7.2 Using Properties of Real and Rational Exponents *(continued)*

Std. 12.0

$\sqrt[3]{x^3} = x$ $\qquad \sqrt[6]{x^6} = |x|$

$\sqrt[6]{(-2)^6} = \sqrt[6]{64} = 2$

$\sqrt[n]{x^n} = x$, if n is odd ; $= |x|$ if n is even ★

$\sqrt[2]{x^8} = x^4$ $\qquad x^{8/2}$ $\qquad \sqrt[5]{x^{15}} = x^3$ $\qquad x^{15/5}$

$\sqrt[4]{x^{11}} = x^{11/4}$ $\qquad x^{2\frac{3}{4}}$ $\qquad x^2 \cdot x^{3/4} = x^2\sqrt[4]{x^3}$

Examples: Simplify.

1. $\sqrt{75x^6y^3} = \sqrt{5^2 \cdot 3x^6y^3} = 5|x^3|y\sqrt{3y}$

2. $\sqrt[3]{54x^{11}}$ $\quad 27 \cdot 2$ $= \sqrt[3]{3^3 \cdot 2x^{11}} = 3x^3\sqrt[3]{2x^2}$

3. $\sqrt[5]{27x^2y^{14}} \cdot \sqrt[5]{36x^6y}$ $\quad 3^3$ $\quad 3^2 \cdot 2^2$ $= \sqrt[5]{3^5 \cdot 2^2x^8y^{15}}$

$= 3xy^3\sqrt[5]{4x^3}$

4. $\sqrt[4]{162a^4} - \sqrt[4]{32a^4} = \sqrt[4]{3^4 \cdot 2\, a^4} - \sqrt[4]{2^5 a^4}$

$2 \cdot 81$

$|a|\sqrt[4]{2} = 3|a|\sqrt[4]{2} - 2|a|\sqrt[4]{2}$

5. $\sqrt[3]{\frac{c}{3d^2}}$

$= \frac{\sqrt[3]{c}}{\sqrt[3]{3d^2}} \cdot \frac{\sqrt[3]{3^2 d}}{\sqrt[3]{3^2 d}} = \frac{\sqrt[3]{9cd}}{\sqrt[3]{3^3 d^3}} = \frac{\sqrt[3]{9cd}}{3d}$

6. $\frac{\sqrt[4]{3}}{\sqrt[4]{8}} = \frac{\sqrt[4]{3}}{\sqrt[4]{2^3}} \cdot \frac{\sqrt[4]{2}}{\sqrt[4]{2}} = \frac{}{\sqrt[4]{2^4}} = \frac{\sqrt[4]{6}}{2}$

7. $\sqrt{8a^2 - 48a + 72} = \sqrt{8(a^2 - 6a + 9)}$

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

$= 2|(a-3)|\sqrt{2}$