LESSON 11

- SIGNS OF SHAPE
  - Basic Shapes
  - Shapes with Structural Modification
  - Shapes with Interior Modification
  - Other Details
  - Calculators and Keyboards
  - Icons
  - Shapes Used as Signs of Omission
  - Identified Signs of Shape
- TYPEFORM INDICATORS FOR MATHEMATICAL WORDS AND PHRASES
  - One Word in Italics or Boldface
  - A Phrase in Italics or Boldface

Format

- Mathematical Statements

Answers to Practice Material

LESSON PREVIEW

Signs of shape are studied in depth, including icons and calculator keys. The study of typeform in Nemeth continues with the study of emphasized words in mathematical context. Format guidelines are given for consistent transcription of mathematical statements.

SIGNS OF SHAPE

[NC Rule 17]

11.1 Definition

A sign of shape is a miniature picture of a geometric figure or an object.

△ (triangle) ∠ (angle) ○ (circle)

Basic Shapes

[NC 17.1]

A basic shape is represented by the shape indicator followed by a numeral, one or more letters, or a dot combination suggestive of the shape.

⠰	Shape Indicator

11.2 Basic Signs of Shape Represented by Numbers—Regular Polygons

A closed figure that has equal sides and equal angles is called a regular polygon and is represented by the shape indicator followed by a numeral specifying the number of sides in the figure.

⠰⠙	Square (4-sided)	□
⠰⠢	Regular Pentagon (5-sided)	⬠
⠰⠬	Regular Hexagon (6-sided)	⬡

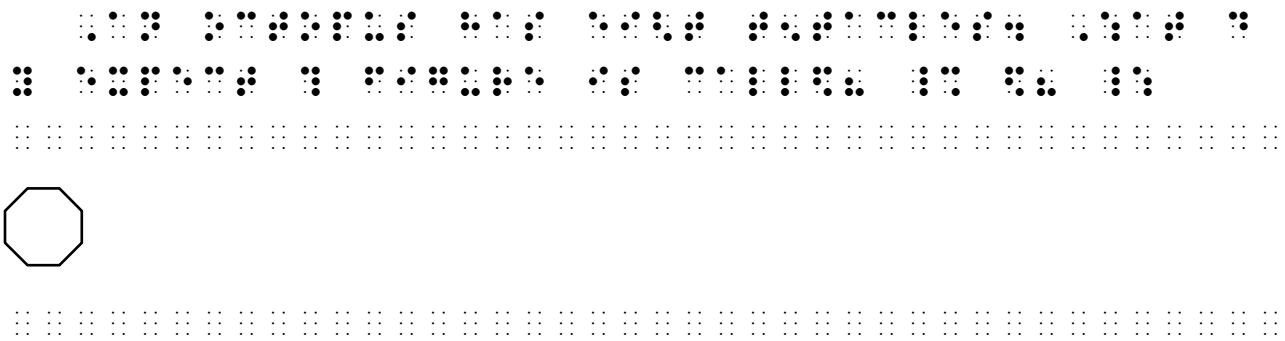
Note that the equilateral triangle, which is a regular polygon, is <u>not</u> represented by the number three. See 11.4.

11.2.1 **Unlisted Regular Polygons.** Symbols which represent regular polygons with seven or more sides are not provided for in the Nemeth Code. If the unlisted shape is a *regular polygon*—that is, it is a closed figure with equal sides and equal angles—the transcriber is instructed to devise a symbol in accordance with the principles above, based on the number of sides the shape has. It may be helpful to include a tactile drawing of the shape. Unlisted regular polygon constructions do not require a transcriber's note.

Refer to *Guidelines and Standards for Tactile Graphics* regarding shapes used in kindergarten through third grade materials such as counting symbols, pictographs, etc.

Example 11-1

An octopus has eight tentacles. What do you expect this figure is called?



In addition to the transcriber-devised symbol, the shape is presented as a tactile graphic at the first mention of this shape. The graphic's left margin is cell 1. Follow directives in Guidelines and Standards for Tactile Graphics for drawing techniques.

11.3 Basic Signs of Shape Represented by Letters—Irregular Polygons

A closed figure which has at least two unequal sides and/or two unequal angles is called an *irregular polygon* and is represented by the shape indicator followed by a letter or a combination of letters suggestive of the name of the shape. (The derivation of the letter following the shape indicator is underlined in the list below.)

⠫⠙	Diamond	◊
⠫⠓⠭	Irregular Hexagon	⬡
⠫⠏⠛	Irregular Pentagon	⬠
⠫⠏	Parallelogram	▱
⠫⠟	Quadrilateral	⏢
⠫⠗	Rectangle	▭
⠫⠍	Rhombus	▱
⠫⠵	Trapezoid	⏢

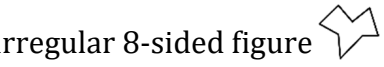
11.3.1 **Unlisted Irregular Polygons.** You may come across a shape which is not provided for in the Nemeth Code. If the unlisted shape is an irregular polygon—that is, it is a closed figure with at least two unequal sides and/or two unequal angles—the transcriber is instructed to devise a symbol if it appears frequently in the transcription. Construct the symbol in accordance with the principles above. Be careful not to choose a letter or letter combination which already has

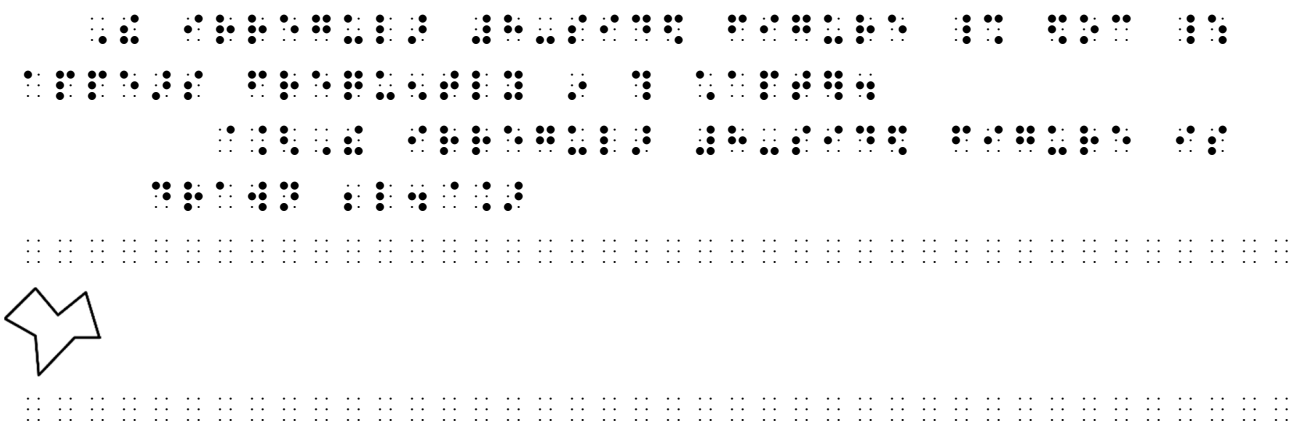
an assigned meaning in the Nemeth Code. Refer to Appendix B of the Nemeth Code for a list of symbols already in use. Find the section for symbols beginning with dots 1246.

A transcriber's note is required to define the figure unless it is described in the narrative. In your note, give the name or description of the symbol used. Include a drawing of the shape when appropriate. Sample transcriber's note:

The irregular 8-sided figure is drawn below.

Example 11-2

The irregular 8-sided figure  appears frequently in this chapter.



A raised outline of the shape is included as a tactile graphic at the first mention of this shape. Follow directives in Guidelines and Standards for Tactile Graphics.

11.4 Other Basic Signs of Shape Represented by Letters

The following shapes are also represented by the shape indicator followed by a letter suggestive of the name. (The derivation of the letter following the shape indicator is underlined.)

	Circle	○
	Ellipse	⬭
	Intersecting Lines	×
	Star	☆
	Triangle	△

Clarification: The triangle shape shown here is an equilateral or equiangular triangle – sides are equal in length, angles are equal in measurement. The symbol ⠫⠩ is used to represent a triangle shape when the print copy uses the drawing to replace the word "triangle" or when it is used to specifically represent an equilateral/equiangular triangle. See 11.8 for other types of triangles.

The following shapes were introduced in Lesson 5 as signs of comparison. They may also be used in print to simply replace the word they represent. Notice that two signs in this category begin with the negation symbol (dots 34) immediately followed by the shape indicator.

⠫⠱	Arc, Concave Upward	⌒
⠫⠳	Is Parallel To	∥
⠸⠫⠳	Is Not Parallel To	∦
⠫⠿	Is Perpendicular To	⊥
⠸⠫⠿	Is Not Perpendicular To	⊥̸

Example 11-3

Line AD ∦ Line BC.

⠫⠩ ⠠⠁⠠⠙ ⠸⠫⠳ ⠠⠃⠠⠉

11.4.1 **Other Unlisted Basic Shapes.** Basic shapes not provided for in the Nemeth Code are formed in accordance with the principles above. One must be careful not to choose a symbol which already has an assigned meaning in the Nemeth Code. Refer to Appendix B of the Nemeth Code for a list of symbols already in use. Find the section for symbols beginning with dots 1246 and dots 34.

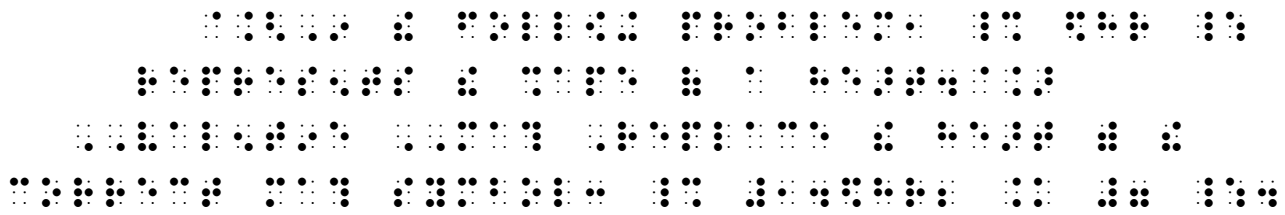
A transcriber's note is required to define the figure. Give the name or description of the symbol used. Include a drawing of the shape if it is vital to the mathematical topic at hand.

Sample transcriber's note:

> In the following problem, ⠫⠭⠽ represents the shape of a heart.

Example 11-4

VALENTINE MATH Replace the heart with the correct math symbol: 14 ♡ 2 = 7.



The transcriber represents the heart shape with ⠫⠓⠗ *since* ⠫⠓ *means "rhombus".*

11.5 Basic Signs of Shape Represented by Other Dot Combinations

Three additional shapes are identified in the Nemeth Code.

⠫⠫	Angle	∠
⠫⠌	Arc, Concave Downward	⌣
⠨⠫	Inverted Triangle	▽

11.6 Filled-In and Shaded Shapes

A filled-in or shaded closed shape (circle, diamond, square, etc.) is represented as such by the filled-in shape indicator or the shaded shape indicator. The appropriate indicator is placed between the shape indicator and the shape symbol.

⠸	Filled-in shape indicator
⠨	Shaded shape indicator

⫸ ★ ⠫⠸⠎ (filled-in star)

⫸ ◍ ⠫⠨⠉ (shaded circle)

⫸ ■ ⠫⠸⠲ (filled-in square)

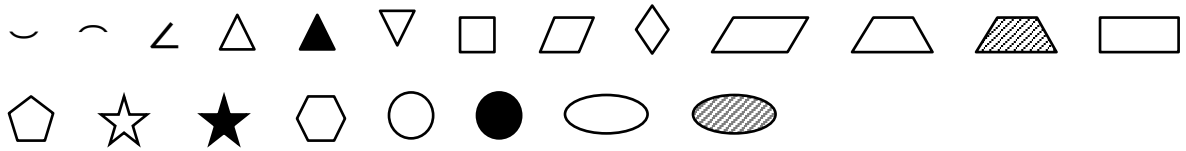
A filled-in square is often used to indicate the end of a long example or exercise. A filled-in square or rectangle used to indicate the end of a mathematical proof has its own special symbol. Proofs will be discussed in Lesson 12.

