◇「콘텐츠산업 진흥법 시행령」제33조에 의한 표시
1) 제작연월일 : 2016-01-12
2) 제작자 : 교육지대㈜
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. 제곱근의 덧셈과 뺄셈

(1) m, n, l이 유리수이고, $a>0$일 때

① $m\sqrt{a}+n\sqrt{a}=(m+n)\sqrt{a}$

② $m\sqrt{a}-n\sqrt{a}=(m-n)\sqrt{a}$

③ $m\sqrt{a}+n\sqrt{a}-l\sqrt{a}=(m+n-l)\sqrt{a}$

제곱근의 덧셈과 뺄셈을 계산 시

◉ 근호 안의 수가 같은 것을 동류항으로 보고 다항식의 덧셈과 뺄셈을 계산하는 것과 같은 방법으로 계산한다.

제곱근의 덧셈

◪ **제곱근의 덧셈을 계산하여라.**

1. $\sqrt{108}+\sqrt{48}$

2. $2\sqrt{3}+3\sqrt{3}$

3. $\sqrt{12}+\sqrt{48}$

4. $\sqrt{20}+\sqrt{45}$

5. $2\sqrt{2}+5\sqrt{2}$

6. $\frac{5}{\sqrt{20}}+\frac{3}{\sqrt{45}}$

7. $3\sqrt{3}+4\sqrt{3}$

8. $7\sqrt{5}+2\sqrt{5}$

9. $\frac{4\sqrt{2}}{5}+\frac{2\sqrt{2}}{5}$

10. $\frac{3\sqrt{2}}{4}+\frac{\sqrt{2}}{2}$

11. $3\sqrt{2}+4\sqrt{2}$

12. $2\sqrt{5}+3\sqrt{5}$

13. $\sqrt{2}+\sqrt{8}$

14. $\sqrt{6}+5\sqrt{6}$

15. $2\sqrt{7}+8\sqrt{7}$

16. $4\sqrt{3}+\sqrt{3}$

17. $4\sqrt{5}+5\sqrt{5}$

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18. $3\sqrt{2}+4\sqrt{2}+5\sqrt{2}$

19. $2\sqrt{3}+\sqrt{3}+5\sqrt{3}$

20. $6\sqrt{5}+3\sqrt{5}+5\sqrt{5}$

21. $5\sqrt{6}+2\sqrt{6}+7\sqrt{6}$

22. $\sqrt{27}+\sqrt{75}+\sqrt{108}$

23. $\sqrt{6}+\sqrt{24}+\sqrt{150}$

24. $\sqrt{8}+\sqrt{32}+\sqrt{128}$

제곱근의 뺄셈

◪ 제곱근의 뺄셈을 계산하여라.

25. $\sqrt{80}-\sqrt{20}$

26. $8\sqrt{3}-\sqrt{3}$

27. $\frac{2\sqrt{3}}{5}-\frac{\sqrt{3}}{3}$

28. $\frac{5\sqrt{5}}{2}-\frac{\sqrt{5}}{6}$

29. $4\sqrt{2}-\sqrt{2}$

30. $5\sqrt{3}-2\sqrt{3}$

31. $\sqrt{6}-4\sqrt{6}$

32. $6\sqrt{7}-8\sqrt{7}$

33. $5\sqrt{10}-3\sqrt{10}$

34. $6\sqrt{5}-2\sqrt{5}$

35. $4\sqrt{6}-9\sqrt{6}$

36. $\sqrt{27}-\sqrt{3}$

37. $\sqrt{98}-\sqrt{32}$

38. $3\sqrt{2}-4\sqrt{2}$

39. $4\sqrt{6}-7\sqrt{6}$

40. $\sqrt{32}-\frac{7\sqrt{2}}{3}$

41. $\frac{\sqrt{5}}{3}-\frac{3\sqrt{5}}{4}$

42. $5\sqrt{2}-\sqrt{2}-2\sqrt{2}$

43. $9\sqrt{5}-4\sqrt{5}-3\sqrt{5}$

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44. $4\sqrt{6}-3\sqrt{6}-2\sqrt{6}$

45. $\sqrt{8}-\sqrt{50}-\sqrt{72}$

46. $\sqrt{192}-\sqrt{108}-\sqrt{27}$

47. $\sqrt{125}-\sqrt{80}-\sqrt{5}$

48. $3\sqrt{6}-2\sqrt{3}-5\sqrt{3}-2\sqrt{6}$

49. $3\sqrt{6}-6\sqrt{5}-3\sqrt{5}$

50. $7\sqrt{3}-2\sqrt{3}-3\sqrt{3}$

51. $\sqrt{18}-\sqrt{98}-\sqrt{50}$

제곱근의 덧셈과 뺄셈의 혼합계산

◪ 다음 식을 계산하여라.

