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

Std. 12.0

$\sqrt[3]{x^3} = x^{3/3} = x$ $\qquad$ $\sqrt[6]{x^6} = |x|$ $\qquad$ $\sqrt[6]{(-2)^6} = |-2|$

$\sqrt[n]{x^n}$ $= x$, if $n$ is odd; $= |x|$, if $n$ is even (principal root)

$\sqrt[2]{x^8} = x^4$ $\qquad x^{8/2}$ $\qquad x^2\cdot x^2\cdot x^2\cdot x^2$

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

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

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**Examples: Simplify.**

1. $\sqrt{75x^6y^3} = \sqrt[2]{5^2\cdot 3x^6y^3} = 5|x^3|y\sqrt{3y}$ $\qquad (75 = 5^2\cdot 3)$

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

3. $\sqrt[5]{27x^2y^{14}}\cdot\sqrt[5]{36x^6y} = \sqrt[5]{3^5\cdot 2^2x^8y^{15}} = 3xy^3\sqrt[5]{4x^3}$ $\qquad (27 = 3^3;\ 36 = 6\cdot 6 = 3\cdot 2\cdot 3\cdot 2)$

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4. $\sqrt[4]{162a^4} - \sqrt[4]{32a^4} = \sqrt[4]{3^4\cdot 2a^4} - \sqrt[4]{2^4\cdot 2a^4} = 3|a|\sqrt[4]{2} - 2|a|\sqrt[4]{2} = |a|\sqrt[4]{2}$ $\qquad (162 = 2\cdot 81 = 2\cdot 3^4;\ 32 = 2^5)$

5. $\sqrt[3]{\dfrac{c}{3d^2}} = \dfrac{\sqrt[3]{c}}{\sqrt[3]{3d^2}}\cdot\dfrac{\sqrt[3]{3^2d}}{\sqrt[3]{3^2d}} = \dfrac{\quad}{\sqrt[3]{3^3d^3}} = \dfrac{\sqrt[3]{9cd}}{3d}$

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

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7. $\sqrt{8a^2-48a+72} = \sqrt{2^3(a-3)^2} = 2|a-3|\sqrt{2}$ $\qquad 8(a^2-6a+9)$