Shapes used as icons are discussed later in this lesson. See 11.26.

Instructions: Format the topic headings as cell-5 headings. Format each series of shapes as one paragraph, placing each opening Nemeth Code indicator at the beginning of each paragraph. Leave one space between each shape. Place as many shapes on one braille line that will fit before beginning a new line. Following the second topic heading, write a transcriber's note defining the flower and chicken shapes. Use "fl" to represent the flower and "ch" to represent the chicken.

PRACTICE 11A

Listed Shapes



Unlisted Shapes

Shapes with Structural Modification

[NC 17.5]

11.7 Definition and Construction

A shape with structural modification is one in which the general print form of a basic shape (such as *triangle*) is changed to show a more specific form (such as *right triangle*).

Basic shape: Triangle

More specific form: Right Triangle

Composite signs in which two or more signs of shape are combined are also structurally modified shapes, for example, two *angle* shapes in print combine to form the symbol for *adjacent angles*.

Basic shape: Angle

More specific form: Adjacent Angles

A shape with structural modification is represented by

- the basic shape symbol,
- followed by the structural shape-modification indicator,
- followed by a letter or an uncontracted combination of letters suggestive of the change in the shape,
- ending with the termination indicator which signals the end of the modification.

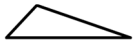
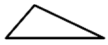
Shape indicator

Structural shape-modification indicator

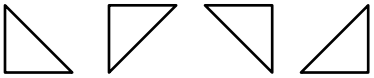
Termination indicator

11.8 Structurally Modified Triangles

The following five structurally modified triangles are identified in the Nemeth Code. Each symbol starts with the basic shape symbol for "triangle" ⠫⠩. The derivation of the letter following the structural shape-modification indicator is underlined in the list of modified triangles below.

⠫⠩⠁	Acute Triangle	
⠫⠩⠊	Isosceles Triangle	
⠫⠩⠕	Obtuse Triangle	
⠫⠩⠗	Right Triangle	
⠫⠩⠎	Scalene Triangle	

Know Your Triangles: Triangles are defined by the measure of angles and sides, not by orientation. For example, each of these is a "right triangle" because each contains a 90° angle.

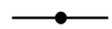


Definitions can be found in Appendix B of this course ("Glossary of Terms").

11.9 Structurally Modified Angles

The following twelve structurally modified angles are identified in the Nemeth Code. Each symbol starts with the basic shape symbol for "angle" ⠫⠨. The derivation of the letter or letters following the structural shape-modification indicator . is underlined in the list below.

Specific Angles

⠫⠨⠨⠕⠻	Obtuse Angle	
⠫⠨⠨⠗⠻	Right Angle	
⠫⠨⠨⠎⠻	Straight Angle	

Combined Angles

⠫⠨⠨⠚⠻	Adjacent Angles	or
⠫⠨⠨⠉⠑⠻	Alternate Exterior Angles	
⠫⠨⠨⠉⠊⠻	Alternate Interior Angles	
⠫⠨⠨⠉⠏⠻	Complementary Angles	
⠫⠨⠨⠉⠻	Corresponding Angles	
⠫⠨⠨⠑⠻	Exterior Angles	
⠫⠨⠨⠊⠻	Interior Angles	
⠫⠨⠨⠎⠏⠻	Supplementary Angles	
⠫⠨⠨⠧⠻	Vertical Angles	

11.10 Unlisted Shapes with Structural Modification

Structurally modified shapes which are not provided for in the Nemeth Code are formed in accordance with the principles above. Review the definition of *structural modification* in 11.7 to properly identify the unlisted shape. Be careful not to choose a symbol which already has an assigned meaning in the Nemeth Code. Refer to Appendix B of the Nemeth Code for a list of symbols already in use. Find the section for symbols beginning with dots 1246.

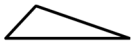
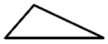
Explain the unlisted shape in a transcriber's note, giving the name or description of the symbol used. Include a drawing of the shape when appropriate.

Instructions: After completing the "Angle/Symbol" table, leave one blank line and then begin the "Triangle/Symbol" table. Do not use box lines. Review simple table format in Lesson 5.

PRACTICE 11B

Structurally Modified Shapes

Angle	Symbol
right	
straight	
obtuse	
complementary	
supplementary	
vertical	

Triangle	Symbol
isosceles	
right	
acute	
obtuse	
scalene	

Shapes with Interior Modification

[NC 17.6]

11.11 Definition and Construction

A shape with interior modification is a basic shape (for example, a *circle*) within which a letter, a numeral, a sign of operation, or other sign appears.

Basic shape:	◯	Circle
More specific form:	⑧	Circle with number 8 inside
More specific form:	⊛	Circle with asterisk inside

A shape with interior modification is represented by

- the basic shape symbol,
- followed by the interior shape-modification indicator,
- followed by the symbol corresponding to the interior sign,
- ending with the termination indicator which signals the end of the modification.

⠸	Shape indicator
⠸⠼	Interior shape-modification indicator
⠸	Termination indicator

Symbols, numbers, words, etc. that represent keys on a calculator or a keyboard follow rules for keystrokes. See 11.23-11.25.

11.12 Circles with Interior Modification

Eleven circles with interior modification are identified in the Nemeth Code. Each symbol starts with the basic shape symbol for "circle" ⠸⠐ followed by the interior shape-modification indicator. ⠸⠼ Notice that an interior numeral includes a numeric indicator and that the contracted form of the right-pointing arrow is not used.

⠐⠐⠨⠐⠐⠕⠕⠕⠨⠳	Circle with Interior Arrow Pointing Right	
⠐⠐⠨⠐⠐⠪⠕⠕⠨⠳	Circle with Interior Arrow Pointing Left	
⠐⠐⠨⠐⠐⠫⠕⠕⠨⠳	Circle with Interior Arrow Pointing Up	
⠐⠐⠨⠐⠐⠵⠕⠕⠨⠳	Circle with Interior Arrow Pointing Down	
⠐⠐⠨⠐⠠⠨⠳	Circle with Interior Capitalized Letter	
⠐⠐⠨⠐⠨⠠⠳	Circle with Interior Numeral	
⠐⠐⠨⠐⠠⠔⠳	Circle with Interior Cross	
⠐⠐⠨⠐⠔⠨⠳	Circle with Interior Dot	
⠐⠐⠨⠐⠤⠳	Circle with Interior Minus Sign	
⠐⠐⠨⠐⠖⠳	Circle with Interior Plus Sign	
⠐⠐⠨⠐⠸⠳	Circle with Interior Vertical Bar	

11.13 Angles with Interior Modification

Three angles with interior modification are identified in the Nemeth Code. Each symbol starts with the basic shape symbol for "angle" ⠐⠣ followed by the interior shape-modification indicator ⠨

⠐⠣⠨⠐⠐⠕⠳	Angle with Interior Arc	
⠐⠣⠨⠐⠐⠕⠕⠨⠳	Angle with Interior Clockwise Arrow	
⠐⠣⠨⠐⠐⠪⠕⠕⠨⠳	Angle with Interior Counterclockwise Arrow	

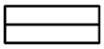
When the print copy uses the "angle with interior arc" symbol throughout the text to simply mean "angle", the two-cell angle symbol may be used: ⠫⠣. A transcriber's note is required to inform the reader of the substitution. Sample note on the Transcriber's Notes page: "In print, the angle shape image includes an interior arc."

When a number with internal measurement is encountered within the text, it is constructed as follows. (See also, 11.18, below.)

⫸ ∠30° ⠫⠣⠸⠫⠒⠴⠘⠨⠡⠐⠻

11.14 Rectangles and Squares with Interior Modification

One rectangle and seven squares with interior modification are identified in the Nemeth Code. Each symbol starts with the basic shape symbol for "rectangle" ⠫⠗ or for "square" ⠫⠲ followed by the interior shape-modification indicator ⠸⠫



⠫⠗⠸⠫⠱⠻	Rectangle with Interior Horizontal Bar	⊟
⠫⠲⠸⠫⠱⠻	Square with Interior Horizontal Bar	⊟
⠫⠲⠸⠫⠳⠻	Square with Interior Vertical Bar	◫
⠫⠲⠸⠫⠔⠻	Square with Interior Diagonal from Lower Left to Upper Right	⧄
⠫⠲⠸⠫⠢⠻	Square with Interior Diagonal from Upper Left to Lower Right	⧅
⠫⠲⠸⠫⠢⠈⠔⠻	Square with Interior Diagonals	⊠
⠫⠲⠸⠫⠡⠻	Square with Interior Dot	⊡
⠫⠲⠸⠫⠼⠢⠻	Square with Interior Numeral	5

11.15 Words Enclosed in Shapes

Words enclosed in shapes are transcribed according to the methods for shapes with internal modification and must be enclosed within Nemeth switches. *Note*: Words that represent keys on a calculator or a keyboard follow rules for keystrokes. See 11.23-11.25.

11.16 Two or More Vertically Arranged Modifiers

When two or more vertically arranged symbols occur within a basic sign of shape, the basic shape symbol and the interior shape-modification indicator are followed first by the symbol for the upper and then by the symbol for the lower interior sign. The termination indicator is used only after the last symbol.

⠫⠉⠸⠫⠫⠒⠒⠕⠫⠬⠒⠒⠻

Circle with Interior Arrow Pointing Right
Over Interior Arrow Pointing Left

⠫⠉⠸⠫⠫⠬⠒⠒⠫⠒⠒⠕⠻

Circle with Interior Arrow Pointing Left
Over Interior Arrow Pointing Right

11.17 Two or More Horizontally Arranged Modifiers

When two or more horizontally arranged symbols occur within a basic sign of shape, a multipurpose indicator (dot 5) is inserted between the interior modifiers to show that they are printed horizontally, not vertically. The termination indicator is used only after the last symbol.

⠫⠉⠸⠫⠫⠧⠒⠒⠕⠐⠫⠩⠒⠒⠕⠻

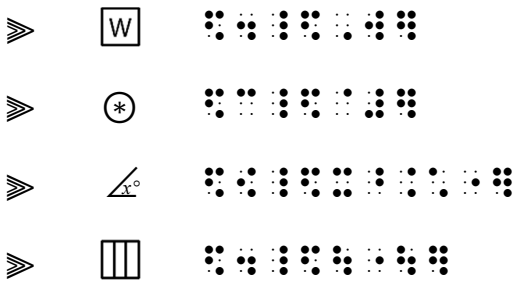
Circle with Interior Arrow Pointing Up
Followed by Interior Arrow Pointing Down

⠫⠉⠸⠫⠫⠩⠒⠒⠕⠐⠫⠧⠒⠒⠕⠻

Circle with Interior Arrow Pointing Down
Followed by Interior Arrow Pointing Up

11.18 Unlisted Shapes with Interior Modification

Shapes with interior modification not provided for in the Nemeth Code are formed in accordance with the principles for the construction of such shapes. Review the definition of interior modification in 11.11 to properly identify the unlisted shape.



A symbol which already has an assigned meaning in the Nemeth Code must not be used for the unlisted sign of shape. If necessary, explain the shape in a transcriber's note giving the name or description of the symbol used. Include a drawing of the shape when appropriate.

Instructions: Transcribe this as a simple list, not as columns.

