Unified English Braille (UEB) Training Modules

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*Brackets indicate the section and page reference where material can be found in the "The Rules of Unified English Braille, Second Edition 2013"

Principles of Unified English Braille (1.2, p 2)

- Unified English Braille (UEB) is a system of English braille which represents all subjects except music.
- The purpose of UEB is to allow the reader to understand without ambiguity what symbols are being expressed by a given braille text.
- The primary transcribing rule is to produce braille that, when read, yields exactly the original print text (apart from purely ornamental aspects).
- A print symbol has one braille equivalent in UEB. Use the braille sign for the print symbol regardless of the subject area.
- In UEB the 64 braille characters including the space are designated as being either a prefix or a root.
 (Cited from The Rules of Unified English Braille, Second Edition 2013)

<u>The Rules of Unified English Braille</u> AND <u>The Guidelines for Technical Material</u> can be downloaded free at: http://www.iceb.org/ueb.html

Contractions, Spacing and Capitalization

There are nine contractions which have been eliminated in UEB. They are:

by	into	to	
ble	com	dd	1.3, p3
ation	ally	o'clock	

The main reason these were eliminated was to allow for more accurate automatic forward- and back-translation between print and braille. There was a need to create more symbols in UEB without creating conflicts in the code, and also an attempt to reduce exceptions to braille rules. More specific reasons for eliminating the above contractions are listed below:

- to, into and by were eliminated to allow for greater consistency in usage of other symbols. Also, the special spacing rules closed off options for making new symbols.
- **ation** and **ally** were eliminated because they created complications in rules having to do with capital letters in the middle of words.
- com was eliminated to make room for greater flexibility in the placement and usage of hyphens and dashes.
- ble was eliminated to allow for unambiguous reading and writing of numbers wherever they occur in literary contexts.
- dd was eliminated to allow for a single way to show the period, dot, decimal point even when it occurs in the middle of words or numbers.
- o'clock was eliminated because of a problem with capitalization.

Prefixes and Suffixes (10.11.3, p 147 and 10.11.7, p150)

Prefix and suffix rules have changed with the introduction of UEB. Previously in English Braille American Edition (EBAE), there were several contractions that could not be used where part of the letters fall into a prefix and the rest fall into the root or base word. For example, the sign for ed previously was not used in reduce or deduce, and also edict or predict.

In general, you can now use a group sign which bridges a prefix and the remainder of the word unless its use would hinder the recognition or pronunciation of the word.

	EBAE	UEB
mistake	:: :: :: :: :: ::	:: :: :: :: ::
Benedict	:: :: :: :: :: :: :: :: :: :: :: :: ::	
edict	*: ** : ** : ** :: :: : **	** ** **
derogatory		
professor		
denounce	** ** ** ** ** **	** ** ** ** **

Examples: dishonest, bereave, congruent

^{**} **Exceptions**- The lower group sign contractions (part-word lower-sign contractions) for "be", "con" or "dis" can only be used when the letters it represents form the first syllable of the word. This rule remains the same in UEB as in EBAE.

The lower group sign (part-word lower-sign contractions) for "ea" cannot be used when the letters "ea" bridge a prefix and the remainder of the word. This rule remains the same in UEB as in EBAE.

Examples: readjust, reassure, reappoint

Spacing of Strong Contractions (10.3, p 108)

Previously, the words and, for, of, the, and with, when used as whole words or when two or more of these words occurred in sequence, they were joined together. In UEB, these words are now spaced apart from each other as they are in print. Please note that since the contractions for to, into and by have been eliminated, these words are spelled out and spaced as they are in print. The "in" in into will still be contracted.

He ran into the basement with the rest of the box of pizza.

Capitalization (8, p79-89)

Capitalization is still indicated by placing the capital sign (dot 6) immediately before the letter affected. (8.3, p79)

Brantford, Ontario

The double dot 6 means that the next word (or string of letters) is capitalized. The double dot 6 is terminated by anything but a letter. (e.g. a hyphen or an apostrophe terminates the double dot 6). (8.4, p80)

Her favourite movies are LORENZO'S OIL and X-MEN.

