div y^{12} = \frac{1}{y^{12-9}} = \frac{1}{y^3}$$

- 84) a^3
- 85) 1

86)
$$r^{17}$$

$$\Rightarrow$$
 (주어진 식)= $x^{15} \div x^4 \times x^6 = x^{15-4+6} = x^{17}$

87)
$$a^4$$

$$\Rightarrow$$
 (주어진 식)= $a^8 \div a^3 \div a = a^{8-3-1} = a^4$

88)
$$\frac{1}{x^9}$$

$$\Rightarrow$$
 (주어진 식)= $x^4 \div x^3 \div x^{10} = x \div x^{10} = \frac{1}{x^9}$

89) 1

$$\Rightarrow$$
 (주어진 식)= $x^3 \times x^5 \div x^8 = x^8 \div x^8 = 1$

90)
$$\frac{1}{y^5}$$

$$ightharpoonup (주어진 식)=y^6 imes y^4 \div y^{15}=y^{10}\div y^{15}=rac{1}{y^5}$$

91) a^9

$$\Rightarrow$$
 (주어진 식)= $a^8 \div a^4 \times a^5 = a^4 \times a^5 = a^{4+5} = a^9$

92) b^9

$$\Rightarrow$$
 (주어진 식)= $b^{12} \div b^6 \times b^3 = b^6 \times b^3 = b^{6+3} = b^9$

93) x^3y^3

94)
$$x^6y^3$$

95)
$$x^4y^8$$

96)
$$27a^6$$

97)
$$a^{10}b^6$$

98)
$$x^8y^{16}$$

99)
$$27x^{12}$$

100)
$$25a^8b^4$$

101)
$$a^{10}b^{20}c^{15}$$

102)
$$8x^6y^{21}z^{15}$$

103)
$$x^4y^8z^{12}$$

104)
$$x^8y^8$$

105)
$$-a^5b^{15}$$

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

107)
$$-27x^6y^{15}$$

108)
$$-a^{35}b^{14}c^7$$

109)
$$49x^6y^4z^{14}$$

- 110) $-8x^6$
- 111) $\frac{b^4}{a^4}$
- 112) $\frac{b^6}{a^9}$
- 113) $\frac{b^{18}}{a^9}$
- 114) $\frac{y^6}{8x^3}$
- 115) $\frac{y^6}{x^4}$
- 116) $\frac{27a^3}{b^9}$
- 117) $\frac{a^6b^2}{c^8}$
- 118) $\frac{16x^{16}}{y^{12}z^4}$
- 119) $-\frac{b^3}{a^{12}}$
- 120) $\frac{25x^2}{y^8}$
- 121) $\frac{a^8b^{12}}{c^{16}}$
- 122) $-\frac{x^9y^3}{8z^6}$