

## C10L3 Notes

### Multiplying and Dividing Radical Expressions

Simplify.

1.  $3\sqrt{15} \cdot -2\sqrt{6}$

$$\begin{aligned} & -6\sqrt{90} \\ & -6\sqrt{9 \cdot 10} \\ & -6\sqrt{9} \cdot \sqrt{10} \\ & -6(3)\sqrt{10} \\ & -18\sqrt{10} \end{aligned}$$

2.  $8\sqrt{12} \cdot 5\sqrt{8}$

$$\begin{aligned} & 40\sqrt{96} \\ & 40\sqrt{16 \cdot 6} \\ & 40\sqrt{16} \cdot \sqrt{6} \\ & 40(4)\sqrt{6} \\ & 160\sqrt{6} \end{aligned}$$

3.  $-\sqrt{10x^3} \cdot 4\sqrt{2x^4}$

$$\begin{aligned} & -4\sqrt{20x^7} \\ & -4\sqrt{4 \cdot 5 \cdot x^6 \cdot x} \\ & -4\sqrt{4} \cdot \sqrt{5} \cdot \sqrt{x^6} \cdot \sqrt{x} \\ & -4(2)\sqrt{5} \cdot x^3\sqrt{x} \\ & -8x^3\sqrt{5x} \end{aligned}$$

4.  $7\sqrt{8x^5} \cdot \sqrt{3x}$

$$\begin{aligned} & \sqrt{24x^6} \\ & \sqrt{4 \cdot 6 \cdot x^6} \\ & \sqrt{4} \cdot \sqrt{6} \cdot \sqrt{x^6} \\ & 2\sqrt{6} \cdot x^3 \\ & 2x^3\sqrt{6} \end{aligned}$$

Simplify by rationalizing the denominator.

5.  $\frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$$\begin{aligned} & \frac{3\sqrt{5}}{\sqrt{25}} \\ & \frac{3\sqrt{5}}{5} \end{aligned}$$

6.  $\frac{6}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$$\begin{aligned} & \frac{6\sqrt{3}}{\sqrt{9}} \\ & \frac{6\sqrt{3}}{3} \\ & 2\sqrt{3} \end{aligned}$$

$$7. \frac{\sqrt{7}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$\frac{\sqrt{21}}{\sqrt{9}}$$

$$\frac{\sqrt{21}}{3}$$

$$8. \frac{\sqrt{5}}{\sqrt{11}} \cdot \frac{\sqrt{11}}{\sqrt{11}}$$

$$\frac{\sqrt{55}}{\sqrt{121}}$$

$$\frac{\sqrt{55}}{11}$$

Simplify by adding or subtracting.

$$9. 8\sqrt{2} - 3\sqrt{2}$$

$$5\sqrt{2}$$

$$10. 4\sqrt{5} + 1\sqrt{5}$$

$$5\sqrt{5}$$

$$11. \sqrt{5} - 6\sqrt{20}$$

$$\sqrt{5} - 6\sqrt{4 \cdot 5}$$

$$\sqrt{5} - 6\sqrt{4}\sqrt{5}$$

$$\sqrt{5} - 6(2)\sqrt{5}$$

$$1\sqrt{5} - 12\sqrt{5}$$

$$-11\sqrt{5}$$

$$12. 3\sqrt{8} + 4\sqrt{98}$$

$$3\sqrt{4 \cdot 2} + 4\sqrt{49 \cdot 2}$$

$$3\sqrt{4}\sqrt{2} + 4\sqrt{49}\sqrt{2}$$

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

$$6\sqrt{2} + 28\sqrt{2}$$

$$34\sqrt{2}$$

Multiply and simplify.

$$13. (3 + \sqrt{5})(4 - \sqrt{5})$$

$$12 - 3\sqrt{5} + 4\sqrt{5} - \sqrt{25}$$

$$12 + 1\sqrt{5} - 5$$

$$7 + \sqrt{5}$$

$$14. (\sqrt{7} + 3\sqrt{2})(5\sqrt{3} - 4\sqrt{2})$$

$$5\sqrt{21} - 4\sqrt{14} + 15\sqrt{6} - 12\sqrt{4}$$

$$5\sqrt{21} - 4\sqrt{14} + 15\sqrt{6} - 12(2)$$

$$5\sqrt{21} - 4\sqrt{14} + 15\sqrt{6} - 24$$

Simplify by rationalizing the denominator. (You will need to find the conjugate of the denominator.)

$$\begin{aligned}
 15. \quad & \frac{3}{2-\sqrt{5}} \cdot \frac{2+\sqrt{5}}{2+\sqrt{5}} \\
 & \frac{3(2+\sqrt{5})}{(2-\sqrt{5})(2+\sqrt{5})} \\
 & \frac{6+3\sqrt{5}}{4+2\sqrt{5}-2\sqrt{5}-\sqrt{25}} \\
 & \frac{6+3\sqrt{5}}{4-5} \\
 & \frac{6+3\sqrt{5}}{-1} \\
 & \text{OK} \\
 & -6-3\sqrt{5}
 \end{aligned}$$

$$\begin{aligned}
 17. \quad & \frac{\sqrt{3}}{\sqrt{5}+\sqrt{7}} \cdot \frac{\sqrt{5}-\sqrt{7}}{\sqrt{5}-\sqrt{7}} \\
 & \frac{\sqrt{3}(\sqrt{5}-\sqrt{7})}{(\sqrt{5}+\sqrt{7})(\sqrt{5}-\sqrt{7})} \\
 & \frac{\sqrt{15}-\sqrt{21}}{\sqrt{25}-\sqrt{35}+\sqrt{35}-\sqrt{49}} \\
 & \frac{\sqrt{15}-\sqrt{21}}{5-7} \\
 & \frac{\sqrt{15}-\sqrt{21}}{-2}
 \end{aligned}$$

$$\begin{aligned}
 16. \quad & \frac{6}{5+\sqrt{3}} \cdot \frac{5-\sqrt{3}}{5-\sqrt{3}} \\
 & \frac{6(5-\sqrt{3})}{(5+\sqrt{3})(5-\sqrt{3})} \\
 & \frac{30-6\sqrt{3}}{25-5\sqrt{3}+5\sqrt{3}-\sqrt{9}} \\
 & \frac{30-6\sqrt{3}}{25-3} \\
 & \frac{30-6\sqrt{3}}{22} \\
 & \frac{15-3\sqrt{3}}{11}
 \end{aligned}$$

$$\begin{aligned}
 18. \quad & \frac{\sqrt{5}}{\sqrt{2}-\sqrt{11}} \cdot \frac{\sqrt{2}+\sqrt{11}}{\sqrt{2}+\sqrt{11}} \\
 & \frac{\sqrt{5}(\sqrt{2}+\sqrt{11})}{(\sqrt{2}-\sqrt{11})(\sqrt{2}+\sqrt{11})} \\
 & \frac{\sqrt{10}+\sqrt{55}}{\sqrt{4}+\sqrt{22}-\sqrt{22}-\sqrt{121}} \\
 & \frac{\sqrt{10}+\sqrt{55}}{2-11} \\
 & \frac{\sqrt{10}+\sqrt{55}}{-9}
 \end{aligned}$$