

10-3 Operations with Radical Expressions

Simplify each radical expression.

$$\begin{aligned}
 1. \quad & 2\sqrt{18} - 4\sqrt{32} \\
 & 2\sqrt{9}\sqrt{2} - 4\sqrt{16}\sqrt{2} \\
 & = 2 \cdot 3\sqrt{2} - 4 \cdot 4\sqrt{2} \\
 & = 6\sqrt{2} - 16\sqrt{2} \\
 & = \boxed{-10\sqrt{2}}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & 3\sqrt{28} - \sqrt{63} \\
 & 3\sqrt{4}\sqrt{7} - \sqrt{9}\sqrt{7} \\
 & = 3 \cdot 2\sqrt{7} - 3\sqrt{7} \\
 & = 6\sqrt{7} - 3\sqrt{7} \\
 & = \boxed{3\sqrt{7}}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & \sqrt{5}(\sqrt{15} - 3) = \sqrt{75} - 3\sqrt{5} \\
 & = \sqrt{25}\sqrt{3} - 3\sqrt{5} \\
 & = \boxed{5\sqrt{3} - 3\sqrt{5}}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad & (\sqrt{6} + \sqrt{3})(\sqrt{2} - 2) \\
 & \begin{array}{r} \sqrt{2} \quad -2 \\ \sqrt{6} \sqrt{12} \quad -2\sqrt{6} \\ +\sqrt{3} \sqrt{6} \quad -2\sqrt{3} \end{array} = -\sqrt{2} - \sqrt{6} - 2\sqrt{3} \\
 & = \sqrt{4}\sqrt{3} - \sqrt{6} - 2\sqrt{3} \\
 & = 2\sqrt{3} - \sqrt{6} - 2\sqrt{3} \\
 & = \boxed{-\sqrt{6}}
 \end{aligned}$$

$$5. \quad (3\sqrt{2} - 5\sqrt{3})^2 = (3\sqrt{2} - 5\sqrt{3})(3\sqrt{2} - 5\sqrt{3})$$

$$\begin{array}{r} 3\sqrt{2} \quad -5\sqrt{3} \\ 3\sqrt{2} \quad 18 \quad -15\sqrt{6} \\ -5\sqrt{3} \quad -15\sqrt{6} \quad 75 \end{array} = \boxed{93 - 30\sqrt{6}}$$