1.2 Simplifying Radicals

Radicals can be written in two forms:

Simplifying

Entire Radical: When all numbers are found under the radical sign and the coefficient is 1.
➔ Entire radicals are in the form: $\sqrt{x}$

Mixed Radical: When the radical is being multiplied by a coefficient other than 1.
➔ Mixed radicals are in the form: $a\sqrt{x}$

coefficient

We can express all mixed radicals as entire radicals and many entire radicals can be **simplified** to mixed radicals. To convert between these two forms, we use…

The **multiplication (product) property** of radicals

$$\sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

Entire to Mixed

1. Rewrite the radicand as product of 2 numbers (first number a perfect root)
2. Evaluate the perfect root = coefficient

Ex. #1: Simplify each radical (express the entire radicals as mixed radicals).

(a) $\sqrt{12}$
$= \sqrt{4}\sqrt{3}$
$= 2\sqrt{3}$

(b) $\sqrt{45}$
$= \sqrt{9}\sqrt{5}$
$= 3\sqrt{5}$

or…
$= \sqrt{9}\sqrt{8}$
$= 3\sqrt{4}\sqrt{2}$
$= 3 \cdot 2 \cdot \sqrt{2}$
$= 6\sqrt{2}$

(c) $\sqrt{72}$
$= \sqrt{36}\sqrt{2}$
$= 6\sqrt{2}$

(d) $\sqrt[3]{144}$
$= \sqrt[3]{8}\sqrt[3]{18}$
$= 2\sqrt[3]{18}$

Mixed to Entire

1. Write the coefficient as a radical
2. Multiply radicals together = entire radical

Ex. #2: Express the following mixed radicals as entire radicals.

(a) $5\sqrt{3}$
$= \sqrt{25}\sqrt{3}$
$= \sqrt{75}$

(b) $2\sqrt{7}$
$= \sqrt{4}\sqrt{7}$
$= \sqrt{28}$

(c) $3\sqrt[3]{4}$
$= \sqrt[3]{27}\sqrt[3]{4}$
$= \sqrt[3]{108}$

HW: 1.2 WS

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