

Adding and Subtracting Radical Expressions

$$2\sqrt{7} + 3\sqrt{7} = \boxed{5\sqrt{7}}$$

$$13\sqrt{2} - 1\sqrt{2} = \boxed{12\sqrt{2}}$$

1. Simplify each radical expression.

a) $4\sqrt{24} + 5\sqrt{6}$

$$\begin{array}{l}
 4\sqrt{24} \\
 \textcircled{2} \sqrt{12} \\
 \textcircled{2} \sqrt{6} \\
 \textcircled{2} \textcircled{3} \\
 4\sqrt{2 \cdot 2 \cdot 2 \cdot 3} \\
 4 \cdot 2 \sqrt{2 \cdot 3} \\
 8\sqrt{6}
 \end{array}
 +
 \begin{array}{l}
 5\sqrt{6} \\
 \textcircled{2} \textcircled{3} \\
 5\sqrt{2 \cdot 3}
 \end{array}
 = \boxed{13\sqrt{6}}$$

b) $-6\sqrt{32} - \sqrt{50} + 3\sqrt{98}$

$$\begin{array}{l}
 -6\sqrt{32} \\
 \textcircled{2} \sqrt{16} \\
 \textcircled{2} \sqrt{8} \\
 \textcircled{2} \sqrt{4} \\
 \textcircled{2} \textcircled{2} \\
 -6\sqrt{2 \cdot 2 \cdot 2 \cdot 2} \\
 -6 \cdot 2 \cdot 2 \sqrt{2} \\
 -24\sqrt{2}
 \end{array}
 -
 \begin{array}{l}
 \sqrt{50} \\
 \textcircled{2} \sqrt{25} \\
 \textcircled{5} \textcircled{5} \\
 -\sqrt{2 \cdot 5 \cdot 5} \\
 -5\sqrt{2}
 \end{array}
 +
 \begin{array}{l}
 3\sqrt{98} \\
 \textcircled{2} \sqrt{49} \\
 \textcircled{7} \textcircled{7} \\
 3\sqrt{2 \cdot 7 \cdot 7} \\
 3 \cdot 7 \sqrt{2} \\
 21\sqrt{2}
 \end{array}
 = \boxed{-8\sqrt{2}}$$

$$c) -3\sqrt{96x^4} + 3\sqrt{120} - 2x\sqrt{54x^2}$$

$$-3\sqrt{96x^4}$$



$$-3\sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x \cdot x}$$

$$-3 \cdot 2 \cdot 2 \cdot x \cdot x \sqrt{2 \cdot 3}$$

$$-12x^2\sqrt{6}$$

$$3\sqrt{120}$$



$$3\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 5}$$

$$3 \cdot 2 \sqrt{2 \cdot 3 \cdot 5}$$

$$6\sqrt{30}$$

$$-2x\sqrt{54x^2}$$



$$-2x\sqrt{2 \cdot 3 \cdot 3 \cdot 3 \cdot x \cdot x}$$

$$-2x \cdot 3 \cdot x \sqrt{2 \cdot 3}$$

$$-6x^2\sqrt{6}$$

$$\underline{-12x^2\sqrt{6}} + 6\sqrt{30} - \underline{6x^2\sqrt{6}} = \boxed{-18x^2\sqrt{6} + 6\sqrt{30}}$$

$$d) \sqrt{20x^2y^3} - xy\sqrt{28y}$$

$$\sqrt{20x^2y^3}$$



$$\sqrt{2 \cdot 2 \cdot 5 \cdot x \cdot x \cdot y \cdot y \cdot y}$$

$$2xy\sqrt{5y}$$

$$-xy\sqrt{28y}$$



$$-xy\sqrt{2 \cdot 2 \cdot 7y}$$

$$-2xy\sqrt{7y}$$

$$\boxed{2xy\sqrt{5y} - 2xy\sqrt{7y}}$$