

Simplifying Radical Expressions

(Multiplication and Division)

Level 1 - Simplify simple radicals and expressions

Level 2 - Simplify expressions of higher order



Radicals (square roots, cube roots, etc.) can be multiplied and divided just as numbers or variables. Once we perform this operation we can then simplify as we've done before

Like exponents, radicals have special rules to follow when performing operations.

Rules for Multiplying and Dividing Radicals	
Multiplication	Division
$\sqrt{a} \cdot \sqrt{b} = \sqrt{a \cdot b}$	$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}, b \neq 0$

The same rules apply for higher-order roots, such as cube roots or fourth roots.

When variables are inside radicals, we apply exponent rules.

<u>Example #1</u>	<u>Example #2</u>	<u>Example #3</u>
$\sqrt{8} \cdot \sqrt{50}$	$\sqrt{8x^4} \cdot \sqrt{4x}$	$\frac{\sqrt[3]{48x^5}}{\sqrt[3]{2x}}$
$\sqrt{400}$	$\sqrt{32 \cdot x^4 \cdot x^1}$	$\sqrt[3]{24x^{5-1}}$
$\sqrt{20 \cdot 20}$	$\sqrt{32 \cdot x^5}$	$\sqrt[3]{8 \cdot 3 \cdot x^4}$
<div style="border: 1px dashed black; padding: 5px; display: inline-block;">20</div>	$\sqrt{16 \cdot 2 \cdot x^2 \cdot x^2 \cdot x}$	<div style="border: 1px dashed black; padding: 5px; display: inline-block;">$2x\sqrt[3]{3x}$</div>
	<div style="border: 1px dashed black; padding: 5px; display: inline-block;">$4x^2 \cdot \sqrt{2x}$</div>	

Remember:

- Combine radicals only when they have the same index (e.g., both square roots or both cube roots).
- Simplify the inside first, then simplify outside the radical.
- Divide exponents by the index of the root when possible.