52. $\sqrt{28}-3\sqrt{7}+\sqrt{112}$

53. $\sqrt{8}+\sqrt{32}-\sqrt{50}$

54. $4\sqrt{5}+9\sqrt{5}-6\sqrt{5}$

55. $\sqrt{27}+\sqrt{45}+5\sqrt{3}-\sqrt{20}$

56. $2\sqrt{12}+\sqrt{24}-\sqrt{18}+3\sqrt{27}$

57. $\sqrt{20}+\sqrt{48}+\sqrt{45}-\sqrt{75}$

58. $8\sqrt{2}+3\sqrt{5}-\sqrt{18}+\sqrt{20}$

59. $4\sqrt{3}-\sqrt{5}-\sqrt{3}+2\sqrt{5}$

60. $6\sqrt{2}+\sqrt{75}-\frac{6}{\sqrt{2}}+\sqrt{27}$

61. $\sqrt{5}-\sqrt{6}+\sqrt{20}+\sqrt{24}$

62. $2\sqrt{3}-6\sqrt{6}+\sqrt{24}-\sqrt{12}$

63. $3\sqrt{5}+5\sqrt{2}-4\sqrt{5}$

64. $4\sqrt{10}-3\sqrt{7}-4\sqrt{7}+7\sqrt{10}$

65. $5\sqrt{5}+3\sqrt{2}-4\sqrt{2}+2\sqrt{5}$

66. $\frac{\sqrt{3}}{2}+\sqrt{3}-\frac{2\sqrt{2}}{3}$

67. $\frac{\sqrt{6}}{2}+\sqrt{2}+\frac{\sqrt{6}}{4}-\frac{2\sqrt{2}}{3}$

68. $\sqrt{32}-\sqrt{2}+\sqrt{18}$

69. $\sqrt{125}-\sqrt{45}+\sqrt{80}$

70. $4\sqrt{2}-\sqrt{27}-3\sqrt{2}+2\sqrt{48}$

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71. $2\sqrt{8}-\sqrt{18}-\sqrt{28}+\sqrt{63}$

72. $\sqrt{8}+\sqrt{45}-\sqrt{18}-\sqrt{5}$

73. $\sqrt{28}+\sqrt{48}-\sqrt{63}-\sqrt{108}$

74. $4\sqrt{5}-\sqrt{125}+\frac{15}{\sqrt{5}}$

75. $\sqrt{\frac{6}{25}}-\sqrt{24}+\frac{9\sqrt{2}}{\sqrt{3}}$

76. $\frac{\sqrt{7}}{2}+\sqrt{5}-\frac{\sqrt{7}}{4}-\frac{2\sqrt{5}}{3}$

77. $\frac{3\sqrt{2}}{4}-\frac{\sqrt{5}}{3}-\frac{\sqrt{2}}{3}+\frac{\sqrt{5}}{2}$

78. $\frac{1}{\sqrt{2}}+\sqrt{8}-\sqrt{32}$

79. $\frac{2\sqrt{3}}{\sqrt{6}}-\frac{4}{\sqrt{2}}+\sqrt{18}$

80. $\sqrt{6}+5\sqrt{10}-7\sqrt{10}+2\sqrt{6}$

81. $5\sqrt{2}-3\sqrt{7}-6\sqrt{2}-2\sqrt{7}$

82. $3\sqrt{2}+\sqrt{6}+2\sqrt{2}-4\sqrt{6}$

83. $3\sqrt{27}+2\sqrt{8}-2\sqrt{48}-\sqrt{18}$

84. $\sqrt{75}-\sqrt{32}+\sqrt{8}-\sqrt{48}$

85. $7\sqrt{3}+\frac{12}{\sqrt{3}}-2\sqrt{75}$

86. $\sqrt{3}-\sqrt{27}-\frac{2}{\sqrt{3}}$

87. $\frac{12}{\sqrt{6}}-\frac{3}{2\sqrt{6}}+\sqrt{24}$

88. $\frac{\sqrt{24}}{3}+\frac{\sqrt{2}}{\sqrt{27}}-\sqrt{6}$

89. $\sqrt{8}+\sqrt{45}-\frac{6}{\sqrt{2}}-\frac{10}{\sqrt{5}}$

90. $\frac{18}{\sqrt{6}}+2\sqrt{3}-\sqrt{96}-\frac{12}{\sqrt{3}}$

91. $\sqrt{10}-\frac{30}{\sqrt{5}}+\frac{5}{\sqrt{10}}+\sqrt{90}$

92. $\sqrt{48}-\frac{54}{\sqrt{6}}-\frac{15}{\sqrt{3}}+\sqrt{24}$

93. $\sqrt{18}\times\frac{2}{\sqrt{3}}+\sqrt{27}$

94. $\frac{2\sqrt{3}}{\sqrt{6}}-4\sqrt{3}+\frac{4}{\sqrt{2}}+\sqrt{27}$

95. $\frac{2\sqrt{3}}{\sqrt{6}}-4\sqrt{3}+\frac{2}{\sqrt{2}}+\sqrt{27}$

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96. $\sqrt{10}-\sqrt{72}+\sqrt{8}+\sqrt{90}$

97. $\sqrt{45}-\frac{7}{\sqrt{7}}-\frac{5}{\sqrt{20}}+\sqrt{28}$

98. $\frac{\sqrt{54}}{\sqrt{3}}+\sqrt{27}+\sqrt{32}-\frac{\sqrt{96}}{\sqrt{2}}$

제곱근의 사칙연산의 혼합계산

◪ 다음 식을 계산하여라.

