6.3 Binomial Radical Expressions **Algebra 2** **THOMPSON**

1) Simplify by combining like radicals.

$7\sqrt{7} + 3\sqrt{7}$ Combine like term – treat $\sqrt{7}$ as a variable

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. $7\sqrt{7} + 3\sqrt{7} = 10\sqrt{7}$ 7 + 3 = 10 and carry over the $\sqrt{7}$
(Type an exact answer, using radicals as needed.)

B. The expression cannot be simplified.

2) Simplify by combining like radicals.

$4\sqrt{3} + 5\sqrt{3}$ Combine like term – treat $\sqrt{3}$ as a variable

A. $4\sqrt{3} + 5\sqrt{3} = 9\sqrt{3}$ 4 + 5 = 9 and carry over the $\sqrt{3}$
(Type an exact answer, using radicals as needed.)

3) Subtract. Assume all variables represent nonnegative real numbers.

$6\sqrt{x} - 9\sqrt{x}$ combine like terms $(\sqrt{x})$

$-3\sqrt{x}$

4) Subtract. Assume all variables represent nonnegative real numbers.

$5\sqrt{x} - 9\sqrt{x}$ combine like terms $(\sqrt{x})$

$-4\sqrt{x}$

5) Simplify. **Perfect squares: 4, 9, 16, 25, 36, 49**

$\sqrt{20} + \sqrt{45}$ Find which of the green #s go into 20 and 45

$4 \cdot 5$ $9 \cdot 5$

$\sqrt{20}$ $\sqrt{45}$ take square root of green and comes out

$2\sqrt{5} + 3\sqrt{5}$ combine like terms = $5\sqrt{5}$

6) Simplify. **Perfect squares: 4, 9, 16, 25, 36, 49**

$\sqrt{12} + \sqrt{75}$ Find which of the green #s go into 12 and 75

$4 \cdot 3 \qquad 25 \cdot 3$

$\sqrt{20} + \sqrt{45}$ take square root of green and comes out

$2\sqrt{3} + 5\sqrt{3}$ combine like terms = $7\sqrt{3}$

7) Add or subtract as indicated.

$2\sqrt[3]{7} + 2\sqrt[3]{7} - 2\sqrt[3]{7}$ substitute $\sqrt[3]{7}$ with x

$2x + 2x - 2x$ Combine like term

$2x$ therefore $2\sqrt[3]{7}$

8) Add or subtract as indicated.

$8\sqrt[3]{2} + 6\sqrt[3]{2} - 9\sqrt[3]{2}$ substitute $\sqrt[3]{2}$ with x

$8x + 6x - 9x$ Combine like term

$5x$ therefore $5\sqrt[3]{7}$

9) Add or subtract as indicated.

$6\sqrt{5} - 8\sqrt{7} - 4\sqrt{5} + 9\sqrt{7}$ Substitute $\sqrt{5}$ as x and $\sqrt{7}$ as y

$6x - 8y - 4x + 9y$ Combine like term

$2x + y$ therefore $2\sqrt{5} + \sqrt{7}$

10) Add or subtract as indicated.

$6\sqrt{2} - 2\sqrt{3} - 4\sqrt{2} + 9\sqrt{3}$ Substitute $\sqrt{2}$ as x and $\sqrt{3}$ as y

$6x - 2y - 4x + 9y$ Combine like term

$2x + 7y$ therefore $2\sqrt{2} + 7\sqrt{3}$

11) Add as indicated. You will need to simplify terms before they can be combined.

$\sqrt{3} + \sqrt{48}$ **Perfect squares: 4, 9, 16, 25, 36, 49**

Find which of the green #s go into 12 and 75

$16 \cdot 3$

$\sqrt{3} + \sqrt{48}$ take square root of green and comes out

$\sqrt{3} + 4\sqrt{3}$ combine like terms = $5\sqrt{3}$

12) Add as indicated. You will need to simplify terms before they can be combined.

$\sqrt{5} + \sqrt{80}$ **Perfect squares: 4, 9, 16, 25, 36, 49**

Find which of the green #s go into 12 and 75

$16 \cdot 5$

$\sqrt{5} + \sqrt{80}$ take square root of green and comes out

$\sqrt{5} + 4\sqrt{5}$ combine like terms = $5\sqrt{5}$

13) Add as indicated. You will need to simplify terms before they can be combined.

$9\sqrt{75} + \sqrt{27}$ **Perfect squares: 4, 9, 16, 25, 36, 49**

Find which of the green #s go into 12 and 75

$25 \cdot 3$ $9 \cdot 3$

$9\sqrt{75} + \sqrt{27}$ take square root of green and comes out

$5 \cdot 9\sqrt{3} + 3\sqrt{3}$

$45\sqrt{3} + 3\sqrt{3}$ combine like terms = $48\sqrt{3}$

14) Add as indicated. You will need to simplify terms before they can be combined.

