

Grades 2 to 5: Nemeth Code Symbols for Fractions and Spatial Problems, Instructional Tools, Materials, and Technology

Lesson 3: Long Division



University of South Carolina Upstate, Fall 2020

Lesson 3 Objectives

Participants will be able to:

- Read and write division problems that do not have a quotient.
- Read and write division problems with and without remainders.
- Set up a math page that contains numbered division problems.
- Read and write division problems with decimals using multiple methods for formatting the problem.

Anatomy of a Division Problem

- Dividend: number that is being divided
- Divisor: number that the dividend is being divided by
- Quotient: answer to the division problem
- Remainder: amount remaining

- Dividend: 215
- Divisor: 3
- Quotient: 71
- Remainder: 2

$$\begin{array}{r} 71r2 \\ \hline 3 \overline{)215} \end{array}$$

Division Problems without Quotients

- The curved division sign $\overline{)}$ ∷ (dots 1-3-5)
- Division problems without a quotient are written in linear format.

$$3 \overline{)15}$$



$$6 \overline{)24}$$



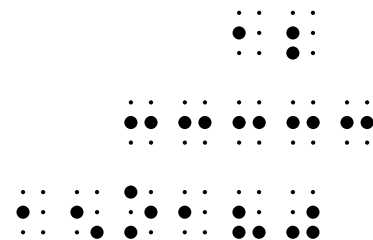
$$12 \overline{)200}$$



Spatial Arrangement Division

- A blank line must be left above and below a spatial problem and one cell to the left and right of the problem.
- The separation line begins above the division sign and goes one cell to the right of the problem (including any remainder).
- There are no numeric indicators in **spatial division problems**. A division problem is considered spatial when it includes a quotient (answer).

$$\begin{array}{r} 12 \\ 15 \overline{)180} \end{array}$$



Numbered Division Problems

Place the problem number on the same line as the dividend.

1. $10 \overline{)100}$	2. $11 \overline{)4400}$		
3. $3 \overline{)234}$	4. $5 \overline{)695}$		

Long Division

$$\begin{array}{r} 985 \\ 3 \overline{)2955} \\ \underline{27} \\ 25 \\ \underline{24} \\ 15 \\ \underline{15} \\ 0 \end{array}$$

The Braille representation of the long division problem is as follows:

$$\begin{array}{r} \dots \dots \dots \\ \dots \dots \dots \dots \dots \dots \\ \dots \dots \dots \dots \dots \dots \\ \dots \dots \dots \\ \dots \dots \dots \dots \dots \dots \\ \dots \dots \dots \\ \dots \dots \dots \\ \dots \dots \dots \dots \dots \dots \\ \dots \dots \dots \\ \dots \dots \dots \\ \dots \dots \dots \dots \dots \dots \\ \dots \dots \dots \\ \dots \dots \dots \\ \dots \dots \dots \dots \dots \dots \\ \dots \dots \dots \end{array}$$

“Showing Your Work” with Long Division Problems

Numbers are aligned by place value.

$$\begin{array}{r} 17 \\ 3 \overline{)51} \\ \underline{3} \\ 21 \\ \underline{21} \\ 0 \end{array}$$

$$\begin{array}{r} 985 \\ 3 \overline{)2955} \\ \underline{27} \\ 25 \\ \underline{24} \\ 15 \\ \underline{15} \\ 0 \end{array}$$

Braille representation of the long division problem 27 into 51. The quotient 17 is shown above the dividend 51. The divisor 3 is to the left of the dividend. The work shows 3 times 17 equals 51, with a remainder of 0.

Braille representation of the long division problem 2955 into 3. The quotient 985 is shown above the dividend 2955. The divisor 3 is to the left of the dividend. The work shows 3 times 985 equals 2955, with a remainder of 0.

