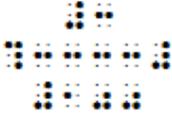


Terms of the fraction are centered above and below their fraction lines.

Example 15.2-3 $\frac{3}{100}$ 

If exact centering is not possible, the term is moved to the left one cell.

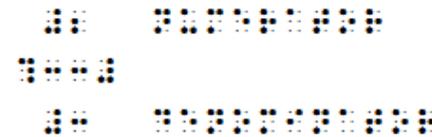
Example 15.2-4 $\frac{25}{100}$ 

15.3 Placement of Identifiers with Spatially Arranged Fractions: An identifier, if present, is placed on the same braille line as the fraction line. One blank space is left between the last symbol in the identifier and the symbol furthest left in the overall arrangement.

Example 15.3-1 5. $\frac{cd}{ef}$ 

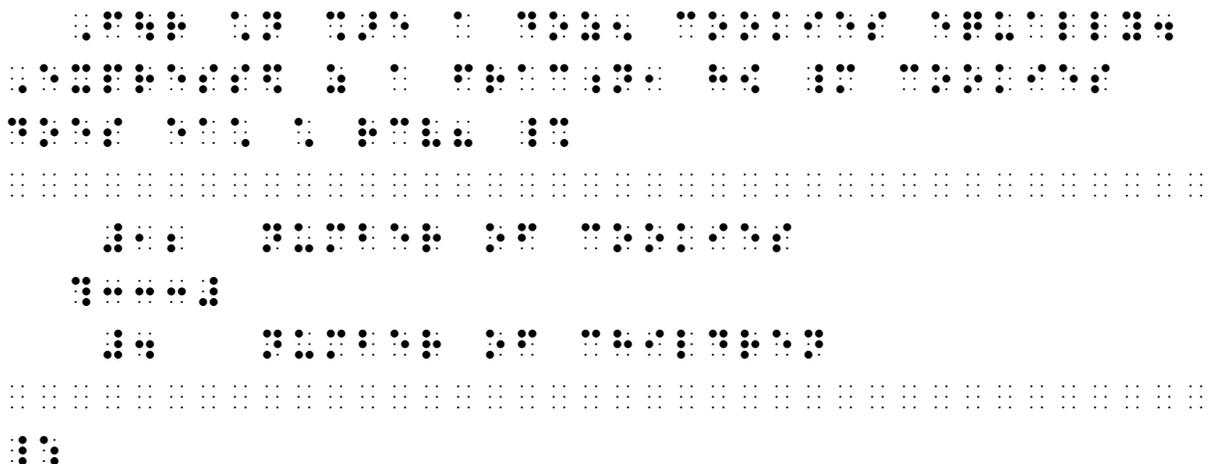
Situations Requiring Spatial Presentation

15.4 Simple Fractions Arranged Spatially for Illustration: When the parts of a simple fraction are labeled, it may be helpful to use a spatial arrangement. Labels are included within the code switch and are uncontracted.

➤ $\frac{2}{3}$ numerator
denominator 

Example 15.4-1 Four children share a dozen cookies equally. Expressed as a fraction, how many cookies does each child receive?

$\frac{12}{4}$ number of cookies
number of children



PRACTICE 15A

1. Shandra invited seven friends to a pizza party. Two pizzas were ordered. Each pizza had eight slices. Which fraction shows how many slices of pizza each child can have if they share equally?
 - a. $\frac{2}{8}$ number of pizzas
 number of children
 - b. $\frac{8}{8}$ number of slices
 number of children
 - c. $\frac{16}{8}$ number of slices
 number of children

15.5 Cancellation Within Fractions: Recall that a spatial arrangement is required whenever numbers, letters, or abbreviations are canceled in print by any type of stroke through them.

Opening Cancellation Indicator	⠠⠠
Closing Cancellation Indicator	⠨⠨

When cancellation occurs within a fraction, replacement items (the result of cancellation) are placed above canceled items in the numerator and below canceled items in the denominator. Each replacement item is centered with respect to the canceled term.

