Section 7-3:
Adding, Subtracting, Multiplying, and Dividing Radical Expressions.

Adding & Subtracting → Like Radicals

Like radicals:
- the same index
- with the same radicand

Simplify.

$8\sqrt{3} + \sqrt{75} - 4\sqrt{3}$

$= 4\sqrt{3} + \sqrt{75}$

$\sqrt{25 \cdot 3}$

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

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

Simplify.

Simplify each radical before trying to combine.

$5\sqrt{18} + 6\sqrt{12} - \sqrt{8} - 2\sqrt{27}$

$\sqrt{9 \cdot 2}$ $\sqrt{4 \cdot 3}$ $\sqrt{4 \cdot 2}$ $\sqrt{9 \cdot 3}$

$= 3\sqrt{2} + 6 \cdot 2\sqrt{3} - 2\sqrt{2} - 2 \cdot 3\sqrt{3}$

$= 15\sqrt{2} + 12\sqrt{3} - 2\sqrt{2} - 6\sqrt{3}$

$= \boxed{13\sqrt{2} + 6\sqrt{3}}$

Simplify.

$10\sqrt[3]{54} + \sqrt{8} - 2\sqrt[3]{16} + 5\sqrt{32}$

$\sqrt[3]{27 \cdot 2}$ $\sqrt{4 \cdot 2}$ $\sqrt[3]{8 \cdot 2}$ $\sqrt{16 \cdot 2}$

$10 \cdot 3\sqrt[3]{2} + 2\sqrt{2} - 2 \cdot 2\sqrt[3]{2} + 5 \cdot 4\sqrt{2}$

$30\sqrt[3]{2}$ $+2\sqrt{2}$ $-4\sqrt[3]{2}$ $+20\sqrt{2}$

$= \boxed{26\sqrt[3]{2} + 22\sqrt{2}}$

Multiplying radical expressions.

Simplify each.

$\sqrt{5}(\sqrt{6}-\sqrt{5})$

$=\sqrt{5}\cdot\sqrt{6}-\sqrt{5}\cdot\sqrt{5}$

$=\sqrt{30}-5$

$\sqrt{3}(4\sqrt{3}-\sqrt{2})$

$=\sqrt{3}\cdot 4\sqrt{3}-\sqrt{3}\sqrt{2}$

$=3\cdot 4-\sqrt{6}$

$=12-\sqrt{6}$

Simplify.

$2\sqrt{3}(7\sqrt{2}+5\sqrt{3})$

$2\sqrt{3}\cdot 7\sqrt{2}+2\sqrt{3}\cdot 5\sqrt{3}$

$14\sqrt{6}+10\cdot 3$

$14\sqrt{6}+30$

Expand and simplify.

$(2-\sqrt{3})(4+10\sqrt{3})$

	2	$-\sqrt{3}$
4	8	$-4\sqrt{3}$
$+10\sqrt{3}$	$20\sqrt{3}$	$-10\cdot 3=-30$

$=-22+16\sqrt{3}$

Expand and simplify.

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

	$4\sqrt{6}$	$-\sqrt{5}$
$2\sqrt{6}$	$8\cdot 6=48$	$-2\sqrt{30}$
$+3\sqrt{5}$	$12\sqrt{30}$	$-3\cdot 5=-15$

$=33+10\sqrt{30}$

Expand and simplify.

$(8-\sqrt{7})^2 = (8-\sqrt{7})(8-\sqrt{7})$

	8	$-\sqrt{7}$
8	64	$-8\sqrt{7}$
$-\sqrt{7}$	$-8\sqrt{7}$	$+7$

$= 71 - 16\sqrt{7}$

Expand and simplify.

$(3-7\sqrt{2})^2$

	3	$-7\sqrt{2}$
3	9	$-21\sqrt{2}$
$-7\sqrt{2}$	$-21\sqrt{2}$	$49 \cdot 2 = 98$

$= 107 - 42\sqrt{2}$

Expand and simplify.

$(7+\sqrt{5})(7-\sqrt{5})$

	7	$+\sqrt{5}$
7	49	$+7\sqrt{5}$
$-\sqrt{5}$	$-7\sqrt{5}$	-5

$= 49 - 5 = 44$

Remember what the result always is when you expand $(a+b)(a-b) = a^2 - b^2$

These factors are called conjugates

Simplify. $(3+\sqrt{6})(3-\sqrt{6})$

use the box

	3	$+\sqrt{6}$
3	9	$+3\sqrt{6}$
$-\sqrt{6}$	$-3\sqrt{6}$	-6

$= 9 - 6$

$= 3$

or → use the above

$= (3)^2 - (\sqrt{6})^2$

$= 9 - 6$

$= 3$

You can now finish Hwk #36:

Sec 7-3 Due Tomorrow

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Problems 14-17, 20, 22, 30, 32