Activity 3A: Answer Key

$$1. \quad 4 \overline{)28}$$

⠠⠎⠢⠒ ⠠⠒⠠⠒

$$2. \quad 25 \overline{)675}$$

⠠⠒⠗ ⠠⠒⠠⠒⠠⠒

$$3. \quad \begin{array}{r} 18 \\ 9 \overline{)162} \end{array}$$

⠠⠒⠠⠒ ⠠⠒⠠⠒⠠⠒⠠⠒⠠⠒⠠⠒
⠠⠒⠠⠒⠠⠒ ⠠⠒⠠⠒⠠⠒⠠⠒

$$4. \quad \begin{array}{r} 320 \\ 30 \overline{)9600} \end{array}$$

⠠⠒⠠⠒⠠⠒⠠⠒⠠⠒ ⠠⠒⠠⠒⠠⠒⠠⠒⠠⠒⠠⠒⠠⠒
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Activity 3A: Answer Key, Continued

$$\begin{array}{r}
 62 \\
 7 \overline{)434} \\
 \underline{42} \\
 14 \\
 \underline{14} \\
 0
 \end{array}$$

Braille representation of the long division 434 divided by 7, resulting in 62 with a remainder of 0. The numbers are represented using Braille digits.

$$\begin{array}{r}
 34 \\
 12 \overline{)408} \\
 \underline{36} \\
 48 \\
 \underline{48} \\
 0
 \end{array}$$

Braille representation of the long division 408 divided by 12, resulting in 34 with a remainder of 0. The numbers are represented using Braille digits.

Activity 3B

Transcribe the following problems.

$$1. \quad 8 \overline{)248}$$

$$2. \quad 17 \overline{)442}$$

$$3. \quad \begin{array}{r} 51 \\ 7 \overline{)357} \end{array}$$

$$4. \quad \begin{array}{r} 413 \\ 20 \overline{)8260} \end{array}$$

$$5. \quad \begin{array}{r} 55 \\ 4 \overline{)220} \\ \underline{20} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

Activity 3B Answer Key

$$1. \quad 8 \overline{)248}$$

$$\begin{array}{cccc} \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \end{array} \quad \begin{array}{cccc} \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \end{array}$$

$$2. \quad 17 \overline{)442}$$

$$\begin{array}{cccc} \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \end{array} \quad \begin{array}{cccc} \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \end{array}$$

$$3. \quad \begin{array}{r} 51 \\ 7 \overline{)357} \end{array}$$

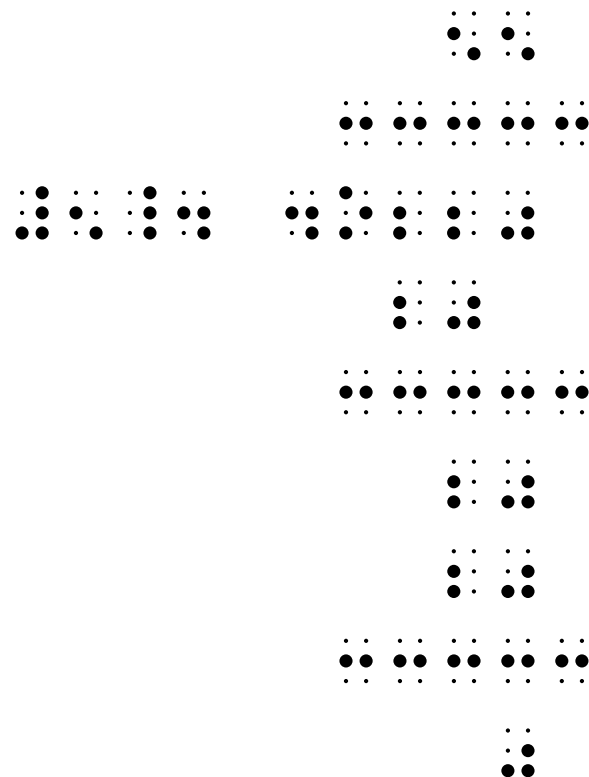
$$\begin{array}{cccc} & & \bullet & \bullet \\ & & \bullet & \bullet \\ & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet \end{array}$$

$$4. \quad \begin{array}{r} 413 \\ 20 \overline{)8260} \end{array}$$

$$\begin{array}{cccc} & & \bullet & \bullet & \bullet \\ & & \bullet & \bullet & \bullet \\ & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet \end{array}$$