The triple dot 6 means that the next passage (three or more words) is capitalized. In order to show the end of that passage, a capital mode terminator (dot 6, dot 3) is placed, unspaced, following the last capitalized word. (8.5, p83)

PLEASE NOTE THAT CHOIR PRACTICE IS CANCELLED TONIGHT.

NOTE: If punctuation appears in a capitalization PASSAGE, then the punctuation does NOT need to be repeated after the punctuation.

Example: Her favourite movies are LORENZO'S OIL AND X-MEN.

```
and compete remain de acceptance des s
```

Let's Practice!!

- 1. The Prime Minister's visit was inspirational for Canada's national unity.
- 2. Freddy Mercury was universally known as a really flambouyant conversationalist and singer.
- 3. It is four o'clock, so we should be at the radio station.
- 4. Internationally, in commerce, he took additional courses which doubled his money.
- 5. Benedict Dunghill
- 6. foreseeably available
- 7. derail at the bridge
- 8. freedom from pandemonium
- 9. for the end of the day
- 10. into braille
- 11. with the rest of the group
- 12. L.B.J., JFK and G.W. BUSH were USA Presidents.
- 13. FOUR-BY-FOUR
- 14. PLEASE GET OUT OF MY WAY!
- 15. I'm going to need a caddy for my golf game.


```
::
   ::
 :: ::
       :: ::
        :: <u>::</u>
: : : : : : : : : :
....
::
•. **
  ::
: ::::
  : :: ::
   .. ..
 ....
    • •
. . . . . .
```

Parameters for When Contractions Can and Cannot Be Used

(10.7 pages 125-132)

Contraction "had"

Use the contraction for "had" when the "a" is short unless other rules limit its use.

```
e.g. haddock
```

Use the "had" contraction in the word "haddock" because the "dd" contraction is eliminated in UEB

BUT do not use in

shadow (using "had" would affect pronunciation)

Contraction "ever"

Use the contraction for "ever" when the stress is on the first "e" and when the letters are not preceded by "e" or "i"

```
e.g. fever
```

BUT do not use in

```
severity (stress is on second "e") OR
```

```
believer (preceded by an "i")
```

Contractions "here"

Use the contractions for "here" when the letters it represents are pronounced as one syllable unless other rules limit its use.

e.g. atmosphere

BUT do not use in

coherence (the last "e" of "here" is needed to pronounce "ence")

Contraction "some"

Use the contraction for "some" when the letters it represents form a syllable of a basic word.

BUT do not use in

somersault (the "e" in "some" forms part of the next syllable)

Changes to the Use of Shortform Words (10.9 pages 137-141)

(see handout for list of shortforms and Appendix 1: Shortforms List)

The use of a shortform as part of a longer word no longer depends whether a word is a proper name.

e.g. Mrs. Littlejohn and Mr. Goodchildren are nice people.

Use shortforms whenever the word it represents is "standing alone", regardless of meaning or pronunciation.

BUT do not use shortforms in:

```
print/braille
```

(in this example, the use of the forward slash limits the use of shortforms because the words are not "standing alone")

Note:

See <u>Appendix 1</u> of the Rules of Unified English Braille for all the words that can use shortforms. For words that are not on the list in Appendix 1, there are exception rules listed on pages 137-141 of the same book

UEB Prefixes (1.2.5, p2)

- In UEB all braille characters are designated as either a prefix or a root.
- There are eight prefixes: The numeric indicator plus the braille characters formed from the dots in the right column of the cell. The UEB prefixes are:

• The last two braille characters are special prefixes.

```
:
```

A special prefix may be used in combination with another special prefix to form a braille sign. Such braille signs are used only as indicators.

