## 계산시 참고사항

**1. 근호를 포함한 식의 분배법칙**

(1) $a>0,\ b>0,\ c>0$일 때

① $\sqrt{a}(\sqrt{b}+\sqrt{c})=\sqrt{ab}+\sqrt{ac},\ \sqrt{a}(\sqrt{b}-\sqrt{c})=\sqrt{ab}-\sqrt{ac}$

② $(\sqrt{a}+\sqrt{b})\sqrt{c}=\sqrt{ac}+\sqrt{bc},\ (\sqrt{a}-\sqrt{b})\sqrt{c}=\sqrt{ac}-\sqrt{bc}$

**2. 분배법칙을 이용한 분모의 유리화**

(1) $a>0,\ b>0,\ c>0$일 때, $\dfrac{\sqrt{a}+\sqrt{b}}{\sqrt{c}}=\dfrac{(\sqrt{a}+\sqrt{b})\times\sqrt{c}}{\sqrt{c}\times\sqrt{c}}=\dfrac{\sqrt{ac}+\sqrt{bc}}{c}$

**3. 근호를 포함한 복잡한 식의 계산**

(1) 괄호가 있으면 분배법칙을 이용하여 괄호를 푼다.
(2) 근호 안에 제곱인 인수가 있으면 근호 밖으로 꺼내어 간단히 한다.
(3) 분모에 무리수가 있으면 분모를 유리화한다.
(4) 곱셈, 나눗셈을 먼저 계산한다.
(5) 근호 안의 수가 같은 것끼리 모아서 덧셈, 뺄셈을 한다.

## 분배법칙을 이용한 식의 계산

**◪ 다음 식을 간단히 하여라.**

1. $\sqrt{2}(3+\sqrt{3})$

2. $(\sqrt{18}-\sqrt{12})\div\sqrt{3}$

3. $\sqrt{5}(2\sqrt{5}-\sqrt{8})$

4. $\sqrt{2}(\sqrt{3}+\sqrt{7})$

5. $\sqrt{3}(2\sqrt{2}-1)$

6. $\sqrt{5}(\sqrt{3}+\sqrt{15})$

7. $\sqrt{2}(\sqrt{6}-\sqrt{2})$

8. $(\sqrt{3}+\sqrt{2})\sqrt{7}$

9. $(\sqrt{3}-\sqrt{10})\sqrt{2}$

10. $(3\sqrt{2}-\sqrt{6})\sqrt{3}$

11. $\sqrt{5}(\sqrt{10}+\sqrt{20})$

12. $(2\sqrt{3}-\sqrt{2})\div\sqrt{2}$


ECN-0199-2015-001-000666229

13. $(4\sqrt{3}-3)\div\sqrt{3}$

14. $(\sqrt{40}-\sqrt{24})\div\sqrt{8}$

15. $(\sqrt{45}-\sqrt{10})\div\sqrt{5}$

16. $(2\sqrt{15}-\sqrt{18})\div\sqrt{3}$

17. $(\sqrt{48}-\sqrt{15})\div(-\sqrt{3})$

18. $(4-2\sqrt{3})\div\sqrt{2}$

19. $(\sqrt{80}-\sqrt{60})\div\sqrt{5}$

20. $\sqrt{2}(\sqrt{3}-\sqrt{5})$

21. $\sqrt{3}(\sqrt{5}+\sqrt{7})$

22. $-\sqrt{2}(\sqrt{2}+\sqrt{6})$

23. $\sqrt{5}(\sqrt{3}-\sqrt{7})$

24. $-2\sqrt{2}(\sqrt{3}+\sqrt{11})$

25. $\sqrt{7}(2\sqrt{3}+\sqrt{7})$

26. $(\sqrt{7}+\sqrt{3})\sqrt{5}$

27. $(\sqrt{11}+2\sqrt{3})\sqrt{2}$

28. $(\sqrt{5}-2\sqrt{2})\sqrt{3}$

29. $(3\sqrt{2}+4\sqrt{3})\sqrt{7}$

30. $(4\sqrt{5}-\sqrt{7})\sqrt{5}$

31. $(\sqrt{2}-3\sqrt{3})\sqrt{3}$

32. $3\sqrt{6}(2\sqrt{2}-5\sqrt{3})$

33. $(-3\sqrt{3}-5\sqrt{2})\sqrt{6}$

34. $(5\sqrt{42}+6\sqrt{14})\div\sqrt{7}$

35. $(-3\sqrt{3}+5\sqrt{2})\div\sqrt{6}$

36. $2\sqrt{3}(\sqrt{8}+3\sqrt{5})$

37. $-\sqrt{5}(4\sqrt{2}-\sqrt{54})$

38. $(\sqrt{6}-2\sqrt{2})\sqrt{3}$

39. $(\sqrt{75}+\sqrt{32})\sqrt{5}$

40. $2\sqrt{6}(\sqrt{5}+\sqrt{8})$

41. $-3\sqrt{2}(\sqrt{12}+3\sqrt{2})$

42. $\sqrt{6}(3\sqrt{10}-2\sqrt{15})$

43. $3\sqrt{3}(2\sqrt{6}+\sqrt{27})$

44. $(2\sqrt{5}+\sqrt{32})\sqrt{5}$

45. $(-3\sqrt{6}+4\sqrt{3})\sqrt{2}$

46. $(7\sqrt{3}-4\sqrt{5})\sqrt{15}$

47. $(5\sqrt{6}+\sqrt{12})\sqrt{3}$

48. $(\sqrt{6}+\sqrt{12})\div\sqrt{3}$

49. $(\sqrt{12}+\sqrt{18})\div\sqrt{6}$

50. $(\sqrt{8}-\sqrt{3})\div\sqrt{2}$

51. $(2\sqrt{15}+\sqrt{3})\div\sqrt{5}$

52. $(3\sqrt{21}-4\sqrt{14})\div\sqrt{7}$

53. $(\sqrt{6}-4\sqrt{2})\div\sqrt{6}$

54. $(6\sqrt{2}-2\sqrt{6})\div\sqrt{3}$

55. $(3\sqrt{3}-5\sqrt{2})\div\sqrt{10}$

## 분모의 유리화

◪ 다음 분수를 유리화 하여라.

