

Exercise

- 1) Simplify $3\sqrt{2} - 5\sqrt{18} + 4\sqrt{50}$
- 2) Simplify $5\sqrt{2} \times 4\sqrt{3} - \sqrt{54}$
- 3) Simplify $\sqrt{12} + \sqrt{27} + \sqrt{75}$
- 4) Expand and simplify $(5 + \sqrt{2})(3 - \sqrt{2})$
- 5) Expand and simplify $(7 - 3\sqrt{5})(5 - 4\sqrt{5})$
- 6) Expand and simplify $(4 + 2\sqrt{5})^2$
- 7) Write $\frac{5}{2 + \sqrt{3}}$ in the form $a + b\sqrt{3}$
where a and b are integers
- 8) Write $\frac{4\sqrt{5}}{3 - \sqrt{5}}$ in the form $a + b\sqrt{5}$
where a and b are integers
- 9) Write $\frac{2 + \sqrt{7}}{3 + 2\sqrt{7}}$ in the form $c + d\sqrt{7}$
where c and d are rational numbers
- 10) Write $\frac{3 - 2\sqrt{2}}{4 - \sqrt{2}}$ in the form $c + d\sqrt{2}$
where c and d are rational numbers

Solutions on following pages

Solutions to Exercise

$$\begin{aligned} 1) \quad & 3\sqrt{2} - 5\sqrt{18} + 4\sqrt{50} \\ &= 3\sqrt{2} - 5\sqrt{9 \times 2} + 4\sqrt{25 \times 2} \\ &= 3\sqrt{2} - 15\sqrt{2} + 20\sqrt{2} \\ &= 8\sqrt{2} \end{aligned}$$

$$\begin{aligned} 2) \quad & 5\sqrt{2} \times 4\sqrt{3} - \sqrt{54} \\ &= 20\sqrt{6} - \sqrt{9 \times 6} \\ &= 20\sqrt{6} - 3\sqrt{6} \\ &= 17\sqrt{6} \end{aligned}$$

$$\begin{aligned} 3) \quad & \sqrt{12} + \sqrt{27} + \sqrt{75} \\ &= \sqrt{4 \times 3} + \sqrt{9 \times 3} + \sqrt{25 \times 3} \\ &= 2\sqrt{3} + 3\sqrt{3} + 5\sqrt{3} \\ &= 10\sqrt{3} \end{aligned}$$

$$\begin{aligned} 4) \quad & (5 + \sqrt{2})(3 - \sqrt{2}) \\ &= 15 + 3\sqrt{2} - 5\sqrt{2} - 2 \\ &= 13 - 2\sqrt{2} \end{aligned}$$

$$\begin{aligned} 5) \quad & (7 - 3\sqrt{5})(5 - 4\sqrt{5}) \\ &= 35 - 15\sqrt{5} - 28\sqrt{5} + 12 \times 5 \\ &= 95 - 43\sqrt{5} \end{aligned}$$

$$\begin{aligned}
 6) \quad & (4 + 2\sqrt{5})^2 \\
 &= (4 + 2\sqrt{5})(4 + 2\sqrt{5}) \\
 &= 16 + 8\sqrt{5} + 8\sqrt{5} + 4 \times 5 \\
 &= 36 + 16\sqrt{5}
 \end{aligned}$$

$$\begin{aligned}
 7) \quad \frac{5}{2 + \sqrt{3}} &= \frac{5}{2 + \sqrt{3}} \times \frac{(2 - \sqrt{3})}{(2 - \sqrt{3})} = \frac{10 - 5\sqrt{3}}{2^2 - (\sqrt{3})^2} \\
 &= \frac{10 - 5\sqrt{3}}{4 - 3} = \frac{10 - 5\sqrt{3}}{1} = 10 - 5\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 8) \quad \frac{4\sqrt{5}}{3 - \sqrt{5}} &= \frac{4\sqrt{5}}{3 - \sqrt{5}} \times \frac{(3 + \sqrt{5})}{(3 + \sqrt{5})} = \frac{12\sqrt{5} + 20}{3^2 - (\sqrt{5})^2} \\
 &= \frac{12\sqrt{5} + 20}{9 - 5} = \frac{12\sqrt{5} + 20}{4} = 5 + 3\sqrt{5}
 \end{aligned}$$

$$\begin{aligned}
 9) \quad \frac{2 + \sqrt{7}}{3 + 2\sqrt{7}} &= \frac{(2 + \sqrt{7})}{(3 + 2\sqrt{7})} \times \frac{(3 - 2\sqrt{7})}{(3 - 2\sqrt{7})} = \frac{6 + 3\sqrt{7} - 4\sqrt{7} - 14}{3^2 - (2\sqrt{7})^2} \\
 &= \frac{-8 - \sqrt{7}}{9 - 28} = \frac{-8 - \sqrt{7}}{-19} = \frac{8}{19} + \frac{1\sqrt{7}}{19}
 \end{aligned}$$

$$\begin{aligned}
 10) \quad \frac{3 - 2\sqrt{2}}{4 - \sqrt{2}} &= \frac{(3 - 2\sqrt{2})}{(4 - \sqrt{2})} \times \frac{(4 + \sqrt{2})}{(4 + \sqrt{2})} = \frac{12 - 8\sqrt{2} + 3\sqrt{2} - 4}{4^2 - (\sqrt{2})^2} \\
 &= \frac{8 - 5\sqrt{2}}{16 - 2} = \frac{8 - 5\sqrt{2}}{14} = \frac{8}{14} - \frac{5\sqrt{2}}{14}
 \end{aligned}$$
