

# SURDS : 3 : SOLUTIONS

$$\begin{aligned}
 1) \quad & \frac{(10\sqrt{3}-1)}{(4-\sqrt{3})} \times \frac{(4+\sqrt{3})}{(4+\sqrt{3})} \\
 &= \frac{40\sqrt{3} + 30 - 4 - \sqrt{3}}{16 + 4\sqrt{3} - 4\sqrt{3} - 3} \\
 &= \frac{39\sqrt{3} + 26}{13} \\
 &= 3\sqrt{3} + 2
 \end{aligned}$$

$$\begin{aligned}
 2) \quad & (2+\sqrt{5})(5-\sqrt{20}) \\
 &= 10 - 2\sqrt{20} + 5\sqrt{5} - \sqrt{100} \\
 &= 10 - 2(2\sqrt{5}) + 5\sqrt{5} - 10 \\
 &= 10 - 4\sqrt{5} + 5\sqrt{5} - 10 \\
 &= \sqrt{5}
 \end{aligned}$$

$$\begin{aligned}
 3) \quad & \frac{(8-\sqrt{7})}{(\sqrt{7}-2)} \times \frac{(\sqrt{7}+2)}{(\sqrt{7}+2)} \\
 &= \frac{8\sqrt{7} + 16 - 7 - 2\sqrt{7}}{7 + 2\sqrt{7} - 2\sqrt{7} - 4} \\
 &= \frac{6\sqrt{7} + 9}{3} \\
 &= 2\sqrt{7} + 3
 \end{aligned}$$

$$\begin{aligned}
 4) \quad & \sqrt{50} + (\sqrt{3} \times \sqrt{6}) - \frac{14}{\sqrt{2}} \\
 &= \sqrt{25}\sqrt{2} + \sqrt{18} - \frac{14\sqrt{2}}{2} \\
 &= 5\sqrt{2} + 3\sqrt{2} - 7\sqrt{2} \\
 &= \sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 5) \quad & \frac{(2\sqrt{11}-3)}{(\sqrt{11}+2)} \times \frac{(\sqrt{11}-2)}{(\sqrt{11}-2)} \\
 &= \frac{22 - 4\sqrt{11} - 3\sqrt{11} + 6}{11 - 2\sqrt{11} + 2\sqrt{11} - 4} \\
 &= \frac{28 - 7\sqrt{11}}{7} \\
 &= 4 - \sqrt{11}
 \end{aligned}$$

$$\begin{aligned}
 6) \quad & \frac{22}{\sqrt{2}} - \sqrt{50} - (\sqrt{2})^5 \\
 &= \frac{22\sqrt{2}}{2} - \sqrt{25}\sqrt{2} - 2^{5/2} \\
 &= 11\sqrt{2} - 5\sqrt{2} - (2^5)^{1/2} \\
 &= 11\sqrt{2} - 5\sqrt{2} - \sqrt{32} \\
 &= 11\sqrt{2} - 5\sqrt{2} - \sqrt{16}\sqrt{2} \\
 &= 11\sqrt{2} - 5\sqrt{2} - 4\sqrt{2} \\
 &= 2\sqrt{2}
 \end{aligned}$$

$$7) \frac{(5\sqrt{7}-\sqrt{3})}{(\sqrt{7}-\sqrt{3})} \times \frac{(\sqrt{7}+\sqrt{3})}{(\sqrt{7}+\sqrt{3})}$$

$$= \frac{35 + 5\sqrt{21} - \sqrt{21} - 3}{7 + \sqrt{21} - \sqrt{21} - 3}$$

$$= \frac{32 + 4\sqrt{21}}{4}$$

$$= 8 + \sqrt{21}$$

$$8) (\sqrt{15} \times \sqrt{20}) - \sqrt{75} - \frac{\sqrt{60}}{\sqrt{5}}$$

$$= (\sqrt{15} \times 2\sqrt{5}) - \sqrt{25} \sqrt{3} - \frac{\sqrt{60} \sqrt{5}}{5}$$

$$= 2\sqrt{75} - 5\sqrt{3} - \frac{\sqrt{300}}{5}$$

$$= 2(5\sqrt{3}) - 5\sqrt{3} - \frac{\sqrt{100} \sqrt{3}}{5}$$

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

$$= 3\sqrt{3}$$

$$9) \frac{\sqrt{2}}{(10-7\sqrt{2})} \times \frac{(10+7\sqrt{2})}{(10+7\sqrt{2})}$$

$$= \frac{10\sqrt{2} + 14}{100 + 70\sqrt{2} - 70\sqrt{2} - 98}$$

$$= \frac{10\sqrt{2} + 14}{2}$$

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

$$10) \frac{90}{\sqrt{3}} - \sqrt{6} \times \sqrt{8} - (2\sqrt{3})^3$$

$$= \frac{90\sqrt{3}}{3} - \sqrt{48} - (2\sqrt{3} \times 2\sqrt{3} \times 2\sqrt{3})$$

$$= 30\sqrt{3} - \sqrt{16} \sqrt{3} - 24\sqrt{3}$$

$$= 30\sqrt{3} - 4\sqrt{3} - 24\sqrt{3}$$

$$= 2\sqrt{3}$$