8.0 - Simplifying Radical Expressions

Bellwork

Simplify the radicals.

$\sqrt{64x}$

$8\sqrt{x}$

$\sqrt{112x^2}$

$\sqrt{4}\ \sqrt{28}\ \sqrt{x^2}$ $= 4x\sqrt{7}$

$\sqrt{4}\ \sqrt{7}$

$\sqrt{48x^2}$

$\sqrt{16}\ \sqrt{3}\ \sqrt{x^2}$

$4x\sqrt{3}$

$\sqrt{32x}$

$\sqrt{16}\ \sqrt{2}\ \sqrt{x}$

$4\sqrt{2x}$

<u>rationalizing the denominator –</u> Getting a square root out of the denominator

"multiply top and bottom by a number that produces a perfect square under the radical sign in the denominator."

Simplify by rationalizing the denominator.

$$\frac{3\sqrt{5}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{10}}{2}$$

Simplify by rationalizing the denominator.

$\frac{\sqrt{2}}{\sqrt{8}} = \frac{\sqrt{1}}{\sqrt{4}} = \boxed{\frac{1}{4}}$

$\frac{3\sqrt{5}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \boxed{\frac{3\sqrt{35}}{7}}$

$\frac{5}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{5\sqrt{10}}{10} = \boxed{\frac{\sqrt{10}}{2}}$

Simplify by rationalizing the denominator.

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

$\frac{\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{\sqrt{15}}{5}}$

$\frac{\sqrt{8}}{2\sqrt{20}} = \frac{\sqrt{2}}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{10}}{2 \cdot 5} = \boxed{\frac{\sqrt{10}}{10}}$

$\frac{3\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{15}}{3} = \boxed{\sqrt{15}}$

Square roots that have the same radicand are called **like radical terms**.

Like Radicals	$\sqrt{2}$ and $3\sqrt{2}$	$-6\sqrt{15}$ and $7\sqrt{15}$	$\sqrt{ab^2}$ and $4\sqrt{ab^2}$
Unlike Radicals	$2\sqrt{5}$ and $\sqrt{2}$	$\sqrt{x}$ and $\sqrt{3x}$	$\sqrt{xy^2}$ and $\sqrt{x^2y}$

To add or subtract square roots, first simplify each radical term and then combine like radical terms by adding or subtracting their coefficients.

Simplify.

$9\sqrt{3}+7\sqrt{3}$ $= 16\sqrt{3}$

$6\sqrt{5}-\sqrt{20}$

$\sqrt{4}\sqrt{5}$

$6\sqrt{5} - 2\sqrt{5} = 4\sqrt{5}$

$\sqrt{80}-5\sqrt{5} = 4\sqrt{5}-5\sqrt{5} = -1\sqrt{5}$ or $-\sqrt{5}$

$\sqrt{16}\sqrt{5}$

Simplify.

$$-\sqrt{24} - 2\sqrt{27} - \sqrt{6}$$

$\sqrt{4}\,\sqrt{6}$ $\quad$ $\sqrt{9}\,\sqrt{3}$

$-2\sqrt{6}$ $\quad$ $-2(3\sqrt{3})$

$-2\sqrt{6} - 6\sqrt{3} - \sqrt{6}$

$\boxed{-3\sqrt{6} - 6\sqrt{3}}$

$$3\sqrt{12} - 3\sqrt{20} + 3\sqrt{5}$$

$\sqrt{4}\,\sqrt{3}$ $\quad$ $\sqrt{4}\,\sqrt{5}$

$3(2\sqrt{3}) - 3(2\sqrt{5}) + 3\sqrt{5} = 6\sqrt{3} - 6\sqrt{5} + 3\sqrt{5}$

$= \boxed{6\sqrt{3} - 3\sqrt{5}}$

Homework:

WS 8.0 - Simplifying Radicals