99. $3\sqrt{6}-6\sqrt{2}\div 2\sqrt{3}$

100. $\sqrt{75}+10\sqrt{6}\div\sqrt{8}$

101. $\sqrt{8}+\sqrt{50}-\frac{9\sqrt{3}}{\sqrt{6}}\div 2$

102. $\sqrt{18}-\sqrt{96}\div\sqrt{12}+\sqrt{72}$

103. $\sqrt{32}-3\sqrt{6}\div\sqrt{12}$

104. $\sqrt{50}+6\div\sqrt{2}-\sqrt{8}$

105. $\sqrt{72}\div\sqrt{12}+2\sqrt{2}\times\sqrt{3}$

106. $\sqrt{2}\times\sqrt{6}-2\div\sqrt{3}$

107. $\sqrt{32}+6\div\sqrt{2}-\sqrt{8}$

108. $\frac{1}{\sqrt{2}}-\sqrt{6}\div\frac{2\sqrt{3}}{3}-\frac{\sqrt{8}}{4}$

109. $\sqrt{2}\times\sqrt{6}-\sqrt{15}\div\sqrt{5}$

110. $\sqrt{6}\div\frac{\sqrt{32}}{3}-\frac{\sqrt{12}}{4}+\frac{3}{\sqrt{48}}$

111. $\sqrt{54}-\sqrt{8}\times\frac{\sqrt{3}}{2}+\sqrt{18}\div\frac{\sqrt{3}}{2}$

112. $\sqrt{5}\times\frac{4}{\sqrt{10}}+3\sqrt{6}\div\sqrt{3}-\sqrt{8}$

113. $\sqrt{24}\times\sqrt{2}-9\sqrt{6}\div 3\sqrt{2}$

114. $\sqrt{32}-\sqrt{6}\times\sqrt{3}+\sqrt{9}\div\sqrt{2}$

115. $5-2\div\sqrt{\frac{45}{2}}\times\frac{3\sqrt{5}}{2}$

116. $5\sqrt{3}\times\sqrt{2}-\sqrt{54}$

117. $8\sqrt{5}\times 2\sqrt{2}-\sqrt{80}\div\sqrt{2}$

118. $\sqrt{3}\times\sqrt{15}-10\div\sqrt{5}$

119. $\sqrt{32}-\sqrt{72}+\frac{5}{\sqrt{6}}\times 2\sqrt{3}$

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120 $\sqrt{6} \div \frac{4\sqrt{2}}{3} - \frac{\sqrt{12}}{4} + \frac{3}{4\sqrt{3}}$

121 $\sqrt{108} \div 3\sqrt{2} + 3\sqrt{3} \times \sqrt{8} - \sqrt{96}$

122 $\sqrt{8} + \sqrt{54} - 6\sqrt{3} \div \sqrt{18} + 4\sqrt{2}$

123 $2\sqrt{2} \times \sqrt{24} - 4\sqrt{6} \div \sqrt{2}$

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정답 및 해설

1) $10\sqrt{3}$
⇨ $\sqrt{108}+\sqrt{48}=6\sqrt{3}+4\sqrt{3}=10\sqrt{3}$

2) $5\sqrt{3}$

3) $6\sqrt{3}$
⇨ $\sqrt{12}+\sqrt{48}=2\sqrt{3}+4\sqrt{3}=(2+4)\sqrt{3}=6\sqrt{3}$

4) $5\sqrt{5}$
⇨ $\sqrt{20}+\sqrt{45}=2\sqrt{5}+3\sqrt{5}=(2+3)\sqrt{5}=5\sqrt{5}$

5) $7\sqrt{2}$
⇨ $2\sqrt{2}+5\sqrt{2}=(2+5)\sqrt{2}=7\sqrt{2}$

6) $\frac{7\sqrt{5}}{10}$
⇨ $\frac{5}{\sqrt{20}}+\frac{3}{\sqrt{45}}=\frac{5}{2\sqrt{5}}+\frac{3}{3\sqrt{5}}=\frac{\sqrt{5}}{2}+\frac{\sqrt{5}}{5}=\frac{7\sqrt{5}}{10}$

7) $7\sqrt{3}$
⇨ $3\sqrt{3}+4\sqrt{3}=(3+4)\sqrt{3}=7\sqrt{3}$

8) $9\sqrt{5}$
⇨ $7\sqrt{5}+2\sqrt{5}=(7+2)\sqrt{5}=9\sqrt{5}$

9) $\frac{6\sqrt{2}}{5}$
⇨ $\frac{4\sqrt{2}}{5}+\frac{2\sqrt{2}}{5}=\left(\frac{4}{5}+\frac{2}{5}\right)\sqrt{2}=\frac{6\sqrt{2}}{5}$

10) $\frac{5\sqrt{2}}{4}$
⇨ $\frac{3\sqrt{2}}{4}+\frac{\sqrt{2}}{2}=\left(\frac{3}{4}+\frac{1}{2}\right)\sqrt{2}=\frac{5\sqrt{2}}{4}$