PRACTICE 11C

Squares with Interior Modification

Square with interior numeral 2

Square with interior dot

Square with interior horizontal bar

Square with interior vertical bar

Square with interior diagonals

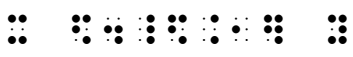
Other Details

11.19 Spacing with Signs of Shape

A sign of shape is spaced in accordance with its assigned meaning. For example, operation signs are unspaced.

⋙ x ⊕ y

Comparison signs are spaced.

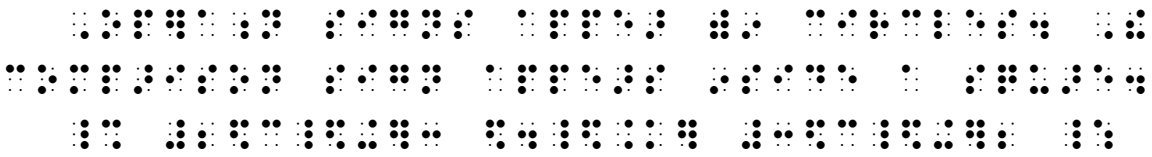
⋙ x ⊃ y 

Exception: Keystroke constructions follow different spacing rules. See 11.24.2.

Example 11-5

Operation signs appear within circles. The comparison sign appears inside a square.

2 ⊕ 3 ⊐ 3 ⊕ 2



11.20 Punctuation with Signs of Shape

Signs of shape are punctuated mathematically when the punctuation falls within the code switches.

⋙ (△, ○, □)

11.21 Plurals/Possessives

The uncapitalized letter "s" or the apostrophe-s combination occurring inside or after a sign of shape to show its plural or possessive are placed <u>after</u> the shape symbol. Apply the general rules for the English-letter indicator to the plural or possessive ending.

Example 11-6

∠s and △s.

Each "s" is printed inside the shape.

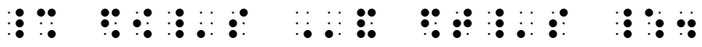
Example 11-7

∠s and △s.

Each "s" follows the printed shape.

Example 11-8

∠'s and △'s.



A punctuation indicator precedes each apostrophe.

Example 11-9

(∠'s and △'s, and ◯'s.)

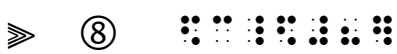
Each "apostrophe-s" is punctuated mathematically because each is associated with a mathematical item.

11.22 Further Considerations Regarding Transcriber-Devised Shapes

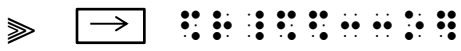
As previously noted, when encountering a shape not provided for in the Nemeth Code the transcriber may devise a symbol if that shape appears more than occasionally. The print shape should also be drawn as a raised-line diagram the first time the new symbol is introduced. In addition to the guidelines regarding unlisted shapes throughout this lesson, observe the following.

11.22.1 **Usage Rules Regarding Interior Numerals and Arrows.** Transcriber-devised forms should heed the following principles regarding interior numerals and arrows.

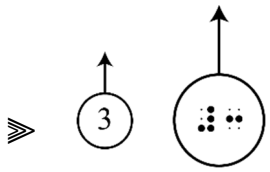
a. The numeric indicator is used before a numeral or before a decimal point and a numeral following the interior shape-modification indicator.



b. When a right-pointing arrow is part of a shape symbol, the shaft is transcribed. The contracted form of the right-pointing arrow is not used.



11.22.2 **Shapes Represented by Drawing.** Drawn-in shapes are often more readable than elaborate braille constructions. Since it is not possible to formulate specific rules for the selection of an appropriate form, the decision is left to the experience and judgment of the transcriber. Shapes may also be represented by a combination of drawing and braille symbols. For example, if a modified shape cannot be represented clearly by braille symbols alone, the shape can be drawn and the modification shown in braille.



PRACTICE 11D

1. ▯, ◯, △, ∠, ⊙, ∠.

2. (◯'s, ∠'s, and △'s.)

3. a ⊕ (b ⊕ c)

4. r ⊗ s ⊗ ____ = rst

5. How many ⧋ can you find in the giant ☐ ?

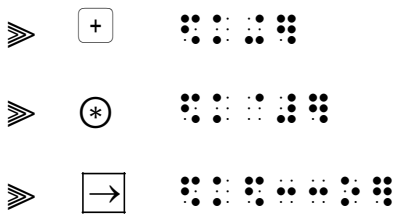
11.23 The Keystroke Indicator

When a print shape with interior modification depicts a labeled calculator or computer key, a contracted form employing a keystroke indicator is used in braille. A keystroke is represented by

- the keystroke indicator,
- followed by the label printed on the calculator key or the computer key,
- ending with the termination indicator which signals the end of the modification.

⠸⠸	Keystroke indicator
⠸⠸⠄	Termination indicator

11.23.1 **Shape in Print.** The keystroke indicator is used regardless of the shape of the key in the print copy.



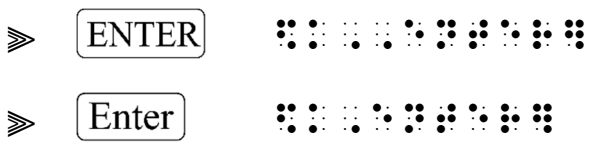
The actual key shape(s) used in a particular text should be specified in a transcriber's note. Sample transcriber's note:

> Calculator keys are depicted in print as square shapes.

11.24 Other Details Concerning Keystrokes

11.24.1 **The Label.** Regarding the label depicted on the key, note the following.

a. Capitalization is duplicated in braille. Words are transcribed without contractions.

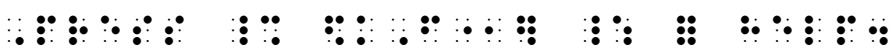


b. Follow the usual rules of the Nemeth Code for use of indicators.

A baseline indicator is required before the termination indicator.

Example 11-10

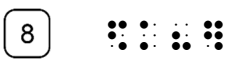
Press £ for help.



A multipurpose indicator (dot 5) is needed to show that the numeral is not a subscript. See Section 6.11.1.c.

c. The numeric indicator is not required within the keystroke construction.

⋙ [8]



Compare to a shape with interior modification which <u>does</u> require a numeric indicator. See <u>11.22.1</u>.

d. The contracted form of the right-pointing arrow is not used in a keystroke construction.

⋙ [→]

11.24.2 **Spacing.** No space is left between keystroke constructions and other similar constructions or mathematical symbols in a sequence of related calculations. Arrows contained in the labels on the keys should not be spaced from the material to which they apply.

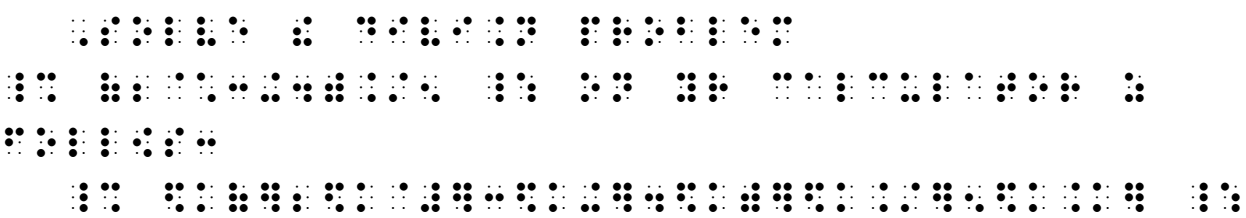
⋙ [A b/c ↔ d/e]

⋙ [**ENTER** ↑]

Example 11-11

Solve the division problem $(2 \times 3 + 4) \div 5$ on your calculator as follows:

[(] 2 [*] 3 [+] 4 [)] [÷] 5 [=]

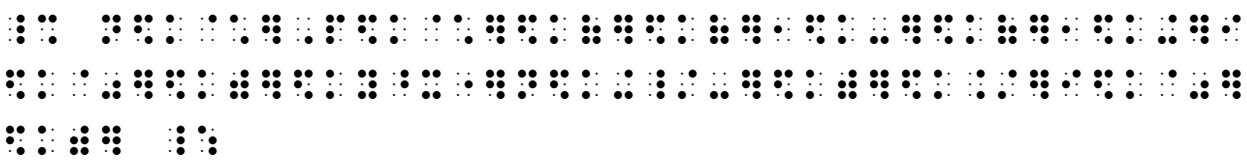


11.25 Long Keystroke Constructions

Use the fullest extent of the current braille line, making sure that a single keystroke construction is not divided between braille lines. When the print lines are arranged in a logical sequence, duplicate the arrangement of the print lines if possible.

Example 11-12

n × P × ((1 − (1 + i %) y^x n +/−) ÷ i %)



Icons

11.26 Consistency in Representation of Icons

When icons appear in mathematical context, the UEB transcriber-defined shape indicator may be used without the insertion of switch indicators. Include the icon on the Special Symbols page. Here is a sample, using the icon in the next example.

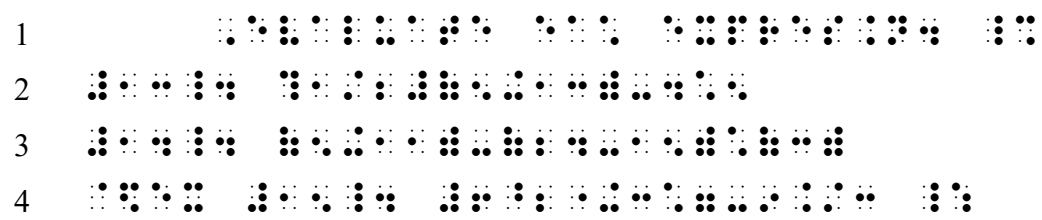
Note: An icon used to indicate the end of a proof has its own special symbol. Proofs will be discussed in Lesson 12.

In Nemeth, identifiers do not need to align when certain items are preceded by an icon. The icon is placed in the appropriate cell for the itemized material.

Example 11-13

Evaluate each expression.

13. $\frac{1}{2}(5 + 13) - 4 \cdot 5$
14. $(5 + 11) - (24 - 15) \cdot (3)$
15. $6^2 + 3 \cdot 7 - 9 \div 3$



This textbook has stated that a gold ribbon indicates extra credit problems.

Line 1: Instructions begin in cell 5. The opening Nemeth Code indicator is placed at the end of this line of text so that all identifiers may start in the same cell.
Line 4: An icon was created to represent the "extra credit" print symbol. There is no need to switch out of Nemeth in order to transcribe the icon.

Shapes Used as Signs of Omission

11.27 Spacing

When a sign of shape is used as a sign of omission or placeholder to represent a numeral, letter, sign of comparison, sign of operation, abbreviation, or any other item, the sign of shape is spaced in accordance with the rules for the omitted material it represents. A sign of shape is unspaced from any braille indicator which applies to it.

⋙ $12 \div 4 = \square$

(a numeral is omitted—symbol is spaced from comparison sign)

⋙ 40 dimes = $\$\bigcirc$

(a numeral is omitted—symbol is unspaced from monetary symbol)

⋙ $\square$ l = 1000 cc

(a numeral is omitted—symbol is spaced from abbreviation "l")

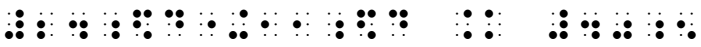
⋙ 15 $\bigcirc$ 15 = 30

(an operation sign is omitted—symbol is unspaced)

⋙ 24 hrs. = 1 $\triangle$

(an abbreviation is omitted—symbol is spaced from preceding numeral)

⋙ $24_{\Diamond} + 11_{\Diamond} = 40_{5}$



(numerals in the subscript position are omitted)

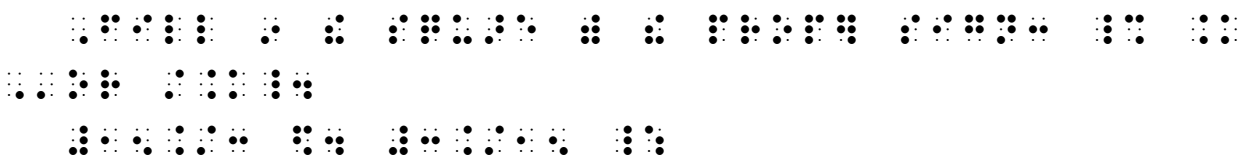
⋙ $y^{\frac{1}{3}} = \sqrt[3]{\blacksquare}$

(the radicand is omitted)

Example 11-14

Fill in the square with the proper sign: $=$ or $\neq$.

