

Distributive Property and FOIL with Radicals



Level 1 - Use the distributive property to expand and then simplify

Level 2 - Use the FOIL method to expand and then simplify

Level 3 - Expand and then simplify expressions containing variables

When radicals are inside parentheses, we often need to **expand** the expression before simplifying.

Remember:

Distributive Property	FOIL
$a(b + c) = ab + ac$	$(a + b)(c + d) = ac + ad + bc + bd$

Radicals follow the same rules!

Example #1	Example #2	Example #3	Example #4
$3\sqrt{2}(4 + \sqrt{2})$	$(\sqrt{3} + 2)(\sqrt{3} + 5)$	$\sqrt{3}(\sqrt{2x} - 2\sqrt{2x})$	$(x - \sqrt{5})(x + \sqrt{5})$
$4 \cdot 3\sqrt{2} + 3\sqrt{2} \cdot \sqrt{2}$ $12\sqrt{2} + 3 \cdot 2$ $12\sqrt{2} + 6$ <div style="border: 1px dashed black; padding: 2px; display: inline-block;">$6 + 12\sqrt{2}$</div>	<p>First: $\sqrt{3} \cdot \sqrt{3}$ Outside: $\sqrt{3} \cdot 5$ Inside: $2 \cdot \sqrt{3}$ Last: $2 \cdot 5$</p> <p>Now combine like terms: $(3) + (5\sqrt{3}) + (2\sqrt{3}) + (10)$</p> <div style="border: 1px dashed black; padding: 2px; display: inline-block;">$13 + 7\sqrt{3}$</div>	$(\sqrt{3})(\sqrt{2x}) - (\sqrt{3})(2\sqrt{2x})$ $\sqrt{6x} - 2\sqrt{6x}$ $(1 - 2)\sqrt{6x}$ <div style="border: 1px dashed black; padding: 2px; display: inline-block;">$-\sqrt{6x}$</div>	<p>First: $x \cdot x$ Outside: $x \cdot \sqrt{5}$ Inside: $-\sqrt{5} \cdot x$ Last: $\sqrt{5} \cdot \sqrt{5}$</p> <p>Now combine like terms: $(x^2) + (x\sqrt{5}) - (x\sqrt{5}) - (5)$</p> <div style="border: 1px dashed black; padding: 2px; display: inline-block;">$x^2 - 5$</div> ↓ difference of squares

Remember:

- Always check if radicals can be simplified after multiplying.
- Watch for special cases such as difference of squares and perfect square