Example:

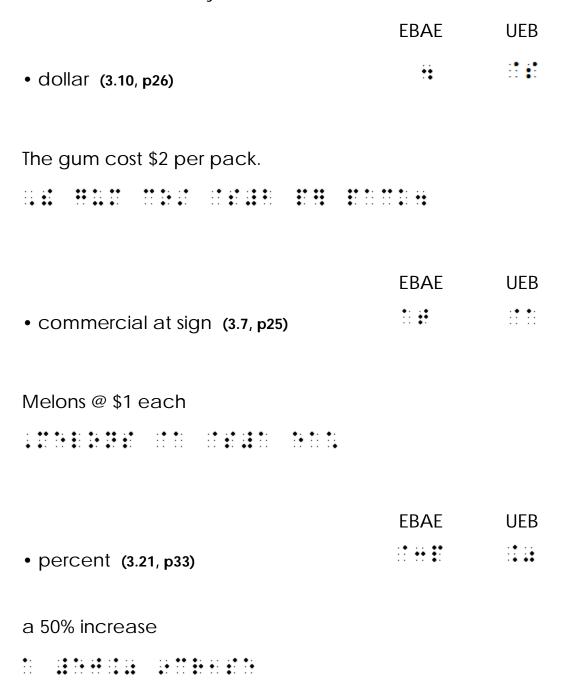
The passage indicators is it is and is it is

• Any other braille sign in UEB is constructed from a root or from a root plus one or more prefixes.

```
so some sigma Letter ς is long dash is is is
```

Changed Punctuation and Other Symbols

The UEB dot formations for the following symbols are different from the ones in current use in EBAE. They were changed for various reasons but most of the changes are designed so that these symbols do not require specific spacing rules as they do in EBAE. Follow print for the use of these symbols.



• asterisk (3.3, p21)

NOTE: Usually the asterisk appears raised from the baseline in print. This is not considered the superscript position.

```
M*A*S*H

• degree (3.11, p27)

EBAE UEB

• 150°, 350°, or 450°?

EBAE UEB
```

NOTE: The closing single quotation mark was changed to conform to UEB symbol construction principles (prefix, root).

:: ::

:: ::

"Maybe just once someone will call me 'sir' without laughing."

• single closing quotation mark (7.6, p76)

```
EBAE UEB
• dash (7.2, p72-74)
```

NOTE: When the spacing in print is indeterminate or inconsistent, space the dash from adjacent words unless it is clear that the dash indicates omission of part of a word.

He sees it – feels it.

• long dash (7.2, p72-74)

```
We want- we need - more br-
EBAE
              UEB
```

NOTE: Use a long dash in braille only when print uses both a short and long dash.

```
Mr. D--- visits Mr. S--- regularly – you know that.
```

EBAE UEB

• ellipsis (7.3, p 74)

NOTE: Wherever a dot that resembles a period appears in print, dots 2-5-6 are used to represent the dot.

"Breathe, Melissa. In ... and out. In ... and out."

EBAE UEB

• parentheses, opening and closing (7, p69)

He hit me (sob).

EBAE UEB

• bracket, opening and closing (7, p69)

[See page 10]

```
• brace, curly bracket (7, p69)

primary colours {red, blue, yellow}

EBAE

UEB

• transcriber's note, opening and closing (3.27, p39)
```

NOTE: Opening and closing transcriber's note are used as enclosures around words of explanation embedded within the text. These symbols are not used on a separate preliminary page listing general transcriber's notes.

[open tn] The following three charts appear side by side in the print. [close tn]

Quotation Marks (7.6, p76-78)

In general, quotation marks will appear as they do in EBAE, except for the single closing quotation mark which has been changed as previously indicated. However, there will now be a way to represent different kinds of quotation marks which appear in print.

NOTE: Use one-cell, nonspecific quotation marks most of the time.

• quotation marks, nonspecific, opening and closing

"Why is that?" he asked.

• quotation marks, single, opening and closing

She said, "Sing 'Happy Birthday'."

If the text uses single quotation marks throughout the text (as in British texts), and double quotation marks are used within the text, then use:

quotation marks, double, opening and closing " "

She said, 'Sing "Happy Birthday".'

