Algebra 1/Part 2 – Unit 8
Operations with Radical Expressions NOTES

- **Adding and Subtracting**

Adding and Subtracting Radical Expressions

Radical expressions can be added or subtracted **IF** they are like radicals. Like radicals have the same index and the same radicand.

EXAMPLES OF LIKE RADICALS

$\sqrt{7}$ *and* $2\sqrt{7}$ $\qquad$ $2\sqrt[3]{3}$ *and* $3\sqrt[3]{3}$

$\sqrt[3]{5}$ *and* $4\sqrt[3]{5}$ $\qquad$ $\sqrt{x}$ *and* $4\sqrt{x}$

If the terms are like radicals:

- Perform the operation (addition or subtraction) with the numbers outside of the radicals.

$2\sqrt{13}+5\sqrt{13}$

$7\sqrt{13}$

$3\sqrt[3]{6}+5\sqrt[3]{6}$

$8\sqrt[3]{6}$

$1\sqrt[3]{14}+5\sqrt[3]{14}$

$6\sqrt[3]{14}$

$6\sqrt{x}-4\sqrt{x}$

$2\sqrt{x}$

$5\sqrt[3]{5}-6\sqrt[3]{5}$

$-1\sqrt[3]{5}$

$-\sqrt[3]{5}$

$7\sqrt{y}-5\sqrt{y}$

$2\sqrt{y}$

If the terms are NOT like radicals:

- You must simplify the radicals first (making them like radicals) and then perform the operation with the numbers outside of the radicals.

$\sqrt{5}+\sqrt{20}$

$1\sqrt{5}+2\sqrt{5}$

$3\sqrt{5}$

$\sqrt{20}$ → $5 \cdot 4$ → $2 \cdot 2$

$2\sqrt{5}$

$\sqrt{8}-\sqrt{2}$

$2\sqrt{2}-1\sqrt{2}$

$1\sqrt{2}$

$\sqrt{2}$

$\sqrt{8}$ → $2 \cdot 4$ → $2 \cdot 2$

$2\sqrt{2}$

$\sqrt{27}+\sqrt{75}$

$3 \cdot 9$ → $3 \cdot 3$; $3 \cdot 25$ → $5 \cdot 5$

$2 \cdot 2 \cdot 2\sqrt{2}$

$8\sqrt{2}$

$3\sqrt{3}+5\sqrt{3}=8\sqrt{3}$

$2\sqrt{32}-3\sqrt{50}$

$4 \cdot 8$ → $2 \cdot 2$; $2 \cdot 4$ → $2 \cdot 2$; $5 \cdot 10$ → $5 \cdot 2$

$5 \cdot 3\sqrt{2}$

$15\sqrt{2}$

$8\sqrt{2}-15\sqrt{2}=-7\sqrt{2}$

$\sqrt[3]{16}+\sqrt[3]{54}$

$2 \cdot 8$ → $2 \cdot 4$ → $2 \cdot 2$; $6 \cdot 9$ → $2 \cdot 3 \cdot 3 \cdot 3$

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

$3\sqrt[3]{4}$

$2\sqrt[3]{2}+3\sqrt[3]{2}=5\sqrt[3]{2}$

$\sqrt[3]{108}-\sqrt[3]{16}$

$9 \cdot 12$ → $3 \cdot 3 \cdot 3 \cdot 4$ → $2 \cdot 2$; $2 \cdot 8$ → $2 \cdot 4$ → $2 \cdot 2$

$2\sqrt[3]{2}$

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

they are not like radicals cannot combine

$\sqrt[3]{16}+\sqrt[3]{48}$

$4 \cdot 4$ → $2 \cdot 2 \cdot 2 \cdot 2$; $6 \cdot 8$ → $2 \cdot 3 \cdot 2 \cdot 4$ → $2 \cdot 2$

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

$2\sqrt[3]{6}$

$2\sqrt[3]{2}+2\sqrt[3]{6}$

$3\sqrt[3]{24}+2\sqrt[3]{81}$

$3 \cdot 8$ → $2 \cdot 4$ → $2 \cdot 2$; $9 \cdot 9$ → $3 \cdot 3 \cdot 3 \cdot 3$

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

$6\sqrt[3]{3}+6\sqrt[3]{3}=12\sqrt[3]{3}$