$15 \div 3 \square 3 \div 15$



11.28 The English-letter Indicator and Comparison Signs

When a sign of shape is used in place of a comparison sign, rules regarding use of the English-letter indicator to items immediately preceding or following the shape apply just as they would for any comparison sign. In these three examples, a "square" symbol is used as a sign of omission representing a comparison sign.

⋙ $x \square y$

An English-letter indicator is not used for a single letter which is immediately preceded or followed by a sign of comparison.

⋙ 1 yr ◯ 200 da

An abbreviation whose letters correspond to a shortform will not be misread as a word in Nemeth because contractions are not used inside the switches. An English-letter indicator is not needed. See 4.22.

⋙ ray ab ⬭ ray ac

A mathematical sequence that corresponds to a shortform will not be misread as a word in Nemeth. No English-letter indicator is needed.

⋙ iii □ iv

An English-letter indicator is not used for a Roman numeral which is immediately preceded or followed by a sign of comparison.

11.29 Use of the Multipurpose Indicator

Because a regular polygon with four or more sides is represented by a numeral, when an unspaced numeral follows such a shape, a multipurpose indicator is used before the numeral to prevent it from being misread. The shapes in these two examples represent a sign of operation.

⋙ 15 □ 15 = 30

Without the multipurpose indicator this is read as a 415-sided regular polygon.

The situation stated above occurs only when the shape is represented by a numeral.

⋙ 15 ◯ 15 = 30

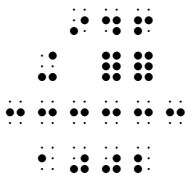
The circle shape is represented in braille with a letter ("c"). The following numeral will not be misread.

11.30 Omissions in Spatially Arranged Problems

In a spatial arrangement, omissions are indicated with the general omission symbol regardless of the symbol used in print.

Example 11-15

```
 9 4 6
+ □□
-----
1 0 0 2
```



In print, the omissions are indicated as two squares.

Instructions: Use the letter p for the "pencil" icon. After completing item E, center "SPECIAL SYMBOLS USED IN THIS VOLUME" and show how the icon will be listed on the Special Symbols page.

PRACTICE 11E

Input the equation using the x key. Press SHIFT and ln to access $(e^{\square})$. Press = for the y value. Now input these values into your calculator.

(2 * 3 + 9) ÷ 5 = and

2 1 2 ∘ → °C End

1. Fill in the box with the correct exponent.

   a. $x^2 \times x^4 = x^{\square}$

   b. $y^3 \times y^{\square} = y^9$

   c. $z^{\square} \times z^5 = z^{15}$

Problems marked with ✎ indicate that you are to show your work.

A. $436 - \square = 102$

B. $5_8 + \bigcirc_8 = 22_8$

✎ C. $5\frac{18}{20} = \square\frac{1}{2}$

D. Name two different operation signs that make this a true statement: $1 \square 1 = 1$.

✎ E. $\frac{15}{20} = \frac{3}{\square}$

Identified Signs of Shape

[NC 17.10.1]

A sign of shape which is followed by a letter, a sequence of letters, or a numeral, is an *identified sign of shape*. The entire unit is mathematical and therefore transcribed in Nemeth.

11.31 Spacing

There must be a space between the shape symbol and its identification. A space often does not appear in the print copy but it must be present in braille.

⋙ △ABC ⠫⠞ ⠠⠁⠠⠃⠠⠉ ("triangle ABC")

⋙ ∠θ ⠫⠪ ⠨⠹ ("angle theta")

Example 11-16

⏢5 denotes "trapezoid 5."

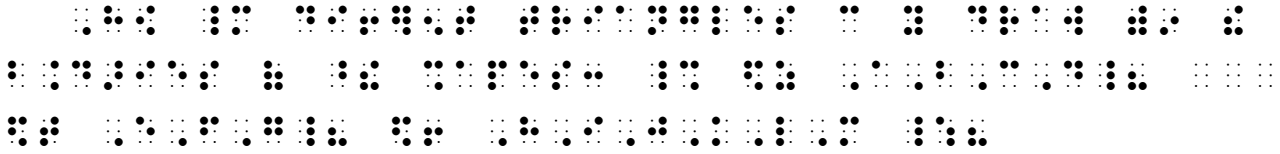
⠸⠩ ⠫⠱ ⠼⠢ ⠸⠱ ⠙⠢⠕⠞⠑⠎ ⠮⠞⠗⠁⠏⠑⠵⠕⠊⠙ ⠼⠑⠲⠴

The first 5 is associated with the mathematical shape and is included inside the switches. A switch to Nemeth is not necessary for the second 5 – it is a freestanding numeral in UEB context.

11.31.1 **Keep Together.** A sign of shape and the letter, sequence of letters, or numeral which follows it is regarded as a single mathematical item and therefore should not be divided between braille lines.

Example 11-17

How many different triangles can you draw within the boundaries of these shapes: ⏢ ABCD? △ EFG? ⬡ HIJKLM?



⠠⠓⠪ ⠸⠍ ⠙⠊⠖⠻⠢⠞ ⠞⠗⠊⠁⠝⠛⠇⠑⠎ ⠉ ⠽ ⠙⠗⠁⠺ ⠼⠔ ⠮
⠃⠨⠙⠞⠊⠑⠎ ⠷ ⠘⠮ ⠩⠁⠏⠑⠎⠒ ⠸⠩ ⠫⠱ ⠠⠁⠠⠃⠠⠉⠠⠙⠸⠮ ⠄⠄⠄
⠫⠞ ⠠⠓⠠⠋⠠⠛⠸⠮ ⠫⠖ ⠠⠓⠠⠊⠠⠚⠠⠅⠠⠇⠠⠍ ⠸⠱⠮

11.31.2 **Surrounding Symbols.** The spacing before and after a sign of shape and its identification is subject to the spacing rules for the symbols preceding or following it.

⋙ △PQR ~ △P'Q'R'

⠫⠞ ⠠⠏⠠⠟⠠⠗ ⠈⠱ ⠫⠞ ⠠⠏⠄⠠⠟⠄⠠⠗⠄

A space precedes and follows the tilde, which, in this case, is a sign of comparison meaning "is similar to".

⋙ $\angle 2 + \angle 3 = \angle 4$

There is no space before or after the operation sign (plus sign).

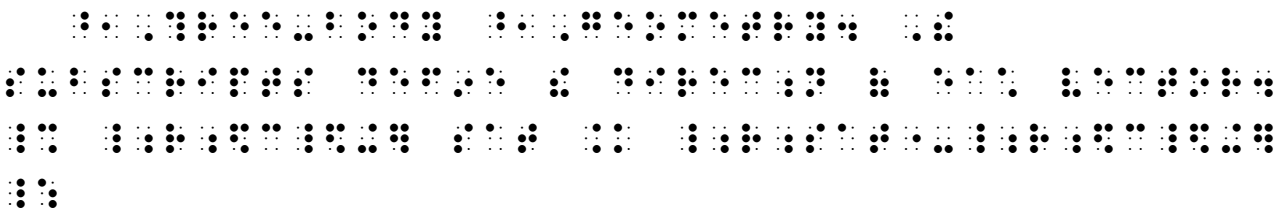
11.32 A Shape Within a Superscript or a Subscript

An identified sign of shape is read as a unit, therefore when one appears in a superscript or a subscript the effect of the level indicator extends through the space following the sign of shape. That is, the space preserves the superscript or subscript level where the sign of shape appears.

⋙ $A_{\triangle ABC}$

Example 11-18

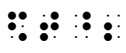
Three-body Geometry. The subscripts define the direction of each vector. $\mathbf{r}_{\oplus \mathrm{sat}} = \mathbf{r}_{\mathrm{sat}} - \mathbf{r}_{\oplus}$



"⊕sat" *is in the subscript position. Only one subscript indicator is needed because the level continues through the space following the shape. (Reminder: Boldface type used to identify letters as vectors must be preserved.)*

11.33 A Shape Which Carries a Superscript or a Subscript

When a sign of shape carries a superscript or subscript, the level indicator is unspaced from the shape.

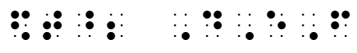
⋙ $\triangle^2$ 

⋙ $\square_2$

The rule for nonuse of the subscript level indicator does not apply to a shape represented by a letter. A subscript indicator is required.

⋙ $\triangle_2$

With an identified sign of shape, the space required between the sign of shape and its identifier follows the superscript or subscript. When the identified shape is on the baseline of writing, the space following the superscript or subscript terminates the effect of the level indicator and reinstates the baseline level.

⋙ $\triangle^2$ DEF 

Only the numeral "2" is in the superscript position. The shape and letters "DEF" are on the baseline of writing.

11.34 The English-letter Indicator

When an English letter or a Roman numeral identifies a shape, the English-letter indicator is not used. *Exception:* If such letters are in nonregular type, rules regarding typeform are followed and an English-letter indicator is required if the variant typeform is retained. Also, if the sign of shape has a plural or a possessive ending, an English-letter indicator may be required. See 11.21.

⋙ ∠*p* (*Spoken:* angle p)

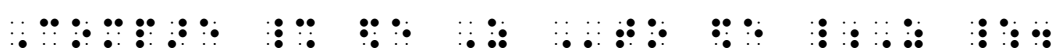
⋙ □ ii (*Spoken:* square ii)

Example 11-19

⊙ Q denotes "circle Q."

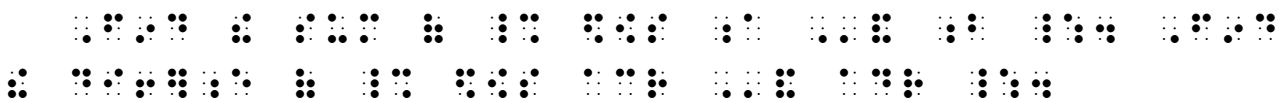
Example 11-20

Compare ⬭ Z to ⬭ Z.



Example 11-21

Find the sum of ∠s a and b. Find the difference of ∠s acr and adr.



Single letters "a" and "b" require an English-letter indicator in Nemeth. (Review the definition of "single letter" in Lesson 3.)

11.34.1 **The Letter "m" meaning "measure".** Notation regarding angle measurement often uses the letter "m" for "measure". The letter "m" is unspaced from the following symbol regardless of spacing used in the print copy.

⫸ $m\angle\theta$

(*Spoken:* the measure of angle theta)

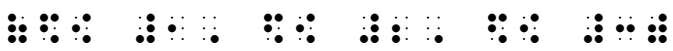
⫸ $m^\circ\angle\alpha$

(*Spoken:* the measure in degrees of angle alpha)

11.35 Use of the Numeric Indicator in an Enclosed List

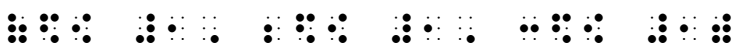
The "enclosed list" was introduced in Lesson 4 where it states that a numeric indicator is not used before a numeral in an enclosed list. More specifically, this rule applies to a numeral that occurs at the beginning of the item. A sign of shape and an identifying numeral which follows it are a single item even though a space occurs between them. In an enclosed list, the numeric indicator is required for the identifying numeral because the numeral is not at the beginning of the item. Look carefully at the use and nonuse of the numeric indicator in each example below, as described in the comments.