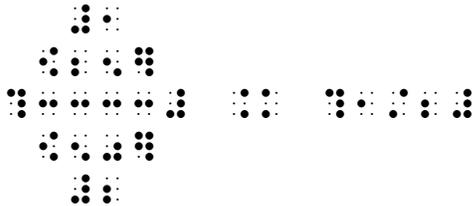
Example 15.5-1

1	⠨⠨
25	⠠⠠⠠⠠
<hr style="width: 100%; border: 0.5px solid black;"/>	⠠⠠⠠⠠⠠⠠⠠⠠
50	⠠⠠⠠⠠
2	⠨⠨

- Line 1: Replacement "1" is centered above canceled "25". A numeric indicator is required.*
- Line 2: A numeric indicator is not required because the numeral is not preceded by a space.*
- Line 3: The fraction line is as long as the longest line in the fraction – in this case, both numerator and denominator have a 4-cell item.*
- Line 4: A numeric indicator is not required because the numeral is not preceded by a space.*
- Line 5: Replacement "2" is centered below canceled "50". A numeric indicator is required.*

Fractions which do not require a spatial arrangement are brailled using the linear method.

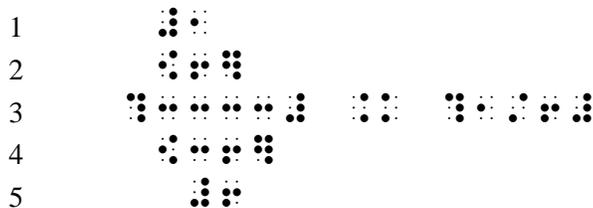
Example 15.5-2
$$\frac{\cancel{25}}{\cancel{50}} = \frac{1}{2}$$



Line 3: The second fraction ("one-half") is brailled as a linear fraction because it doesn't contain cancellation. The equals sign and the linear fraction are brailled on the same line as the spatial fraction line.

If exact centering is not possible, the term is moved to the left one cell.

Example 15.5-3
$$\frac{\cancel{1}}{\cancel{36}} = \frac{1}{6}$$



Line 1: Replacement "1" is centered above canceled "6". Exact centering is not possible so it is moved left one cell.

Line 2: Canceled "6" is centered above the fraction line. Exact centering is not possible so it is moved left one cell.

Line 3: The fraction line is as long as the longest line in the fraction (the denominator).

Line 4: Canceled "36" is centered below the fraction line.

Line 5: Replacement "6" is centered below canceled "36".

15.5.2 Cancellation and Level Indicators: Paired cancellation indicators must be placed on the same level of writing.

➤ d^2 ⠠⠠⠠⠠⠠⠠⠠⠠

"d²" is canceled. The cancellation indicators are on the baseline of writing.

Example 15.5-7

$$\frac{\cancel{d^2}}{\cancel{1}} = d$$

The replacement items are centered above and below the canceled items.

In the next example, only the superscript is canceled.

➤ p^3 ⠠⠠⠠⠠⠠⠠⠠

The cancellation indicators are in the superscript position.

Example 15.5-8

$$\frac{4x^2q}{p^3 2}$$

The replacement numeral "2" is placed below the canceled superscript in the denominator, centered below the term it replaces.

15.5.3 Canceled Abbreviations: A canceled abbreviation is unspaced from the cancellation indicators.

➤ $in.$ ⠠⠠⠠⠠⠠⠠⠠

➤ m^2 ⠠⠠⠠⠠⠠⠠⠠

The spaces required before and after the abbreviation are inserted before the opening cancellation indicator and after the closing cancellation indicator.

Here is a transcription of the example from the previous page where the complex fraction in the numerator is brailled as a linear arrangement within the overall spatial arrangement.

