Example 2 Writing Radicals in Simplest Form

Write each radical in simplest form, if possible.

a) $\sqrt[3]{40}$ b) $\sqrt{26}$ c) $\sqrt[4]{32}$

SOLUTION

$\sqrt{1 \cdot 26}$

$\sqrt{1} \cdot \sqrt{26}$

$1\sqrt{26}$

$\sqrt{26}$

$\sqrt{75}$

$\sqrt{25 \cdot 3}$ (perfect sq.)

$\sqrt{25} \cdot \sqrt{3}$

$5\sqrt{3}$

CHECK YOUR UNDERSTANDING

4.3 Mixed and Entire Radicals

$\sqrt[3]{40}$

$\sqrt[3]{8 \cdot 5}$ (perfect cube.)

$\sqrt[3]{8} \cdot \sqrt[3]{5}$

$2\sqrt[3]{5}$

$\sqrt[4]{32}$

$\sqrt[4]{16 \cdot 2}$

$\sqrt[4]{16} \cdot \sqrt[4]{2}$

$2\sqrt[4]{2}$

$\sqrt[4]{32}$ [Entire]

$2\sqrt[4]{2}$ [Mixed]

$2\sqrt[4]{2}$

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

$\sqrt[4]{16 \cdot 2}$

$\sqrt[4]{32}$

$\frac{48}{100} = \frac{24}{50} = \frac{12}{25}$

Express as a reduced mixed radical.

$5\sqrt{18}$

$5\sqrt{9 \cdot 2}$

$5\sqrt{9} \cdot \sqrt{2}$

$5 \cdot 3\sqrt{2}$

$15\sqrt{2}$

Entire Radicals
(mixed ⇒ entire)

mixed → entire

$a\sqrt[n]{b} \rightarrow \sqrt{(a^n) \cdot b}$

Express as an entire radical.

$2\sqrt[4]{7}$

$\sqrt[4]{2^4} \cdot \sqrt[4]{7}$

$\sqrt[4]{16} \cdot \sqrt[4]{7}$

$\sqrt[4]{16 \cdot 7}$

$\sqrt[4]{112}$

$\sqrt[4]{2^4 \cdot 7}$

$\sqrt[4]{16 \cdot 7}$

$\sqrt[4]{112}$

Express as an entire radical.

$3\sqrt{5}$

$3\sqrt{5}$

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

$\sqrt{9 \cdot 5}$

$\sqrt{45}$

mixed → entire

$2\sqrt[3]{10}$ =

$\sqrt[3]{2^3 \cdot 10}$

$\sqrt[3]{8 \cdot 10}$

$\sqrt[3]{80}$

Homework
#10 → the rest of it
#12 → all of them