Lesson 10-8

Example 1 Simplify Square Roots
Simplify $\sqrt{16e^2}$.

$$\begin{aligned}\sqrt{16e^2} &= \sqrt{16} \cdot \sqrt{e^2} \\ &= \sqrt{4 \cdot 4} \cdot \sqrt{e \cdot e} \\ &= 4|e|\end{aligned}$$

Example 2 Simplify Square Roots
Simplify $\sqrt{121r^4}$.

$$\begin{aligned}\sqrt{121r^4} &= \sqrt{121} \cdot \sqrt{r^4} \\ &= \sqrt{11 \cdot 11} \cdot \sqrt{r^2 \cdot r^2} \\ &= 11r^2\end{aligned}$$

Example 3 Simplify Cube Roots
Simplify $\sqrt[3]{n^6}$.

$$\begin{aligned}\sqrt[3]{n^6} &= \sqrt[3]{n^2 \cdot n^2 \cdot n^2} \\ &= n^2\end{aligned}$$

Example 4 Simplify Cube Roots
Simplify $\sqrt[3]{125h^9}$.

$$\begin{aligned}\sqrt[3]{125h^9} &= \sqrt[3]{125} \cdot \sqrt[3]{h^9} && \text{Product Property of Cube Roots} \\ &= \sqrt[3]{5 \cdot 5 \cdot 5} \cdot \sqrt[3]{h^3 \cdot h^3 \cdot h^3} \\ &= 5 \cdot h^3 \text{ or } 5h^3 && \text{Simplify.}\end{aligned}$$

Example 5 Real-World Example
GEOMETRY Express the length of one side of a cube whose volume is $343p^{12}$ cubic units in simplified form.

$$\begin{aligned}V &= s^3 && \text{Volume of a cube} \\ 343p^{12} &= s^3 && \text{Replace } V \text{ with } 343p^{12}. \\ \sqrt[3]{343p^{12}} &= s && \text{Definition of cube root} \\ \sqrt[3]{343} \cdot \sqrt[3]{p^4 \cdot p^4 \cdot p^4} &= s && \text{Product Property of Cube Roots} \\ 7 \cdot p^4 &= s && \text{Simplify.} \\ s &= 7p^4 && \text{Simplify.}\end{aligned}$$

The length of one side of the cube is $7p^4$ units.