See 7.6 of Rules of Unified English Braille for examples of other infrequently used types of quotation marks

New Symbols

Here are some new symbols that were not available in EBAE. These symbols follow the prefix and root formation of UEB and can be used wherever they occur in literary contexts. Follow print for the use of these symbols.

```
• back slash (7, p69)

CSC\wrms

• forward slash (7.4, p74) /

Log on to http://braille
```

NOTE: In the forward slash, the root is the same as forward slash in EBAE, but in UEB it requires the prefix dots 4-5-6.

Nutritional facts include:

- carbohydrates
- protein
- fat
- cholesterol
- fiber
- sodium

```
:: ::
• tilde (3.25, p36)
http://www.business.com/~yourname
NOTE: Contractions can be used in web addresses in UEB.
                     :: ::
• underscore (7.2, p72)
NOTE: Regardless of the length of the character in print which
indicates a blank to be filled in, use one low line underscore in braille.
We saw ____ and ___ grazing in the field.
```

• angle brackets, opening and closing (7, p69) <>

Jan Swan <swanj@iafrica.com>

• double dagger (3.3, p21) ‡

```
• dagger (3.3, p21)
```

NOTE: A dagger may be used as a reference mark, or as the Christian cross to signify death or a member of the clergy. Follow print for the use of the dagger and double dagger, regardless of meaning. Sometimes the dagger and double dagger appear raised

position.

The painter included daisies*, white roses† and ivy‡ in the portrait.

from the baseline in print. This is not considered the superscript

*symbolizing innocence

tsymbolizing virtue

‡symbolizing fidelity

A dot is a dot is a dot!

In UEB the period, dot, decimal and computer dot will always be shown as dots 2-5-6. For the ellipsis, the number of dots shown in print, are also shown in the braille.

1.5 million people will vote.

www.loc.gov

NOTE: If the web address takes more than one line of braille, use the dot 5 (continuation indicator) unspaced at the end of the first line to show that the address will continue on the next line.

The escargot is on sale for \$28.50.

"... for they shall inherit the earth."

Exercises

1. The candy costs \$1. 2. They are charging \$5 at the door. Percent: 3. He scored 82% on the test. 4. The admission fee increased 50%. Asterisk: 5. Press *98 for voicemail access. 6. The code for school entry is 11940* Degree: 7. 350° 8. 425° Single close quotation mark: 9. "How many of you have read 'The Hunger Games' series?" Dash/Long Dash: 10. We came-we saw-we conquered. 11. Live - love - I---Ellipsis: 12. One, two, three...

Dollar:

13. Ready, set, go
Parenthesis:
14. Identify the verb(s) in the sentences.15. (page 72)
Bracket:
16. [Glossary reference]17. The recipe calls for sweet potatoes [or yams].
Brace:
18. Gender {girl or boy} 19. {see below}
Tilde:
20. http://www.wrms/ca~find
Underscore:
21 and were seen running through the field.
Angle brackets:
22. Jane Smith <jane.smith@me.com></jane.smith@me.com>
Dagger:
23. Father John Duffy†
Dot:
24. 13.5 million people live in New York City.

```
25. www.wrms.ca
26. The tickets cost $35.50 each.
****
** ** ** ** ** ** **
:: :: ::
```

```
-----
# 11 # 11
1 1 1 1
:: :: :: ::
# 11 # ##
```

Transcriber Defined Symbols

Use a transcriber-defined symbol for any print symbol which has no UEB equivalent. List each transcriber-defined symbol used and its meaning on the symbols page or in a transcriber's note.

Note: In grade 2 braille, use grade 1 mode for the first transcriber-defined print symbol.

```
Happy face
Flower symbol
Girl stick person
Boy stick person
Cloud
Sun
Star
```

***The items beside each transcriber-defined symbol above are arbitrarily attached as examples. The symbols could have other meanings assigned as defined by the transcriber.

