NAME _____ DATE _____ PERIOD ____

11-2 Study Guide and Intervention *(continued)*

Operations with Radical Expressions

Multiply Radical Expressions Multiplying two radical expressions with different radicands is similar to multiplying binomials.

Example **Multiply $(3\sqrt{2} - 2\sqrt{5})(4\sqrt{20} + \sqrt{8})$.**

Use the FOIL method.

$$\begin{aligned}(3\sqrt{2} - 2\sqrt{5})(4\sqrt{20} + \sqrt{8}) &= (3\sqrt{2})(4\sqrt{20}) + (3\sqrt{2})(\sqrt{8}) + (-2\sqrt{5})(4\sqrt{20}) + (-2\sqrt{5})(\sqrt{8}) \\ &= 12\sqrt{40} + 3\sqrt{16} - 8\sqrt{100} - 2\sqrt{40} && \text{Multiply.} \\ &= 12\sqrt{2^2 \cdot 10} + 3 \cdot 4 - 8 \cdot 10 - 2\sqrt{2^2 \cdot 10} && \text{Simplify.} \\ &= 24\sqrt{10} + 12 - 80 - 4\sqrt{10} && \text{Simplify.} \\ &= 20\sqrt{10} - 68 && \text{Combine like terms.}\end{aligned}$$

Exercises

Find each product.

1. $2(\sqrt{3} + 4\sqrt{5})$
   $2\sqrt{3} + 8\sqrt{5}$

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

3. $\sqrt{5}(\sqrt{5} - \sqrt{2})$
   $5 - \sqrt{10}$

4. $\sqrt{2}(3\sqrt{7} + 2\sqrt{5})$
   $3\sqrt{14} + 2\sqrt{10}$

5. $(2 - 4\sqrt{2})(2 + 4\sqrt{2})$
   -28

6. $(3 + \sqrt{6})^2$
   $15 + 6\sqrt{6}$

7. $(2 - 2\sqrt{5})^2$
   $24 - 8\sqrt{5}$

8. $3\sqrt{2}(\sqrt{8} + \sqrt{24})$
   $12 + 12\sqrt{3}$

9. $\sqrt{8}(\sqrt{2} + 5\sqrt{8})$
   44

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

11. $(\sqrt{3} + \sqrt{6})^2$
    $9 + 6\sqrt{2}$

12. $(\sqrt{2} - 2\sqrt{3})^2$
    $14 - 4\sqrt{6}$

13. $(\sqrt{5} - \sqrt{2})(\sqrt{2} + \sqrt{6})$
    $\sqrt{10} - 2 + \sqrt{30} - 2\sqrt{3}$

14. $(\sqrt{8} - \sqrt{2})(\sqrt{3} + \sqrt{6})$
    $\sqrt{6} + 2\sqrt{3}$

15. $(\sqrt{5} - \sqrt{18})(7\sqrt{5} + \sqrt{3})$
    $35 + \sqrt{15} - 2\sqrt{10} - 3\sqrt{6}$

16. $(2\sqrt{3} - \sqrt{45})(\sqrt{12} + 2\sqrt{6})$
    $12 - 6\sqrt{5} + 12\sqrt{2} - 6\sqrt{30}$

17. $(2\sqrt{5} - 2\sqrt{3})(\sqrt{10} + \sqrt{6})$
    $4\sqrt{2}$

18. $(\sqrt{2} + 3\sqrt{3})(\sqrt{12} - 4\sqrt{8})$
    $2 - 22\sqrt{6}$

What Do You Get When You Cross. . .

1. A thief with a cement truck? A H A R D E N E D C R I M I N A L
   5 14 5 12 9 2 13 2 9 11 12 15 7 15 13 5 10

2. A supermarket with a jungle? C H E C K O U T L I O N S
   11 14 2 11 4 1 8 3 10 15 1 13 6

Express each product below in simplest form. Find your answer and notice the letter next to it. Each time the exercise number appears in the code, write this letter above it. Keep working and you will discover the result of each "double cross."

O (1) $(5-\sqrt{2})(5+\sqrt{2})$ 23
E (2) $(7+\sqrt{3})(7-\sqrt{3})$ 46
T (3) $(\sqrt{10}-6)(\sqrt{10}+6)$ −26
K (4) $(\sqrt{10}-\sqrt{6})(\sqrt{10}+\sqrt{6})$ 4
A (5) $(\sqrt{2}+8)(\sqrt{2}+3)$ $26+11\sqrt{2}$

(K) 4 (O) 23
(G) −14 (T) −26
(E) 46
(A) $26+11\sqrt{2}$
(P) $30+9\sqrt{2}$

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S (6) $(\sqrt{13}+1)(\sqrt{13}-5)$ $8-4\sqrt{13}$
M (7) $(6-\sqrt{15})(3-\sqrt{15})$ $33-9\sqrt{15}$
U (8) $(9+\sqrt{7})^2$ $88+18\sqrt{7}$
D (9) $3\sqrt{2}(\sqrt{6}+\sqrt{2})$ $6\sqrt{3}+6$
L (10) $2\sqrt{5}(7\sqrt{3}-\sqrt{10})$ $14\sqrt{15}-10\sqrt{2}$

(D) $6\sqrt{3}+6$ (V) $7\sqrt{15}$
(S) $8-4\sqrt{13}$ (B) $9\sqrt{3}$
(U) $88+18\sqrt{7}$
(L) $14\sqrt{15}-10\sqrt{2}$
(M) $33-9\sqrt{15}$

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C (11) $5\sqrt{3}(2\sqrt{15}+\sqrt{8})$ $30\sqrt{5}+10\sqrt{6}$
R (12) $3\sqrt{6}(4\sqrt{3}-2\sqrt{15})$ $36\sqrt{2}-18\sqrt{10}$
N (13) $(8+3\sqrt{5})(1+2\sqrt{5})$ $38+19\sqrt{5}$
H (14) $(2\sqrt{7}+4)(5\sqrt{7}-11)$ $26-2\sqrt{7}$
I (15) $(3\sqrt{10}-5\sqrt{2})(2\sqrt{10}+6\sqrt{2})$ $16\sqrt{5}$

(Y) $8+6\sqrt{7}$ (I) $16\sqrt{5}$
(H) $26-2\sqrt{7}$ (F) $11\sqrt{5}$
(N) $38+19\sqrt{5}$
(C) $30\sqrt{5}+10\sqrt{6}$
(R) $36\sqrt{2}-18\sqrt{10}$

OBJECTIVE 3-o: To multiply binomials containing radicals.