Example 15.8-1
$$\frac{\frac{1/2}{3/4}}{5}$$

Terms of the fraction are centered above and below their fraction lines.

If the numerator and denominator are too long to fit on one line, follow the rules regarding division of mathematical expressions between braille lines. (See **Lesson 14**.)

Example 15.8-2

1. Show that
$$\frac{\frac{3\frac{1}{3}}{7\frac{1}{5}} - \frac{1}{2\frac{2}{7}}}{4\frac{1}{5} \times \frac{2\frac{2}{3}}{6\frac{3}{8}}} \text{ of } \frac{11\frac{1}{5}}{17} \times 52\frac{4}{11} = \frac{1}{2}.$$

Numerator and denominator are divided before an operation sign (priority #2). The numerator is divided before the minus sign; the denominator is divided before the multiplication cross. Terms of the fraction are centered above and below the spatial fraction line.

The combined transcription method illustrated above is the preferred way of brailleing a hypercomplex fraction. However, it is permissible to use an entirely spatial arrangement or an entirely linear arrangement. Example 15.8-1 is illustrated below using these two alternate methods.

$$\frac{\frac{1}{2}}{\frac{3}{4}} \quad \frac{\quad}{5}$$

Entirely spatial

Entirely linear A linear arrangement uses the horizontal hypercomplex fraction line.

<p>Horizontal Hypercomplex Fraction Line (used in linear arrangements) </p>
--

Linear hypercomplex fractions are difficult to assemble mentally.

15.9 Higher Orders of Complexity: Hypercomplex fractions of higher order may be transcribed in the manner described above, with dot 6 added the appropriate number of times before the fraction indicators and the matching fraction lines. No examples are shown.

Instructions: Transcribe this hypercomplex fraction using the combined method—that is, braille each complex fraction as a linear arrangement within the overall spatial arrangement. Numerators and denominators can be determined by noting the length of each fraction line in print.

PRACTICE 15C

$$\frac{\frac{r^2 - 4s^2}{s^2}}{r + 2s} \quad \frac{\quad}{s} \quad \frac{4r - 2s^2}{3s} \quad \frac{2s^2 - 3r}{4r}$$

PRACTICE 15D

$$\sqrt{3} = 1 + \frac{1}{3 + \frac{1}{3 + \frac{1}{3 + \dots}}}$$

FORMAT

Remarks and Comments

15.11 Guidelines: When short narrative comments alternate with math problems, switch out of Nemeth Code to transcribe the comments in contracted braille. Two ways to handle such remarks are illustrated in this section. Regardless of which method you use, the same format should be used throughout the transcription and an explanation should be included on the Transcriber's Notes page according to the guidelines given in *Braille Formats*.

Author's comments are often printed in a different color or typeface. The distinction is disregarded in the braille transcription according to guidelines given in *The Rules of Unified English Braille*. In the examples in this section, author's remarks are printed in italics.

15.11.1 OPTION #1—Continue the Commentary on the Same Line: This option is the preferred treatment of authors' remarks. The comments continue on the line on which the related math ends, with runovers in the appropriate location for the math expression. By placing the opening Nemeth Code indicator after the last word of each comment rather than at the beginning of the next line of math, the switch indicator does not interfere with the math under study. If there is not room on the line, the indicator is treated as a runover to the comment line.

The single-word switch indicator is used for a one-word comment.

