Division with 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 using division with **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 Problems in Order to Simplify Radical Expressions Involving Quotients

For any natural number index k and any real numbers a and b, ($b \neq 0$), where $\sqrt[k]{a}$ and $\sqrt[k]{b}$ are real numbers, $\sqrt[k]{\frac{a}{b}} = \frac{\sqrt[k]{a}}{\sqrt[k]{b}}$. Follow the same conventions for reading and spacing as we did in Lessons 1 to 4.

In the examples below, when you hear the word times, only use a multiplication dot when specifically indicated.

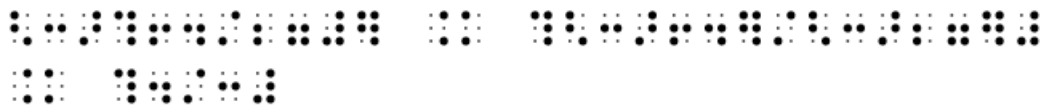
Examples

1. $\sqrt{\frac{16}{25}} = \frac{\sqrt{16}}{\sqrt{25}} = \frac{4}{5}$

   The square root of open fraction sixteen over twenty-five close fraction end root equals open fraction the square root of sixteen end root over the square root of twenty-five end root close fraction equals four-fifths.

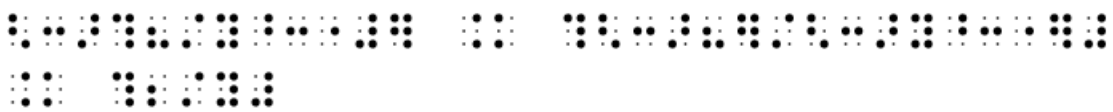
2. $\sqrt[3]{\frac{64}{27}} = \frac{\sqrt[3]{64}}{\sqrt[3]{27}} = \frac{4}{3}$

   The cube root of open fraction sixty-four over twenty-seven close fraction end root equals open fraction the cube root of sixty-four end root over the cube root of twenty-seven end root close fraction equals four-thirds.



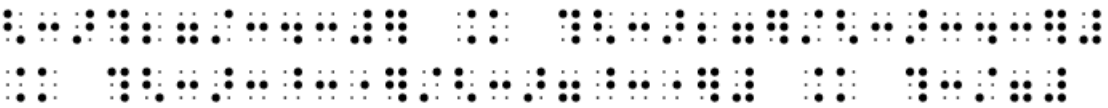
3. $\sqrt[3]{\frac{8}{y^3}} = \frac{\sqrt[3]{8}}{\sqrt[3]{y^3}} = \frac{2}{y}$

   The cube root of open fraction eight over y cubed close fraction end root equals open fraction the cube root of eight end root over the cube root of y cubed end root close fraction equals open fraction two over y close fraction.



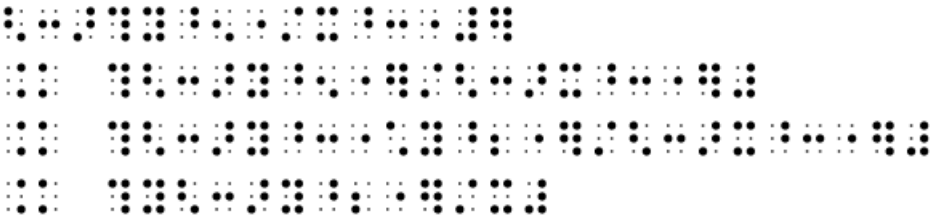
4. $\sqrt[3]{\frac{27}{343}} = \frac{\sqrt[3]{27}}{\sqrt[3]{343}} = \frac{\sqrt[3]{3^3}}{\sqrt[3]{7^3}} = \frac{3}{7}$

The cube root of open fraction twenty-seven over three hundred forty-three close fraction end root equals open fraction the cube root of twenty-seven end root over the cube root of three hundred forty-three end root close fraction equals open fraction the cube root of three cubed end root over the cube root of seven cubed end root close fraction equals three-sevenths.



5. $\sqrt[3]{\frac{y^5}{x^3}} = \frac{\sqrt[3]{y^5}}{\sqrt[3]{x^3}} = \frac{\sqrt[3]{y^3 \cdot y^2}}{\sqrt[3]{x^3}} = \frac{y\sqrt[3]{y^2}}{x}$

The cube root of open fraction y to the fifth power over x cubed close fraction end root equals open fraction the cube root of y to the fifth power end root over the cube root of x cubed end root close fraction equals open fraction the cube root of y cubed times (multiplication dot) y squared end root over the cube root of x cubed end root close fraction equals open fraction y cube root of y squared end root over x close fraction.