56. $\dfrac{\sqrt{5}-\sqrt{3}}{\sqrt{3}}$

57. $\dfrac{\sqrt{6}+\sqrt{8}}{\sqrt{2}}$

58. $\dfrac{\sqrt{2}-\sqrt{5}}{\sqrt{10}}$

59. $\dfrac{\sqrt{3}-2\sqrt{12}}{\sqrt{15}}$

60. $\dfrac{\sqrt{8}+6\sqrt{6}}{3\sqrt{2}}$

61. $\dfrac{\sqrt{3}+\sqrt{6}}{\sqrt{2}}$

62. $\dfrac{4\sqrt{3}-3}{\sqrt{3}}$

63. $\dfrac{10+\sqrt{10}}{\sqrt{2}}$

64. $\dfrac{6-2\sqrt{3}}{\sqrt{3}}$

65. $\frac{\sqrt{35}+\sqrt{15}}{\sqrt{5}}$

66. $\frac{\sqrt{6}-3}{3\sqrt{2}}$

67. $\frac{\sqrt{72}-18}{\sqrt{3}}$

68. $\frac{\sqrt{6}-\sqrt{8}}{2\sqrt{2}}$

69. $\frac{\sqrt{3}-\sqrt{6}}{\sqrt{12}}$

70. $\frac{\sqrt{12}-\sqrt{15}}{\sqrt{3}}$

71. $\frac{\sqrt{54}+\sqrt{15}}{\sqrt{6}}$

72. $\frac{2\sqrt{3}-\sqrt{6}}{\sqrt{48}}$

73. $\frac{4\sqrt{3}-\sqrt{6}}{\sqrt{3}}$

74. $\frac{4+2\sqrt{2}}{\sqrt{2}}$

75. $\frac{4+2\sqrt{2}}{3\sqrt{8}}$

76. $\frac{6\sqrt{2}-\sqrt{24}}{\sqrt{12}}$

77. $\frac{6+3\sqrt{5}}{\sqrt{3}}$

78. $\frac{2\sqrt{7}-3\sqrt{3}}{\sqrt{6}}$

79. $\frac{\sqrt{3}+\sqrt{5}}{\sqrt{2}}$

80. $\frac{\sqrt{3}+\sqrt{7}}{\sqrt{5}}$

81. $\frac{\sqrt{5}+2}{\sqrt{6}}$

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

83. $\frac{\sqrt{6}-\sqrt{3}}{\sqrt{5}}$

84. $\frac{4-\sqrt{5}}{\sqrt{2}}$

85. $\frac{2\sqrt{2}+\sqrt{6}}{\sqrt{5}}$

86. $\frac{2\sqrt{5}+4\sqrt{6}}{\sqrt{3}}$

87. $\frac{2\sqrt{6}+3\sqrt{3}}{\sqrt{8}}$

88. $\frac{3\sqrt{2}+5\sqrt{7}}{\sqrt{14}}$

89. $\frac{4\sqrt{3}-\sqrt{18}}{\sqrt{6}}$

90. $\frac{5\sqrt{2}-2\sqrt{10}}{\sqrt{5}}$

91. $\frac{5\sqrt{3}-2\sqrt{6}}{\sqrt{12}}$

92. $\frac{2\sqrt{15}-3\sqrt{3}}{\sqrt{10}}$

## 분배법칙을 이용한 복잡한 식의 계산

◪ 다음 식을 간단히 하여라.

93. $\frac{\sqrt{20}-\sqrt{15}}{\sqrt{5}}+\sqrt{3}$

94. $\frac{4\sqrt{3}-3}{\sqrt{3}}+\sqrt{12}$

95. $\frac{\sqrt{12}-\sqrt{6}}{\sqrt{3}}+2\sqrt{2}-1$

96. $4\sqrt{3}(\sqrt{3}-1)+5(2-\sqrt{3})$

97. $8\sqrt{7}+(6\sqrt{14}-9\sqrt{2})\div 3\sqrt{2}$

98. $\frac{45}{\sqrt{5}}-\sqrt{3}(2\sqrt{15}-\sqrt{12})+2\sqrt{5}$

99. $(2\sqrt{30}-\sqrt{15})\div\sqrt{3}+\sqrt{2}(\sqrt{10}-\sqrt{5})$

100. $(3\sqrt{35}-\sqrt{21})\div\sqrt{7}-\sqrt{45}+2\sqrt{12}$

101. $\sqrt{3}(\sqrt{12}+1)+\sqrt{2}(\sqrt{6}-\sqrt{2})$

102. $\sqrt{18}-\sqrt{3}(3\sqrt{6}-\sqrt{24})$

103. $\sqrt{6}(2\sqrt{3}-2)+(\sqrt{18}-\sqrt{54})$

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

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

106. $-\sqrt{28}+\sqrt{7}\left(\frac{\sqrt{2}}{\sqrt{7}}-1\right)$

107. $\sqrt{2}(6+3\sqrt{3})-\frac{4-2\sqrt{3}}{\sqrt{2}}$

108. $\frac{\sqrt{12}-\sqrt{2}}{\sqrt{2}}+\sqrt{2}(\sqrt{2}+\sqrt{3})$

109. $(\sqrt{18}+4\sqrt{5})\div\sqrt{2}-\sqrt{5}\left(\sqrt{2}-\frac{1}{\sqrt{5}}\right)$

110. $\frac{\sqrt{27}+9}{\sqrt{3}}-\frac{\sqrt{8}-\sqrt{6}}{\sqrt{2}}$

111. $\sqrt{24}-\sqrt{\frac{8}{3}}+\frac{\sqrt{45}-\sqrt{30}}{\sqrt{5}}$

112. $\frac{\sqrt{72}-18}{\sqrt{12}}-\sqrt{2}(\sqrt{6}-\sqrt{2})$

113. $\frac{4}{\sqrt{2}}+\frac{9}{\sqrt{3}}-\sqrt{3}(1-\sqrt{6})$

114. $\sqrt{3}\left(3\sqrt{2}-\frac{1}{\sqrt{3}}\right)-2\sqrt{2}\left(\sqrt{2}+\frac{\sqrt{3}}{2}\right)$

