PRINCIPLES - LESSON 14C
MULTIPLYING RADICALS

Simplify.

ex1) $5 \cdot \sqrt{3} = \boxed{5\sqrt{3}}$

ex2) $5 \cdot \sqrt{4} = 5 \cdot 2 = \boxed{10}$

ex3) $\sqrt{5} \cdot \sqrt{4} = \sqrt{5} \cdot 2 = \boxed{2\sqrt{5}}$

THE GROUND RULES

Ground Rule #1:

"Inside with Inside - Outside with Outside"

When multiplying radicals, multiply numbers inside a radical only by other numbers inside a radical. Multiply numbers outside a radical only by other numbers outside a radical.

MULTIPLYING RADICALS

Simplify.

ex4) $\sqrt{8} \cdot \sqrt{2}$ **THE EASY WAY**

$= \sqrt{8 \cdot 2} = \sqrt{16} = \boxed{4}$

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ex5) $\sqrt{8} \cdot \sqrt{2}$ **THE HARD WAY**

$= \sqrt{4 \cdot 2} \cdot \sqrt{2}$

$= 2\sqrt{2} \cdot \sqrt{2}$

$= 2\sqrt{4} = 2 \cdot 2 = \boxed{4}$

THE GROUND RULES

Ground Rule #2:

How to Multiply Radicals

$$\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$$

(true for all real numbers)

MULTIPLYING RADICALS

Simplify.

ex6) $\sqrt{2n^5} \cdot \sqrt{6n}$

$= \sqrt{2n^5 \cdot 6n}$

$= \sqrt{12n^6}$

$= \sqrt{4 \cdot 3 \cdot n^6}$

$= \boxed{2n^3\sqrt{3}}$

ex7) $3\sqrt{5xy} \cdot 2\sqrt{4xy^4}$

$= 3 \cdot 2 \cdot \sqrt{5xy \cdot 4xy^4}$

$= 6\sqrt{4 \cdot 5 \cdot x^2 \cdot y^4 \cdot y}$

$= \boxed{12xy^2\sqrt{5y}}$

MULTIPLYING RADICALS

Simplify.

ex8) $5\sqrt[3]{9x^2} \cdot 2\sqrt[3]{-3x^5}$

Now we need perfect cubes!

$= 10\sqrt[3]{-27x^7}$

$= 10\sqrt[3]{-27 \cdot x^6 \cdot x}$

$= \boxed{-30x^2\sqrt[3]{x}}$

MULTIPLYING RADICALS

Simplify.

ex9) $\sqrt{3}\left(\sqrt{3}+5\right)$

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

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

MULTIPLYING RADICALS

Simplify.

FOIL

ex10) $(2\sqrt{5}+4)(4\sqrt{5}-7)$

F O I L

$= 8\sqrt{25} - 14\sqrt{5} + 16\sqrt{5} - 28$

$= 40 + 2\sqrt{5} - 28$

$= \boxed{12 + 2\sqrt{5}}$

MULTIPLYING RADICALS

Simplify.

NOT FOIL

ex11) $(-6\sqrt{w})^2$

$= (-6\sqrt{w})(-6\sqrt{w})$

$= 36\sqrt{w^2}$

$= \boxed{36w}$

FOIL

ex12) $(1-6\sqrt{w})^2$

$= (1-6\sqrt{w})(1-6\sqrt{w})$

F O I L

$= 1 - 6\sqrt{w} - 6\sqrt{w} + 36\sqrt{w^2}$

$= \boxed{1 - 12\sqrt{w} + 36w}$