

Adding Subtracting Multiplying Radicals Worksheet Ans Key

$$1. -5\sqrt{3} - 3\sqrt{3} = \boxed{-8\sqrt{3}}$$

$$2. 2\sqrt{8} - \sqrt{8} = \boxed{\sqrt{8}}$$

$$3. -4\sqrt{6} - \sqrt{6} = \boxed{-5\sqrt{6}}$$

$$4. -3\sqrt{5} + 2\sqrt{5} = \boxed{-\sqrt{5}}$$

$$5. -3\sqrt{27} - 3\sqrt{27} - 3\sqrt{27} = -9\sqrt{27} = -9 \cdot 3\sqrt{3} \\ \stackrel{\textcircled{9}}{\textcircled{3}} = \boxed{-27\sqrt{3}}$$

$$6. -3\sqrt{12} + 3\sqrt{3} + 3\sqrt{20} \\ \stackrel{\textcircled{4}}{\textcircled{3}} \quad \quad \quad \stackrel{\textcircled{4}}{\textcircled{5}} \\ = -3 \cdot 2\sqrt{3} + 3\sqrt{3} + 3 \cdot 2\sqrt{5} \\ = -6\sqrt{3} + 3\sqrt{3} + 6\sqrt{5} \\ = \boxed{-3\sqrt{3} + 6\sqrt{5}}$$

$$7. -2\sqrt{45} - 3\sqrt{20} - 2\sqrt{6} \\ \stackrel{\textcircled{9}}{\textcircled{5}} \quad \quad \quad \stackrel{\textcircled{4}}{\textcircled{5}} \\ = -2 \cdot 3\sqrt{5} - 3 \cdot 2\sqrt{5} - 2\sqrt{6} \\ = -6\sqrt{5} - 6\sqrt{5} - 2\sqrt{6} \\ = \boxed{-12\sqrt{5} - 2\sqrt{6}}$$

$$8. \quad -3\sqrt[6]{3} - 2\sqrt[6]{192} - \sqrt[6]{320}$$

$\begin{matrix} \textcircled{64} \\ \wedge \\ 3 \end{matrix}$

 $\begin{matrix} \textcircled{64} \\ \wedge \\ 5 \end{matrix}$

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

$$9. \quad -3\sqrt[3]{-3} + 2\sqrt[3]{162} + 3\sqrt[3]{81}$$

$$\begin{aligned}
 &= -3\sqrt[3]{-3} + 2 \cdot 3\sqrt[3]{6} + 3 \cdot 3\sqrt[3]{3} \\
 &= \boxed{-3\sqrt[3]{-3} + 6\sqrt[3]{6} + 9\sqrt[3]{3}} = 3\sqrt[3]{3} + 6\sqrt[3]{6} + 9\sqrt[3]{3} \\
 &= \boxed{12\sqrt[3]{3} + 6\sqrt[3]{6}}
 \end{aligned}$$

$$10. \quad 4\sqrt[6]{3} + 2\sqrt[6]{32} - 3\sqrt[6]{192} - 2\sqrt[6]{192}$$

$$\begin{aligned}
 &= 4\sqrt[6]{3} + 2 \cdot 2\sqrt[6]{2} - 3 \cdot 2\sqrt[6]{3} - 2 \cdot 2\sqrt[6]{3} \\
 &= 4\sqrt[6]{3} + 4\sqrt[6]{2} - 6\sqrt[6]{3} - 4\sqrt[6]{3} \\
 &= \boxed{4\sqrt[6]{3} + 4\sqrt[6]{2} - 10\sqrt[6]{3}}
 \end{aligned}$$