11) $7\sqrt{2}$
⇨ $3\sqrt{2}+4\sqrt{2}=(3+4)\sqrt{2}=7\sqrt{2}$

12) $5\sqrt{5}$
⇨ $2\sqrt{5}+3\sqrt{5}=(2+3)\sqrt{5}=5\sqrt{5}$

13) $3\sqrt{2}$
⇨ $\sqrt{2}+\sqrt{8}=\sqrt{2}+2\sqrt{2}=(1+2)\sqrt{2}=3\sqrt{2}$

14) $6\sqrt{6}$
⇨ $\sqrt{6}+5\sqrt{6}=(1+5)\sqrt{6}=6\sqrt{6}$

15) $10\sqrt{7}$
⇨ $2\sqrt{7}+8\sqrt{7}=(2+8)\sqrt{7}=10\sqrt{7}$

16) $5\sqrt{3}$
⇨ $4\sqrt{3}+\sqrt{3}=(4+1)\sqrt{3}=5\sqrt{3}$

17) $9\sqrt{5}$
⇨ $4\sqrt{5}+5\sqrt{5}=(4+5)\sqrt{5}=9\sqrt{5}$

18) $12\sqrt{2}$
⇨ $3\sqrt{2}+4\sqrt{2}+5\sqrt{2}=(3+4+5)\sqrt{2}=12\sqrt{2}$

19) $8\sqrt{3}$
⇨ $2\sqrt{3}+\sqrt{3}+5\sqrt{3}=(2+1+5)\sqrt{3}=8\sqrt{3}$

20) $14\sqrt{5}$
⇨ $6\sqrt{5}+3\sqrt{5}+5\sqrt{5}=(6+3+5)\sqrt{5}=14\sqrt{5}$

21) $14\sqrt{6}$
⇨ $5\sqrt{6}+2\sqrt{6}+7\sqrt{6}=(5+2+7)\sqrt{6}=14\sqrt{6}$

22) $14\sqrt{3}$
⇨ $\sqrt{27}+\sqrt{75}+\sqrt{108}=3\sqrt{3}+5\sqrt{3}+6\sqrt{3}$
$=(3+5+6)\sqrt{3}=14\sqrt{3}$

23) $8\sqrt{6}$
⇨ $\sqrt{6}+\sqrt{24}+\sqrt{150}=\sqrt{6}+2\sqrt{6}+5\sqrt{6}$
$=(1+2+5)\sqrt{6}=8\sqrt{6}$

24) $14\sqrt{2}$
⇨ $\sqrt{8}+\sqrt{32}+\sqrt{128}=2\sqrt{2}+4\sqrt{2}+8\sqrt{2}$
$=(2+4+8)\sqrt{2}=14\sqrt{2}$

25) $2\sqrt{5}$
⇨ $\sqrt{80}-\sqrt{20}=4\sqrt{5}-2\sqrt{5}=2\sqrt{5}$

26) $7\sqrt{3}$
⇨ $8\sqrt{3}-\sqrt{3}=(8-1)\sqrt{3}=7\sqrt{3}$

27) $\frac{\sqrt{3}}{15}$
⇨ $\frac{2\sqrt{3}}{5}-\frac{\sqrt{3}}{3}=\left(\frac{2}{5}-\frac{1}{3}\right)\sqrt{3}=\frac{\sqrt{3}}{15}$

28) $\frac{7\sqrt{5}}{3}$
⇨ $\frac{5\sqrt{5}}{2}-\frac{\sqrt{5}}{6}=\left(\frac{5}{2}-\frac{1}{6}\right)\sqrt{5}=\frac{14\sqrt{5}}{6}=\frac{7\sqrt{5}}{3}$

29) $3\sqrt{2}$
⇨ $4\sqrt{2}-\sqrt{2}=(4-1)\sqrt{2}=3\sqrt{2}$

30) $3\sqrt{3}$

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⇨ $5\sqrt{3}-2\sqrt{3}=(5-2)\sqrt{3}=3\sqrt{3}$

31) $-3\sqrt{6}$
⇨ $\sqrt{6}-4\sqrt{6}=(1-4)\sqrt{6}=-3\sqrt{6}$

32) $-2\sqrt{7}$
⇨ $6\sqrt{7}-8\sqrt{7}=(6-8)\sqrt{7}=-2\sqrt{7}$

33) $2\sqrt{10}$
⇨ $5\sqrt{10}-3\sqrt{10}=(5-3)\sqrt{10}=2\sqrt{10}$

34) $4\sqrt{5}$
⇨ $6\sqrt{5}-2\sqrt{5}=(6-2)\sqrt{5}=4\sqrt{5}$

35) $-5\sqrt{6}$
⇨ $4\sqrt{6}-9\sqrt{6}=(4-9)\sqrt{6}=-5\sqrt{6}$

36) $2\sqrt{3}$
⇨ $\sqrt{27}-\sqrt{3}=3\sqrt{3}-\sqrt{3}=(3-1)\sqrt{3}=2\sqrt{3}$

37) $3\sqrt{2}$
⇨ $\sqrt{98}-\sqrt{32}=7\sqrt{2}-4\sqrt{2}=(7-4)\sqrt{2}=3\sqrt{2}$

38) $-\sqrt{2}$

39) $-3\sqrt{6}$
⇨ $4\sqrt{6}-7\sqrt{6}=(4-7)\sqrt{6}=-3\sqrt{6}$

40) $\frac{5\sqrt{2}}{3}$
⇨ $\sqrt{32}-\frac{7\sqrt{2}}{3}=4\sqrt{2}-\frac{7\sqrt{2}}{3}=\frac{5\sqrt{2}}{3}$