Modifiers/Accents (page 43 of the Rules of Unified English Braille) Examples:

```
crème brulée
        Étienne
        maître
:: ::
     Ø solidus (forward slash) overlay on following letter
:: ::
     ŏ breve above following letter
:: ::
     ō macron above following letter
ò grave accent above following letter
Ô circumflex above following letter
Õ tilde above following letter
:
     Ö diaeresis (umlaut) above following letter
Ó acute accent above following letter
first transcriber-defined modifier on following letter
second transcriber-defined modifier on following letter
third transcriber-defined modifier on following letter
NOTE: For more modifiers, see pages 42, 43 of Rules of Unified English
Braille as well as the list in your UEB training package.
```

Practice Exercises: Modifiers/Accents

- 1. señors, pères, garçons
- 2. Garde Républicaine marched down the Champs Élysées.
- 3. Côte d'Or, Moët, and La Tâche are fine wines.

Typeforms (page 91 of the Rules of Unified English Braille)

It is not always necessary to indicate different typeforms when transcribing into braille.

Typeform indicators are considered necessary in braille when the print change in typeform is significant because it indicates emphasis or shows distinction. Place a modifier before the letter it modifies in braille, irrespective of whether it appears above, below or overlaying the letter(s) in print. Whenever a transcriber-defined modifier is used, give the print symbol it represents in a transcriber's note or on a symbols page.

- Italic symbol indicator
- Italic word indicator
- : Italic passage indicator
- Italic terminator
- boldface symbol indicator
- boldface word indicator
- boldface passage indicator
- boldface terminator

- underlined symbol indicator
- underlined word indicator
- underlined passage indicator
- underlined terminator
- script symbol indicator
- script word indicator
- script passage indicator
- script terminator

NOTE: When setting more than one kind of typeform for a PASSAGE (e.g. italics, bold and underline), the typeforms must be terminated in reverse order (e.g. underline, bold, italics). This is referred to as "nesting" in UEB. The order that you set typeforms is not prescribed in UEB.

- first transcriber-defined typeform symbol indicator
- first transcriber-defined typeform word indicator
- first transcriber-defined typeform passage indicator
- first transcriber-defined typeform terminator

NOTE: Typeform indicators consist of two parts: a prefix and a root. The prefix designates the typeform and the root determines its extent. Additional transcriber-defined typeforms may be formed using the following prefixes:

- Prefix for second transcriber-defined typeform
- Prefix for third transcriber-defined typeform
- Prefix for fourth transcriber-defined typeform
- Prefix for fifth transcriber-defined typeform

Practice Exercises: Typeforms

- The merry-go-round with its calliope
 (a carousel's steam whistle instrument) brings
 childhood memories galore.
- Produce the product for profit as well as refusing pesticides.
- 3. <u>February</u>, nominated for the **Man Booker Prize**, is Lisa Moore's book on the Ocean Ranger disaster (set in Newfoundland).
- 4. The letter famously began_Dear John.
- 5. Omit crossed out sections.

Dot Locator for "Mention" (3.13, p28)

A dot locator for "mention" is used unspaced before a braille symbol which is under discussion, as in a symbols list, a transcriber's note or in a publication about braille. The Rules of Unified English Braille manual makes use of the dot locator for "mention" throughout the text.

NOTE: The dot locator is not shown in print.

Example:

Common Punctuation

- , comma
- : semicolon
- : colon
- . period

Dot Locator for "Use" (3.14, p29)

A dot locator for "use" is used unspaced before a braille symbol to assure that it will be physically recognizable to the tactual reader. An isolated braille symbol that contains lower dots, or dots on the right hand side of the cell, may be misread.

Example:

+	_	÷

Grade 1 Indicator - A Fundamental Concept of UEB

(5, p51-58)

Overview:

In English Braille American Edition, dot 5-6 is known as the letter sign.

In UEB, dot 5-6 is called the **Grade 1 Indicator**, and is an integral part of the literary and math code.

A braille symbol may have an uncontracted, contracted or numeric meaning. A grade 1 indicator is used to set grade 1 mode when the grade 1 meaning of a symbol could be misread as a contraction or a numeric meaning.

What we already know in EBAE ...

In EBAE, a single dot 5-6 means that the next symbol is in grade 1.

For example, in contracted braille if you want to make a "j" as opposed to the word "just", then you would braille a dot 5-6 in front of the "j" to tell the reader the "j" is in grade 1 mode.

Let's look at UEB...