Activity 3B Answer Key, Continued

5.
$$\begin{array}{r} 55 \\ 4 \overline{)220} \\ \underline{20} \\ 20 \\ \underline{20} \\ 0 \end{array}$$



Remainders

- When a quotient includes a remainder, put a space followed by "r," followed by a dot 5, and then the remainder.
- Extend the separation lines to one cell past the end of the remainder.
- Note: Sometimes students confuse the dot 5 with a 1.

$$\begin{array}{r}
 73r1 \\
 \hline
 6 \overline{)439}
 \end{array}$$

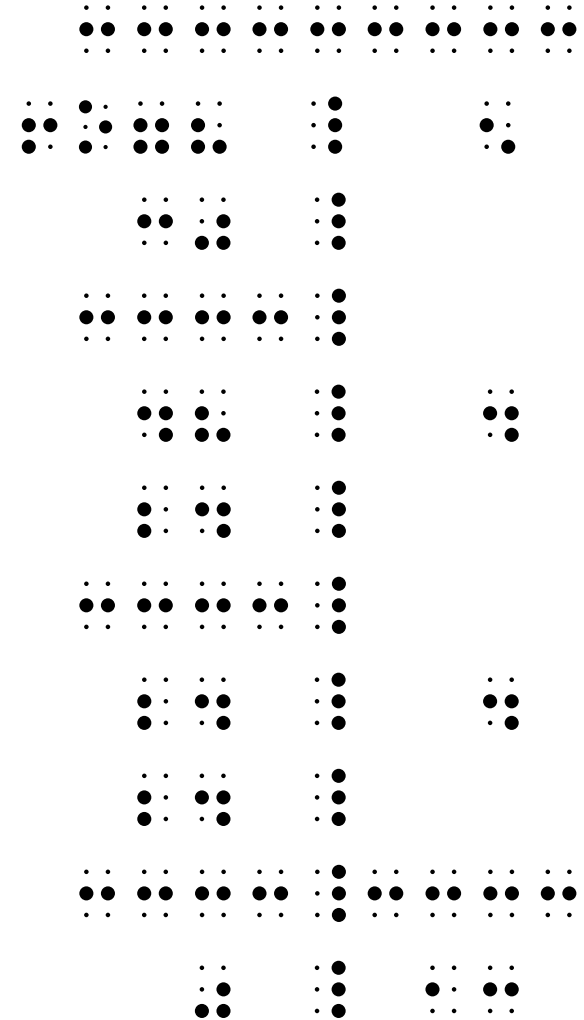
$$\begin{array}{r}
 181r4 \\
 \hline
 25 \overline{)4529} \\
 \underline{25} \\
 202 \\
 \underline{200} \\
 29 \\
 \underline{25} \\
 4
 \end{array}$$

Alternate Division

With this method the student:

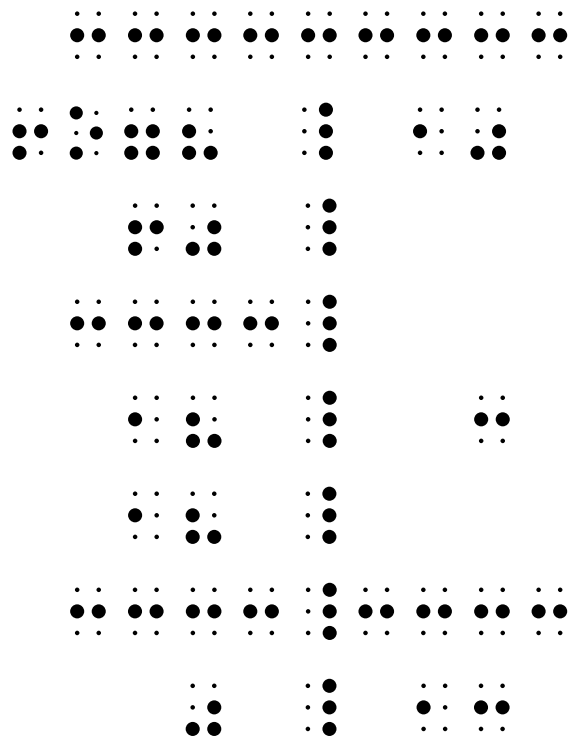
- Doesn't have to roll the paper constantly up and down when using the Perkins braillewriter.
- Doesn't need to have all of their multiplication facts memorized.
- General ed. teachers may use the terms "t-method," or "hangman method."

$$\begin{array}{r}
 6 \overline{)78} \quad 5 \\
 \underline{30} \\
 48 \quad 4 \\
 \underline{24} \\
 24 \quad 4 \\
 \underline{24} \\
 0 \quad 13
 \end{array}$$



Same Problem (Another Way)

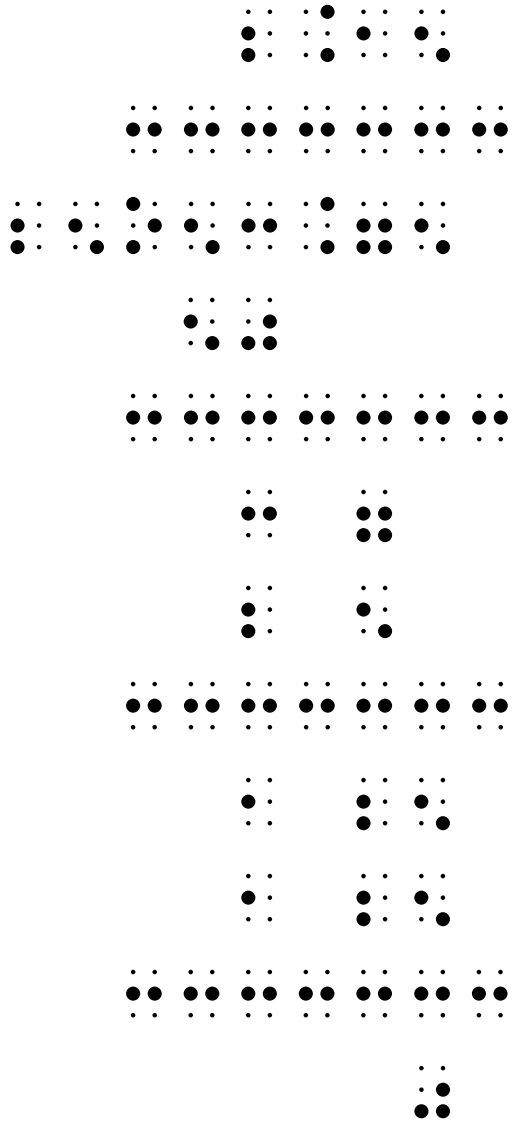
$$\begin{array}{r} 6 \overline{)78} \quad 10 \\ \underline{60} \\ 18 \quad 3 \\ \underline{18} \\ 0 \quad 13 \end{array}$$



Division with Decimals in the Dividend: Method 1

With this method, when a decimal occurs in a dividend, leave a blank column of cells under the decimal point except at the separation line.