115. $\sqrt{48}-\frac{6}{\sqrt{3}}-3\sqrt{3}(2-\sqrt{3})$

116. $\frac{\sqrt{27}+\sqrt{2}}{\sqrt{3}}+\frac{\sqrt{8}-\sqrt{12}}{\sqrt{2}}$

117. $\frac{\sqrt{6}+\sqrt{2}}{\sqrt{2}}+\frac{\sqrt{15}-\sqrt{5}}{\sqrt{5}}$


## 정답 및 해설

1) $3\sqrt{2}+\sqrt{6}$

2) $\sqrt{6}-2$

⇨ $(\sqrt{18}-\sqrt{12})\div\sqrt{3}=\sqrt{6}-\sqrt{4}=\sqrt{6}-2$

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

⇨ $\sqrt{5}(2\sqrt{5}-\sqrt{8})=10-\sqrt{40}=10-2\sqrt{10}$

4) $\sqrt{6}+\sqrt{14}$

⇨ $\sqrt{2}(\sqrt{3}+\sqrt{7})=\sqrt{2}\times\sqrt{3}+\sqrt{2}\times\sqrt{7}=\sqrt{6}+\sqrt{14}$

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

⇨ $\sqrt{3}(2\sqrt{2}-1)=\sqrt{3}\times2\sqrt{2}-\sqrt{3}\times1=2\sqrt{6}-\sqrt{3}$

6) $\sqrt{15}+5\sqrt{3}$

⇨ $\sqrt{5}(\sqrt{3}+\sqrt{15})=\sqrt{5}\times\sqrt{3}+\sqrt{5}\times\sqrt{15}$
$=\sqrt{15}+\sqrt{75}=\sqrt{15}+5\sqrt{3}$

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

⇨ $\sqrt{2}(\sqrt{6}-\sqrt{2})=\sqrt{2}\times\sqrt{6}-\sqrt{2}\times\sqrt{2}$
$=\sqrt{12}-2=2\sqrt{3}-2$

8) $\sqrt{21}+\sqrt{14}$

⇨ $(\sqrt{3}+\sqrt{2})\sqrt{7}=\sqrt{3}\times\sqrt{7}+\sqrt{2}\times\sqrt{7}=\sqrt{21}+\sqrt{14}$

9) $\sqrt{6}-2\sqrt{5}$

⇨ $(\sqrt{3}-\sqrt{10})\sqrt{2}=\sqrt{3}\times\sqrt{2}-\sqrt{10}\times\sqrt{2}$
$=\sqrt{6}-\sqrt{20}=\sqrt{6}-2\sqrt{5}$

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

⇨ $(3\sqrt{2}-\sqrt{6})\sqrt{3}=3\sqrt{2}\times\sqrt{3}-\sqrt{6}\times\sqrt{3}$
$=3\sqrt{6}-\sqrt{18}=3\sqrt{6}-3\sqrt{2}$

11) $5\sqrt{2}+10$

⇨ $\sqrt{5}(\sqrt{10}+\sqrt{20})=\sqrt{5}\times\sqrt{10}+\sqrt{5}\times\sqrt{20}$
$=\sqrt{50}+\sqrt{100}=5\sqrt{2}+10$

12) $\sqrt{6}-1$

⇨ $(2\sqrt{3}-\sqrt{2})\div\sqrt{2}$
$=(2\sqrt{3}-\sqrt{2})\times\frac{1}{\sqrt{2}}$
$=2\sqrt{3}\times\frac{1}{\sqrt{2}}-\sqrt{2}\times\frac{1}{\sqrt{2}}=\sqrt{6}-1$

13) $4-\sqrt{3}$

⇨ $(4\sqrt{3}-3)\div\sqrt{3}=(4\sqrt{3}-3)\times\frac{1}{\sqrt{3}}$
$=4\sqrt{3}\times\frac{1}{\sqrt{3}}-3\times\frac{1}{\sqrt{3}}$
$=4-\sqrt{3}$

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

⇨ $(\sqrt{40}-\sqrt{24})\div\sqrt{8}$
$=(\sqrt{40}-\sqrt{24})\times\frac{1}{\sqrt{8}}$
$=\sqrt{40}\times\frac{1}{\sqrt{8}}-\sqrt{24}\times\frac{1}{\sqrt{8}}=\sqrt{5}-\sqrt{3}$

15) $3-\sqrt{2}$

⇨ $(\sqrt{45}-\sqrt{10})\div\sqrt{5}$
$=(\sqrt{45}-\sqrt{10})\times\frac{1}{\sqrt{5}}$
$=\sqrt{45}\times\frac{1}{\sqrt{5}}-\sqrt{10}\times\frac{1}{\sqrt{5}}$
$=\sqrt{9}-\sqrt{2}=3-\sqrt{2}$

16) $2\sqrt{5}-\sqrt{6}$

⇨ $(2\sqrt{15}-\sqrt{18})\div\sqrt{3}$
$=(2\sqrt{15}-\sqrt{18})\times\frac{1}{\sqrt{3}}$
$=2\sqrt{15}\times\frac{1}{\sqrt{3}}-\sqrt{18}\times\frac{1}{\sqrt{3}}=2\sqrt{5}-\sqrt{6}$

17) $-4+\sqrt{5}$

⇨ $(\sqrt{48}-\sqrt{15})\div(-\sqrt{3})$
$=(\sqrt{48}-\sqrt{15})\times\left(-\frac{1}{\sqrt{3}}\right)$
$=\sqrt{48}\times\left(-\frac{1}{\sqrt{3}}\right)-\sqrt{15}\times\left(-\frac{1}{\sqrt{3}}\right)$
$=-\sqrt{16}+\sqrt{5}=-4+\sqrt{5}$

18) $2\sqrt{2}-\sqrt{6}$

⇨ $(4-2\sqrt{3})\div\sqrt{2}=(4-2\sqrt{3})\times\frac{1}{\sqrt{2}}$
$=4\times\frac{1}{\sqrt{2}}-2\sqrt{3}\times\frac{1}{\sqrt{2}}$
$=2\sqrt{2}-\sqrt{6}$

