Simplify the following:

1) $3\sqrt{40}$

$3(\sqrt{4 \times 10})$

$3(2\sqrt{10})$

$6\sqrt{10}$

2) $-2\sqrt{48}$

$-2(\sqrt{16 \cdot 3})$

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

$= -8\sqrt{3}$

3) $\sqrt[3]{24}$

$\sqrt[3]{8 \cdot 3}$

$2\sqrt[3]{3}$

4) $\sqrt[5]{64}$

$2\sqrt[5]{2}$

5) $5\sqrt[4]{48}$

$5(\sqrt[4]{16 \cdot 3})$

$= 10\sqrt[4]{3}$

6) $2\sqrt[4]{162}$

$2\sqrt[4]{81 \cdot 2}$

$= 6\sqrt[4]{2}$

Mixed → Entire

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

$= \sqrt{45}$

$3\sqrt{7}$ Mixed $\left\{ \begin{array}{l} \sqrt{70} \\ \text{Entire} \end{array} \right.$

$2\sqrt{14} \rightarrow \sqrt{56}$

$5\sqrt{6} \rightarrow \sqrt{150}$

$3\sqrt[3]{2} = \sqrt[3]{54}$

$\sqrt[3]{3^3 \cdot 2}$

$2\sqrt[5]{3} = \sqrt[5]{2^5 \cdot 3}$

$= \sqrt[5]{96}$

Simplifying radicals involving variables:

$\sqrt{x} = x^{1/2}$

$\sqrt{x^{16}}$

$(x^{16})^{1/2} = x^{\frac{16}{2}} = x^8$

$\sqrt[3]{w^{27}} = w^9$

$\sqrt[5]{32y^{10}} = 2y^2$

What if things do not work out as nicely??

$\sqrt{x^{11}}$

$= \sqrt{x^0 \cdot x^1}$

$= x^5\sqrt{x}$

$\sqrt{27x^6y^5}$

$\sqrt{9 \cdot 3 x^6 y^4 y^1}$

$= 3x^3y^2\sqrt{3y}$

$\sqrt[4]{16a^5b^{18}}$

$\sqrt[4]{16\, a^4 \cdot a\, b^{16} \cdot b^2}$

$= 2ab^4\sqrt[4]{ab^2}$

Skills Check-up...Do I really understand??

1. State any restrictions on the following radicals:

$(a)\sqrt[7]{2x-5}$

None, $x \in \mathbb{R}$

$(b)\sqrt[4]{3-5x}$

$3-5x \geq 0$

$\frac{-5x}{-5} \geq \frac{-3}{-5}$

$x \leq \frac{3}{5}$

2. Simplify each of the following radicals:

$(a)-3\sqrt{48}$

$= -12\sqrt{3}$

$(b)3\sqrt[3]{24}$

$= 6\sqrt[3]{3}$

$(c)3\sqrt{27x^5y^{12}}$

$= 3\sqrt{9 \cdot 3 x^4 x^1 y^{12}}$

$= 9x^2y^6\sqrt{3x}$

$(d)4w\sqrt[4]{32w^{15}y^9z^3}$

$4w\sqrt[4]{16 \cdot 2w^{12}w^3y^8y^1z^3}$

$= 8w^4y^2\sqrt[4]{2w^3yz^3}$

3. Express each of the following as an ENTIRE radical:

$(a)-5\sqrt{8}$

$= -\sqrt{200}$

$= -\sqrt{200}$

$(b)3\sqrt[3]{2}$

$= \sqrt[3]{54}$

$(c)2a^5b\sqrt{6a}$

$= \sqrt{24a^{11}b^2}$

- Adding and Subtracting Radical Expressions
  - Simplify and combine LIKE RADICALS

$3\sqrt{3}+7\sqrt{3}$
$=10\sqrt{3}$

$5\sqrt{8}-4\sqrt{12}-\sqrt{300}+\sqrt{18}$

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

$10\sqrt{2}-8\sqrt{3}-10\sqrt{3}+3\sqrt{2}$

$13\sqrt{2}-18\sqrt{3}$

$2\sqrt{50x^5}-6x^2\sqrt{98x}+5\sqrt{48x}$

$=2\sqrt{25\cdot 2\cdot x^4 x}-6x^2\sqrt{49\cdot 2x}+5\sqrt{16\cdot 3x}$

$=10x^2\sqrt{2x}-42x^2\sqrt{2x}+20\sqrt{3x}$

$=-32x^2\sqrt{2x}+20\sqrt{3x}$

$7+2\sqrt[3]{16w^9}-5w^2\sqrt[3]{54w^3}$

$7+2\sqrt[3]{8\cdot 2w^9}-5w^2\sqrt[3]{27\cdot 2w^3}$

$=7+4w^3\sqrt[3]{2}-15w^3\sqrt[3]{2}$

$=7-11w^3\sqrt[3]{2}$

$\frac{9}{2}\sqrt{10} - \frac{5}{2}\sqrt{10}$

$\frac{4}{2}\sqrt{10}$

$2\sqrt{10}$

$7\sqrt{10} - 5\sqrt{10}$

$2\sqrt{10}$

$10x^2 + 5x^2$

$15x^2$

Practice Problems:

Textbook:

Page 279
2, 3, 4, 8, 9, 10, 12, 13, 15, 18

Bonus Problem:

Page 281
#21