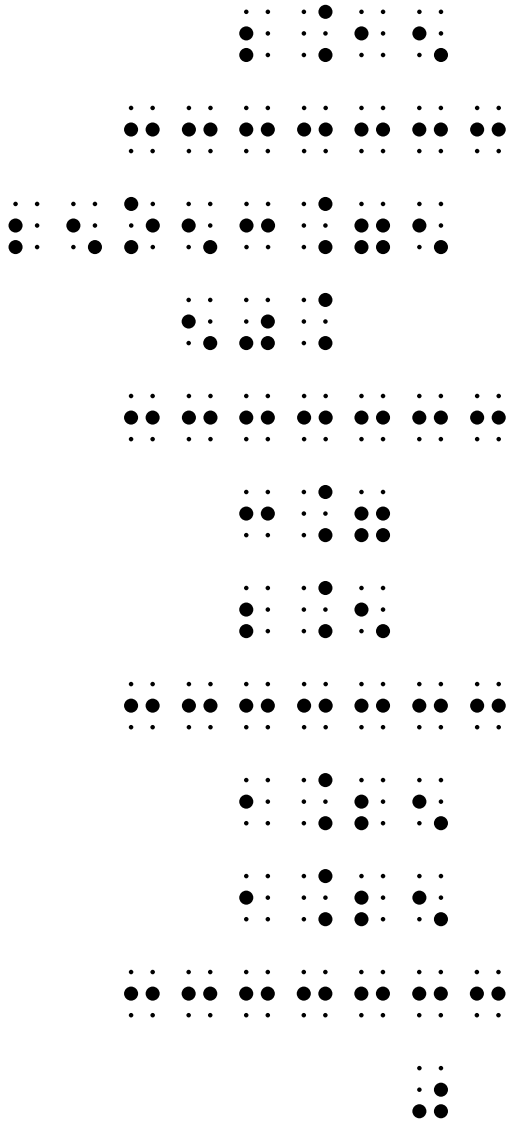
$$\begin{array}{r}
 2.15 \\
 \hline
 25 \overline{)53.75} \\
 \underline{50} \\
 37 \\
 \underline{25} \\
 125 \\
 \underline{125} \\
 0
 \end{array}$$



Division with Decimals in the Dividend: Method 2

With this method, when a decimal occurs in a dividend, repeat the decimal as you are bringing it down.

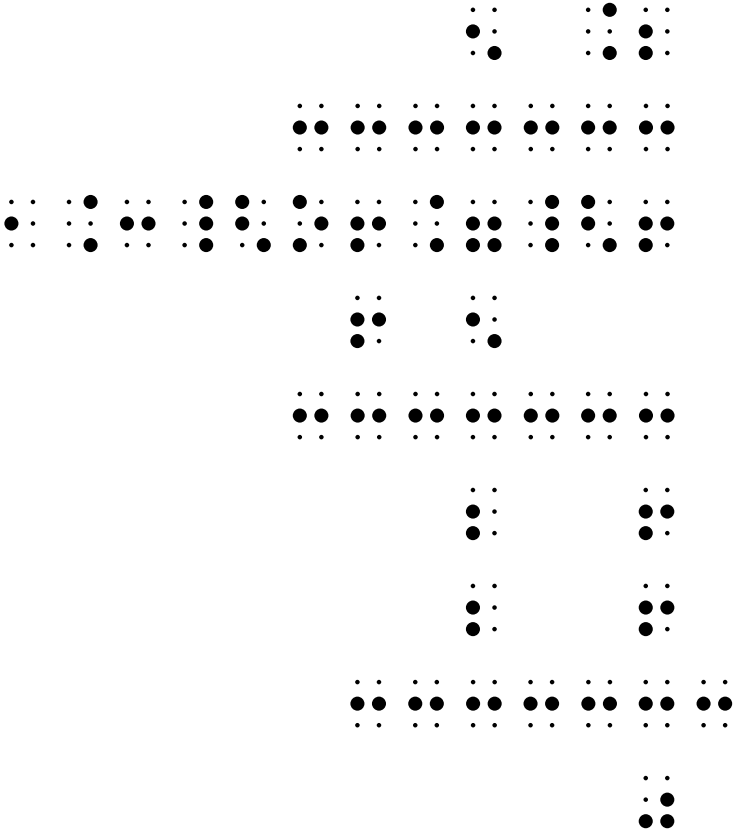
$$\begin{array}{r}
 2.15 \\
 \hline
 25 \overline{)53.75} \\
 \underline{50} \\
 3.7 \\
 \underline{2.5} \\
 1.25 \\
 \underline{1.25} \\
 0
 \end{array}$$