19) $4-2\sqrt{3}$

⇨ $(\sqrt{80}-\sqrt{60})\div\sqrt{5}$
$=(\sqrt{80}-\sqrt{60})\times\frac{1}{\sqrt{5}}$
$=\sqrt{80}\times\frac{1}{\sqrt{5}}-\sqrt{60}\times\frac{1}{\sqrt{5}}$
$=\sqrt{16}-\sqrt{12}=4-2\sqrt{3}$

20) $\sqrt{6}-\sqrt{10}$

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

21) $\sqrt{15}+\sqrt{21}$

⇨ $\sqrt{3}(\sqrt{5}+\sqrt{7})=\sqrt{3}\sqrt{5}+\sqrt{3}\sqrt{7}=\sqrt{15}+\sqrt{21}$

22) $-2-2\sqrt{3}$
⇨ $-\sqrt{2}(\sqrt{2}+\sqrt{6})=-\sqrt{2}\sqrt{2}-\sqrt{2}\sqrt{6}$
$=-\sqrt{4}-\sqrt{12}=-2-2\sqrt{3}$

23) $\sqrt{15}-\sqrt{35}$
⇨ $\sqrt{5}(\sqrt{3}-\sqrt{7})=\sqrt{5}\sqrt{3}-\sqrt{5}\sqrt{7}=\sqrt{15}-\sqrt{35}$

24) $-2\sqrt{6}-2\sqrt{22}$
⇨ $-2\sqrt{2}(\sqrt{3}+\sqrt{11})=-2\sqrt{2}\sqrt{3}-2\sqrt{2}\sqrt{11}$
$=-2\sqrt{6}-2\sqrt{22}$

25) $2\sqrt{21}+7$
⇨ $\sqrt{7}(2\sqrt{3}+\sqrt{7})=2\sqrt{7}\sqrt{3}+\sqrt{7}\sqrt{7}=2\sqrt{21}+7$

26) $\sqrt{35}+\sqrt{15}$
⇨ $(\sqrt{7}+\sqrt{3})\sqrt{5}=\sqrt{7}\sqrt{5}+\sqrt{3}\sqrt{5}=\sqrt{35}+\sqrt{15}$

27) $\sqrt{22}+2\sqrt{6}$
⇨ $(\sqrt{11}+2\sqrt{3})\sqrt{2}=\sqrt{11}\sqrt{2}+2\sqrt{3}\sqrt{2}$
$=\sqrt{22}+2\sqrt{6}$

28) $\sqrt{15}-2\sqrt{6}$
⇨ $(\sqrt{5}-2\sqrt{2})\sqrt{3}=\sqrt{5}\sqrt{3}-2\sqrt{2}\sqrt{3}=\sqrt{15}-2\sqrt{6}$

29) $3\sqrt{14}+4\sqrt{21}$
⇨ $(3\sqrt{2}+4\sqrt{3})\sqrt{7}=3\sqrt{2}\sqrt{7}+4\sqrt{3}\sqrt{7}$
$=3\sqrt{14}+4\sqrt{21}$

30) $20-\sqrt{35}$
⇨ $(4\sqrt{5}-\sqrt{7})\sqrt{5}=4\sqrt{5}\sqrt{5}-\sqrt{7}\sqrt{5}=20-\sqrt{35}$

31) $\sqrt{6}-9$
⇨ $(\sqrt{2}-3\sqrt{3})\sqrt{3}=\sqrt{2}\sqrt{3}-3\sqrt{3}\sqrt{3}=\sqrt{6}-9$

32) $12\sqrt{3}-45\sqrt{2}$
⇨ $3\sqrt{6}(2\sqrt{2}-5\sqrt{3})=6\sqrt{6}\sqrt{2}-15\sqrt{6}\sqrt{3}$
$=6\sqrt{12}-15\sqrt{18}=12\sqrt{3}-45\sqrt{2}$

33) $-9\sqrt{2}-10\sqrt{3}$
⇨ $(-3\sqrt{3}-5\sqrt{2})\sqrt{6}=-3\sqrt{3}\sqrt{6}-5\sqrt{2}\sqrt{6}$
$=-3\sqrt{18}-5\sqrt{12}=-9\sqrt{2}-10\sqrt{3}$

34) $5\sqrt{6}+6\sqrt{2}$
⇨ $(5\sqrt{42}+6\sqrt{14})\div\sqrt{7}=(5\sqrt{42}+6\sqrt{14})\times\frac{1}{\sqrt{7}}$
$=5\sqrt{\frac{42}{7}}+6\sqrt{\frac{14}{7}}=5\sqrt{6}+6\sqrt{2}$

35) $-\frac{3\sqrt{2}}{2}+\frac{5\sqrt{3}}{3}$
⇨ $(-3\sqrt{3}+5\sqrt{2})\div\sqrt{6}=(-3\sqrt{3}+5\sqrt{2})\times\frac{1}{\sqrt{6}}$
$=-3\sqrt{\frac{3}{6}}+5\sqrt{\frac{2}{6}}=-3\sqrt{\frac{1}{2}}+5\sqrt{\frac{1}{3}}=-\frac{3\sqrt{2}}{2}+\frac{5\sqrt{3}}{3}$

36) $4\sqrt{6}+6\sqrt{15}$
⇨ $2\sqrt{3}(\sqrt{8}+3\sqrt{5})=2\sqrt{3}\sqrt{8}+6\sqrt{3}\sqrt{5}$
$=2\sqrt{24}+6\sqrt{15}=4\sqrt{6}+6\sqrt{15}$

37) $-4\sqrt{10}+3\sqrt{30}$
⇨ $-\sqrt{5}(4\sqrt{2}-\sqrt{54})=-4\sqrt{5}\sqrt{2}+\sqrt{5}\sqrt{54}$
$=-4\sqrt{10}+\sqrt{270}=-4\sqrt{10}+3\sqrt{30}$

38) $3\sqrt{2}-2\sqrt{6}$
⇨ $(\sqrt{6}-2\sqrt{2})\sqrt{3}=\sqrt{6}\sqrt{3}-2\sqrt{2}\sqrt{3}$
$=\sqrt{18}-2\sqrt{6}=3\sqrt{2}-2\sqrt{6}$

