7.5 - Expressions with several Radicals

<u>Like Radicals</u> – have the <u>exact</u> same _____ and _____.

These can be combined similarly to "like terms" of variables.

① Simplify by combining like radicals

a) $3\sqrt{5} + 5\sqrt{5}$

b) $3\sqrt{3} - 5 \times \sqrt[3]{3} + 7\sqrt[3]{3}$

c) $3\sqrt{2} + 4\sqrt{3} - \sqrt{2} - 7\sqrt{3} + \sqrt[3]{2}$

d) $4\sqrt{8} - 6\sqrt{2}$

e) $3\sqrt[3]{16} + \sqrt[3]{54}$

② Multiply

a) $\sqrt{7}\left(3-\sqrt{7}\right)$

b) $\sqrt[3]{2}\left(\sqrt[3]{4}-2\sqrt[3]{32}\right)$

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

d) $\left(4-\sqrt{5}\right)^{2}$

e) $\left(3-\sqrt{7}\right)\left(3+\sqrt{7}\right)^{*}$

*These are called conjugates

③ Rationalize the Denominator (Review)

a) $\dfrac{3}{4-\sqrt{7}}$

b) $\dfrac{\sqrt{7}+\sqrt{5}}{\sqrt{5}+\sqrt{2}}$

To Simplify Products or Quotients with Differing Indices

1. Convert all radical expressions to exponential notation.
2. When the bases are identical, subtract exponents to divide and add exponents to multiply. This may require finding a common denominator.
3. Convert back to radical notation and, if possible, simplify.

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④ Simplify (variables are positive. ☺)

a) $\sqrt[3]{x^2} \cdot \sqrt[6]{x^5}$

b) $\sqrt[5]{a^3 b} \cdot \sqrt{ab}$

c) $\dfrac{\sqrt[3]{(2+5x)^2}}{\sqrt[4]{2+5x}}$

⑤ Find $(f \cdot g)(x)$

$f(x) = \sqrt[4]{x^7} + \sqrt[4]{3x^2}, \qquad g(x) = \sqrt[4]{x}$

⑥ Let $f(x) = x^2$. Find $f(\sqrt{6} - \sqrt{3})$