Activity time: See if you can re-create the problems in examples 1 to 5.

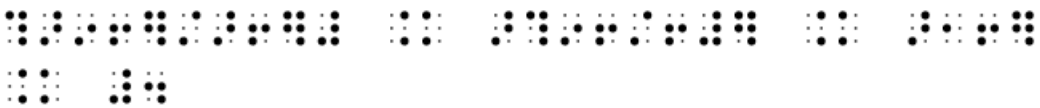
Basic Rules for Reading and Writing Problems in Order to Divide Radical Expressions

Reversing the equation of the theorem above, for any natural number index k and any real numbers a and b, ($b \neq 0$), where $\sqrt[k]{a}$ and $\sqrt[k]{b}$ are real numbers, $\frac{\sqrt[k]{a}}{\sqrt[k]{b}} = \sqrt[k]{\frac{a}{b}}$.

Examples

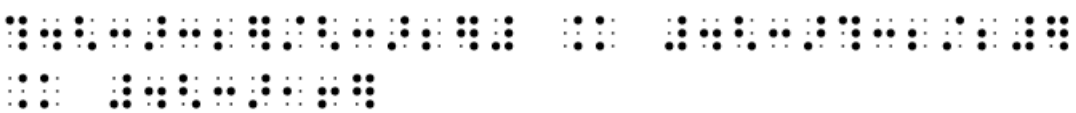
6. $\frac{\sqrt{96}}{\sqrt{6}} = \sqrt{\frac{96}{6}} = \sqrt{16} = 4$

Open fraction the square root of ninety-six end root over the square root of six end root close fraction equals the square root of open fraction ninety-six over six close fraction end root equals the square root of sixteen end root equals four.



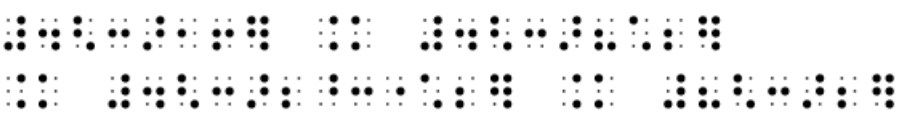
7. $\frac{4\sqrt[3]{32}}{\sqrt[3]{2}} = 4\sqrt[3]{\frac{32}{2}} = 4\sqrt[3]{16}$

Open fraction four cube root of thirty-two end root over the cube root of two end root close fraction equals four cube root of open fraction thirty-two over two close fraction end root equals four cube root of sixteen end root.



8. Review to finish Problem 7: $4\sqrt[3]{16} = 4\sqrt[3]{8 \cdot 2} = 4\sqrt[3]{2^3 \cdot 2} = 8\sqrt[3]{2}$

Four cube root of sixteen end root equals four cube root of eight times (multiplication dot) two end root equals four cube root of two cubed times (multiplication dot) two end root equals eight cube root of two end root.

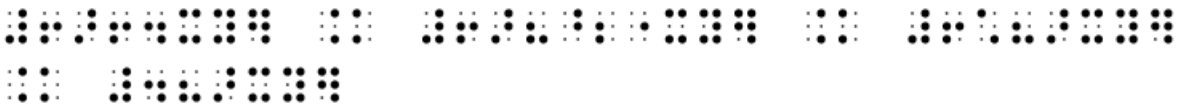


9. $\frac{12\sqrt{128xy}}{2\sqrt{2}} = 6\sqrt{\frac{128xy}{2}} = 6\sqrt{64xy}$

Open fraction twelve times the square root of one hundred twenty-eight x y end root over two times the square root of two end root close fraction equals six times the square root of open fraction one hundred twenty-eight x y over two close fraction end root equals six times the square root of sixty-four x y end root.

10. Review to finish Problem 9: $6\sqrt{64xy} = 6\sqrt{8^2xy} = 6 \cdot 8\sqrt{xy} = 48\sqrt{xy}$

    Six square root of sixty-four x y end root equals six square root of eight squared x y end root equals six times (multiplication dot) eight square root of x y end root equals forty-eight square root of x y end root.

Activity time: See if you can re-create the problems in examples 6 to 10.