

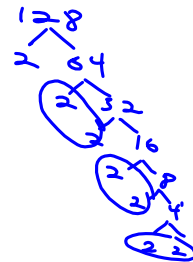
Unit 5 Section??
Operations on Radicals

Objectives: Simplify, Add, Subtract, Multiply and Divide Radicals

Recall: To ADD and SUBTRACT radicals, the radicals must be the same. Break down the radicals, then if you have like radicals add or subtract the outside numbers.

Ex. 1 $\sqrt{5} + 3\sqrt{5} = 4\sqrt{5}$

Ex. 2 $2\sqrt{72} + 6\sqrt{128}$
 $2 \cdot 2 \cdot 3 \cdot \sqrt{2} + 6 \cdot 2 \cdot 2 \cdot 2 \cdot \sqrt{2}$
 $12\sqrt{2} + 48\sqrt{2}$
 $60\sqrt{2}$

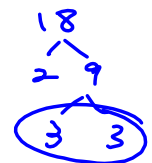


Multiply.

Ex. 3 $(5\sqrt{3})(8\sqrt{21})$
 $5 \cdot 8 \sqrt{3 \cdot 21}$
 $40 \sqrt{63}$
 $40 \cdot 3 \sqrt{7}$
 $120\sqrt{7}$



Ex. 4 $2\sqrt{6}(4+2\sqrt{3})$
 $8\sqrt{6} + 4\sqrt{18}$
 $8\sqrt{6} + 4 \cdot 3\sqrt{2}$
 $8\sqrt{6} + 12\sqrt{2}$



Ex. 5 $(2-\sqrt{3})(3+2\sqrt{3})$
 $6 + 4\sqrt{3} - 3\sqrt{3} - 2\sqrt{9}$
 $6 + 1\sqrt{3} - 2 \cdot 3$
 $6 + \sqrt{3} - 6$
 $\sqrt{3}$

Ex. 6 $(9-2\sqrt{5})(9+2\sqrt{5})$
 $81 + 18\sqrt{5} - 18\sqrt{5} - 4\sqrt{25}$
 $81 - 4 \cdot 5$
 $81 - 20$
 61

Recall: NO radicals left in the denominator. Multiply by the conjugate.

The conjugate of $a + \sqrt{b}$ is $\underline{a - \sqrt{b}}$.

The conjugate of $a - \sqrt{b}$ is $\underline{a + \sqrt{b}}$.

Simplify.

$$\begin{aligned} \text{Ex. 7} \quad & \frac{1}{2 + \sqrt{7}} \cdot \frac{2 - \sqrt{7}}{2 - \sqrt{7}} \\ & = \frac{2 - \sqrt{7}}{4 - \sqrt{49}} \\ & = \frac{2 - \sqrt{7}}{4 - 7} = \frac{2 - \sqrt{7}}{-3} \\ & \text{or } \frac{-2 + \sqrt{7}}{3} \end{aligned}$$

$$\begin{aligned} \text{Ex. 8} \quad & \frac{5}{-3 - 2\sqrt{5}} \cdot \frac{-3 + 2\sqrt{5}}{-3 + 2\sqrt{5}} \\ & = \frac{-15 + 10\sqrt{5}}{9 - 4\sqrt{25}} \\ & = \frac{-15 + 10\sqrt{5}}{9 - 4 \cdot 5} \\ & = \frac{-15 + 10\sqrt{5}}{9 - 20} = \frac{15 + 10\sqrt{5}}{-11} \\ & \text{or } \frac{-15 - 10\sqrt{5}}{11} \end{aligned}$$