

C6L2 Notes

Multiplying and Dividing Radical Expressions

Multiply and simplify.

1. $\sqrt{27} \cdot \sqrt{243}$

$$\sqrt{9 \cdot 3} \cdot \sqrt{9 \cdot 9 \cdot 3}$$
$$\sqrt{9} \cdot \sqrt{3} \cdot \sqrt{9} \cdot \sqrt{9} \cdot \sqrt{3}$$
$$3 \cdot 3 \cdot 3 \sqrt{9}$$
$$27 \sqrt{9}$$
$$27 \cdot 3$$
$$81$$

$$\begin{array}{r} 3 \overline{)243} \\ \underline{3 81} \\ 3 \overline{)27} \\ \underline{3 9} \\ 3 \end{array}$$

2. $\sqrt[4]{8} \cdot \sqrt[4]{2}$

$$\sqrt[4]{16}$$
$$2$$

$$\begin{array}{r} 2 \overline{)16} \\ \underline{2 8} \\ 2 \overline{)4} \\ 2 \end{array}$$

3. $\sqrt[5]{16} \cdot \sqrt[3]{25}$

CANNOT BE DONE
BECAUSE OF
DIFFERENT ROOTS.

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

$\sqrt{-9}$
NON REAL

5. $\sqrt[3]{-27} \cdot \sqrt[3]{-3}$

$$\sqrt[3]{81}$$
$$\sqrt[3]{27 \cdot 3}$$
$$\sqrt[3]{27} \cdot \sqrt[3]{3}$$

$$\begin{array}{r} 3 \overline{)81} \\ \underline{3 27} \\ 3 \overline{)9} \\ 3 \end{array}$$

6. $\sqrt{18} \cdot \sqrt{27}$

$$\sqrt{9 \cdot 2} \cdot \sqrt{9 \cdot 3}$$
$$\sqrt{9} \cdot \sqrt{2} \cdot \sqrt{9} \cdot \sqrt{3}$$
$$3 \cdot 3 \sqrt{2 \cdot 3}$$
$$9 \sqrt{6}$$

$$\begin{array}{r} 2 \overline{)18} \\ \underline{2 9} \\ 3 \end{array}$$

$$\begin{array}{r} 3 \overline{)27} \\ \underline{3 9} \\ 3 \end{array}$$

$$7. \sqrt{6x^9} \cdot \sqrt{30x^2}$$

$$\sqrt{180x^{11}}$$

$$\sqrt{4 \cdot 9 \cdot 5 \cdot x^{10} \cdot x}$$

$$\sqrt{4} \cdot \sqrt{9} \cdot \sqrt{5} \cdot \sqrt{x^{10}} \cdot \sqrt{x}$$

$$2 \cdot 3 \cdot |x^5| \sqrt{5x}$$

$$6 |x^5| \sqrt{5x}$$

$$\begin{array}{r} 2 \overline{)180} \\ 2 \overline{)90} \\ 3 \overline{)45} \\ 3 \overline{)15} \\ 5 \end{array}$$

$$8. 3\sqrt{5x} \cdot 4\sqrt{10xy^6}$$

$$12\sqrt{50x^2y^6}$$

$$12\sqrt{25 \cdot 2 \cdot x^2 \cdot y^6}$$

$$12\sqrt{25} \cdot \sqrt{2} \cdot \sqrt{x^2} \cdot \sqrt{y^6}$$

$$12 \cdot 5 |x| |y^3| \sqrt{2}$$

$$60 |x| |y^3| \sqrt{2}$$

$$\begin{array}{r} 2 \overline{)50} \\ 5 \overline{)25} \\ 5 \end{array}$$

$$9. 4\sqrt[3]{3x^4y} \cdot 7\sqrt[3]{x^3y^2}$$

$$28\sqrt[3]{3x^7y^3}$$

$$28\sqrt[3]{3x^6 \cdot x \cdot y^3}$$

$$28 \cdot \sqrt[3]{3} \cdot \sqrt[3]{x^6} \cdot \sqrt[3]{x} \cdot \sqrt[3]{y^3}$$

$$28x^2y \sqrt[3]{3x}$$

$$10. \sqrt[4]{14m^5} \cdot 6\sqrt[4]{8mn^3}$$

$$4\sqrt[4]{112m^6n^3}$$

$$\sqrt[4]{16 \cdot 7 \cdot m^4 \cdot m^2 \cdot n^3}$$

$$\sqrt[4]{16} \cdot \sqrt[4]{7} \cdot \sqrt[4]{m^4} \cdot \sqrt[4]{m^2} \cdot \sqrt[4]{n^3}$$

$$2|m| \sqrt{7m^2n^3}$$

$$\begin{array}{r} 2 \overline{)112} \\ 2 \overline{)56} \\ 2 \overline{)28} \\ 2 \overline{)14} \\ 7 \end{array}$$

Divide and simplify.

11. $\frac{\sqrt{300}}{\sqrt{3}}$

$$\sqrt{\frac{300}{3}}$$

$$\sqrt{100}$$

$$10$$

12. $\frac{\sqrt{75x^4}}{\sqrt{3x}}$

$$\sqrt{\frac{75x^4}{3x}}$$

$$\sqrt{25x^3}$$

$$\sqrt{25 \cdot x^2 \cdot x}$$

$$\sqrt{25} \cdot \sqrt{x^2} \cdot \sqrt{x}$$

$$5|x|\sqrt{x}$$

13. $\frac{\sqrt{54x^5y^5}}{\sqrt{2xy^3}}$

$$\sqrt{\frac{54x^5y^5}{2xy^3}}$$

$$\sqrt{27x^4y^2}$$

$$\begin{array}{r} 3 \overline{)27} \\ \underline{3} \\ 3 \\ \underline{3} \\ 3 \\ \underline{3} \\ 0 \end{array}$$

$$\sqrt{9 \cdot 3 \cdot x^4 \cdot y^2}$$

$$\sqrt{9} \cdot \sqrt{3} \cdot \sqrt{x^4} \cdot \sqrt{y^2}$$

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

14. $\frac{\sqrt[3]{375x^8y^3}}{\sqrt[3]{3xy}}$

$$\sqrt[3]{\frac{375x^8y^3}{3xy}}$$

$$\sqrt[3]{125x^7y^2}$$

$$\sqrt[3]{125 \cdot x^6 \cdot x \cdot y^2}$$

$$\sqrt[3]{125} \cdot \sqrt[3]{x^6} \cdot \sqrt[3]{x} \cdot \sqrt[3]{y^2}$$

$$5x^2\sqrt[3]{xy^2}$$