Example 15.11-2

What percent of 48 is 54?

$$n \cdot 48 = 54 \quad \text{Write an equation.}$$

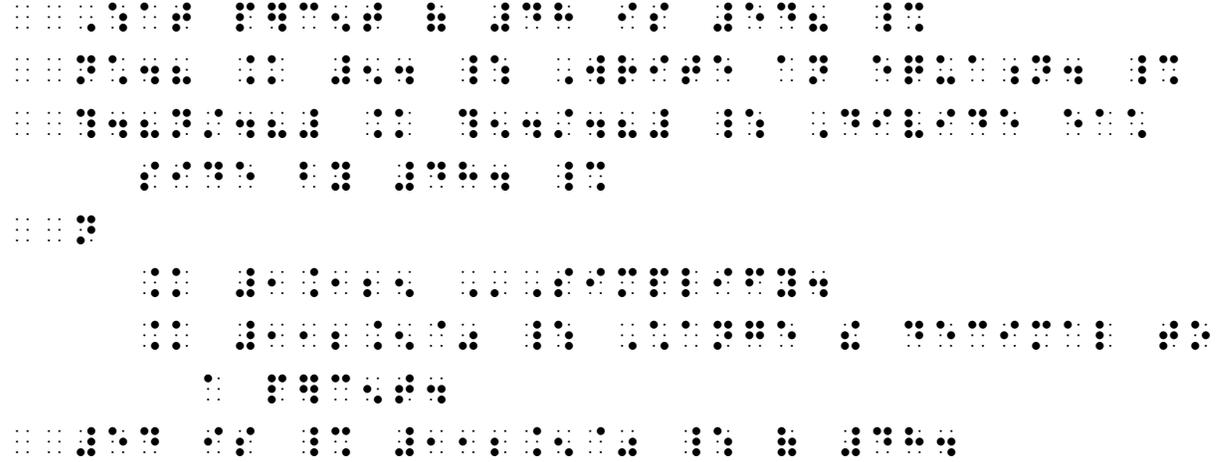
$$\frac{48n}{48} = \frac{54}{48} \quad \text{Divide each side by 48.}$$

$$n = 1.125 \quad \text{Simplify.}$$

$$= 112.5\% \quad \text{Change the decimal to a percent.}$$

54 is 112.5% of 48.

1
2
3
4
5
6
7
8
9



Lines 1 and 9: Narrative paragraph begins in cell 3.

Line 2, 3, 5: Expressions displayed to narrative text begin in cell 3. The author's comments follow on the same line. Runovers (line 4) begin in cell 5.

Lines 5-8: This is a linked expression requiring special margins. The runover margin for the anchor and links (as well as the comment) is cell 7.

Line 6: The comment consists of one word. The single-word switch indicator is used on the word "Simplify" even though there are no contractions in the word.

Line 3: Math displayed to itemized (1-3) begins in cell 5.

Lines 3-17: This linked expression meets the criteria for "special margins". The anchor starts in cell 5 (line 3). Each link begins in cell 7 (lines 4, 11, 17). Runovers begin in cell 9 (line 5).

Lines 6,15, 18: Each comment begins in cell 13, which is four cells to the right of the runover position of the previous line, even if no runover is present.

Lines 7, 16, 19-20: Runovers to comments are blocked in cell 13.

Line 16: The switch indicator is brailled at the end of the comment in order not to interfere with the alignment of the equals sign that begins the next link on line 17.

Instructions: Demonstrate your understanding of the rules by transcribing this practice twice – first using option #1, then using option #2. *NOTE:* In print, the equals signs are aligned. This alignment is disregarded in the braille transcription.

PRACTICE 15E

We write the equation in the slope-intercept form, $y = mx + b$, by solving for y .

$$-5x - 2y = 6$$

$$-2y = 5x + 6 \quad \textit{Add } 5x \textit{ to both sides.}$$

$$\frac{-2y}{-2} = \frac{5x+6}{-2} \quad \textit{Divide both sides by } -2.$$

$$y = \frac{5x}{-2} + \frac{6}{-2} \quad \textit{Divide each term by } -2 \textit{ and simplify.}$$

