

## ADDING AND SUBTRACTING SURDS

Simplify the expressions in this exercise.

$$\begin{aligned} 1 \quad & \sqrt{3} + 2\sqrt{3} + 4\sqrt{3} \\ & = 7\sqrt{3} \end{aligned}$$

$$\begin{aligned} 2 \quad & 5\sqrt{7} - 2\sqrt{7} + 4\sqrt{7} \\ & = 7\sqrt{7} \end{aligned}$$

$$\begin{aligned} 3 \quad & 3\sqrt{5} + 5\sqrt{5} - 2\sqrt{5} \\ & = 6\sqrt{5} \end{aligned}$$

$$8 \quad \sqrt{20} + \sqrt{5}$$

$$9 \quad \sqrt{18} + \sqrt{32} - \sqrt{2}$$

$$10 \quad \sqrt{27} + 2\sqrt{48} - 4\sqrt{3}$$

$$\textcircled{8} \quad \sqrt{20} + \sqrt{5} = \sqrt{2^2 \times 5} + \sqrt{5} = 2\sqrt{5} + \sqrt{5} = 3\sqrt{5}$$

$$\textcircled{9} \quad \sqrt{18} + \sqrt{32} - \sqrt{2} = \sqrt{3^2 \times 2} + \sqrt{2^4 \times 2} - \sqrt{2} = 3\sqrt{2} + 4\sqrt{2} - \sqrt{2} = 6\sqrt{2}$$

$$\begin{aligned} \textcircled{10} \quad & \sqrt{27} + 2\sqrt{48} - 4\sqrt{3} = \sqrt{3^3} + 2\sqrt{2^4 \times 3} - 4\sqrt{3} \\ & \quad \quad \quad = 3\sqrt{3} + 8\sqrt{3} - 4\sqrt{3} \\ & \quad \quad \quad = 7\sqrt{3} \end{aligned}$$

$$11 \quad \sqrt{12} + \sqrt{3} + \sqrt{48}$$

$$12 \quad 2\sqrt{50} - 3\sqrt{18}$$

$$13 \quad \sqrt{7} + \sqrt{28} - \sqrt{63}$$

$$\begin{aligned} \textcircled{11} \quad & \sqrt{12} + \sqrt{3} + \sqrt{48} = \sqrt{2^2 \times 3} + \sqrt{3} + \sqrt{2^4 \times 3} \\ & \quad \quad \quad = 2\sqrt{3} + \sqrt{3} + 4\sqrt{3} = 7\sqrt{3} \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & 2\sqrt{50} - 3\sqrt{18} = 2\sqrt{2 \times 5^2} - 3\sqrt{3^2 \times 2} \\ & \quad \quad \quad = 10\sqrt{2} - 9\sqrt{2} = \sqrt{2} \end{aligned}$$

$$\begin{aligned} \textcircled{13} \quad & \sqrt{7} + \sqrt{28} - \sqrt{63} = \sqrt{7} + \sqrt{2^2 \times 7} - \sqrt{3^2 \times 7} \\ & \quad \quad \quad = \sqrt{7} + 2\sqrt{7} - 3\sqrt{7} \\ & \quad \quad \quad = 0 \end{aligned}$$

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24  $5\sqrt{7} + 3\sqrt{5} - 2\sqrt{28}$

25  $5\sqrt{45} - 2\sqrt{32}$

26  $\sqrt{98} - 2\sqrt{20} - \sqrt{12}$

$$\begin{aligned} \textcircled{24} \quad 5\sqrt{7} + 3\sqrt{5} - 2\sqrt{28} &= 5\sqrt{7} + 3\sqrt{5} - 2\sqrt{2^2 \times 7} \\ &= 5\sqrt{7} + 3\sqrt{5} - 4\sqrt{7} = \sqrt{7} + 3\sqrt{5} \end{aligned}$$

$$\begin{aligned} \textcircled{25} \quad 5\sqrt{45} - 2\sqrt{32} &= 5\sqrt{3^2 \times 5} - 2\sqrt{2^4 \times 2} \\ &= 15\sqrt{5} - 8\sqrt{2} \end{aligned}$$

$$\begin{aligned} \textcircled{26} \quad \sqrt{98} - 2\sqrt{20} - \sqrt{12} &= \sqrt{2 \times 7^2} - 2\sqrt{2^2 \times 5} - \sqrt{2^2 \times 3} \\ &= 7\sqrt{2} - 4\sqrt{5} - 2\sqrt{3} \end{aligned}$$

27  $\sqrt{125} - 5\sqrt{2} + \sqrt{50}$

28  $7\sqrt{3} - 2\sqrt{2} + \sqrt{12} + \sqrt{8}$

29  $\sqrt{150} - \sqrt{96} - \sqrt{24}$

$$\begin{aligned} \textcircled{27} \quad \sqrt{125} - 5\sqrt{2} + \sqrt{50} &= \sqrt{5^3} - 5\sqrt{2} + \sqrt{2 \times 5^2} \\ &= 5\sqrt{5} - 5\sqrt{2} + 5\sqrt{2} = 5\sqrt{5} \end{aligned}$$

$$\begin{aligned} \textcircled{28} \quad 7\sqrt{3} - 2\sqrt{2} + \sqrt{12} + \sqrt{8} &= 7\sqrt{3} - 2\sqrt{2} + \sqrt{2^2 \times 3} + \sqrt{2^3} \\ &= 7\sqrt{3} - 2\sqrt{2} + 2\sqrt{3} + 2\sqrt{2} \\ &= 9\sqrt{3} \end{aligned}$$

$$\begin{aligned} \textcircled{29} \quad \sqrt{150} - \sqrt{96} - \sqrt{24} &= \sqrt{2 \times 3 \times 5^2} - \sqrt{2^5 \times 3} - \sqrt{2^2 \times 6} \\ &= 5\sqrt{6} - 4\sqrt{6} - 2\sqrt{6} \\ &= -\sqrt{6} \end{aligned}$$