Division with Decimals in the Divisor: Method 1

With this method, the caret (dots 4-5-6, dots 1-2-6) is used to indicate the new position of decimal points.

$$\begin{array}{r}
 5 . 2 \\
 1.3 \wedge \overline{) 6.7 \wedge 6} \\
 \underline{65} \\
 26 \\
 \underline{26} \\
 0
 \end{array}$$



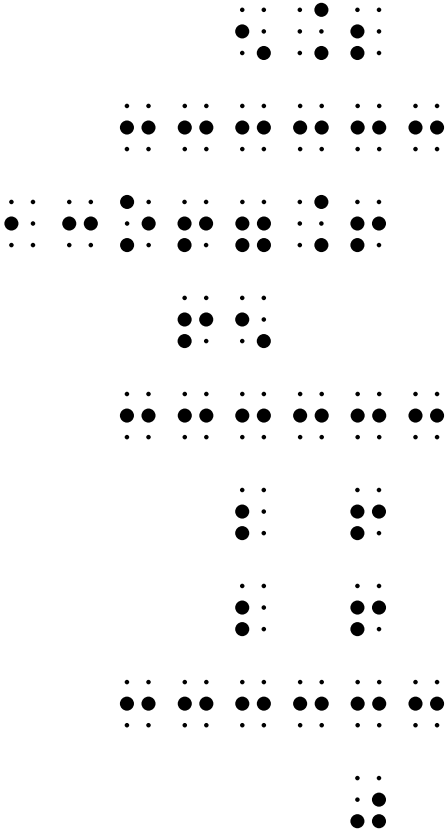
Division with Decimals in the Divisor: Method 2

With this method, move the decimal the same number of places in the dividend and divisor so the divisor becomes a whole number and then do regular decimal division.

