6.2 Multiplying and Dividing Radicals

you can only mult if they have the same index	1	Multiply coefficients, then use the **PRODCUT RULE:** $\sqrt[n]{a} \cdot \sqrt[n]{b} =$ $\sqrt[n]{ab}$	
	2	**SIMPLIFY** the resulting radical	
	1. $\sqrt{27} \cdot \sqrt{5}$ $\sqrt{135}$ $\sqrt{9}\sqrt{15}$ $3\sqrt{15}$		2. $3\sqrt{10} \cdot -2\sqrt{18}$ $-6\sqrt{180}$ $-6\sqrt{36}\sqrt{5}$ $-6 \cdot 6\sqrt{5}$ $-36\sqrt{5}$
	3. $2\sqrt[3]{9} \cdot 5\sqrt[3]{-24}$ $10\sqrt[3]{-216}$ $10(-6)$ -60		4. $-3\sqrt[4]{64} \cdot -\sqrt[4]{8}$ $+3\sqrt[4]{512}$ $3\sqrt[4]{256}\sqrt[4]{2}$ $3 \cdot 4\sqrt[4]{2}$ $12\sqrt[4]{2}$
Multiplying Radicals	5. $\sqrt{6x^4} \cdot 5\sqrt{8x^5}$ $5\sqrt{48x^9}$ $5\sqrt{16x^8}\sqrt{3x}$ $5 \cdot 4x^4\sqrt{3x}$ $20x^4\sqrt{3x}$		6. $\sqrt[3]{54m^8} \cdot \sqrt[3]{5m^4}$ $\sqrt[3]{270m^{12}}$ $\sqrt[3]{27m^{12}}\sqrt[3]{10}$ $3m^4\sqrt[3]{10}$
	7. $\sqrt[3]{-3a^7b^4} \cdot \sqrt[3]{36a^6b^2}$ $\sqrt[3]{-108a^{13}b^6}$ $\sqrt[3]{-27a^{12}b^6}\sqrt[3]{4a}$ $-3a^4b^2\sqrt[3]{4a}$		8. $2\sqrt[4]{p^2q} \cdot 7\sqrt[4]{p^3q^{10}}$ $14\sqrt[4]{p^5q^{11}}$ $14\sqrt[4]{p^4q^8}\sqrt[4]{pq^3}$ $14pq^2\sqrt[4]{pq^3}$
	1	Divide coefficients, then use the **QUOTIENT RULE:** $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} =$ $\sqrt[n]{\frac{a}{b}}$	
	2	**SIMPLIFY** the resulting radical	
Dividing Radicals	9. $\frac{12\sqrt{160}}{2\sqrt{5}}$ $6\sqrt{32}$ $6\sqrt{16}\sqrt{2}$ $6 \cdot 4\sqrt{2}$ $24\sqrt{2}$		10. $\frac{36\sqrt[4]{1250}}{9\sqrt[4]{2}}$ $4\sqrt[4]{625}$ $4 \cdot 5$ 20
	11. $\frac{\sqrt{x^3y^9}}{\sqrt{x^2y^5}}$ $\sqrt{xy^4}$ $y^2\sqrt{x}$		12. $\frac{28\sqrt[3]{-16m^6}}{4\sqrt[3]{2m}}$ $7\sqrt[3]{-8m^5}$ $7 \cdot -2m^2\sqrt[3]{m^2}$ $-14m\sqrt[3]{m^2}$

$\sqrt[3]{8}$ $\sqrt[3]{5}$

13. $\sqrt{\frac{48}{16}}$

$\sqrt{3}$

14. $\sqrt[3]{\frac{40}{27}}$

$\frac{\sqrt[3]{40}}{\sqrt[3]{27}} = \frac{\sqrt[3]{40}}{3} = \frac{2\sqrt[3]{5}}{3}$

15. $\sqrt[3]{\frac{7x^5}{64y^6}}$

$\frac{\sqrt[3]{7x^5}}{\sqrt[3]{64y^6}}$

$\frac{x\sqrt[3]{7x^2}}{4y^2}$

16. $\sqrt[4]{\frac{32w}{81}}$

$\frac{\sqrt[4]{32w}}{\sqrt[4]{81}} = \frac{\sqrt[4]{16}\,\sqrt[4]{2w}}{\sqrt[4]{81}}$

$\frac{2\sqrt[4]{2w}}{3}$

Rationalizing the Denominator

higher roots
↓
complete groups of "n" terms

Monomial Denominator: Multiply the numerator and denominator by the radical.

17. $\frac{3}{2\sqrt{5}}$ $\frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{2\sqrt{25}} = \frac{3\sqrt{5}}{2\cdot 5}$

$\frac{3\sqrt{5}}{10}$

18. $\sqrt{\frac{8}{15}}$ $\frac{\sqrt{8}}{\sqrt{15}} = \frac{2\sqrt{2}}{\sqrt{15}}\cdot\frac{\sqrt{15}}{\sqrt{15}}$

$\frac{2\sqrt{30}}{15}$

19. $\frac{3\sqrt{12}}{4\sqrt{7}}$

$\frac{3\cdot 2\sqrt{3}}{4\sqrt{7}}\cdot\frac{\sqrt{7}}{\sqrt{7}} = \frac{6\sqrt{21}}{4\cdot 7}$

$\frac{6\sqrt{21}}{28} = \frac{3\sqrt{21}}{14}$

20. $\frac{\sqrt[3]{7x}}{\sqrt[3]{5y^2}}$ $\frac{\sqrt[3]{7x}}{\sqrt[3]{5y^2}}\cdot\frac{\sqrt[3]{5^2y}}{\sqrt[3]{5^2y}}$

$\frac{\sqrt[3]{7\cdot 25xy}}{\sqrt[3]{5^3y^3}} = \frac{\sqrt[3]{175xy}}{5y}$

21. $\frac{\sqrt[3]{8}}{5\sqrt[3]{2}}$ $\frac{2}{5\sqrt[3]{2}}\cdot\frac{\sqrt[3]{2^2}}{\sqrt[3]{2^2}}$

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

22. $\frac{\sqrt[3]{3x^4}}{\sqrt[3]{9x^3}}$ $\frac{\cancel{x}\sqrt[3]{3x}}{\cancel{x}\sqrt[3]{9}}$ $\frac{\sqrt[3]{3x}}{\sqrt[3]{3^2}}\cdot\frac{\sqrt[3]{3}}{\sqrt[3]{3}}$

$\frac{\sqrt[3]{9x}}{\sqrt[3]{3^3}} = \frac{\sqrt[3]{9x}}{3}$