11-2 Operations With Radical Expressions

(Pages 593–597)

Radical expressions in which the radicands are alike can be added or subtracted in the same way that monomials are added or subtracted. If the radicals in a radical expression are not in simplest form, simplify them first. Then use the distributive property wherever possible to further simplify the expression. You can also use the FOIL method to multiply radical expressions with different radicands.

Examples

a. Simplify $3\sqrt{11} + 2\sqrt{7} - 5\sqrt{7} + 9\sqrt{11}$.

$3\sqrt{11} + 2\sqrt{7} - 5\sqrt{7} + 9\sqrt{11}$

$= (2 - 5)\sqrt{7} + (3 + 9)\sqrt{11}$

$= -3\sqrt{7} + 12\sqrt{11}$

b. Simplify $2\sqrt{12} + 4\sqrt{3}$.

$2\sqrt{12} + 4\sqrt{3} = 2\left(\sqrt{2^2}\sqrt{3}\right) + 4\sqrt{3}$

$= 2\left(2\sqrt{3}\right) + 4\sqrt{3}$

$= 4\sqrt{3} + 4\sqrt{3}$

$= 8\sqrt{3}$

Try These Together

Simplify.

1. $3\sqrt{6} + \sqrt{6}$ **2.** $14\sqrt{5} - 2\sqrt{5}$ **3.** $4\sqrt{18} + 2\sqrt{8}$

HINT: Make sure the radicals are in simplest form first, then use the distributive property to further simplify the expression.

Practice

Simplify.

4. $3\sqrt{7} + 4\sqrt{7} - 3\sqrt{7}$ **5.** $4\sqrt{13} - 2\sqrt{13} + 6\sqrt{13}$ **6.** $2\sqrt{7x} + 3\sqrt{7x}$

7. $5\sqrt{3a} + 4\sqrt{3a}$ **8.** $2\sqrt{c} + 6\sqrt{c} - 3\sqrt{c}$ **9.** $4\sqrt{8} + 3\sqrt{8} + 2\sqrt{8}$

10. $\sqrt{16} + \sqrt{24} + \sqrt{9}$ **11.** $\sqrt{20} + \sqrt{28} - \sqrt{25}$ **12.** $\sqrt{30} + \sqrt{40} - \sqrt{12}$

13. $2\sqrt{2} + 2\sqrt{\dfrac{1}{2}}$ **14.** $6\sqrt{50} + 3\sqrt{3}$ **15.** $2\sqrt{72} - 3\sqrt{50}$

16. Sailing Before modern navigational tools, old sailing ships would have a small platform on top of the front mast called a crow's nest. Sailors in the crow's nest could see land or other ships that were much farther away than the sailors on deck. The equation $d = \sqrt{\dfrac{3h}{2}}$ can be used to find the distance d in miles a person h feet high above the water can see. If the deck was 20 feet above the water and the crow's nest was another 32 feet above the deck, about how much farther could sailors in the crow's nest see than those on deck? Round to the nearest tenth of a mile.

17. **Standardized Test Practice** Simplify $6\sqrt{3x} + 4\sqrt{3x} - \sqrt{3x}$.

   A $9\sqrt{3x}$ **B** $9\sqrt{x}$ **C** $10\sqrt{3x}$ **D** $27\sqrt{x}$

Answers: 1. $4\sqrt{6}$ **2.** $12\sqrt{5}$ **3.** $16\sqrt{2}$ **4.** $4\sqrt{7}$ **5.** $8\sqrt{13}$ **6.** $5\sqrt{7x}$ **7.** $9\sqrt{3a}$ **8.** $5\sqrt{c}$ **9.** $18\sqrt{2}$ **10.** $7 + 2\sqrt{6}$