Original Problem

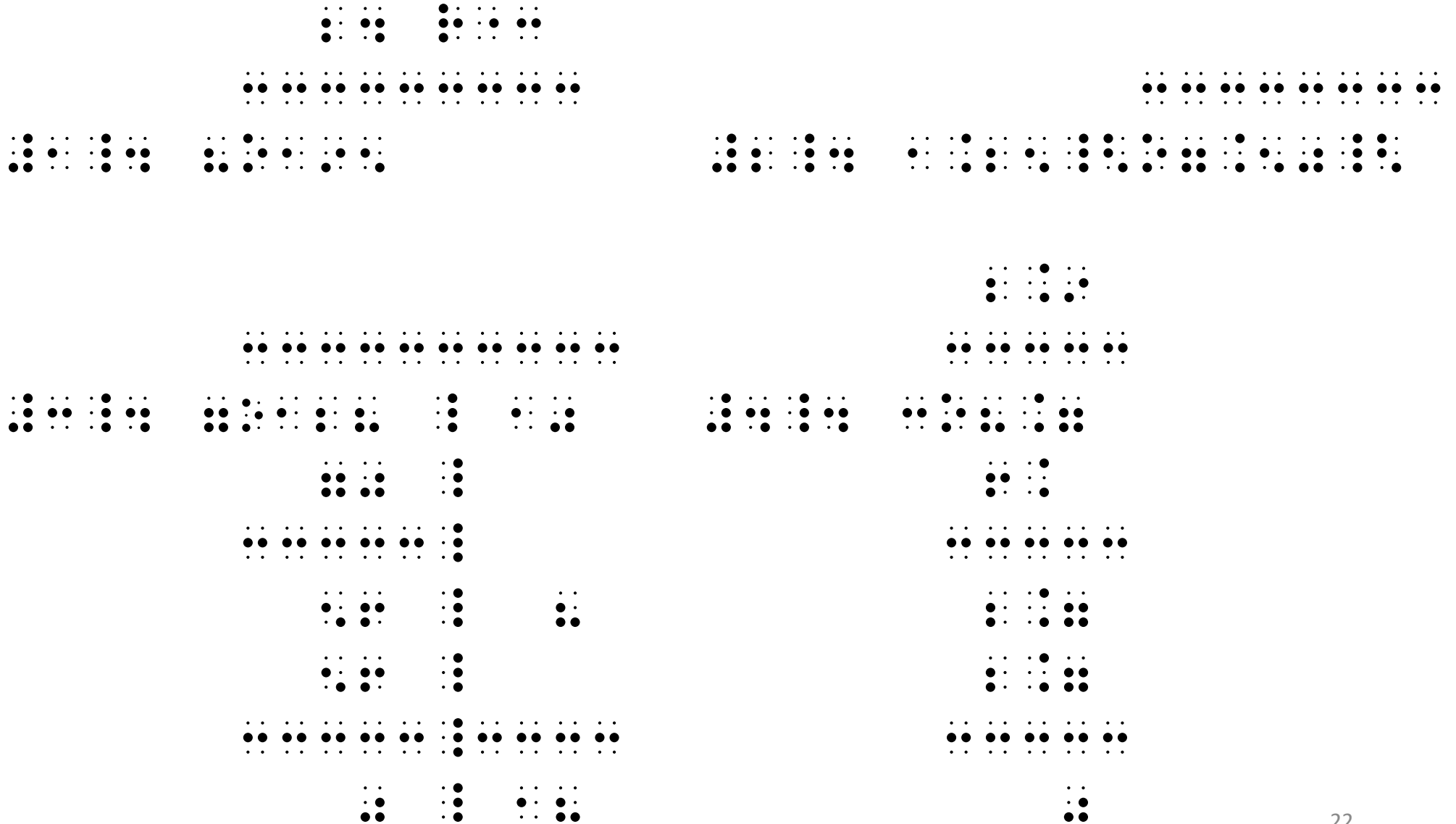
$$1.3 \overline{)6.76}$$

$$\begin{array}{r}
 5.2 \\
 13 \overline{)67.6} \\
 \underline{65} \\
 26 \\
 \underline{26} \\
 0
 \end{array}$$



Activity 3C

Interline
the
problems.



Activity 3C Answer Key

$$1. \quad 8 \overline{)195} \quad \begin{array}{r} 24r3 \end{array}$$

$$2. \quad 1.25 \overline{)7.50} \quad \begin{array}{r} 6 \end{array}$$

Braille representation of the first division problem. The dividend 195 is written in three groups of three dots. The divisor 8 is written in a group of three dots. The quotient 24 is written in two groups of three dots, and the remainder 3 is written in a group of three dots. The division symbol is represented by a vertical line and a right-facing parenthesis.

Braille representation of the second division problem. The dividend 7.50 is written in three groups of three dots, with a decimal point between the first and second groups. The divisor 1.25 is written in three groups of three dots, with a decimal point between the first and second groups. The quotient 6 is written in a group of three dots. The division symbol is represented by a vertical line and a right-facing parenthesis.

Activity 3C Answer Key, Continued

3. $7 \overline{)126} \ 10$

$$\begin{array}{r} 7 \overline{)126} \ 10 \\ \underline{70} \\ 56 \ 8 \\ \underline{56} \\ 0 \ 18 \end{array}$$

4. $3 \overline{)8.7}$

$$\begin{array}{r} 3 \overline{)8.7} \\ \underline{6} \\ 2.7 \\ \underline{2.7} \\ 0 \end{array}$$