$$11. \quad -\sqrt[3]{320} - 4\sqrt[3]{5} + 2\sqrt[3]{135} + 2\sqrt[3]{16}$$

$\begin{matrix} \textcircled{64} \\ \wedge \\ 5 \end{matrix}$

 $\begin{matrix} \textcircled{27} \\ \wedge \\ 5 \end{matrix}$

 $\begin{matrix} \textcircled{8} \\ \wedge \\ 2 \end{matrix}$

$$= -4\sqrt[3]{5} - 4\sqrt[3]{5} + 2 \cdot 3\sqrt[3]{5} + 2 \cdot 2\sqrt[3]{2}$$

$$= -4\sqrt[3]{5} - 4\sqrt[3]{5} + 6\sqrt[3]{5} + 4\sqrt[3]{2}$$

$$= \boxed{-2\sqrt[3]{5} + 4\sqrt[3]{2}}$$

$$\begin{aligned}
 20. \quad & -\sqrt{2} (\sqrt{10} - 4\sqrt{6}) = -\sqrt{20} + 4\sqrt{12} \\
 & \qquad \qquad \qquad \textcircled{4}^{\wedge} 5 \qquad \qquad \textcircled{4}^{\wedge} 3 \\
 & = -2\sqrt{5} + 4 \cdot 2\sqrt{3} \\
 & = \boxed{-2\sqrt{5} + 8\sqrt{3}}
 \end{aligned}$$

$$\begin{aligned}
 21. \quad & \sqrt{15} (2\sqrt{10} - 4\sqrt{6}) = 2\sqrt{150} - 4\sqrt{90} \\
 & \qquad \qquad \qquad \textcircled{25}^{\wedge} 6 \qquad \qquad \textcircled{9}^{\wedge} 10 \\
 & = 2 \cdot 5\sqrt{6} - 4 \cdot 3\sqrt{10} \\
 & = \boxed{10\sqrt{6} - 12\sqrt{10}}
 \end{aligned}$$

22. Foil!

$$\begin{aligned}
 & (-7 + \sqrt{3x})(4 + \sqrt{3x}) \\
 & = -7(4) - 7\sqrt{3x} + (\sqrt{3x})(4) + (\sqrt{3x})(\sqrt{3x}) \\
 & = -28 - 7\sqrt{3x} + 4\sqrt{3x} + 3x \\
 & = \boxed{-28 - 3\sqrt{3x} + 3x}
 \end{aligned}$$

$$\begin{aligned}
 23. \quad & (\sqrt{2a} - 5)(7\sqrt{2a} - 5) \\
 & = (\sqrt{2a})(7\sqrt{2a}) - 5\sqrt{2a} - 35\sqrt{2a} + 25 \\
 & = 7(2a) - 5\sqrt{2a} - 35\sqrt{2a} + 25 \\
 & = \boxed{14a - 40\sqrt{2a} + 25}
 \end{aligned}$$

24. Foil

$$\begin{aligned}
 & (2 + \sqrt{5})(-2 + \sqrt{5k}) \\
 & = -4 + 2\sqrt{5k} - 2\sqrt{5} + \sqrt{25k} \\
 & = \boxed{-4 + 2\sqrt{5k} - 2\sqrt{5} + 5\sqrt{k}}
 \end{aligned}$$

$$25. (\sqrt{3} + \sqrt{5x})(\sqrt{3} - 5\sqrt{5x})$$

$$= (\sqrt{3})(\sqrt{3}) - (\sqrt{3})(-5\sqrt{5x}) + (\sqrt{5x})(\sqrt{3}) + (\sqrt{5x})(-5\sqrt{5x})$$

$$= 3 + 5\sqrt{15x} + \sqrt{15x} - 5\sqrt{25x^2}$$

$$= 3 + 6\sqrt{15x} - 5 \cdot 5x$$

$$= 3 + 6\sqrt{15x} - 25x$$

$$26. (7 + \sqrt{6})(1 + \sqrt{6})$$

$$= 7 + 7\sqrt{6} + \sqrt{6} + 6$$

$$= 13 + 8\sqrt{6}$$

A. $\frac{1}{x^2} = x^{-2}$
 $\frac{d}{dx} x^{-2} = -2x^{-3}$
 $= -\frac{2}{x^3}$

B. $\frac{d}{dx} \ln(x^2)$
 $= \frac{1}{x^2} \cdot 2x$
 $= \frac{2x}{x^2} = \frac{2}{x}$

11

12