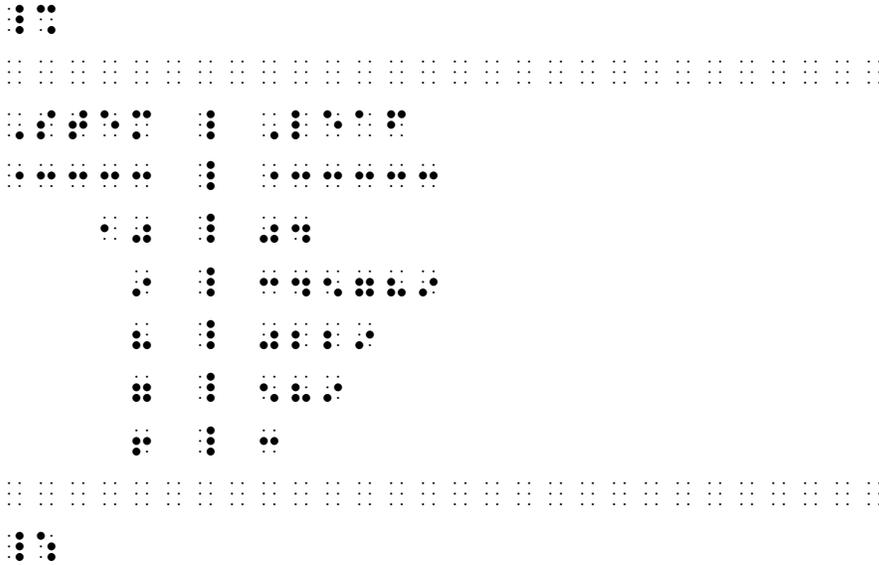
$$y = -\frac{5}{2}x - 3 \quad \textit{Slope-intercept form}$$

The following Nemeth Code rules apply to this example.

- The numeric indicator is omitted in the body of the plot.
- Spaces are not brailled between single-digit entries.
- The data are justified to the vertical line as shown in print.

Example 15.13-1

Stem	Leaf
10	0 4
9	3 4 5 7 8 9
8	0 2 2 9
7	5 8 9
6	3



The table is preceded and followed by a blank line. Code switch indicators do not replace required blank lines.

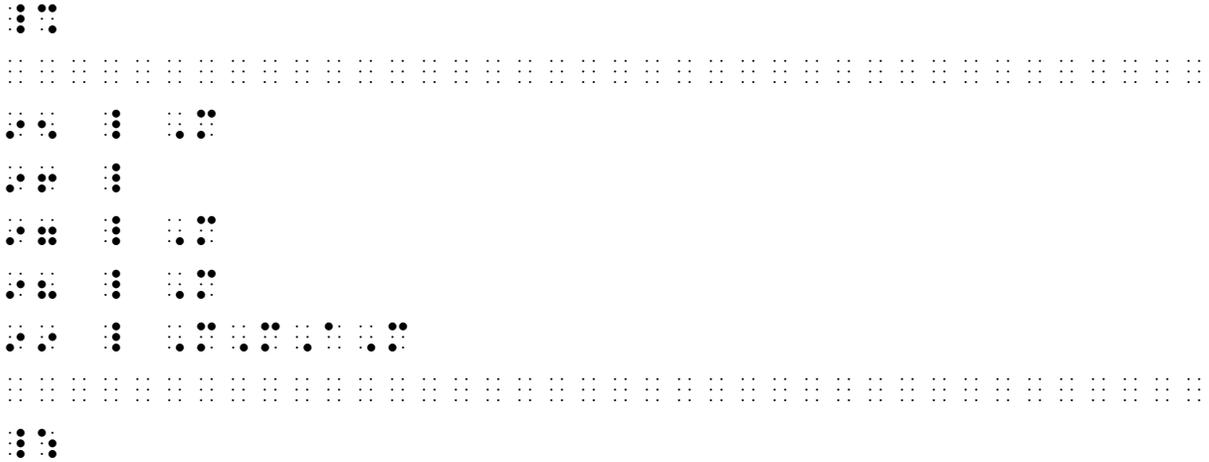
15.17 Blank Entries: A blank entry in a stem-and-leaf plot is shown as blank space in the braille transcription. Do not braille a general omission symbol. Do not fill the width of the column with dot 5s.