39) $5\sqrt{15}+4\sqrt{10}$
⇨ $(\sqrt{75}+\sqrt{32})\sqrt{5}=\sqrt{75}\sqrt{5}+\sqrt{32}\sqrt{5}$
$=\sqrt{375}+\sqrt{160}=5\sqrt{15}+4\sqrt{10}$

40) $2\sqrt{30}+8\sqrt{3}$
⇨ $2\sqrt{6}(\sqrt{5}+\sqrt{8})=2\sqrt{6}\sqrt{5}+2\sqrt{6}\sqrt{8}$
$=2\sqrt{30}+2\sqrt{48}=2\sqrt{30}+8\sqrt{3}$

41) $-6\sqrt{6}-18$
⇨ $-3\sqrt{2}(\sqrt{12}+3\sqrt{2})=-3\sqrt{2}\sqrt{12}-9\sqrt{2}\sqrt{2}$
$=-3\sqrt{24}-9\sqrt{2}=-6\sqrt{6}-18$

42) $6\sqrt{15}-6\sqrt{10}$
⇨ $\sqrt{6}(3\sqrt{10}-2\sqrt{15})=3\sqrt{6}\sqrt{10}-2\sqrt{6}\sqrt{15}$
$=3\sqrt{60}-2\sqrt{90}=6\sqrt{15}-6\sqrt{10}$

43) $18\sqrt{2}+27$
⇨ $3\sqrt{3}(2\sqrt{6}+\sqrt{27})=6\sqrt{3}\sqrt{6}+3\sqrt{3}\sqrt{27}$
$=6\sqrt{18}+3\sqrt{81}=18\sqrt{2}+27$

44) $10+4\sqrt{10}$
⇨ $(2\sqrt{5}+\sqrt{32})\sqrt{5}=2\sqrt{5}\sqrt{5}+\sqrt{32}\sqrt{5}$
$=2\sqrt{25}+\sqrt{160}=10+4\sqrt{10}$

45) $-6\sqrt{3}+4\sqrt{6}$
⇨ $(-3\sqrt{6}+4\sqrt{3})\sqrt{2}=-3\sqrt{6}\sqrt{2}+4\sqrt{3}\sqrt{2}$
$=-3\sqrt{12}+4\sqrt{6}=-6\sqrt{3}+4\sqrt{6}$

46) $21\sqrt{5}-20\sqrt{3}$
⇨ $(7\sqrt{3}-4\sqrt{5})\sqrt{15}=7\sqrt{3}\sqrt{15}-4\sqrt{5}\sqrt{15}$
$=7\sqrt{45}-4\sqrt{75}=21\sqrt{5}-20\sqrt{3}$

47) $15\sqrt{2}+6$
⇨ $(5\sqrt{6}+\sqrt{12})\sqrt{3}=5\sqrt{6}\sqrt{3}+\sqrt{12}\sqrt{3}$

$=5\sqrt{18}+\sqrt{36}=15\sqrt{2}+6$

48) $\sqrt{2}+2$

⇨ $(\sqrt{6}+\sqrt{12})\div\sqrt{3}=(\sqrt{6}+\sqrt{12})\times\frac{1}{\sqrt{3}}$

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

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

⇨ $(\sqrt{12}+\sqrt{18})\div\sqrt{6}=(\sqrt{12}+\sqrt{18})\times\frac{1}{\sqrt{6}}$

$=\sqrt{\frac{12}{6}}+\sqrt{\frac{18}{6}}=\sqrt{2}+\sqrt{3}$

50) $2-\frac{\sqrt{6}}{2}$

⇨ $(\sqrt{8}-\sqrt{3})\div\sqrt{2}=(\sqrt{8}-\sqrt{3})\times\frac{1}{\sqrt{2}}$

$=\sqrt{\frac{8}{2}}-\sqrt{\frac{3}{2}}=2-\frac{\sqrt{6}}{2}$

51) $2\sqrt{3}+\frac{\sqrt{15}}{5}$

⇨ $(2\sqrt{15}+\sqrt{3})\div\sqrt{5}=(2\sqrt{15}+\sqrt{3})\times\frac{1}{\sqrt{5}}$

$=2\sqrt{\frac{15}{5}}+\sqrt{\frac{3}{5}}=2\sqrt{3}+\frac{\sqrt{15}}{5}$

52) $3\sqrt{3}-4\sqrt{2}$

⇨ $(3\sqrt{21}-4\sqrt{14})\div\sqrt{7}=(3\sqrt{21}-4\sqrt{14})\times\frac{1}{\sqrt{7}}$

$=3\sqrt{\frac{21}{7}}-4\sqrt{\frac{14}{7}}=3\sqrt{3}-4\sqrt{2}$

53) $1-\frac{4\sqrt{3}}{3}$

⇨ $(\sqrt{6}-4\sqrt{2})\div\sqrt{6}=(\sqrt{6}-4\sqrt{2})\times\frac{1}{\sqrt{6}}$

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

54) $2\sqrt{6}-2\sqrt{2}$

⇨ $(6\sqrt{2}-2\sqrt{6})\div\sqrt{3}=(6\sqrt{2}-2\sqrt{6})\times\frac{1}{\sqrt{3}}$

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

55) $\frac{3\sqrt{30}}{10}-\sqrt{5}$

⇨ $(3\sqrt{3}-5\sqrt{2})\div\sqrt{10}=(3\sqrt{3}-5\sqrt{2})\times\frac{1}{\sqrt{10}}$

$=3\sqrt{\frac{3}{10}}-5\sqrt{\frac{2}{10}}=\frac{3\sqrt{30}}{10}-\sqrt{5}$

56) $\frac{\sqrt{15}-3}{3}$

57) $\sqrt{3}+2$

⇨ $\frac{\sqrt{6}+\sqrt{8}}{\sqrt{2}}=\frac{2\sqrt{3}+4}{2}=\sqrt{3}+2$

58) $\frac{\sqrt{5}}{5}-\frac{\sqrt{2}}{2}$

⇨ $\frac{\sqrt{2}-\sqrt{5}}{\sqrt{10}}=\frac{2\sqrt{5}-5\sqrt{2}}{10}=\frac{\sqrt{5}}{5}-\frac{\sqrt{2}}{2}$