⫸ $(\angle 1,\ \angle 2,\ \angle 3)$

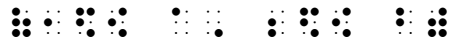


In this enclosed list, each numeral needs a numeric indicator because it identifies the angle symbol—the numeral does not begin the item.

⫸ $(\angle 1,\ 2\angle 1,\ 3\angle 1)$



Only the numerals which begin an item ("2" and "3") are transcribed without a numeric indicator in this enclosed list.

⫸ $(1\angle a,\ 2\angle b)$ 

The numerals ("1" and "2") begin each item in this enclosed list—a numeric indicator is not transcribed. The letters ("a" and "b") are transcribed without a letter indicator according to the rules governing identified signs of shape.

PRACTICE 11F

1. □ABCD is a square. ▱ EFGH is a parallelogram. ◇ JKLM is a rhombus.
2. Compare triangles: △ADM ≅ △A'D'M'. ◿ BEP ≇ ◿ CFP.
3. Should △ABV be included in the set {△3, ∠ GHA, ◊2}?
4. $\angle 3 + \angle 4 = 90°$
5. $m\angle p + m\angle q = 180°$
6. $m°\angle\theta = -45$
7. $A_{\Delta DEF} = \frac{1}{2}bh$
8. $\angle ECB = \frac{1}{2}\angle ABC$

Typeform Indicators for Mathematical Words and Phrases

[NC 7.3 and 7.4]

As discussed in Lesson 7, when a variant typeform has mathematical significance or is illustrating a teaching point, the typeform is retained in the braille transcription. Otherwise, the variant typeform is disregarded. In this lesson, we will study how to apply this practice to words and phrases.

11.36 Italic and Boldface Typeform Indicators

The Nemeth Code recognizes two possible typeforms for words: italics and boldface. Different methods are used depending upon the extent of the variant typeform.

11.36.1 **One Word in Italics or Boldface.** When an italicized or boldfaced word is part of a mathematical expression and the typeform is determined to be significant, the following indicators are used. The indicator is unspaced from the following word.

⠨	`Single Word Italic Type`
⠸	`Single Word Boldface Type`
⠸⠨	`Single Word Bold Italic Type`

⫸ *four* ⠨⠋⠕⠥⠗

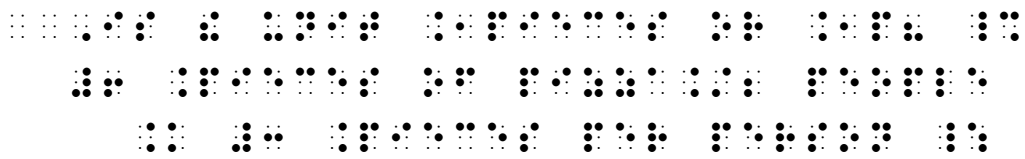
⫸ **four** ⠸⠋⠕⠥⠗

⫸ ***four*** ⠸⠨⠋⠕⠥⠗

Example 11-22

Is the unit *pieces* or *people*?

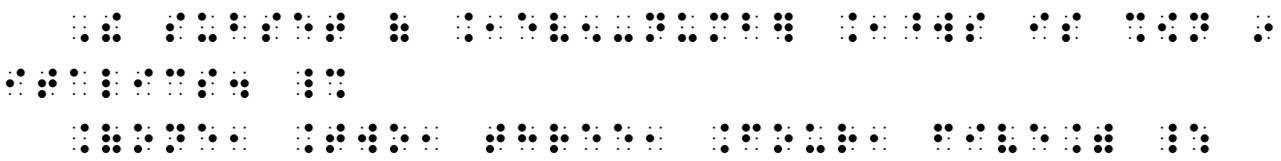
6 *pieces* of pizza ÷ 2 people = 3 *pieces* per person



⠠⠠⠠⠊⠎ ⠮ ⠥⠝⠊⠞ ⠨⠂⠏⠊⠑⠉⠑⠎ ⠕⠗ ⠨⠂⠏⠢ ⠸⠩
⠼⠗ ⠨⠏⠊⠑⠉⠑⠎ ⠕⠋ ⠏⠊⠵⠵⠁⠨⠌⠆ ⠏⠑⠕⠏⠇⠑
⠨⠅ ⠼⠒ ⠨⠏⠊⠑⠉⠑⠎ ⠏⠑⠗ ⠏⠑⠗⠎⠕⠝ ⠸⠱

Example 11-23

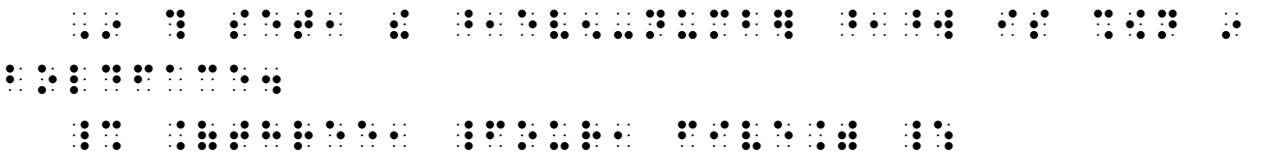
The subset of *even-number words* is shown in italics.
{one, *two*, three, *four*, five}



In UEB context, the UEB italic word indicator is used. In Nemeth context, the Nemeth italic type indicator is used.

Example 11-24

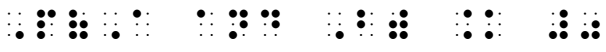
In this set, the **even-number word** is shown in boldface.
{three, **four**, five}



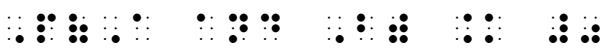
In UEB context, the UEB boldface word indicator is used. In Nemeth context, the Nemeth boldface type indicator is used.

a. **Probability Statements.** Words encountered in probability statements may be printed in regular type, in italics, in boldface, or fully capitalized. If all such words in the publication are printed in the same typeface, the distinction may be disregarded in braille. (Remember, capitalization is not a typeform, so capitalization is retained.) The word is part of the probability statement and so is transcribed in Nemeth—that is, without the single-word switch indicator and uncontracted. In the examples below, assume the typeface shown for the word is used throughout the document.

- $P(A \textit{ and } B) = 0$



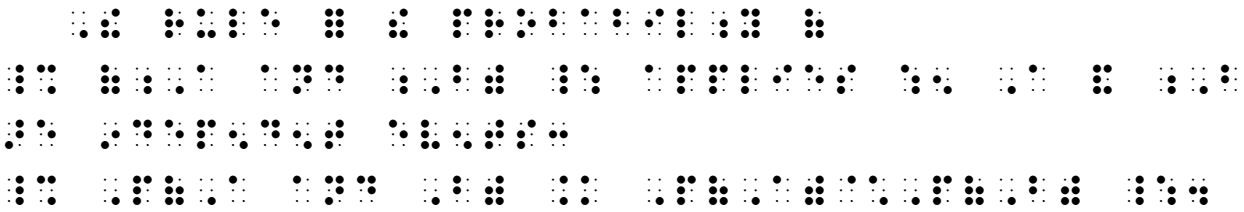
- $P(\mathrm{A\ and\ B}) = 0$



- $\mathrm{P(A\ OR\ B) = ?}$

Example 11-25

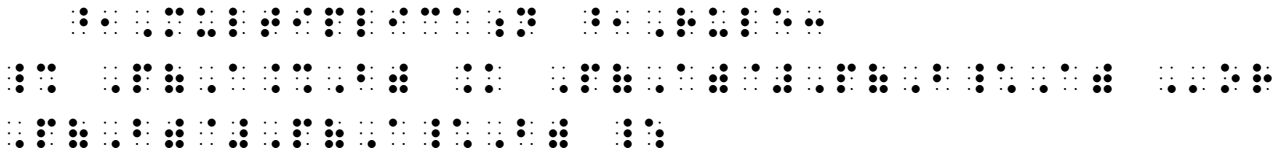
The rule for the probability of $(A \text{ and } B)$ applies when A and B are independent events: $P(A \text{ and } B) = P(A) \times P(B)$.



The italicized word "and" is part of the mathematical expression $(A \text{ and } B)$ and so is transcribed in Nemeth. The italics are disregarded when all such statements are printed in italics. At the end of line 2, note that the word "and" is part of the sentence structure and is transcribed in UEB.

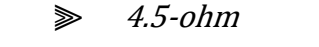
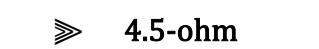
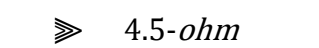
Example 11-26

Multiplication Rule: $P(\text{A} \cap \text{B}) = P(\text{A}) * P(\text{B} \backslash \text{A})$, or $P(\text{B}) * P(\text{A} \backslash \text{B})$



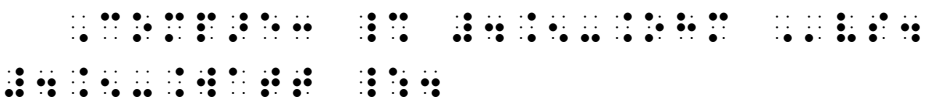
The word "or" is not part of the rule and so is transcribed in UEB using the single-word switch indicator. The intersection symbol, multiplication asterisk, and backslash are operation signs and so are unspaced.

b. **Hyphenated Expression.** If one or both components of a hyphenated expression are printed in a nonregular typeform, and if it is determined that the typeform must be retained, the appropriate single word typeform indicator is used. The typeform continues through the hyphen. The entire hyphenated expression is transcribed inside the switches.

- *4.5-ohm* 
  (both parts are in italics)
- **4.5-ohm** 
  (both parts are bold)
- 4.5-*ohm* 
  (only the word is in italics)

Example 11-27

Compare: 4.5-*ohm* vs. 4.5-*watt*.



c. **Typeform Change Following the Hyphen.** Because a hyphen does not terminate typeform, a return to regular type after the hyphen is shown by inserting a typeform terminator before the hyphen.

⠸⠄	Typeform Terminator

⫸ *4.5*-ohm
(4.5 is in italics, ohm is in regular type)

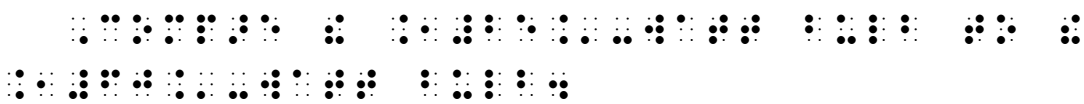
If there is a change in typeform after the hyphen to a different nonregular type, the first typeform does not need an explicit terminator. The appropriate typeform indicator used after the hyphen terminates the effect of the first indicator.

⫸ *4.5-**ohm***
(4.5 is in italics, ohm is in bold italics)

d. Within narrative, a hyphenated expression may be transcribed in UEB unless the numeral or letter itself requires a switch to Nemeth.

Example 11-28

Compare the *25*-watt bulb to the *60*-watt bulb.

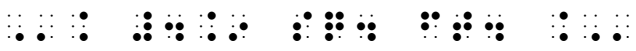


11.36.2 **A Phrase in Italics or Boldface.** When an italicized or boldfaced phrase is part of a mathematical expression and the typeform is retained, the following indicators are used.

⠨⠶	Opening Italic Type for two or more words
⠠⠶⠄	Closing Italic Type for two or more words
⠨⠶⠆	Opening Boldface Type for two or more words
⠰⠶⠄	Closing Boldface Type for two or more words

These typeform indicators are preceded and followed by a space and must not stand alone on a line. When both indicators are required for the same word or phrase, they are unspaced from each other and are closed in the opposite order as opened.