The following rules also apply to the next example.

- The numeric indicator and the English letter indicator are omitted in the body of the plot.
- Spaces are not brailled between single-letter data entries.
- Uppercase letters are capitalized individually.

Example 15.17-1

95	M
96	
97	M
98	M
99	M M A M



This plot has no key and no column headings—none are added in braille. The blank space in the second row indicates a blank entry in the leaf column.. Single letters are unspaced and are capitalized individually.

15.18 Runovers Within the Table: A runover of leaves shown in print should be ignored if all leaves will fit on one row in braille. Use the full width of the available cells in the row.

Example 15.18-1

Stem	Leaf
1	2 2 2 3 4 4 5 5 5 5 6 6 7 7 7 7 8 8 9 9 9 9 9
2	0 1 1 1 2 6 6 8
3	0

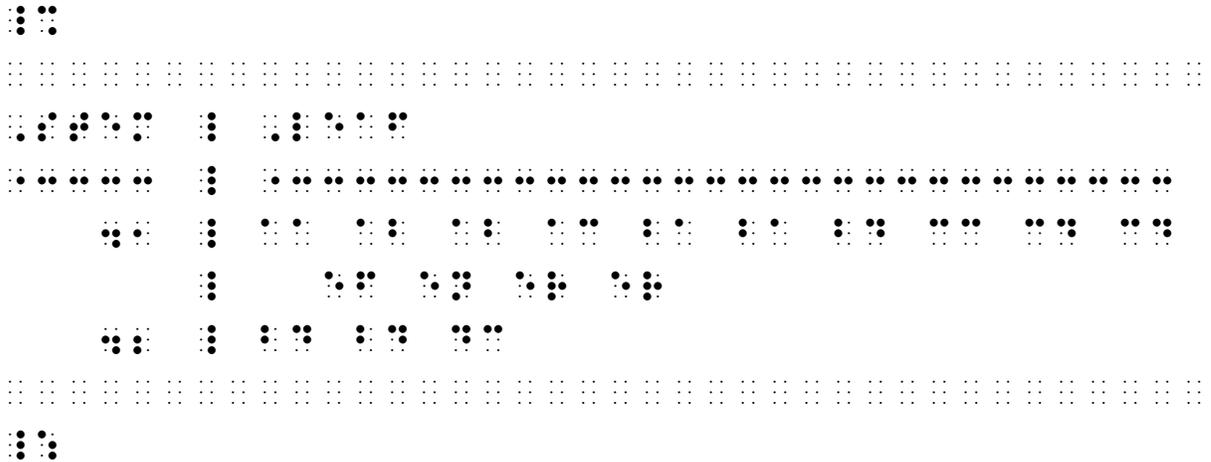
1|2=12

The first row of leaf data requires two lines in print but not in braille.

If leaf data will not fit on one line in the braille transcription, indent the runover line two cells to the right after using as much of the braille line as possible. Do not repeat the stem row heading. The next example illustrates, expanding the two-letter data example shown previously.

Example 15.18-2

Stem	Leaf
41	aa ab ab ac ba ba bd cc cd cd ef en er er
42	bd bd dc



The vertical line is brailled on every line in the table.