$6\sqrt{98} + \sqrt{50}$ **Perfect squares: 4, 9, 16, 25, 36, 49**

Find which of the green #s go into 12 and 75

$49\,|\,2 \qquad 25\,|\,2$

$6\sqrt{98} + \sqrt{27}$ take square root of green and comes out

$7 \cdot 6\sqrt{2} + 5\sqrt{2}$

$42\sqrt{2} + 5\sqrt{2}$ combine like terms = $47\sqrt{2}$

15) Multiply. multiplying binomials – USE FOIL

$(3-\sqrt{7})(3+\sqrt{7})$

$9 + 3\sqrt{7} - 3\sqrt{7} - \sqrt{7}^2$ Squaring cancels out square root $\sqrt{7}^2 = 7$

$9 - 7 = 2$

16) Multiply the pair of conjugates. multiplying binomials – USE FOIL

$(3-\sqrt{11})(3+\sqrt{11})$

$9 + 3\sqrt{11} - 3\sqrt{11} - \sqrt{11}^2$ Squaring cancels out square root $\sqrt{11}^2 = 11$

$9 - 11 = -2$

6. Multiply and simplify.

$(8-5\sqrt{6})(3+4\sqrt{6})$

multiplying binomials – USE FOIL

$24 + 32\sqrt{6} - 15\sqrt{6} - 20 \cdot \sqrt{6}^2$ combine like terms $(\sqrt{2})$

$24 + 17\sqrt{6} - 20(6)$ Squaring cancels out square root $\sqrt{2}^2 = 2$

$24 + 17\sqrt{6} - 120$ combine like terms

$-96 + 17\sqrt{6}$

7. Multiply. Write twice $(8 + \sqrt{7})(8 + \sqrt{7})$ multiplying binomials – USE FOIL

$(8 + \sqrt{7})^2$

$64 + 8\sqrt{7} + 8\sqrt{7} + \sqrt{7}^2$ Squaring cancels out square root $\sqrt{7}^2 = 7$

$64 + 16\sqrt{7} + 7$ combine like terms

$71 + 16\sqrt{7}$

8. Multiply the pair of conjugates.

$(4 - \sqrt{11})(4 + \sqrt{11})$ multiplying binomials – USE FOIL

$16 + 4\sqrt{11} - 4\sqrt{11} - \sqrt{11}^2$ combine like terms $(\sqrt{11})$ they cancel

$16 - 11$ Squaring cancels out square root $\sqrt{11}^2 = 11$

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9. What is the simplified form of the following expression?

$\sqrt{18} + \sqrt{72} - \sqrt{2}$ **Perfect squares: 4, 9, 16, 25, 36, 49**

Find which of the green #s go into 18 and 72

$9 \cdot 2$ $36 \cdot 2$

$\sqrt{18}$ $\sqrt{72}$ take square root of green and comes out

$3\sqrt{2} + 6\sqrt{2} - \sqrt{2}$ combine like terms = $8\sqrt{2}$

10. Perform the indicated operation and simplify.

$(8\sqrt{5} - 5\sqrt{6})(6\sqrt{5} + 5\sqrt{6})$

multiplying binomials – USE FOIL

$48 \cdot \sqrt{5}^2 + 40\sqrt{30} - 30\sqrt{30} - 25 \cdot \sqrt{6}^2$ combine like terms $(\sqrt{2})$

$48(5) + 10\sqrt{30} - 25(6)$ Squaring cancels out square root $\sqrt{2}^2 = 2$

$240 + 10\sqrt{30} - 150$ combine like terms

$90 + 10\sqrt{30}$

11. Multiply and simplify.

$(3 - 9\sqrt{5})(7 + 3\sqrt{5})$ multiplying binomials – USE FOIL

$21 + 9\sqrt{5} - 63\sqrt{5} - 27 \cdot \sqrt{5}^2$ combine like terms $(\sqrt{2})$

$21 - 54\sqrt{5} - 27(5)$ Squaring cancels out square root $\sqrt{2}^2 = 2$

$21 - 54\sqrt{5} - 135$ combine like terms

$-114 - 54\sqrt{5}$

12. Multiply the pair of conjugates.

$(1 - \sqrt{5})(1 + \sqrt{5})$ multiplying binomials – USE FOIL

$1 + \sqrt{5} - \sqrt{5} - \sqrt{5}^2$ combine like terms $(\sqrt{5})$ they cancel

$1 - 5$ Squaring cancels out square root $\sqrt{11}^2 = 11$

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