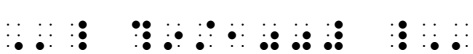
⋙ *4.9 sq. ft.*



⋙ *4.9 sq. **ft.***

⋙ *4.9 **sq. ft.***

11.36.3 **Significant Typeform Applied to a Fraction or a Mathematical Symbol.** When typeform is retained for a fraction, or for a numeral that is associated with a mathematical symbol such as a percent sign or monetary symbol, the appropriate three-cell typeform indicators are used.

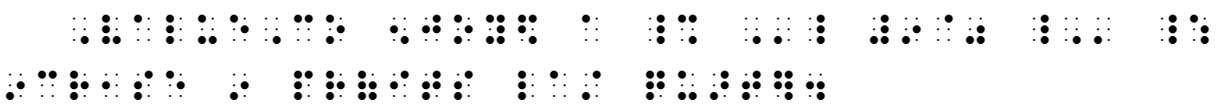
$\mathbf{\frac{9}{100}}$ 

9%

$9

Example 11-29

ValueCo enjoyed a **9%** increase in profits last quarter.



11.37 Code Switching Within an Emphasized UEB Passage

Switching from UEB to Nemeth terminates the effect of a UEB typeform. The appropriate UEB typeform indicator is restated after Nemeth is terminated when emphasis continues. Nemeth typeform indicators are not used in the math portion unless the typeform gives unique meaning to the mathematical word or symbol.

Example 11-30

The resistance values of **resistors A and B in the 4.5-volt series circuit** are 21.1 Ω and 7.0 Ω, respectively.

1 ⠸⠂ ⠸⠶⠕⠎⠊⠎⠞⠕⠗⠎ ⠁ ⠯ ⠃ ⠔ ⠮ ⠸⠎⠑⠗⠊⠑⠎ ⠉⠊⠗⠉⠥⠊⠞ ⠲ ⠸⠄
2 ⠸⠹⠂ ⠄ ⠸⠄ ⠸⠹⠆ ⠸⠼⠂⠂⠲⠁ ⠸⠇ ⠸⠼⠛⠲⠚ ⠸⠇
3 ⠸⠼⠑⠲⠑ ⠸⠇ ⠸⠆ ⠸⠼⠁⠲⠚ ⠸⠇ ⠸⠹⠄
4 ⠸⠼⠛⠲⠚ ⠸⠇ ⠸⠹⠄ ⠸⠶⠑⠝⠙ ⠕⠋ ⠝⠥⠍⠑⠗⠊⠉ ⠉⠕⠙⠑

Line 1: The UEB boldface passage indicator applies to "resistors A and B in the".
Line 2: A switch to Nemeth is required for the decimal number. The switch to Nemeth terminates the effect of the UEB typeform indicator without the need for a UEB termination indicator. Boldface is not retained in the Nemeth portion. UEB boldface is reinstated following the Nemeth Code terminator.
Line 4: Although 7.0 Ω fits on line 3, the Nemeth Code terminator does not. All are brought down to line 4.

Example 11-31

If the cost **after applying the 15% discount** is $25.34, what is the original price?

1 ⠸⠂ ⠁ ⠋⠞ ⠁⠏ ⠸⠶⠏⠇⠽⠊⠝⠛ ⠞⠓⠑ ⠁ ⠸⠄
2 ⠸⠹⠂ ⠼⠁⠑ ⠸⠄ ⠸⠹⠆ ⠼⠃⠑⠲⠉⠴ ⠸⠇ ⠼⠃⠓ ⠕⠋ ⠸⠄
3 ⠸⠶⠏⠑⠗⠉⠑⠝⠞ ⠙⠊⠎⠉⠕⠥⠝⠞⠲ ⠸⠄

Line 1: The UEB boldface passage indicator applies "after applying the".
Line 2: A switch to Nemeth is required for the percentage. The switch to Nemeth terminates the effect of the UEB typeform indicator without the need for a UEB termination indicator. Boldface is not retained in the Nemeth portion. UEB boldface is reinstated following the Nemeth Code terminator.

Example 11-32

Energy and mass are equivalent, *which is the message of* $E = mc^2$.

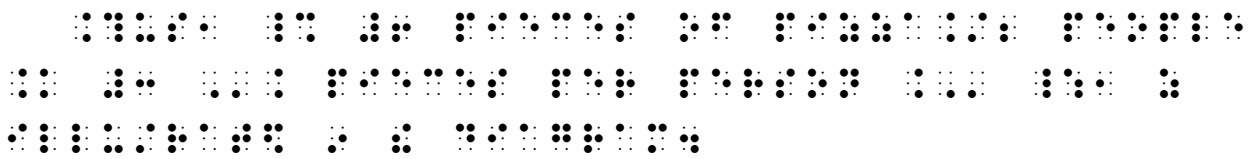
⠸⠂ ⠑⠝⠻⠛⠽ ⠁⠝⠙ ⠍⠁⠎⠎ ⠁⠗⠑ ⠑⠟⠥⠊⠧⠁⠇⠑⠝⠞⠂ ⠺⠓⠊⠉⠓ ⠊⠎ ⠁
⠸⠶⠎⠑⠝⠞⠊⠍⠑⠝⠞ ⠕⠋ ⠸⠹⠂ ⠑ ⠸⠇ ⠍ ⠉ ⠘⠆ ⠸⠄

Even though the formula is part of the italicized passage, italics are disregarded inside the switches because the typeform is not mathematically significant.

a. Although switching from UEB to Nemeth terminates typeform, switching from Nemeth to UEB does not. When the three-cell Nemeth typeform indicators are used inside the switches, the closing typeform indicator is required before terminating Nemeth Code.

Example 11-33

Thus, 6 pieces of pizza ÷ 2 people = 3 *pieces per person,* as illustrated in the diagram.



The italic typeface is retained for the phrase "pieces per person" because it illustrates a teaching point.

Mathematical Statements

[NC 7.4.4 and 26.7]

11.38 Axioms, Corollaries, Definitions, Laws, Lemmas, Propositions, Theorems

A mathematical statement is often printed in a distinctive style to catch the reader's attention. It also may be set off from the main text by different margins or some other means of distinction. The statement is usually introduced by a word such as Axiom, Corollary, Definition, Law, Lemma, Proposition, or Theorem. We will refer to this word as a "label" in this section.

Follow these directives in the braille transcription.

a. To draw attention to the mathematical statement in braille, leave one blank line before the label and one blank line after the statement.

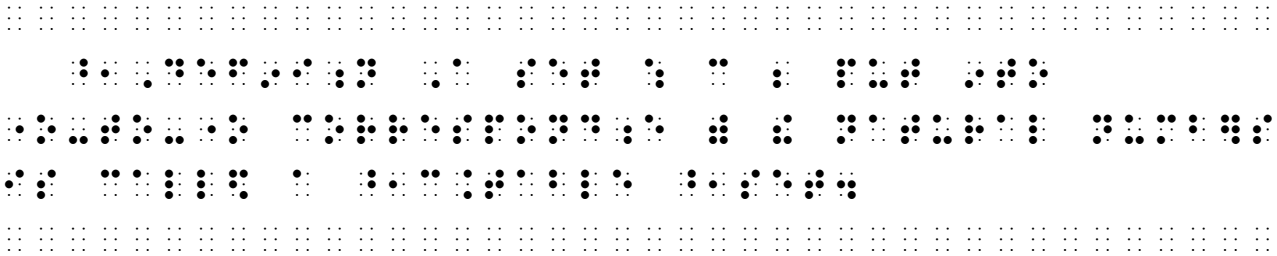
b. The label can be formatted as a paragraph heading or as a cell-5 or cell-7 heading, at the transcriber's discretion. Consistent treatment is important. Follow print for the capitalization style of the label. Typeform is disregarded in a cell-5 or cell-7 heading. Typeform is retained in a paragraph heading unless it is printed as fully capitalized as well as a variant typeform, in which case capitalization is retained but typeform is disregarded.

c. Continue with the text, using normal (3-1) paragraph style. When all statements in the text are printed in the same typeform, the uniform typeform may be disregarded in the transcription.

d. If, in the body of a mathematical statement, a word or phrase is singled out for special attention by using a nonregular typeface, the change in typeface is retained in braille.

Example 11-34

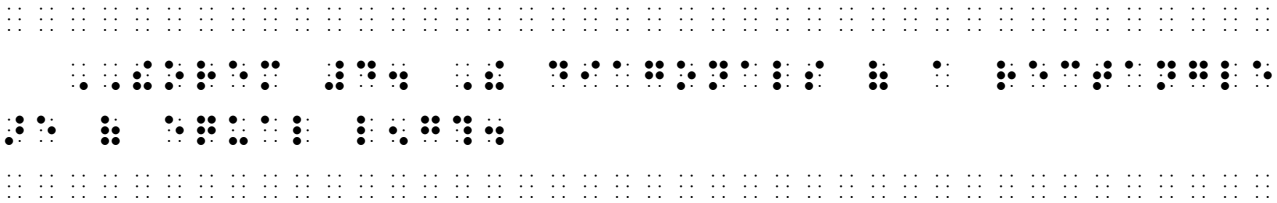
Definition *A set which can be put into one-to-one correspondence with the natural numbers is called a* ***countable set****.*



A blank line precedes and follows the mathematical statement. In print, "Definition" is a marginal heading and is in boldface type. The statement is printed in italics and is set off from the main body text with indented margins. In braille, the label is transcribed as a paragraph heading, but could just as well have been formatted as a cell-5 or cell-7 heading. As a paragraph heading, typeface is retained. We will assume that all Definition statements in this book are printed in italics, therefore the uniform typeface of the statement is disregarded. Boldface is retained for the bold words within the statement.

Example 11-35

THEOREM 4. *The diagonals of a rectangle are of equal length.*

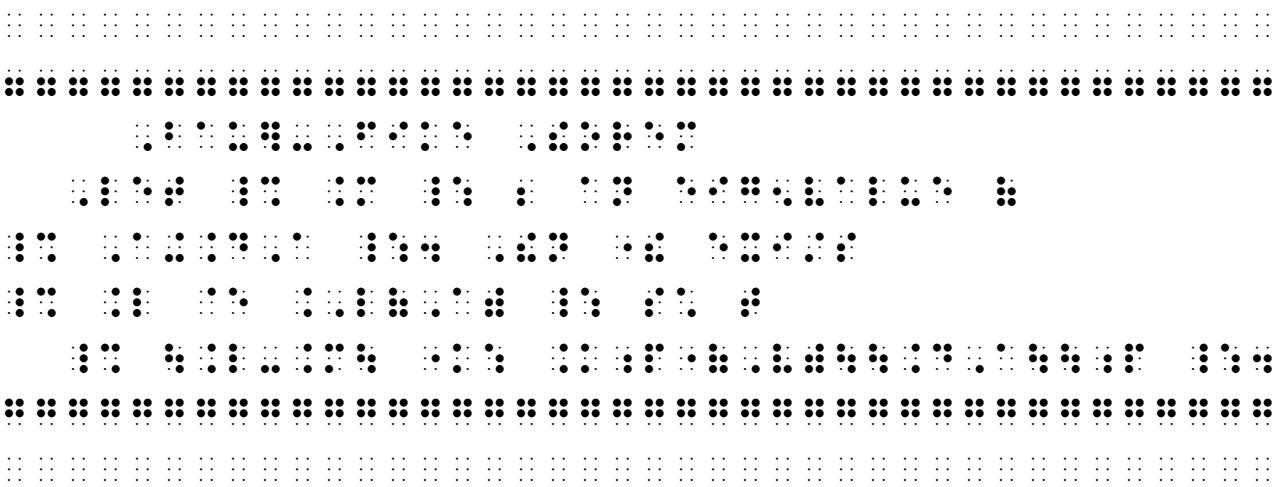


The label is printed in bold type. Typeform of the paragraph heading is disregarded because it is fully capitalized. The statement is printed in italics. We will assume that all Theorem statements in this book are printed in italics, therefore the uniform typeface of the statement is disregarded.

