

Adding and Subtracting Radical Expressions

Date _____ Period _____

Simplify.

1) $3\sqrt{6} - 4\sqrt{6}$

$$\boxed{-\sqrt{6}}$$

2) $-3\sqrt{7} + 4\sqrt{7}$

$$\boxed{\sqrt{7}}$$

3) $-11\sqrt{21} - 11\sqrt{21}$

$$\boxed{-22\sqrt{21}}$$

4) $-9\sqrt{15} + 10\sqrt{15}$

$$\boxed{\sqrt{15}}$$

5) $-10\sqrt{7} + 12\sqrt{7}$

$$\boxed{2\sqrt{7}}$$

6) $-3\sqrt{17} - 4\sqrt{17}$

$$\boxed{-7\sqrt{17}}$$

7) $-10\sqrt{11} - 11\sqrt{11}$

$$\boxed{-21\sqrt{11}}$$

8) $-2\sqrt{3} + 3\sqrt{27}$

$$2\sqrt{3} + 9\sqrt{3}$$

$$\boxed{7\sqrt{3}}$$

Simplify

$$3\sqrt{27}$$

$$3\sqrt{9 \cdot 3}$$

$$3 \cdot 3\sqrt{3}$$

$$9\sqrt{3}$$

9) $2\sqrt{6} - 2\sqrt{24}$

Simplify

$$-2\sqrt{24}$$

$$2\sqrt{6} - 4\sqrt{6}$$

$$-2\sqrt{6 \cdot 4}$$

$$-2(2)\sqrt{6}$$

$$-4\sqrt{6}$$

$$\boxed{-2\sqrt{6}}$$

11) $-\sqrt{12} + 3\sqrt{3}$

Simplify

$$-\sqrt{12}$$

$$-2\sqrt{3} + 3\sqrt{3}$$

$$-\sqrt{4 \cdot 3}$$

$$-2\sqrt{3}$$

$$\boxed{\sqrt{3}}$$

10) $2\sqrt{6} + 3\sqrt{54}$

$$2\sqrt{6} + 9\sqrt{6}$$

$$\boxed{11\sqrt{6}}$$

Simplify

$$3\sqrt{54}$$

$$3\sqrt{9 \cdot 6}$$

$$3(3)\sqrt{6}$$

$$9\sqrt{6}$$

$$9\sqrt{6}$$

12) $3\sqrt{3} - \sqrt{27}$

$$3\sqrt{3} - 3\sqrt{3}$$

$$\boxed{0}$$

Simplify

$$-\sqrt{27}$$

$$-\sqrt{9 \cdot 3}$$

$$-3\sqrt{3}$$

$$-3\sqrt{3}$$

$$13) 3\sqrt{8} + 3\sqrt{2}$$

$$\begin{aligned} & 3\sqrt{4 \cdot 2} + 3\sqrt{2} \\ & 3 \cdot 2\sqrt{2} + 3\sqrt{2} \\ & 6\sqrt{2} + 3\sqrt{2} \\ & \boxed{9\sqrt{2}} \end{aligned}$$

$$15) -3\sqrt{20} - \sqrt{5}$$

$$\begin{aligned} & -3\sqrt{4 \cdot 5} - \sqrt{5} \\ & -3 \cdot 2\sqrt{5} - \sqrt{5} \\ & -6\sqrt{5} - \sqrt{5} \\ & \boxed{-7\sqrt{5}} \end{aligned}$$

$$17) 3\sqrt{18} - 2\sqrt{2}$$

$$\begin{aligned} & 3\sqrt{9 \cdot 2} - 2\sqrt{2} \\ & 3 \cdot 3\sqrt{2} - 2\sqrt{2} \\ & 9\sqrt{2} - 2\sqrt{2} \\ & \boxed{7\sqrt{2}} \end{aligned}$$