41) $-\frac{5\sqrt{5}}{12}$
⇨ $\frac{\sqrt{5}}{3}-\frac{3\sqrt{5}}{4}=\frac{4-9}{12}\sqrt{5}=-\frac{5\sqrt{5}}{12}$

42) $2\sqrt{2}$
⇨ $5\sqrt{2}-\sqrt{2}-2\sqrt{2}=(5-1-2)\sqrt{2}=2\sqrt{2}$

43) $2\sqrt{5}$
⇨ $9\sqrt{5}-4\sqrt{5}-3\sqrt{5}=(9-4-3)\sqrt{5}=2\sqrt{5}$

44) $-\sqrt{6}$
⇨ $4\sqrt{6}-3\sqrt{6}-2\sqrt{6}=(4-3-2)\sqrt{6}=-\sqrt{6}$

45) $-9\sqrt{2}$
⇨ $\sqrt{8}-\sqrt{50}-\sqrt{72}=2\sqrt{2}-5\sqrt{2}-6\sqrt{2}$
$=(2-5-6)\sqrt{2}=-9\sqrt{2}$

46) $-\sqrt{3}$
⇨ $\sqrt{192}-\sqrt{108}-\sqrt{27}=8\sqrt{3}-6\sqrt{3}-3\sqrt{3}$
$=(8-6-3)\sqrt{3}=-\sqrt{3}$

47) 0
⇨ $\sqrt{125}-\sqrt{80}-\sqrt{5}=5\sqrt{5}-4\sqrt{5}-\sqrt{5}$
$=(5-4-1)\sqrt{5}=0$

48) $\sqrt{6}-7\sqrt{3}$
⇨ $(3-2)\sqrt{6}+(-2-5)\sqrt{3}=\sqrt{6}-7\sqrt{3}$

49) $-9\sqrt{5}+3\sqrt{6}$

⇨ $3\sqrt{6}-6\sqrt{5}-3\sqrt{5}=(-6-3)\sqrt{5}+3\sqrt{6}$
$=-9\sqrt{5}+3\sqrt{6}$

50) $2\sqrt{3}$
⇨ $7\sqrt{3}-2\sqrt{3}-3\sqrt{3}=(7-2-3)\sqrt{3}=2\sqrt{3}$

51) $-9\sqrt{2}$
⇨ $\sqrt{18}-\sqrt{98}-\sqrt{50}=3\sqrt{2}-7\sqrt{2}-5\sqrt{2}$
$(3-7-5)\sqrt{2}=-9\sqrt{2}$

52) $3\sqrt{7}$
⇨ $\sqrt{28}-3\sqrt{7}+\sqrt{112}=2\sqrt{7}-3\sqrt{7}+4\sqrt{7}=3\sqrt{7}$

53) $\sqrt{2}$
⇨ $\sqrt{8}+\sqrt{32}-\sqrt{50}=2\sqrt{2}+4\sqrt{2}-5\sqrt{2}=\sqrt{2}$

54) $7\sqrt{5}$

55) $8\sqrt{3}+\sqrt{5}$

56) $-3\sqrt{2}+2\sqrt{6}+13\sqrt{3}$

57) $5\sqrt{5}-\sqrt{3}$

58) $5\sqrt{2}+5\sqrt{5}$

59) $3\sqrt{3}+\sqrt{5}$

60) $3\sqrt{2}+8\sqrt{3}$

61) $3\sqrt{5}+\sqrt{6}$

62) $-4\sqrt{6}$
⇨ $2\sqrt{3}-6\sqrt{6}+\sqrt{24}-\sqrt{12}$
$=2\sqrt{3}-6\sqrt{6}+2\sqrt{6}-2\sqrt{3}=-4\sqrt{6}$

63) $5\sqrt{2}-\sqrt{5}$
⇨ $3\sqrt{5}+5\sqrt{2}-4\sqrt{5}=5\sqrt{2}+(3-4)\sqrt{5}$
$=5\sqrt{2}-\sqrt{5}$

64) $-7\sqrt{7}+11\sqrt{10}$
⇨ $4\sqrt{10}-3\sqrt{7}-4\sqrt{7}+7\sqrt{10}$
$=(-3-4)\sqrt{7}+(4+7)\sqrt{10}=-7\sqrt{7}+11\sqrt{10}$

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65) $-\sqrt{2}+7\sqrt{5}$

⇨ $5\sqrt{5}+3\sqrt{2}-4\sqrt{2}+2\sqrt{5}$
$=(3-4)\sqrt{2}+(5+2)\sqrt{5}=-\sqrt{2}+7\sqrt{5}$

66) $-\frac{2\sqrt{2}}{3}+\frac{3\sqrt{3}}{2}$

⇨ $\frac{\sqrt{3}}{2}+\sqrt{3}-\frac{2\sqrt{2}}{3}=\frac{2\sqrt{2}}{3}+\left(\frac{1}{2}+1\right)\sqrt{3}$
$=-\frac{2\sqrt{2}}{3}+\frac{3\sqrt{3}}{2}$