Example 11-36

Bauer-Fike Theorem
Let μ be an eigenvalue of $A + \delta A$. Then there exists $\lambda \in \Lambda(A)$ such that

$$|\lambda - \mu| \leq \kappa_p(V)\|\delta A\|_p.$$



The mathematical statement is boxed. Box lines are retained for distinction. The label, printed in boldface, is formatted as a cell-5 heading. Typeform is disregarded in a cell-5 heading, (The label could just as well have been formatted as a paragraph heading, in which case the bold type would be retained.) The definition is printed in normal typeface, with the exception of the letters in the mathematical expressions which are in italics. In braille, variables are transcribed in normal type unless the typeface has mathematical significance. You may wish to review any unfamiliar symbols in this example. Greek letters mu, delta, lambda (both capital and lowercase), and kappa, as well as the comparison sign for "membership".

Instructions: Format each statement's label as a paragraph heading. Assume all Theorem statements in this book are printed in italics. Retain the box around the Definition.

PRACTICE 11G

Write your answer in the box. Pay close attention to the italicized units.

$52\ \textit{churros} \div 26\ \textit{children} = \square\ \textit{churros per child}$

Pythagorean Theorem *In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.*

$$c^2 = a^2 + b^2$$

DEFINITION	A positive number expressed in the form $a \times 10^n$, where $1 \leq a < 10$ and n is an integer is said to be written in **scientific notation**.

For further practice, see Appendix A—Reading Practice.

EXERCISE 11

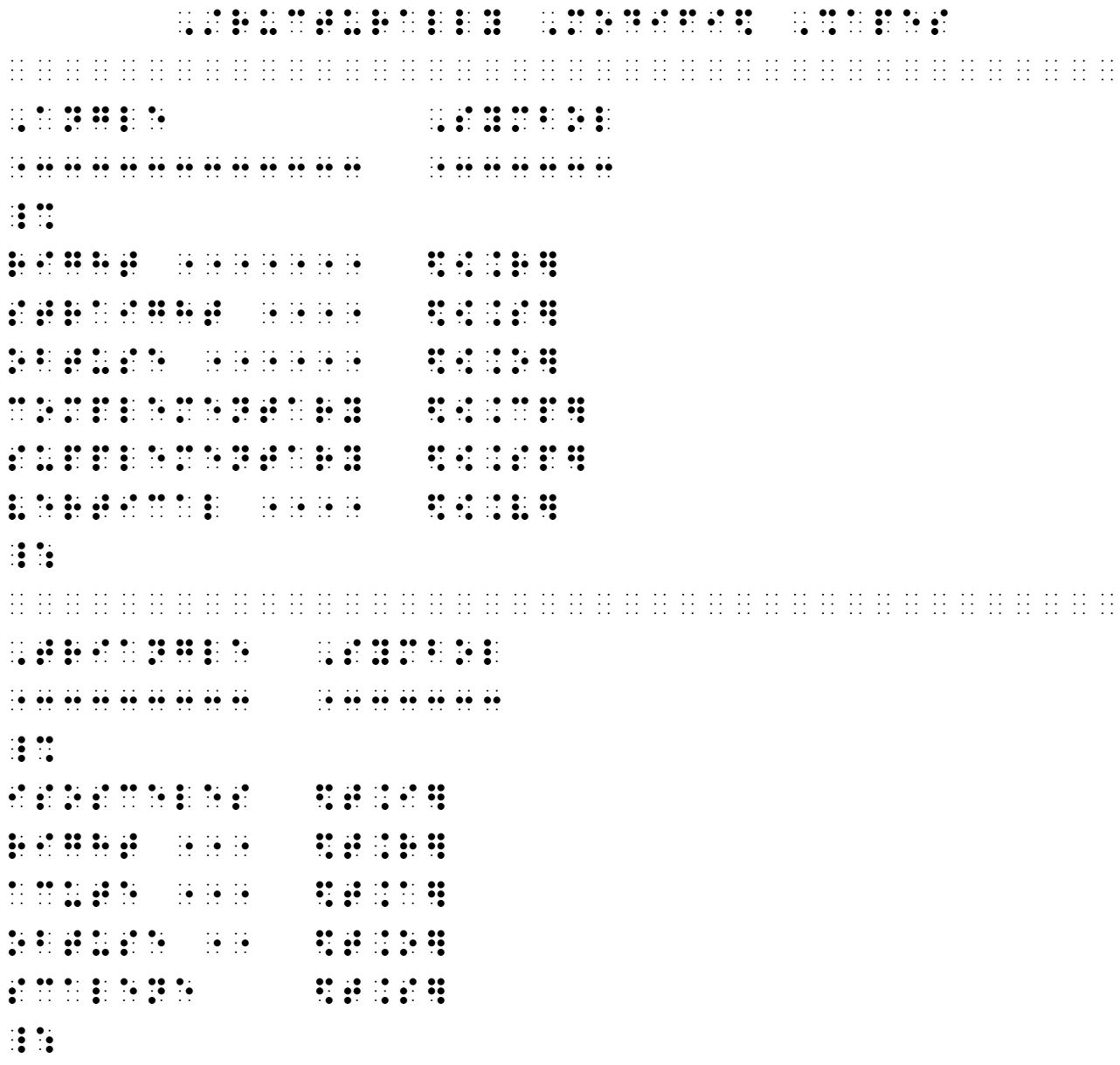
Prepare Exercise 11 for your grader.

ANSWERS TO PRACTICE MATERIAL

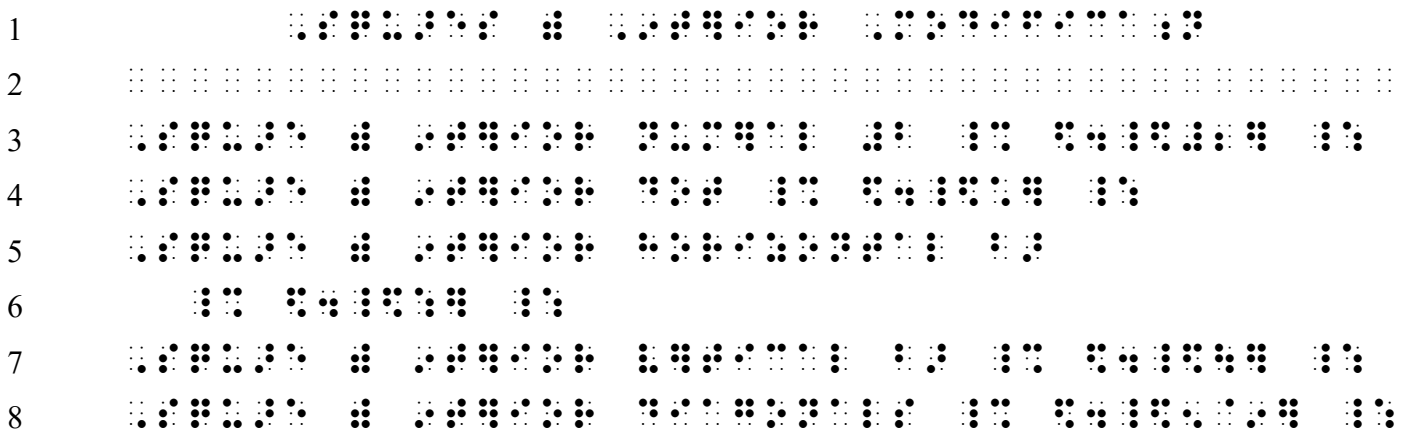
PRACTICE 11A

⠀⠀⠀⠀⠠⠇⠊⠌⠫ ⠠⠩⠁⠏⠑⠎
  ⠸⠩ ⠫⠄ ⠫⠁ ⠫⠪ ⠫⠞ ⠫⠸⠞ ⠨⠫ ⠫⠲ ⠫⠓ ⠫⠙ ⠫⠛ ⠫⠵
⠫⠨⠵ ⠫⠗ ⠫⠢ ⠫⠎ ⠫⠸⠎ ⠫⠖ ⠫⠉ ⠫⠸⠉ ⠫⠑ ⠫⠨⠑ ⠸⠱
⠀⠀
⠀⠀⠀⠀⠠⠥⠝⠇⠊⠌⠫ ⠠⠩⠁⠏⠑⠎
      ⠈⠨⠣⠠⠔ ⠮ ⠇⠊⠌ ⠆⠇⠂ ⠸⠩ ⠫⠋⠇ ⠸⠱
    ⠗⠑⠏⠗⠑⠎⠢⠞⠎ ⠁ ⠋⠇⠪⠻ ⠩⠁⠏⠑ ⠯ ⠸⠩ ⠫⠉⠓ ⠸⠱
    ⠗⠑⠏⠗⠑⠎⠢⠞⠎ ⠁ ⠡⠊⠉⠅⠢ ⠩⠁⠏⠑⠲⠈⠌⠜
⠀⠀⠸⠩ ⠫⠦ ⠫⠋⠇ ⠫⠉⠓ ⠸⠱

