Lesson 10-1

Example 1

ARCHITECTURE An architect is drawing a landscaping plan which includes three square cement blocks with areas of approximately 7, 35 and 72 square feet. To find the length of a side for each square, she fines the square root of each area. Find the value of each to the nearest hundredth: $\sqrt{7}$, $\sqrt{35}$, and $\sqrt{72}$.

Solution

Use a calculator. Then round to the hundredths place.

$\sqrt{7} = 2.645751311\ldots$ rounds to 2.65
$\sqrt{35} = 5.916079783\ldots$ rounds to 5.92
$\sqrt{72} = 8.485281374\ldots$ rounds to 8.49

Example 2

Simplify each.

a. $\sqrt{27}$ **b.** $\sqrt{175}$ **c.** $\sqrt{288}$

Solution

Rewrite each radicand as a product of two numbers, so that one of them is a perfect square.

a. $\sqrt{27} = \sqrt{9 \cdot 3} = \sqrt{9} \cdot \sqrt{3}$, or $3\sqrt{3}$

b. $\sqrt{175} = \sqrt{25 \cdot 7} = \sqrt{25} \cdot \sqrt{7}$, or $5\sqrt{7}$

c. $\sqrt{288} = \sqrt{144 \cdot 2} = \sqrt{144} \cdot \sqrt{2}$, or $12\sqrt{2}$

Example 3

Multiply $(3\sqrt{15})(-2.4\sqrt{3})$.

Solution

Rewrite the product so that ration and irrational factors are together.

$$\begin{aligned}(3\sqrt{15})(-2.4\sqrt{3}) &= (3 \cdot -2.4)(\sqrt{15} \cdot \sqrt{3}) \\ &= -7.2\sqrt{45}\end{aligned}$$

The product can be simplified.

$$\begin{aligned}-7.2\sqrt{45} &= -7.2(\sqrt{9 \cdot 5}) \\ &= -7.2(3\sqrt{5}) \\ &= -21.6\sqrt{5}\end{aligned}$$

So, $(3\sqrt{15})(-2.4\sqrt{3}) = -21.6\sqrt{5}$.

Example 4

Find the quotient in simplest radical form of $-3\sqrt{26} \div 4\sqrt{39}$.

Solution

$$\frac{-3\sqrt{26}}{4\sqrt{39}} = \frac{-3}{4} \cdot \sqrt{\frac{26}{39}}$$ Simplify $\frac{26}{39}$.

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

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

In simplest radical form, denominators cannot include radicals.

$$\frac{-3\sqrt{2}}{4\sqrt{3}} = \frac{-3\sqrt{2}(\sqrt{3})}{4\sqrt{3}(\sqrt{3})}$$ Multiply the numerator and denominator by $\sqrt{3}$.

$$= \frac{-3\sqrt{6}}{4\sqrt{9}}$$

$$= \frac{-3\sqrt{6}}{4 \cdot 3} \text{ or } \frac{-\sqrt{6}}{4}$$