67) $\frac{\sqrt{2}}{3}+\frac{3\sqrt{6}}{4}$

⇨ $\frac{\sqrt{6}}{2}+\sqrt{2}+\frac{\sqrt{6}}{4}-\frac{2\sqrt{2}}{3}$
$=\left(1-\frac{2}{3}\right)\sqrt{2}+\left(\frac{1}{2}+\frac{1}{4}\right)\sqrt{6}=\frac{\sqrt{2}}{3}+\frac{3\sqrt{6}}{4}$

68) $6\sqrt{2}$

⇨ $\sqrt{32}-\sqrt{2}+\sqrt{18}=4\sqrt{2}-\sqrt{2}+3\sqrt{2}=6\sqrt{2}$

69) $6\sqrt{5}$

⇨ $\sqrt{125}-\sqrt{45}+\sqrt{80}=5\sqrt{5}-3\sqrt{5}+4\sqrt{5}=6\sqrt{5}$

70) $\sqrt{2}+5\sqrt{3}$

⇨ $4\sqrt{2}-\sqrt{27}-3\sqrt{2}+2\sqrt{48}$
$=4\sqrt{2}-3\sqrt{3}-3\sqrt{2}+8\sqrt{3}=\sqrt{2}+5\sqrt{3}$

71) $\sqrt{2}+\sqrt{7}$

⇨ $2\sqrt{8}-\sqrt{18}-\sqrt{28}+\sqrt{63}$
$=4\sqrt{2}-3\sqrt{2}-2\sqrt{7}+3\sqrt{7}=\sqrt{2}+\sqrt{7}$

72) $-\sqrt{2}+2\sqrt{5}$

⇨ $\sqrt{8}+\sqrt{45}-\sqrt{18}-\sqrt{5}=2\sqrt{2}+3\sqrt{5}-3\sqrt{2}-\sqrt{5}$
$=(2-3)\sqrt{2}+(3-1)\sqrt{5}=-\sqrt{2}+2\sqrt{5}$

73) $-\sqrt{7}-2\sqrt{3}$

⇨ $\sqrt{28}+\sqrt{48}-\sqrt{63}-\sqrt{108}$
$=2\sqrt{7}+4\sqrt{3}-3\sqrt{7}-6\sqrt{3}=(2-3)\sqrt{7}+(4-6)\sqrt{3}$
$=-\sqrt{7}-2\sqrt{3}$

74) $2\sqrt{5}$

⇨ $4\sqrt{5}-\sqrt{125}+\frac{15}{\sqrt{5}}=4\sqrt{5}-5\sqrt{5}+3\sqrt{5}=2\sqrt{5}$

75) $\frac{6\sqrt{6}}{5}$

⇨ $\sqrt{\frac{6}{25}}-\sqrt{24}+\frac{9\sqrt{2}}{\sqrt{3}}=\frac{\sqrt{6}}{5}-2\sqrt{6}+3\sqrt{6}=\frac{6\sqrt{6}}{5}$

76) $\frac{\sqrt{5}}{3}+\frac{\sqrt{7}}{4}$

⇨ $\frac{\sqrt{7}}{2}+\sqrt{5}-\frac{\sqrt{7}}{4}-\frac{2\sqrt{5}}{3}$
$=\left(1-\frac{2}{3}\right)\sqrt{5}+\left(\frac{1}{2}-\frac{1}{4}\right)\sqrt{7}=\frac{\sqrt{5}}{3}+\frac{\sqrt{7}}{4}$

77) $\frac{5\sqrt{2}}{12}+\frac{\sqrt{5}}{6}$

⇨ $\frac{3\sqrt{2}}{4}-\frac{\sqrt{5}}{3}-\frac{\sqrt{2}}{3}+\frac{\sqrt{5}}{2}$
$=\left(\frac{3}{4}-\frac{1}{3}\right)\sqrt{2}+\left(-\frac{1}{3}+\frac{1}{2}\right)\sqrt{5}=\frac{5\sqrt{2}}{12}+\frac{\sqrt{5}}{6}$

78) $-\frac{3\sqrt{2}}{2}$

⇨ $\frac{1}{\sqrt{2}}+\sqrt{8}-\sqrt{32}=\frac{\sqrt{2}}{2}+2\sqrt{2}-4\sqrt{2}$
$=\left(\frac{1}{2}+2-4\right)\sqrt{2}=-\frac{3\sqrt{2}}{2}$

79) $2\sqrt{2}$

80) $3\sqrt{6}-2\sqrt{10}$

⇨ $\sqrt{6}+5\sqrt{10}-7\sqrt{10}+2\sqrt{6}$
$=(1+2)\sqrt{6}+(5-7)\sqrt{10}=3\sqrt{6}-2\sqrt{10}$

81) $-\sqrt{2}-5\sqrt{7}$

⇨ $5\sqrt{2}-3\sqrt{7}-6\sqrt{2}-2\sqrt{7}$
$=(5-6)\sqrt{2}+(-3-2)\sqrt{7}=-\sqrt{2}-5\sqrt{7}$

82) $5\sqrt{2}-3\sqrt{6}$

83) $\sqrt{2}+\sqrt{3}$

84) $\sqrt{3}-2\sqrt{2}$

85) $\sqrt{3}$

86) $-\frac{8\sqrt{3}}{3}$

⇨ $\sqrt{3}-\sqrt{27}-\frac{2}{\sqrt{3}}=\sqrt{3}-3\sqrt{3}-\frac{2\sqrt{3}}{3}$
$=\left(1-3-\frac{2}{3}\right)\sqrt{3}=-\frac{8\sqrt{3}}{3}$