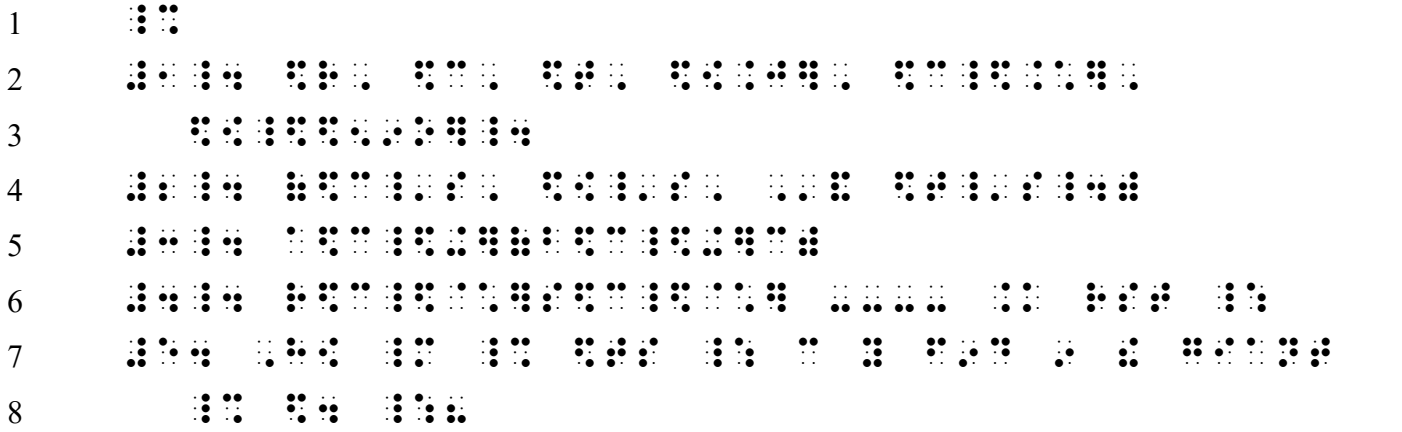
PRACTICE 11B

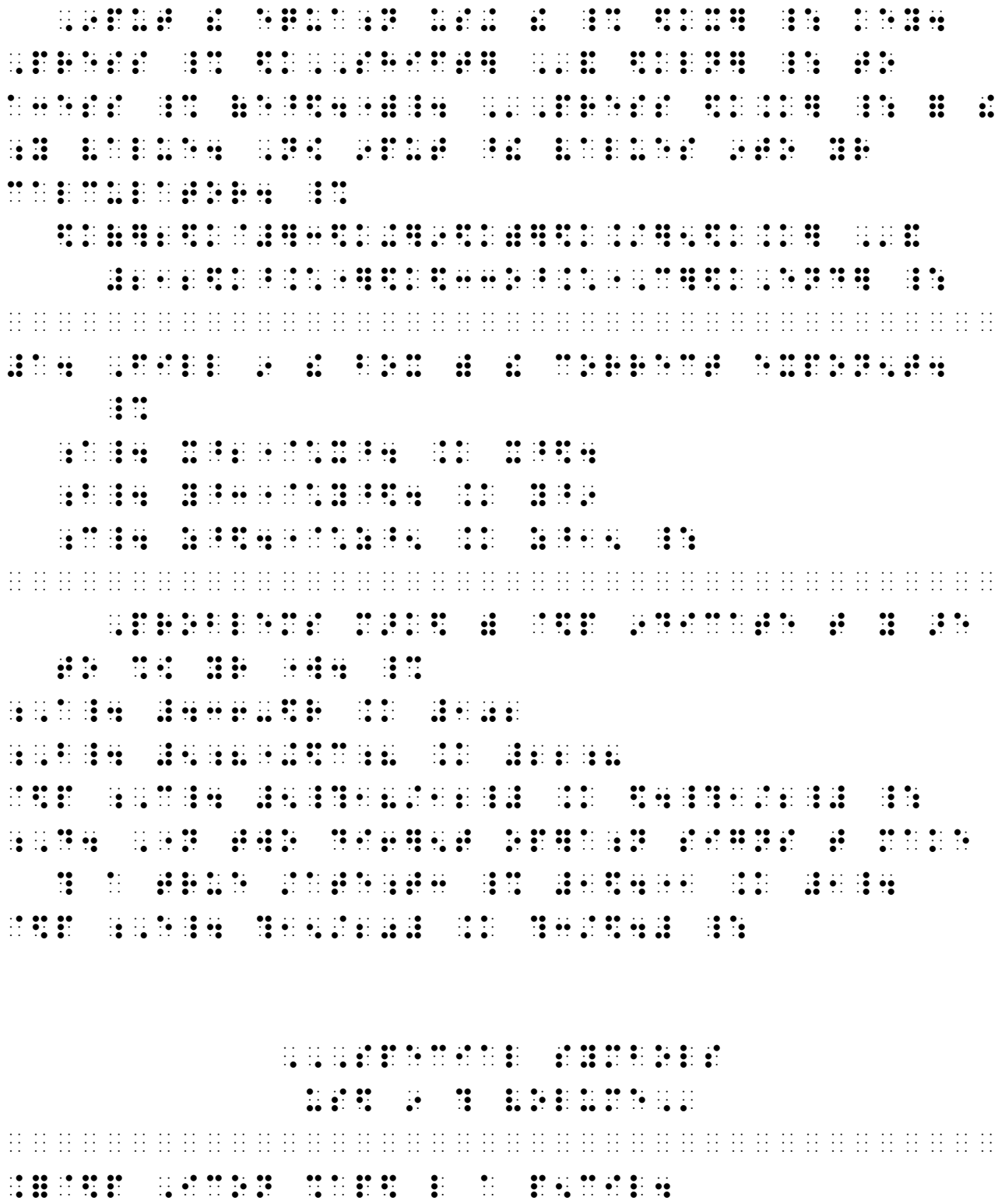


PRACTICE 11C



PRACTICE 11D





PRACTICE 11F

1 ⠠⠊⠎ ⠊⠞ ⠓⠁⠙ ⠁⠇⠗⠑⠁⠙⠽ ⠃⠑⠑⠝ ⠞⠕⠙ ⠁ ⠎⠞⠁⠗⠞⠊⠝⠛ ⠏⠕⠊⠝⠞

2 ⠠⠞⠓ ⠓⠕⠗ ⠉⠕⠍⠏⠁⠝⠽ ⠓⠁⠎ ⠞⠕⠙ ⠁ ⠋⠁⠉⠞⠕⠗⠽ ⠞⠕ ⠎⠞⠁⠗⠞ ⠏⠗⠕⠙⠥⠉⠊⠝⠛ ⠞⠓⠊⠎ ⠽⠑⠁⠗

3 ⠠⠞⠓ ⠓⠊ ⠉⠕⠍⠏⠁⠝⠽ ⠓⠁⠎ ⠞⠕⠙ ⠁ ⠋⠁⠉⠞⠕⠗⠽ ⠞⠕ ⠎⠞⠁⠗⠞ ⠏⠗⠕⠙⠥⠉⠊⠝⠛ ⠞⠓⠊⠎ ⠽⠑⠁⠗

4 ⠠⠊⠎ ⠊⠞ ⠞⠗⠥⠑ ⠞⠓⠁⠞ ⠎⠓⠑ ⠓⠁⠙ ⠞⠕ ⠎⠞⠁⠽ ⠁⠞ ⠓⠕⠍⠑ ⠞⠕ ⠍⠁⠅⠑ ⠊⠞

5 ⠠⠞⠓ ⠓⠊ ⠉⠕⠍⠏⠁⠝⠽ ⠓⠁⠎ ⠞⠕⠙ ⠁ ⠋⠁⠉⠞⠕⠗⠽ ⠞⠕ ⠎⠞⠁⠗⠞ ⠏⠗⠕⠙⠥⠉⠊⠝⠛ ⠞⠓⠊⠎ ⠽⠑⠁⠗

6 ⠠⠎⠓⠑ ⠓⠁⠙ ⠁ ⠎⠞⠁⠗⠞ ⠁⠞ ⠞⠓⠑ ⠎⠞⠁⠗⠞ ⠕⠋ ⠞⠓⠑ ⠽⠑⠁⠗ ⠃⠥⠞ ⠎⠓⠑ ⠓⠁⠙ ⠝⠕ ⠏⠗⠕⠙⠥⠉⠞

7 ⠠⠊⠞⠎ ⠁⠇⠇ ⠁⠃⠕⠥⠞ ⠞⠓⠑ ⠍⠕⠝⠑⠽ ⠞⠓⠁⠞ ⠁ ⠉⠕⠍⠏⠁⠝⠽ ⠍⠁⠅⠑⠎ ⠁⠋⠞⠑⠗ ⠊⠞ ⠊⠎ ⠎⠕⠇⠙

8 ⠠⠞⠓ ⠉⠓⠁⠊⠗ ⠙⠕⠑⠎ ⠝⠕⠞ ⠉⠕⠝⠞⠗⠕⠇ ⠞⠓⠑ ⠎⠞⠁⠗⠞ ⠕⠋ ⠞⠓⠑ ⠽⠑⠁⠗

9 ⠠⠊⠞⠎ ⠝⠕⠞ ⠙⠕⠝⠑ ⠁⠞ ⠁⠇⠇ ⠁⠇⠇ ⠞⠓⠑ ⠞⠊⠍⠑

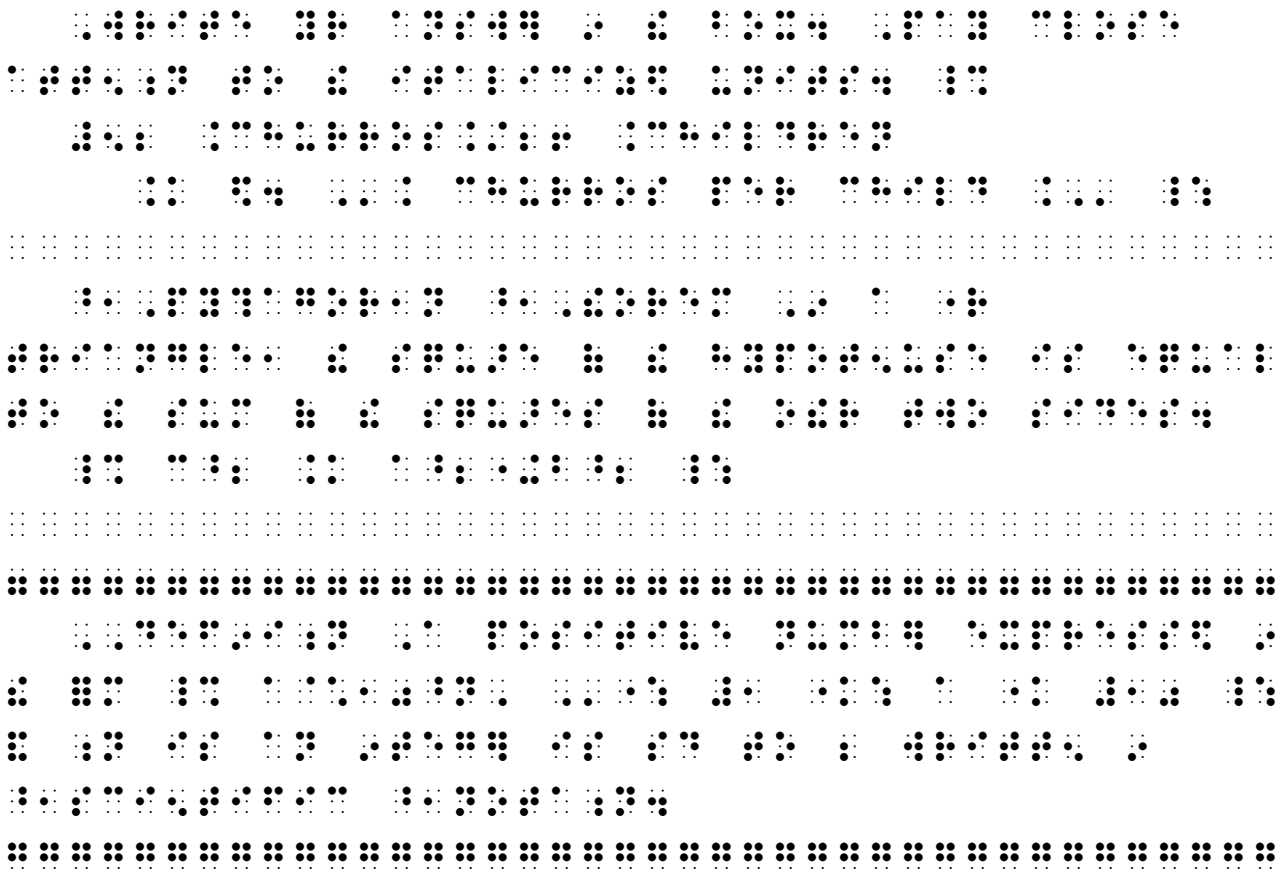
10 ⠠⠊⠞ ⠍⠁⠅⠑⠎ ⠞⠓⠑ ⠙⠊⠗⠑⠉⠞⠕⠗⠎ ⠍⠑ ⠞⠕ ⠙⠕ ⠁⠇⠇ ⠞⠓⠑ ⠞⠊⠍⠑

11 ⠠⠊⠞⠎ ⠝⠕⠞ ⠞⠓⠑ ⠉⠕⠍⠏⠁⠝⠽ ⠞⠓⠁⠞ ⠞⠕ ⠍⠑

12 ⠠⠊⠞⠎ ⠞⠗⠥⠑ ⠞⠓⠁⠞ ⠞⠓⠑ ⠉⠕⠍⠏⠁⠝⠽ ⠞⠓⠁⠞ ⠞⠕ ⠍⠑

13 ⠠⠊⠎ ⠓⠑ ⠞⠓⠑ ⠞⠗⠥⠑ ⠞⠓⠑ ⠉⠕⠍⠏⠁⠝⠽ ⠞⠓⠁⠞ ⠞⠕ ⠍⠑

PRACTICE 11G



Lines 3-4: The displayed expression begins in cell 3. The linked expression will not fit on one line. It is divided before the equals sign. Review the topic of linked expressions in Lesson 8.