

Algebra: Adding and Subtracting Radical Expressions



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DIRECTIONS

Combine the radical expressions. First simplify each radical so all terms have the same radicand, then add or subtract the coefficients of the like radicals. Variables under the radical are assumed nonnegative.

1. Combine:

$$3\sqrt{2} + 5\sqrt{2}$$

Answer: _____

2. Combine:

$$7\sqrt{3} - 2\sqrt{3}$$

Answer: _____

3. Combine:

$$4\sqrt{5} + 2\sqrt{5} - \sqrt{5}$$

Answer: _____

4. Simplify and combine:

$$\sqrt{8} + \sqrt{2}$$

Answer: _____

5. Simplify and combine:

$$\sqrt{12} - \sqrt{3}$$

Answer: _____

6. Simplify and combine:

$$\sqrt{50} + \sqrt{32}$$

Answer: _____

7. Simplify and combine:

$$2\sqrt{18} - \sqrt{8}$$

Answer: _____

8. Simplify and combine:

$$\sqrt{27} + \sqrt{48} - \sqrt{12}$$

Answer: _____

9. Simplify and combine:

$$\sqrt{45} - \sqrt{20} + \sqrt{80}$$

Answer: _____

10. Combine ($x \geq 0$):

$$5\sqrt{x} + 3\sqrt{x} - 2\sqrt{x}$$

Answer: _____

Answer Key & Solutions

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TEACHER NOTES

Items 1–3: like radicals — combine coefficients. Items 4–9: simplify first by factoring out perfect squares ($8=4\cdot 2$, $12=4\cdot 3$, $50=25\cdot 2$, etc.), then combine. Item 10: variable radicals.

1. Combine: $3\sqrt{2} + 5\sqrt{2}$

Answer: $8\sqrt{2}$

Like radicals: $(3+5)\sqrt{2} = 8\sqrt{2}$.

2. Combine: $7\sqrt{3} - 2\sqrt{3}$

Answer: $5\sqrt{3}$

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

3. Combine: $4\sqrt{5} + 2\sqrt{5} - \sqrt{5}$

Answer: $5\sqrt{5}$

$(4+2-1)\sqrt{5} = 5\sqrt{5}$.

4. Simplify and combine: $\sqrt{8} + \sqrt{2}$

Answer: $3\sqrt{2}$

$\sqrt{8} = 2\sqrt{2}$; $2\sqrt{2} + \sqrt{2} = 3\sqrt{2}$.

5. Simplify and combine: $\sqrt{12} - \sqrt{3}$

Answer: $\sqrt{3}$

$\sqrt{12} = 2\sqrt{3}$; $2\sqrt{3} - \sqrt{3} = \sqrt{3}$.

6. Simplify and combine: $\sqrt{50} + \sqrt{32}$

Answer: $9\sqrt{2}$

$\sqrt{50} = 5\sqrt{2}$; $\sqrt{32} = 4\sqrt{2}$; sum = $9\sqrt{2}$.

7. Simplify and combine: $2\sqrt{18} - \sqrt{8}$

Answer: $4\sqrt{2}$

$2\sqrt{18} = 2\cdot 3\sqrt{2} = 6\sqrt{2}$; $\sqrt{8} = 2\sqrt{2}$; $6\sqrt{2} - 2\sqrt{2} = 4\sqrt{2}$.

8. Simplify and combine: $\sqrt{27} + \sqrt{48} - \sqrt{12}$

Answer: $5\sqrt{3}$

$3\sqrt{3} + 4\sqrt{3} - 2\sqrt{3} = 5\sqrt{3}$.

9. Simplify and combine: $\sqrt{45} - \sqrt{20} + \sqrt{80}$

Answer: $5\sqrt{5}$

$3\sqrt{5} - 2\sqrt{5} + 4\sqrt{5} = 5\sqrt{5}$.

10. Combine ($x \geq 0$): $5\sqrt{x} + 3\sqrt{x} - 2\sqrt{x}$

Answer: $6\sqrt{x}$

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