87) $\frac{15\sqrt{6}}{4}$

⇨ $\frac{12}{\sqrt{6}}-\frac{3}{2\sqrt{6}}+\sqrt{24}=2\sqrt{6}-\frac{\sqrt{6}}{4}+2\sqrt{6}$
$=\left(2-\frac{1}{4}+2\right)\sqrt{6}=\frac{15\sqrt{6}}{4}$

88) $-\frac{2\sqrt{6}}{9}$

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$\Rightarrow \frac{\sqrt{24}}{3}+\frac{\sqrt{2}}{\sqrt{27}}-\sqrt{6}=\frac{2\sqrt{6}}{3}+\frac{\sqrt{2}}{3\sqrt{3}}-\sqrt{6}$

$=\frac{2\sqrt{6}}{3}+\frac{\sqrt{6}}{9}-\sqrt{6}=\left(\frac{2}{3}+\frac{1}{9}-1\right)\sqrt{6}=-\frac{2\sqrt{6}}{9}$

89) $-\sqrt{2}+\sqrt{5}$

$\Rightarrow \sqrt{8}-\sqrt{45}-\frac{6}{\sqrt{2}}-\frac{10}{\sqrt{5}}$

$=2\sqrt{2}+3\sqrt{5}-3\sqrt{2}-2\sqrt{5}=(2-3)\sqrt{2}+(3-2)\sqrt{5}$

$=-\sqrt{2}+\sqrt{5}$

90) $-\sqrt{6}-2\sqrt{3}$

$\Rightarrow \frac{18}{\sqrt{6}}+2\sqrt{3}-\sqrt{96}-\frac{12}{\sqrt{3}}$

$=3\sqrt{6}+2\sqrt{3}-4\sqrt{6}-4\sqrt{3}=(3-4)\sqrt{6}+(2-4)\sqrt{3}$

$=-\sqrt{6}-2\sqrt{3}$

91) $\frac{9\sqrt{10}}{2}-6\sqrt{5}$

$\Rightarrow \sqrt{10}-\frac{30}{\sqrt{5}}+\frac{5}{\sqrt{10}}+\sqrt{90}$

$=\sqrt{10}-6\sqrt{5}+\frac{\sqrt{10}}{2}+3\sqrt{10}=\left(1+\frac{1}{2}+3\right)\sqrt{10}-6\sqrt{5}$

$=\frac{9\sqrt{10}}{2}-6\sqrt{5}$

92) $-\sqrt{3}-7\sqrt{6}$

$\Rightarrow \sqrt{48}-\frac{54}{\sqrt{6}}-\frac{15}{\sqrt{3}}+\sqrt{24}$

$=4\sqrt{3}-9\sqrt{6}-5\sqrt{3}+2\sqrt{6}=(4-5)\sqrt{3}+(-9+2)\sqrt{6}$

$=-\sqrt{3}-7\sqrt{6}$

93) $2\sqrt{6}+3\sqrt{3}$

$\Rightarrow \sqrt{18}\times\frac{2}{\sqrt{3}}+\sqrt{27}=3\sqrt{2}\times\frac{2}{\sqrt{3}}+3\sqrt{3}$

$=2\sqrt{6}+3\sqrt{3}$

94) $3\sqrt{2}-\sqrt{3}$

$\Rightarrow$ (주어진 식)

$=\frac{2\sqrt{18}}{6}-4\sqrt{3}+\frac{4\sqrt{2}}{2}+3\sqrt{3}=\sqrt{2}-4\sqrt{3}+2\sqrt{2}+3\sqrt{3}$

$=3\sqrt{2}-\sqrt{3}$

95) $2\sqrt{2}-\sqrt{3}$

$\Rightarrow$ (주어진 식)$=\frac{2}{\sqrt{2}}-4\sqrt{3}+\frac{2}{\sqrt{2}}+3\sqrt{3}=2\sqrt{2}-\sqrt{3}$

96) $4\sqrt{10}-4\sqrt{2}$

$\Rightarrow \sqrt{10}-\sqrt{72}+\sqrt{8}+\sqrt{90}$

$=\sqrt{10}-6\sqrt{2}+2\sqrt{2}+3\sqrt{10}=(1+3)\sqrt{10}+(-6+2)\sqrt{2}$

$=4\sqrt{10}-4\sqrt{2}$

97) $\frac{5\sqrt{5}}{2}+\sqrt{7}$

$\Rightarrow \sqrt{45}-\frac{7}{\sqrt{7}}-\frac{5}{\sqrt{20}}+\sqrt{28}$

$=3\sqrt{5}-\sqrt{7}-\frac{\sqrt{5}}{2}+2\sqrt{7}$

$=\left(3-\frac{1}{2}\right)\sqrt{5}+(-1+2)\sqrt{7}$

$=\frac{5\sqrt{5}}{2}+7$

98) $7\sqrt{2}-\sqrt{3}$

$\Rightarrow \frac{\sqrt{54}}{\sqrt{3}}+\sqrt{27}+\sqrt{32}-\frac{\sqrt{96}}{\sqrt{2}}$