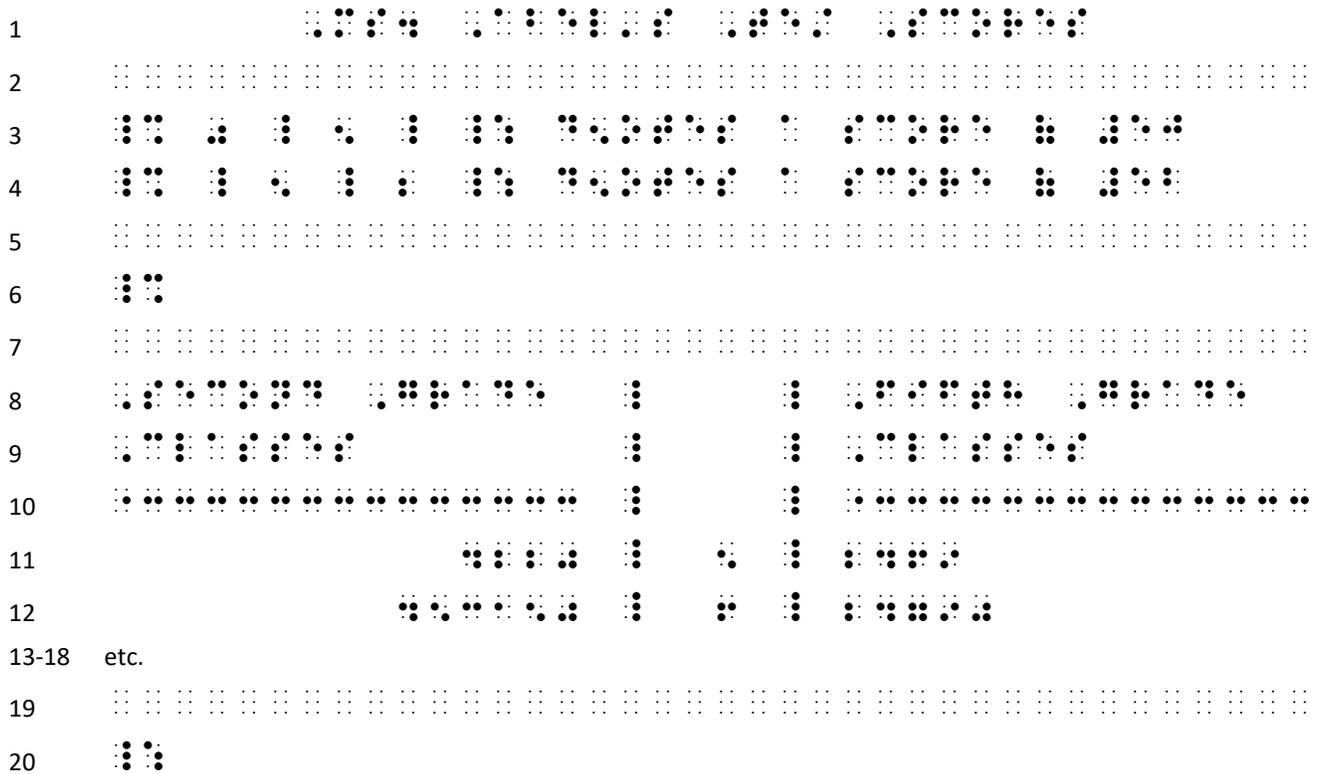
15.19 Back-To-Back Plot: A back-to-back stem-and-leaf plot is used when two sets of data are to be compared. There are three columns. The stem is the middle column. Data is read from the stem outward, which means that data in the left leaf is read from right to left. There will be two keys. In this example, the keys are printed within the body of the table.

Example 15.19-1

Ms. Abel's Test Scores

Second Grade Classes			Fifth Grade Classes	
0 5 denotes a	4220	5	2469	5 2 denotes a
score of 50	453150	6	24790	score of 52
	987776655521	7	111223334556667899900	
	999998888776655444332110	8	122244455789	
	98877753320	9	223577780	
		10	00	

ALTERNATE METHOD



PRACTICE 15F

A pet store owner constructed the following stem-and-leaf plot showing the number of guinea pigs at each of her seventeen stores:

Stem	Leaf
0	7 8
1	
2	0 6 8 8 8
3	0 2 6 6 7 8
4	1 2 6 6
5	

Key: 2 | 0 represents 20 guinea pigs

How many stores have fewer than 36 guinea pigs?

For further practice, see Appendix A—Reading Practice.

