# Multiplying Radical Expressions

When multiplying radical expressions it is important to remember the following rule:

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

Let us consider the following product of radical expressions:

$$2\sqrt{3} \cdot 5\sqrt{7}$$

Because we are allowed to multiply in any order, we can group the radicals together to get:

$$2 \cdot 5 \cdot \sqrt{3} \cdot \sqrt{7}$$

And now since $2 \cdot 5 = 10$ and $\sqrt{3} \cdot \sqrt{7} = \sqrt{21}$ we get:

$$2 \cdot 5 \cdot \sqrt{3} \cdot \sqrt{7} = 10\sqrt{21}$$

Let us now consider an example below in which we will multiply two binomial radical expressions:

$$(3 - \sqrt{2})(\sqrt{18} + \sqrt{5})$$

We will now multiply like we learned in Section 1.4 by multiply every term in the first parenthesis by every term in the second parenthesis.

$$3 \cdot \sqrt{18} + 3 \cdot \sqrt{5} - \sqrt{2} \cdot \sqrt{18} - \sqrt{2} \cdot \sqrt{5} = 3\sqrt{18} + 3\sqrt{5} - 6 - \sqrt{10}$$

**Check yourself:**

In exercises below multiply radical expressions as indicated:

1) $5\sqrt{6} \cdot 2\sqrt{7}$

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

3) $(5\sqrt{2} - 3\sqrt{7})(5\sqrt{2} + 3\sqrt{7})$

***Answers:***

1) $10\sqrt{42}$

2) $6 - 2\sqrt{2} + 3\sqrt{5} - \sqrt{10}$

3) -13