$=3\sqrt{2}+3\sqrt{3}+4\sqrt{2}-4\sqrt{3}$

$=(3+4)\sqrt{2}+(3-4)\sqrt{3}$

$=7\sqrt{2}-\sqrt{3}$

99) $2\sqrt{6}$

100) $10\sqrt{3}$

101) $\frac{19\sqrt{2}}{4}$

$\Rightarrow \sqrt{8}+\sqrt{50}-\frac{9\sqrt{3}}{\sqrt{6}}\div 2=2\sqrt{2}+5\sqrt{2}-\frac{9}{2}\sqrt{\frac{3}{6}}$

$=2\sqrt{2}+5\sqrt{2}-\frac{9\sqrt{2}}{4}=\left(2+5-\frac{9}{4}\right)\sqrt{2}=\frac{19\sqrt{2}}{4}$

102) $7\sqrt{2}$

$\Rightarrow \sqrt{18}-\sqrt{96}\div\sqrt{12}+\sqrt{72}$

$=3\sqrt{2}-4\sqrt{6}\times\frac{1}{2\sqrt{3}}+6\sqrt{2}=3\sqrt{2}-2\sqrt{2}+6\sqrt{2}$

$=(3-2+6)\sqrt{2}=7\sqrt{2}$

103) $\frac{5\sqrt{2}}{2}$

$\Rightarrow \sqrt{32}-3\sqrt{6}\div\sqrt{12}=4\sqrt{2}-3\sqrt{6}\times\frac{1}{2\sqrt{3}}$

$=4\sqrt{2}-\frac{3\sqrt{2}}{2}=\frac{5\sqrt{2}}{2}$

104) $6\sqrt{2}$

$\Rightarrow \sqrt{50}+6\div\sqrt{2}-\sqrt{8}=5\sqrt{2}+6\times\frac{1}{\sqrt{2}}-2\sqrt{2}$

$=(5+3-2)\sqrt{2}=6\sqrt{2}$

105) $3\sqrt{6}$

$\Rightarrow \sqrt{72}\div\sqrt{12}+2\sqrt{2}\times\sqrt{3}$

$=6\sqrt{2}\times\frac{1}{2\sqrt{3}}+2\sqrt{2}\times\sqrt{3}=3\sqrt{\frac{2}{3}}+2\sqrt{6}=3\sqrt{6}$

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106) $\frac{4\sqrt{3}}{3}$

107) $5\sqrt{2}$

108) $-\frac{3\sqrt{2}}{2}$

109) $\sqrt{3}$

110) $\frac{\sqrt{3}}{2}$

111) $4\sqrt{6}$

112) $3\sqrt{2}$

113) $\sqrt{3}$

114) $\frac{5}{2}\sqrt{2}$

115) $5-\sqrt{2}$

⇨ $5-2\div\sqrt{\frac{45}{2}}\times\frac{3\sqrt{5}}{2}=5-2\div\frac{3\sqrt{5}}{\sqrt{2}}\times\frac{3\sqrt{5}}{2}$

$=5-2\times\frac{\sqrt{2}}{3\sqrt{5}}\times\frac{3\sqrt{5}}{2}=5-\sqrt{2}$

116) $2\sqrt{6}$

117) $14\sqrt{10}$

118) $\sqrt{5}$

⇨ $\sqrt{3}\times\sqrt{15}-10\div\sqrt{5}=3\sqrt{5}-2\sqrt{5}=\sqrt{5}$

119) $3\sqrt{2}$

⇨ $\sqrt{32}-\sqrt{72}+\frac{5}{\sqrt{6}}\times2\sqrt{3}$

$=4\sqrt{2}-6\sqrt{2}+5\sqrt{2}=3\sqrt{2}$

120) $\frac{\sqrt{3}}{2}$

⇨ $\sqrt{6}\div\frac{4\sqrt{2}}{3}-\frac{\sqrt{12}}{4}+\frac{3}{4\sqrt{3}}$

$=\sqrt{6}\times\frac{3}{4\sqrt{2}}-\frac{2\sqrt{3}}{4}+\frac{3\sqrt{3}}{12}$

$=\frac{3\sqrt{3}}{4}-\frac{2\sqrt{3}}{4}+\frac{\sqrt{3}}{4}=\frac{\sqrt{3}}{2}$

121) $3\sqrt{6}$

122) $6\sqrt{2}+2\sqrt{6}$

⇨ $\sqrt{8}+\sqrt{54}-6\sqrt{3}\div\sqrt{18}+4\sqrt{2}$

$=2\sqrt{2}+3\sqrt{6}-\frac{6\sqrt{3}}{3\sqrt{2}}+4\sqrt{2}$

$=2\sqrt{2}+3\sqrt{6}-\sqrt{6}+4\sqrt{2}=6\sqrt{2}+2\sqrt{6}$

123) $4\sqrt{3}$

⇨ $2\sqrt{2}\times\sqrt{24}-4\sqrt{6}\div\sqrt{2}=2\sqrt{2}\times2\sqrt{6}-4\sqrt{6}\div\sqrt{2}$

$=4\sqrt{12}-4\sqrt{3}=8\sqrt{3}-4\sqrt{3}=4\sqrt{3}$

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