59) $-\frac{3\sqrt{5}}{5}$

⇨ $\frac{\sqrt{3}-2\sqrt{12}}{\sqrt{15}}=\frac{\sqrt{3}-4\sqrt{3}}{\sqrt{15}}$

$=\frac{-3\sqrt{3}\times\sqrt{15}}{\sqrt{15}\times\sqrt{15}}=\frac{-9\sqrt{5}}{15}=-\frac{3\sqrt{5}}{5}$

60) $\frac{2+6\sqrt{3}}{3}$

⇨ $\frac{\sqrt{8}+6\sqrt{6}}{3\sqrt{2}}=\frac{4+12\sqrt{3}}{6}=\frac{2+6\sqrt{3}}{3}$

61) $\frac{\sqrt{6}+2\sqrt{3}}{2}$

⇨ $\frac{\sqrt{3}+\sqrt{6}}{\sqrt{2}}=\frac{(\sqrt{3}+\sqrt{6})\times\sqrt{2}}{\sqrt{2}\times\sqrt{2}}=\frac{\sqrt{6}+2\sqrt{3}}{2}$

62) $4-\sqrt{3}$

⇨ $\frac{4\sqrt{3}-3}{\sqrt{3}}=\frac{(4\sqrt{3}-3)\times\sqrt{3}}{\sqrt{3}\times\sqrt{3}}=\frac{12-3\sqrt{3}}{3}=4-\sqrt{3}$

63) $5\sqrt{2}+\sqrt{5}$

⇨ $\frac{10+\sqrt{10}}{\sqrt{2}}=\frac{(10+\sqrt{10})\times\sqrt{2}}{\sqrt{2}\times\sqrt{2}}$

$=\frac{10\sqrt{2}+2\sqrt{5}}{2}=5\sqrt{2}+\sqrt{5}$

64) $2\sqrt{3}-2$

⇨ $\frac{6-2\sqrt{3}}{\sqrt{3}}=\frac{(6-2\sqrt{3})\times\sqrt{3}}{\sqrt{3}\times\sqrt{3}}=\frac{6\sqrt{3}-6}{3}=2\sqrt{3}-2$

65) $\sqrt{7}+\sqrt{3}$

⇨ $\frac{\sqrt{35}+\sqrt{15}}{\sqrt{5}}=\frac{(\sqrt{35}+\sqrt{15})\times\sqrt{5}}{\sqrt{5}\times\sqrt{5}}$

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

66) $\frac{2\sqrt{3}-3\sqrt{2}}{6}$

⇨ $\frac{\sqrt{6}-3}{3\sqrt{2}}=\frac{(\sqrt{6}-3)\times\sqrt{2}}{3\sqrt{2}\times\sqrt{2}}=\frac{2\sqrt{3}-3\sqrt{2}}{6}$

67) $2\sqrt{6}-6\sqrt{3}$

⇨ $\frac{\sqrt{72}-18}{\sqrt{3}}=\frac{6\sqrt{2}-18}{\sqrt{3}}=\frac{(6\sqrt{2}-18)\times\sqrt{3}}{\sqrt{3}\times\sqrt{3}}$
$=\frac{6\sqrt{6}-18\sqrt{3}}{3}=2\sqrt{6}-6\sqrt{3}$

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

⇨ $\frac{\sqrt{6}-\sqrt{8}}{2\sqrt{2}}$
$=\frac{\sqrt{6}-2\sqrt{2}}{2\sqrt{2}}=\frac{(\sqrt{6}-2\sqrt{2})\times\sqrt{2}}{2\sqrt{2}\times\sqrt{2}}$
$=\frac{2\sqrt{3}-4}{4}=\frac{\sqrt{3}-2}{2}$

69) $\frac{1-\sqrt{2}}{2}$

⇨ $\frac{\sqrt{3}-\sqrt{6}}{\sqrt{12}}=\frac{\sqrt{3}-\sqrt{6}}{2\sqrt{3}}=\frac{(\sqrt{3}-\sqrt{6})\times\sqrt{3}}{2\sqrt{3}\times\sqrt{3}}$
$=\frac{3-3\sqrt{2}}{6}=\frac{1-\sqrt{2}}{2}$

70) $2-\sqrt{5}$

⇨ $\frac{\sqrt{12}-\sqrt{15}}{\sqrt{3}}$
$=\frac{2\sqrt{3}-\sqrt{15}}{\sqrt{3}}=\frac{(2\sqrt{3}-\sqrt{15})\times\sqrt{3}}{\sqrt{3}\times\sqrt{3}}$
$=\frac{6-3\sqrt{5}}{3}=2-\sqrt{5}$

71) $\frac{6+\sqrt{10}}{2}$

⇨ $\frac{\sqrt{54}+\sqrt{15}}{\sqrt{6}}$
$=\frac{3\sqrt{6}+\sqrt{15}}{\sqrt{6}}=\frac{(3\sqrt{6}+\sqrt{15})\times\sqrt{6}}{\sqrt{6}\times\sqrt{6}}$
$=\frac{18+3\sqrt{10}}{6}=\frac{6+\sqrt{10}}{2}$

72) $\frac{2-\sqrt{2}}{4}$

⇨ $\frac{2\sqrt{3}-\sqrt{6}}{\sqrt{48}}$
$=\frac{2\sqrt{3}-\sqrt{6}}{4\sqrt{3}}=\frac{(2\sqrt{3}-\sqrt{6})\times\sqrt{3}}{4\sqrt{3}\times\sqrt{3}}$
$=\frac{6-3\sqrt{2}}{12}=\frac{2-\sqrt{2}}{4}$

73) $4-\sqrt{2}$

74) $2\sqrt{2}+2$

75) $\frac{\sqrt{2}+1}{3}$

⇨ $\frac{4+2\sqrt{2}}{3\sqrt{8}}=\frac{(4+2\sqrt{2})\times\sqrt{8}}{3\times8}=\frac{8\sqrt{2}+8}{24}=\frac{\sqrt{2}+1}{3}$

76) $\sqrt{6}-\sqrt{2}$

⇨ $\frac{6\sqrt{2}-\sqrt{24}}{\sqrt{12}}=\frac{(6\sqrt{2}-\sqrt{24})\sqrt{12}}{\sqrt{12}\times\sqrt{12}}$
$=\frac{12\sqrt{6}-12\sqrt{2}}{12}=\sqrt{6}-\sqrt{2}$

