

Expanding Radical Expressions

Multiply and simplify each expression completely. Assume all variables are non-negative.

1. Distributing a Radical Monomial

Multiply the monomial by each term inside the brackets. Simplify each product completely.

1. $\sqrt{3}(2 + \sqrt{5})$

5. $(3\sqrt{6})(2 + 5\sqrt{3})$

2. $2\sqrt{3}(3x + 2)$

6. $(-2\sqrt{7})(3\sqrt{2} - \sqrt{7})$

3. $2\sqrt{2}(3 + \sqrt{8})$

7. $7\sqrt{3}(5\sqrt{5} - 6\sqrt{3})$

4. $2\sqrt{3}(3\sqrt{5} + \sqrt{6})$

8. $(-8\sqrt{6})(1 + 4\sqrt{10})$

2. Distribute, Simplify & Combine

Distribute first. Simplify every radical product, then combine like terms when possible.

1. $\sqrt{x}(2\sqrt{x} + 1)$

5. $-\sqrt{3}(4\sqrt{12} - 2\sqrt{3} + \sqrt{6})$

2. $3\sqrt{2}(\sqrt{8} + 2\sqrt{2})$

6. $-\sqrt{2}(14\sqrt{5} + 3\sqrt{6} - \sqrt{13})$

3. $(4\sqrt{2})(3\sqrt{5} - 2\sqrt{8})$

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

4. $2\sqrt{5}(3\sqrt{20} - \sqrt{5})$

8. $2\sqrt{3}(4\sqrt{27} - 3\sqrt{12} + \sqrt{75})$

3. Radical Monomials with Variables

Distribute the monomial to each term. Multiply coefficients and variables, simplify radical products, and combine like terms when possible.

1. $x\sqrt{x}(\sqrt{x} + 2)$

5. $2y(-x - \sqrt{xy} + \sqrt{y})$

2. $2x\sqrt{x}(3x + \sqrt{x})$

6. $2x\sqrt{x}(5x + \sqrt{x} + 3)$

3. $x\sqrt{3}(x\sqrt{12} + 2)$

7. $x\sqrt{3}(x\sqrt{12} - 5x + 2)$

4. $4\sqrt{xy}(6x - \sqrt{xy})$

8. $4\sqrt{xy}(6x - \sqrt{xy} - \sqrt{y})$

4. Multi-Term Radical Expressions with Variables

Distribute carefully to every term. Simplify all products completely and combine like terms where possible.

1. $2y(-x - \sqrt{xy} + \sqrt{y} - 4)$

5. $5x\sqrt{x}(5x\sqrt{x} - 2x - \sqrt{x} + 2)$

2. $3x\sqrt{x}(2x + \sqrt{x} - \sqrt{y} + 1)$

6. $3xy\sqrt{y}(2x\sqrt{x} + 3\sqrt{y} + 2)$

3. $5x\sqrt{x}(xy + 3\sqrt{x} - \sqrt{y} + 2)$

7. $4xy\sqrt{y}(2xy\sqrt{x} + 3x\sqrt{y} + 3\sqrt{x} + 4)$

4. $4x\sqrt{y}(2x + \sqrt{y} - \sqrt{x} + 3)$

8. $-3x\sqrt{2x}(2x\sqrt{8x} - 4\sqrt{2x} + \sqrt{y} - 5)$