Math in Living C O L O R !!

To see Section 5.03 with explanations, examples, and exercises, click here!

5.03 Adding and Subtracting Square Roots

Basic Algebra: One Step at a Time. Page 413-418: #28, 29, 37, 38, 41.

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p. 416: 28. $\sqrt{125} + \sqrt{50}$

Solution: Make two separate radicals for each of the radicals above:

$$\sqrt{} \bullet \sqrt{} + \sqrt{} \bullet \sqrt{}$$

Find a perfect square factor in each of the numbers, and place it in the (first) RED radical.

$$\sqrt{25} \bullet \sqrt{} + \sqrt{25} \bullet \sqrt{}$$

Place the other factor that is "left-over" in the (second) BLUE radical.

$$\sqrt{25} \bullet \sqrt{5} + \sqrt{25} \bullet \sqrt{2}$$

Take square roots of the perfect squares:

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

Since these are NOT LIKE radicals, you CANNOT combine them.

Final answer: $5 \bullet \sqrt{5} + 5 \bullet \sqrt{2}$

Calculator check: $\sqrt{125} + \sqrt{50}$ = 18.251

$5 \bullet \sqrt{5} + 5 \bullet \sqrt{2}$ = 18.251

P. 416: 29. $\sqrt{72} + \sqrt{50}$

Solution: Make two separate radicals for each of the radicals above:

$$\sqrt{} \bullet \sqrt{} + \sqrt{} \bullet \sqrt{}$$

Find a perfect square factor in each of the numbers, and place it in the (first) RED radical.

$$\sqrt{36} \bullet \sqrt{} + \sqrt{25} \bullet \sqrt{}$$

Place the other factor that is "left-over" in the (second) BLUE radical.

$$\sqrt{36} \bullet \sqrt{2} + \sqrt{25} \bullet \sqrt{2}$$

Take square roots of the perfect squares:

$$6 \bullet \sqrt{2} + 5 \bullet \sqrt{2}$$

Since these are LIKE radicals, you can combine them:

Final answer: $11 \bullet \sqrt{2}$

Calculator check: $\sqrt{72} + \sqrt{50}$ = 15.556

$11 \bullet \sqrt{2}$ = 15.556

P. 417: 37. $3\sqrt{75} - 4\sqrt{48} - 8\sqrt{8}$

Solution: Make two separate radicals for each of the radicals above:

$$3\sqrt{} \bullet \sqrt{} - 4\sqrt{} \bullet \sqrt{} - 8\sqrt{} \bullet \sqrt{}$$

Find a perfect square factor in each of the numbers, and place it in the (first) RED radical.

$$3\sqrt{25} \bullet \sqrt{} - 4\sqrt{16} \bullet \sqrt{} - 8\sqrt{4} \bullet \sqrt{}$$

Place the other factor that is "left-over" in the (second) BLUE radical.

$$3\sqrt{25} \bullet \sqrt{3} - 4\sqrt{16} \bullet \sqrt{3} - 8\sqrt{4} \bullet \sqrt{2}$$

Take square roots of the perfect squares:

$$3 \bullet 5 \bullet \sqrt{3} - 4 \bullet 4 \bullet \sqrt{3} - 8 \bullet 2 \bullet \sqrt{2}$$

Multiply the numbers together:

$$15 \bullet \sqrt{3} - 16 \bullet \sqrt{3} - 16 \bullet \sqrt{2}$$

Notice that the first two terms are both $\sqrt{3}$ terms? Combine these.

Final answer: $-\sqrt{3} - 16\sqrt{2}$

Calculator check: $3\sqrt{75} - 4\sqrt{48} - 8\sqrt{8}$ = −24.359

$-\sqrt{3} - 16\sqrt{2}$ = −24.359

P. 417: 38. $4\sqrt{72} - 8\sqrt{50} + 3\sqrt{98}$

Solution: Make two separate radicals for each of the radicals above:

$$4\sqrt{} \bullet \sqrt{} - 8\sqrt{} \bullet \sqrt{} + 3\sqrt{} \bullet \sqrt{}$$

Find a perfect square factor in each of the numbers, and place it in the (first) RED radical.

$$4\sqrt{72} - 8\sqrt{50} + 3\sqrt{98}$$

$$4\sqrt{36} \bullet \sqrt{} - 8\sqrt{25} \bullet \sqrt{} + 3\sqrt{49} \bullet \sqrt{}$$

Place the other factor that is "left-over" in the (second) BLUE radical.

$$4\sqrt{36} \bullet \sqrt{2} - 8\sqrt{25} \bullet \sqrt{2} + 3\sqrt{49} \bullet \sqrt{2}$$

Take square roots of the perfect squares:

$$4 \bullet 6 \bullet \sqrt{2} - 8 \bullet 5 \bullet \sqrt{2} + 3 \bullet 7 \bullet \sqrt{2}$$

Multiply the numbers together:

$$24 \bullet \sqrt{2} - 40 \bullet \sqrt{2} + 21 \bullet \sqrt{2}$$

Notice that they are all $\sqrt{2}$ terms? Combine all like terms: (24– 40 + 21 = 5)

Final answer: $5 \bullet \sqrt{2}$

Calculator check: $4\sqrt{72} - 8\sqrt{50} + 3\sqrt{98}$ = 7.071

$5 \bullet \sqrt{2}$ = 7.071

P. 417: 41. $5\sqrt{63} + 7\sqrt{28} - 8\sqrt{175}$

Solution: Make two separate radicals for each of the radicals above:

$$5\sqrt{} \bullet \sqrt{} + 7\sqrt{} \bullet \sqrt{} - 8\sqrt{} \bullet \sqrt{}$$

Find a perfect square factor in each of the numbers, and place it in the (first) RED radical.

$$5\sqrt{9} \bullet \sqrt{} + 7\sqrt{4} \bullet \sqrt{} - 8\sqrt{25} \bullet \sqrt{}$$

Place the other factor that is "left-over" in the (second) BLUE radical.

$$5\sqrt{9} \bullet \sqrt{7} + 7\sqrt{4} \bullet \sqrt{7} - 8\sqrt{25} \bullet \sqrt{7}$$

Take square roots of the perfect squares:

$$5 \bullet 3 \bullet \sqrt{7} + 7 \bullet 2 \bullet \sqrt{7} - 8 \bullet 5 \bullet \sqrt{7}$$

Multiply the numbers together:

$$15 \bullet \sqrt{7} + 14 \bullet \sqrt{7} - 40 \bullet \sqrt{7}$$

Notice that they are all $\sqrt{7}$ terms? Combine all like terms: (15+ 14 – 40 = -11)

$$-11 \bullet \sqrt{7}$$

Calculator check: $5\sqrt{63} + 7\sqrt{28} - 8\sqrt{175}$ = −29.103

$-11 \bullet \sqrt{7}$ = −29.103