U7L5: Adding and Subtracting Radicals

Students can simplify radicals involving addition and subtraction.
Students can solve problems involving sums and differences of radicals.

Simplifying Sums and Differences

Lime terms have the same radical part.

Example: $4\sqrt{7} + -12\sqrt{7}$

NOT: $3\sqrt{11} + 5\sqrt{6}$

Example 1: Simplify

$1\sqrt{2}+3\sqrt{2}$

$4\sqrt{2}$

Example 2: Simplify

a. $4\sqrt{3}-\sqrt{12}$

$4\sqrt{3}-\sqrt{4\cdot3}$

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

$2\sqrt{3}$

b. $3\sqrt{45}+2\sqrt{5}$

$3\sqrt{9\cdot5}+2\sqrt{5}$

$3\cdot3\sqrt{5}+2\sqrt{5}$

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

$11\sqrt{5}$

Sometimes you need to use the distributive property with radicals.

Example 3: Simplify

a. $\sqrt{2}\left(5-\sqrt{8}\right)$

$\sqrt{2}(5)-\sqrt{2}(\sqrt{8})$

$5\sqrt{2}-\sqrt{16}$

$5\sqrt{2}-4$

b. $2\left(2+\sqrt{3}\right)$

$2(2)+2(\sqrt{3})$

$4+2\sqrt{3}$

c. $\sqrt{3}\left(5\sqrt{2}-2\sqrt{6}\right)$

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

$5\sqrt{6}-2\sqrt{18}$

$5\sqrt{6}-2\sqrt{9\cdot2}$

$5\sqrt{6}-2\cdot3\sqrt{2}$

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

Example 4: Simplify

a. $\dfrac{6\pm\sqrt{12}}{4}$

$\dfrac{6\pm\sqrt{4\cdot3}}{4}$

$\dfrac{6\pm2\sqrt{3}}{4}=\dfrac{3\pm\sqrt{3}}{2}$

b. $\dfrac{9\pm\sqrt{180}}{12}$

$\dfrac{9\pm\sqrt{36\cdot5}}{12}$

$\dfrac{9\pm6\sqrt{5}}{12}=\dfrac{3\pm2\sqrt{5}}{4}$

c. $\dfrac{10\pm\sqrt{112}}{2}$

$\dfrac{10\pm\sqrt{16\cdot7}}{2}$

$\dfrac{10\pm4\sqrt{7}}{2}$

$5\pm2\sqrt{7}$