

Operations with Radical Expressions

Simplify each expression. SHOW ALL WORK and circle/box your final answer.

$$1. 7\sqrt{7} - 2\sqrt{7} = \boxed{5\sqrt{7}}$$

$$2. 3\sqrt{13} + 7\sqrt{13} = \boxed{10\sqrt{13}}$$

$$3. 6\sqrt{5} - 2\sqrt{5} + 8\sqrt{5} \\ = (6 - 2 + 8)\sqrt{5} = \boxed{12\sqrt{5}}$$

$$4. \sqrt{15} + 8\sqrt{15} - 12\sqrt{15} \\ = (1 + 8 - 12)\sqrt{15} = \boxed{-3\sqrt{15}}$$

$$5. \sqrt{44} - \sqrt{11} = 2\sqrt{11} - \sqrt{11} = \boxed{\sqrt{11}}$$

$$\begin{array}{c} 44 \\ \swarrow \searrow \\ 4 \quad 11 \\ \swarrow \searrow \\ 2 \quad 2 \end{array}$$

$$2\sqrt{11}$$

$$6. 8\sqrt{54} - 4\sqrt{6} = 3\sqrt{6} - 4\sqrt{6} = \boxed{-\sqrt{6}}$$

$$\begin{array}{c} 54 \\ \swarrow \searrow \\ 9 \quad 6 \\ \swarrow \searrow \\ 3 \quad 3 \quad 3 \quad 2 \end{array}$$

$$3\sqrt{6}$$

$$7. \sqrt{27} + \sqrt{48} + \sqrt{12} = 3\sqrt{3} + 4\sqrt{3} + 2\sqrt{3} = \boxed{9\sqrt{3}}$$

$$\begin{array}{c} 27 \\ \swarrow \searrow \\ 9 \quad 3 \\ \swarrow \searrow \\ 3 \quad 3 \end{array} \quad \begin{array}{c} 48 \\ \swarrow \searrow \\ 4 \quad 12 \\ \swarrow \searrow \\ 2 \quad 2 \quad 2 \quad 6 \\ \swarrow \searrow \\ 2 \quad 3 \end{array} \quad \begin{array}{c} 12 \\ \swarrow \searrow \\ 2 \quad 6 \\ \swarrow \searrow \\ 2 \quad 3 \end{array}$$

$$3\sqrt{3}$$

$$4\sqrt{3}$$

$$2\sqrt{3}$$

$$9\sqrt{2}(\sqrt{8} + \sqrt{6})$$

$$= \sqrt{2} \cdot \sqrt{8} + \sqrt{2} \cdot \sqrt{6}$$

$$= \sqrt{16} + \sqrt{12}$$

$$= 4 + \sqrt{12} = \boxed{4 + 2\sqrt{3}}$$

$$\begin{array}{c} 12 \\ \swarrow \searrow \\ 3 \quad 4 \\ \swarrow \searrow \\ 2 \quad 2 \end{array}$$

$$8. \sqrt{72} + \sqrt{50} - \sqrt{8} = 6\sqrt{2} + 5\sqrt{2} - 2\sqrt{2} = \boxed{9\sqrt{2}}$$

$$\begin{array}{c} 72 \\ \swarrow \searrow \\ 2 \quad 36 \\ \swarrow \searrow \\ 2 \quad 6 \quad 6 \\ \swarrow \searrow \\ 2 \quad 3 \quad 3 \quad 2 \end{array} \quad \begin{array}{c} 50 \\ \swarrow \searrow \\ 5 \quad 10 \\ \swarrow \searrow \\ 5 \quad 2 \end{array} \quad \begin{array}{c} 8 \\ \swarrow \searrow \\ 2 \quad 4 \\ \swarrow \searrow \\ 2 \quad 2 \end{array}$$

$$6\sqrt{2}$$

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

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

$$= 3\sqrt{12} - 2\sqrt{18} = \boxed{6\sqrt{3} - 6\sqrt{2}}$$

$$\begin{array}{c} 12 \\ \swarrow \searrow \\ 2 \quad 6 \\ \swarrow \searrow \\ 2 \quad 3 \end{array} \quad \begin{array}{c} 18 \\ \swarrow \searrow \\ 3 \quad 6 \\ \swarrow \searrow \\ 3 \quad 2 \end{array}$$