77) $2\sqrt{3}+\sqrt{15}$

⇨ $\frac{6+3\sqrt{5}}{\sqrt{3}}=\frac{(6+3\sqrt{5})\sqrt{3}}{\sqrt{3}\times\sqrt{3}}=\frac{6\sqrt{3}+3\sqrt{15}}{3}$
$=2\sqrt{3}+\sqrt{15}$

78) $\frac{2\sqrt{42}-9\sqrt{2}}{6}$

⇨ $\frac{2\sqrt{7}-3\sqrt{3}}{\sqrt{6}}=\frac{(2\sqrt{7}-3\sqrt{3})\sqrt{6}}{\sqrt{6}\times\sqrt{6}}=\frac{2\sqrt{42}-9\sqrt{2}}{6}$

79) $\frac{\sqrt{6}+\sqrt{10}}{2}$

⇨ $\frac{\sqrt{3}+\sqrt{5}}{\sqrt{2}}=\frac{(\sqrt{3}+\sqrt{5})\sqrt{2}}{\sqrt{2}\times\sqrt{2}}=\frac{\sqrt{6}+\sqrt{10}}{2}$

80) $\frac{\sqrt{15}+\sqrt{35}}{5}$

⇨ $\frac{\sqrt{3}+\sqrt{7}}{\sqrt{5}}=\frac{(\sqrt{3}+\sqrt{7})\sqrt{5}}{\sqrt{5}\times\sqrt{5}}=\frac{\sqrt{15}+\sqrt{35}}{5}$

81) $\frac{\sqrt{30}+2\sqrt{6}}{6}$

⇨ $\frac{\sqrt{5}+2}{\sqrt{6}}=\frac{(\sqrt{5}+2)\sqrt{6}}{\sqrt{6}\times\sqrt{6}}=\frac{\sqrt{30}+2\sqrt{6}}{6}$

82) $\frac{\sqrt{6}-\sqrt{15}}{3}$

⇨ $\frac{\sqrt{2}-\sqrt{5}}{\sqrt{3}}=\frac{(\sqrt{2}-\sqrt{5})\sqrt{3}}{\sqrt{3}\times\sqrt{3}}=\frac{\sqrt{6}-\sqrt{15}}{3}$

83) $\frac{\sqrt{30}-\sqrt{15}}{5}$

⇨ $\frac{\sqrt{6}-\sqrt{3}}{\sqrt{5}}=\frac{(\sqrt{6}-\sqrt{3})\sqrt{5}}{\sqrt{5}\times\sqrt{5}}=\frac{\sqrt{30}-\sqrt{15}}{5}$

84) $\frac{4\sqrt{2}-\sqrt{10}}{2}$

⇨ $\frac{4-\sqrt{5}}{\sqrt{2}}=\frac{(4-\sqrt{5})\sqrt{2}}{\sqrt{2}\times\sqrt{2}}=\frac{4\sqrt{2}-\sqrt{10}}{2}$

85) $\frac{2\sqrt{10}+\sqrt{30}}{5}$

⇨ $\frac{2\sqrt{2}+\sqrt{6}}{\sqrt{5}}=\frac{(2\sqrt{2}+\sqrt{6})\sqrt{5}}{\sqrt{5}\times\sqrt{5}}=\frac{2\sqrt{10}+\sqrt{30}}{5}$

86) $\frac{2\sqrt{15}+12\sqrt{2}}{3}$

⇨ $\frac{2\sqrt{5}+4\sqrt{6}}{\sqrt{3}}=\frac{(2\sqrt{5}+4\sqrt{6})\sqrt{3}}{\sqrt{3}\times\sqrt{3}}$

$=\frac{2\sqrt{15}+4\sqrt{18}}{3}=\frac{2\sqrt{15}+12\sqrt{2}}{3}$

87) $\frac{4\sqrt{3}+3\sqrt{6}}{4}$

⇨ $\frac{2\sqrt{6}+3\sqrt{3}}{\sqrt{8}}=\frac{(2\sqrt{6}+3\sqrt{3})\sqrt{8}}{\sqrt{8}\times\sqrt{8}}=\frac{2\sqrt{48}+3\sqrt{24}}{8}$

$=\frac{8\sqrt{3}+6\sqrt{6}}{8}=\frac{4\sqrt{3}+3\sqrt{6}}{4}$

88) $\frac{6\sqrt{7}+35\sqrt{2}}{14}$

⇨ $\frac{3\sqrt{2}+5\sqrt{7}}{\sqrt{14}}=\frac{(3\sqrt{2}+5\sqrt{7})\sqrt{14}}{\sqrt{14}\times\sqrt{14}}=\frac{6\sqrt{7}+35\sqrt{2}}{14}$

89) $2\sqrt{2}-\sqrt{3}$

⇨ $\frac{4\sqrt{3}-\sqrt{18}}{\sqrt{6}}=\frac{(4\sqrt{3}-\sqrt{18})\sqrt{6}}{\sqrt{6}\times\sqrt{6}}=\frac{12\sqrt{2}-6\sqrt{3}}{6}$

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

90) $\sqrt{10}-2\sqrt{2}$

⇨ $\frac{5\sqrt{2}-2\sqrt{10}}{\sqrt{5}}=\frac{(5\sqrt{2}-2\sqrt{10})\sqrt{5}}{\sqrt{5}\times\sqrt{5}}$

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

91) $\frac{5-2\sqrt{2}}{2}$

⇨ $\frac{5\sqrt{3}-2\sqrt{6}}{\sqrt{12}}=\frac{(5\sqrt{3}-2\sqrt{6})\sqrt{12}}{\sqrt{12}\times\sqrt{12}}=\frac{5\sqrt{36}-2\sqrt{72}}{12}$

$=\frac{30-12\sqrt{2}}{12}=\frac{5-2\sqrt{2}}{2}$

92) $\frac{10\sqrt{6}-3\sqrt{30}}{10}$

⇨ $\frac{2\sqrt{15}-3\sqrt{3}}{\sqrt{10}}=\frac{(2\sqrt{15}-3\sqrt{3})\sqrt{10}}{\sqrt{10}\times\sqrt{10}}$

