# 3.0 Multiply Radicals



number x number

Skill Review: multiply polynomials: VAR x VAR

$3(2x) =$ $6x$

$5x(4x+3) =$ $20x^2 + 15x$

$(3x-4)(2x-5) =$ $6x^2 - 15x - 8x + 20$

$= 6x^2 - 23x + 20$

**Objective: Multiply and Simplify Radical Expressions.**

1. Monomial Multiplication (whole by whole & radical by radical). Multiply the following radicals and simplify if possible.

a. $\sqrt{5}\times\sqrt{6}$

$= \sqrt{30}$

b. $\sqrt{6}\times\sqrt{7}$

$= \sqrt{42}$

"multiply"

c. $3\sqrt{6}\times\sqrt{15}$

$= 3\sqrt{90}$

$= 3\sqrt{9}\sqrt{10}$

$= 3(3)\sqrt{10}$

$= 9\sqrt{10}$

"simplify"

d. $3\sqrt{5}\times 4\sqrt{8}$

$= 12\sqrt{40}$

$= 12\sqrt{4}\sqrt{10}$

$= 12(2)\sqrt{10}$

$= 24\sqrt{10}$

e. $\sqrt{18}\times\sqrt{15}$

$= \sqrt{9}\sqrt{2} \times \sqrt{15}$

$= 3\sqrt{2} \times \sqrt{15}$

$= 3\sqrt{30}$

f. $\sqrt{20}\times\sqrt{12}$

multiply

$\sqrt{20} \times \sqrt{12}$

$= \sqrt{240}$

$= \sqrt{16}\sqrt{15}$

$= 4\sqrt{15}$

vs simplify

$= \sqrt{4}\sqrt{5} \times \sqrt{4}\sqrt{3}$

$= 2\sqrt{5} \times 2\sqrt{3}$

$= 4\sqrt{15}$

# 3.0 Multiply Radicals



2. Distributive Property. Multiply and simplify wherever possible.

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

$= 15\sqrt{2} - 21$

b. $\sqrt{2}(3\sqrt{6}+\sqrt{10})$

$= 3\sqrt{12} + \sqrt{20}$

$= 3\sqrt{4}\sqrt{3} + \sqrt{4}\sqrt{5}$

$= 3(2)\sqrt{3} + 2\sqrt{5}$

$= 6\sqrt{3} + 2\sqrt{5}$

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

$= 3\sqrt{12} - 2\sqrt{20} + 3\sqrt{30} - 2\sqrt{50}$

$= 3\sqrt{4}\sqrt{3} - 2\sqrt{4}\sqrt{5} + 3\sqrt{30} - 2\sqrt{25}\sqrt{2}$

$= 3(2)\sqrt{3} - 2(2)\sqrt{5} + 3\sqrt{30} - 2(5)\sqrt{2}$

$= 6\sqrt{3} - 4\sqrt{5} + 3\sqrt{30} - 10\sqrt{2}$

d. $(5\sqrt{2}-2\sqrt{6})^2$ $(5\sqrt{2}-2\sqrt{6})$

$= 25\sqrt{4} - 10\sqrt{12} - 10\sqrt{12} + 4\sqrt{36}$

$= 25(2) - 20\sqrt{12} + 4(6)$

$= 50 - 20\sqrt{4}\sqrt{3} + 24$

$= 74 - 20(2)\sqrt{3}$

$= 74 - 40\sqrt{3}$

e. $(\sqrt{5}+\sqrt{3})(\sqrt{5}-\sqrt{3})$

$= \sqrt{25} - \sqrt{15} + \sqrt{15} - \sqrt{9}$ (zero)

$= \sqrt{25} - \sqrt{9}$

$= 5 - 3$

$= 2$

f. $(2+7\sqrt{5})(2+\sqrt{5})$

$= 4 + 2\sqrt{5} + 14\sqrt{5} + 7\sqrt{25}$

$= 4 + 16\sqrt{5} + 7(5)$

$= 4 + 16\sqrt{5} + 35$

$= 39 + 16\sqrt{5}$