Adding and Subtracting Radical Expressions

Background

After completing the *1. How to Read and Write a Radical Expression* and *2. Radical Expressions with an Index* focused lessons, you are ready to learn how to read and write the Nemeth Code involved in adding and subtracting **radical expressions**. As a quick review, when writing a **square root**, you follow three simple steps. You would braille:

1. ⠨ (dots 3-4-5) the **radical symbol**
2. the **radicand**, value inside/under a radical symbol, which you want to find the root of
3. ⠸ (dots 1-2-4-5-6) the **termination indicator**

So to write $\sqrt{4}$ (the principal square root of 4) in Nemeth Code, you would write:

⠨⠼⠙⠸ or radical symbol, four, termination indicator.

When writing a radical with an index, you follow these simple steps. You would braille:

1. ⠰ (dots 1-2-6) the **index-of-radical indicator**
2. the **index** of the radical
3. ⠨ (dots 3-4-5) the **radical symbol**
4. the **radicand**, value inside/under a radical symbol, which you want to find the root of
5. ⠸ (dots 1-2-4-5-6) the **termination indicator**

So to write $\sqrt[3]{27}$ (the cube root of 27) in Nemeth Code, you would write:

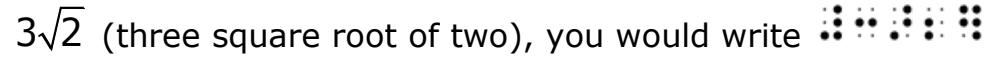
⠰⠼⠉⠨⠼⠆⠶⠸ or index-of-radical indicator, three, radical symbol, twenty-seven, termination indicator.

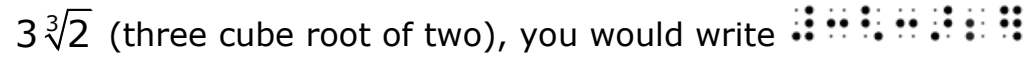
Basic Rules for Reading and Writing a Number Followed by a Radical Expression Representing Multiplication

Before we begin to practice how to read and write problems involving adding and subtracting radical expressions, we need to learn how to read and write a number followed by a radical expression. Since there is a convention in algebra of denoting multiplication by **juxtaposition** (putting symbols side by side), there is no need to use a multiplication sign between the number and this radical expression. However, a multiplication dot is sometimes used

for clarification, and we may say the word "times" whether the multiplication sign is present or not. In examples, when you hear the word times, only use a multiplication dot when specifically indicated. No space should be left between a radical and a variable, number, fraction, sign of grouping, a braille indicator, or another radical.

Examples

1. To write $3\sqrt{2}$ (three square root of two), you would write  or numeric indicator, three, radical symbol, two, termination indicator.

2. To write $3\sqrt[3]{2}$ (three cube root of two), you would write  or numeric indicator, three, index-of-radical indicator, three, radical symbol, two, termination indicator.

Activity time: See if you can re-create the problems in examples 1 to 2.

Basic Rules for Reading and Writing Problems in Order to Add and Subtract Radical Expressions

We can add any two real numbers. For example, the sum of 3 and $\sqrt{2}$ can be written $3+\sqrt{2}$. No simplification is possible. However, if we have **like radical terms** (terms that have the same index and radicand), we can use the **distributive property** to simplify, and then combine like radical terms. The distributive property states that for any real numbers a, b, and c, $a(b+c)=ab+ac$.

Examples

3. $4\sqrt{3}+2\sqrt{3}=(4+2)\sqrt{3}=6\sqrt{3}$

   Four times the square root of three end root plus two times the square root of three end root equals open parenthesis four plus two close parenthesis times the square root of three end root equals six times the square root of three end root.

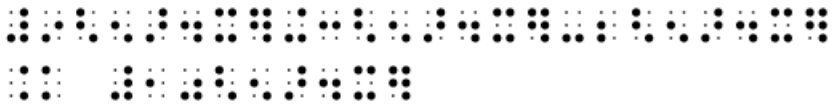
4. $7\sqrt[3]{5}-\sqrt{3}+2\sqrt[3]{5}+\sqrt{3}=9\sqrt[3]{5}$

   Seven cube root of five end root minus the square root of three end root plus two cube root of five end root plus the square root of three end root equals nine cube root of five end root.

5. $9\sqrt[5]{4x} + 3\sqrt[5]{4x} - 2\sqrt[5]{4x} = 10\sqrt[5]{4x}$

   Nine times the fifth root of four x end root plus three times the fifth root of four x end root minus two times the fifth root of four x end root equals ten times the fifth root of four x end root.



6. $2\sqrt{3z+3} + \sqrt{3z+3} = 3\sqrt{3z+3}$

   Two square root of three z plus three end root plus the square root of three z plus three end root equals three square root of three z plus three end root.

Activity time: See if you can re-create the problems in examples 3 to 6.