$=\frac{2\sqrt{150}-3\sqrt{30}}{10}=\frac{10\sqrt{6}-3\sqrt{30}}{10}$

93) 2

⇨ $\frac{\sqrt{20}-\sqrt{15}}{\sqrt{5}}+\sqrt{3}=\frac{(\sqrt{20}-\sqrt{15})\times\sqrt{5}}{\sqrt{5}\times\sqrt{5}}+\sqrt{3}$

$=\frac{10-5\sqrt{3}}{5}+\sqrt{3}$

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

94) $4+\sqrt{3}$

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

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

95) $1+\sqrt{2}$

⇨ $\frac{\sqrt{12}-\sqrt{6}}{\sqrt{3}}+2\sqrt{2}-1=\frac{6-3\sqrt{2}}{3}+2\sqrt{2}-1$

$=2-\sqrt{2}+2\sqrt{2}-1$

$=1+\sqrt{2}$

96) $22-9\sqrt{3}$

⇨ $4\sqrt{3}(\sqrt{3}-1)+5(2-\sqrt{3})$

$=12-4\sqrt{3}+10-5\sqrt{3}=22-9\sqrt{3}$

97) $10\sqrt{7}-3$

98) $6+5\sqrt{5}$

99) $\sqrt{10}+\sqrt{5}$

100) $3\sqrt{3}$

101) $4+3\sqrt{3}$

⇨ $\sqrt{3}(\sqrt{12}+1)+\sqrt{2}(\sqrt{6}-\sqrt{2})$

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

102) 0

⇨ $\sqrt{18}-\sqrt{3}(3\sqrt{6}-\sqrt{24})=3\sqrt{2}-9\sqrt{2}+6\sqrt{2}=0$

103) $9\sqrt{2}-5\sqrt{6}$

⇨ $\sqrt{6}(2\sqrt{3}-2)+(\sqrt{18}-\sqrt{54})$

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

104) $2\sqrt{6}$

105) $3\sqrt{2}$

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

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

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

107) $4\sqrt{2}+4\sqrt{6}$

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

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

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

108) $2\sqrt{6}+1$

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

109) $4+\sqrt{10}$
⇨ $(\sqrt{18}+4\sqrt{5})\div\sqrt{2}-\sqrt{5}\left(\sqrt{2}-\frac{1}{\sqrt{5}}\right)$
$=(\sqrt{18}+4\sqrt{5})\times\frac{1}{\sqrt{2}}-\sqrt{5}\left(\sqrt{2}-\frac{1}{\sqrt{5}}\right)$
$=3+2\sqrt{10}-\sqrt{10}+1=4+\sqrt{10}$

110) $1+4\sqrt{3}$
⇨ $\frac{\sqrt{27}+9}{\sqrt{3}}-\frac{\sqrt{8}-\sqrt{6}}{\sqrt{2}}$
$=\frac{3\sqrt{3}+9}{\sqrt{3}}-\frac{2\sqrt{2}-\sqrt{6}}{\sqrt{2}}$
$=\frac{9+9\sqrt{3}}{3}-\frac{4-2\sqrt{3}}{2}$
$=3+3\sqrt{3}-(2-\sqrt{3})=1+4\sqrt{3}$

111) $\frac{\sqrt{6}}{3}+3$
⇨ $\sqrt{24}-\sqrt{\frac{8}{3}}+\frac{\sqrt{45}-\sqrt{30}}{\sqrt{5}}$
$=2\sqrt{6}-\frac{2\sqrt{2}}{\sqrt{3}}+\frac{3\sqrt{5}-\sqrt{30}}{\sqrt{5}}$
$=2\sqrt{6}-\frac{2\sqrt{6}}{3}+3-\sqrt{6}=\frac{\sqrt{6}}{3}+3$

112) $\sqrt{6}-5\sqrt{3}+2$
⇨ $\frac{\sqrt{72}-18}{\sqrt{12}}-\sqrt{2}(\sqrt{6}-\sqrt{2})$
$=\frac{6\sqrt{2}-18}{2\sqrt{3}}-2\sqrt{3}+2=\frac{3\sqrt{2}-9}{\sqrt{3}}-2\sqrt{3}+2$
$=\frac{3\sqrt{6}-9\sqrt{3}}{3}-2\sqrt{3}+2$
$=\sqrt{6}-3\sqrt{3}-2\sqrt{3}+2=\sqrt{6}-5\sqrt{3}+2$

113) $5\sqrt{2}+2\sqrt{3}$
⇨ $\frac{4}{\sqrt{2}}+\frac{9}{\sqrt{3}}-\sqrt{3}(1-\sqrt{6})$
$=2\sqrt{2}+3\sqrt{3}-\sqrt{3}+3\sqrt{2}=5\sqrt{2}+2\sqrt{3}$

114) $2\sqrt{6}-5$
⇨ $\sqrt{3}\left(3\sqrt{2}-\frac{1}{\sqrt{3}}\right)-2\sqrt{2}\left(\sqrt{2}+\frac{\sqrt{3}}{2}\right)$
$=3\sqrt{6}-1-4-\sqrt{6}=2\sqrt{6}-5$

115) $9-4\sqrt{3}$
⇨ $\sqrt{48}-\frac{6}{\sqrt{3}}-3\sqrt{3}(2-\sqrt{3})$
$=4\sqrt{3}-2\sqrt{3}-6\sqrt{3}+9=9-4\sqrt{3}$

116) $5-\frac{2\sqrt{6}}{3}$

117) $2\sqrt{3}$
⇨ $\frac{\sqrt{6}+\sqrt{2}}{\sqrt{2}}+\frac{\sqrt{15}-\sqrt{5}}{\sqrt{5}}$
$=\frac{(\sqrt{6}+\sqrt{2})\sqrt{2}}{2}+\frac{(\sqrt{15}-\sqrt{5})\sqrt{5}}{5}=\frac{2\sqrt{3}+2}{2}+\frac{5\sqrt{3}-5}{5}$
$=\sqrt{3}+1+\sqrt{3}-1=2\sqrt{3}$