$$19) 3\sqrt{18} + 3\sqrt{12} + 2\sqrt{27}$$

$$\begin{aligned} & 3\sqrt{9 \cdot 2} + 3\sqrt{4 \cdot 3} + 2\sqrt{9 \cdot 3} \\ & 3 \cdot 3\sqrt{2} + 3 \cdot 2\sqrt{3} + 2 \cdot 3\sqrt{3} \\ & 9\sqrt{2} + 6\sqrt{3} + 6\sqrt{3} \Rightarrow \boxed{9\sqrt{2} + 12\sqrt{3}} \end{aligned}$$

$$21) -3\sqrt{2} + 3\sqrt{20} - 3\sqrt{8}$$

$$\begin{aligned} & -3\sqrt{2} + 3\sqrt{5 \cdot 4} - 3\sqrt{4 \cdot 2} \\ & -3\sqrt{2} + 3 \cdot 2\sqrt{5} - 3 \cdot 2\sqrt{2} \\ & -3\sqrt{2} + 6\sqrt{5} - 6\sqrt{2} \Rightarrow \boxed{-9\sqrt{2} + 6\sqrt{5}} \end{aligned}$$

$$23) -2\sqrt{20} + 2\sqrt{18} - 2\sqrt{5}$$

$$\begin{aligned} & -2\sqrt{5 \cdot 4} + 2\sqrt{9 \cdot 2} - 2\sqrt{5} \\ & -2 \cdot 2\sqrt{5} + 2 \cdot 3\sqrt{2} - 2\sqrt{5} \\ & -4\sqrt{5} + 6\sqrt{2} - 2\sqrt{5} \Rightarrow \boxed{6\sqrt{2} - 6\sqrt{5}} \end{aligned}$$

$$25) -\sqrt{45} + 2\sqrt{5} - \sqrt{20} - 2\sqrt{6}$$

$$\begin{aligned} & -\sqrt{9 \cdot 5} + 2\sqrt{5} - \sqrt{5 \cdot 4} - 2\sqrt{6} \\ & -3\sqrt{5} + 2\sqrt{5} - 2\sqrt{5} - 2\sqrt{6} \\ & \boxed{-3\sqrt{5} - 2\sqrt{6}} \end{aligned}$$

$$27) -3\sqrt{45} + 2\sqrt{12} + 3\sqrt{6} - 3\sqrt{20}$$

$$14) -3\sqrt{6} + 3\sqrt{6}$$

$$\boxed{0}$$

$$16) 2\sqrt{45} - 2\sqrt{5}$$

$$\begin{aligned} & 2\sqrt{9 \cdot 5} - 2\sqrt{5} \\ & 2 \cdot 3\sqrt{5} - 2\sqrt{5} \\ & 6\sqrt{5} - 2\sqrt{5} \\ & \boxed{4\sqrt{5}} \end{aligned}$$

$$18) -3\sqrt{18} + 3\sqrt{8} - \sqrt{24}$$

$$\begin{aligned} & -3\sqrt{9 \cdot 2} + 3\sqrt{4 \cdot 2} - \sqrt{6 \cdot 4} \\ & -3 \cdot 3\sqrt{2} + 3 \cdot 2\sqrt{2} - 2\sqrt{6} \\ & -9\sqrt{2} + 6\sqrt{2} - 2\sqrt{6} \\ & \boxed{-3\sqrt{2} - 2\sqrt{6}} \end{aligned}$$

$$20) -3\sqrt{5} - \sqrt{6} - \sqrt{5}$$

$$22) -3\sqrt{3} - \sqrt{8} - 3\sqrt{3}$$

$$24) 2\sqrt{18} - 2\sqrt{12} + 2\sqrt{18}$$

$$26) 2\sqrt{20} - \sqrt{20} + 3\sqrt{20} - 2\sqrt{45}$$

$$28) -\sqrt{27} - 3\sqrt{45} - \sqrt{20} + 2\sqrt{45}$$