<u>Grade 1 symbol indicator</u>: A single Grade 1 indicator [dot 5-6] means that the next **symbol** is in grade 1 mode and is only used if there is ambiguity.

I think Mr. X is mysterious.

```
....
```

<u>Grade 1 word indicator</u>: A double Grade 1 indicator [dot 5-6, 5-6] means that the next **word** is in grade 1 mode.

f-f-f-freezing (Note the two ways this can be brailled.)

<u>Grade 1 passage indicator</u>: A triple Grade 1 indicator [dot 5-6, 5-6, 5-6] means that the next **passage** (three or more words) is in grade 1. To show the end of the passage, dot 5-6 dot 3, is used; this is called a **grade 1 terminator**.

I w-II I-ve y-u f-r-v-r!

Let's braille some examples of a Grade 1 symbol indicator:

- 1. Old Macdonald says e, i, e, i, o.
- 2. You forgot the ? in your sentence.

Let's braille some examples of a Grade 1 word indicator:

- 3. I spell his name s-a-n-t-a.
- 4. The party was t-e-r-r-i-f-i-c.

Let's braille some examples of a Grade 1 passage indicator:

- 5. Try cracking this secret message: Th-s d-y w-ll g-d-wn -n h-st-ry.
- 6. Put the vowels in this sentence: H- c-n t-lk f-st.

Grade 1 Mode and the Numeric Indicator

Grade 1 mode can also be set by the numeric indicator (number sign dot 3-4-5-6).

When grade 1 mode is set by the numeric indicator, it is terminated by a space, hyphen or dash or a grade 1 terminator.

Examples:

3 d

3-D

:: :: :: :: ::

3k

1st

(The "s" shows that it is no longer in numeric mode, BUT it is still in grade 1 mode.)

Dinner4you

Dinner4edwards (**NOTE**: you can put a grade 1 terminator after the 4 and then use contractions in the word "edwards")

Grade 1 Mode and Avoiding Confusion with Contractions

Grade 1 mode prevents a letter from being read as an alphabetic word sign.

Example: Finish letters "o" to "t".

NOTE: There is no letter sign in front of the "o", but there is a letter sign in front of the "t" because it could be confused with "that".

Let's braille an example:

7. Mind your p's and q's.

8. Mr. I. C. White, M.D.

Grade 1 mode also prevents a letter sequence from being read as a short form.

Example: Press the Alt key.

NOTE: "Alt" could be misread as altogether without the grade 1 indicator.

Let's braille an example:

9. Put in the CD-ROM. (**NOTE**: CD could be confused with the short form could.)

In text entirely in grade 1 braille (using no contractions), grade 1 indicators are only used for the lowercase letters a-j following digits, and a question mark in an unusual position.

Example: Do question 5g

Standing Alone Rule

Used to determine when a braille sign is read as a contraction. The braille symbol is unaccompanied by additional letters, symbols or punctuation (exceptions outlined in 2.6 of Rules of Unified English Braille).

Grade 1 Mode and Arithmetic

Grade 1 indicators will not be needed for simple arithmetic problems involving numbers, operation signs, numerical fractions and mixed numbers.

Example:

```
3-2 = 1
```

As previously stated, a braille symbol may have an uncontracted, contracted or numeric meaning. A grade 1 indicator is used to set grade 1 mode when the grade 1 meaning of a symbol could be misread as a contraction.

Simple algebraic equations which include letters may need grade 1 symbol indicators where letters stand alone or follow numbers.

Example:

```
y = x+4c
```

Let's braille an example:

10.
$$B = 4y + x + 2$$

```
:: ::
### :### # #### # ###### ###### ###### ###
 :: :: ::
:: :: :: ::
 . . .
  : :
```

UEB and Math

Math will now be represented using UEB. The phasing out of Nemeth Code is part of the UEB implementation plan for Ontario.

All numbers will be represented by the following (6, p59):

The following are some basic operation signs (11.2, p169):

Addition	+	: : ::
Subtraction	-	:• :: ••
Multiplication	Х	::• •:
Division	÷	: :
Multiplication Dot	•	:: ::

The following are some common comparison signs (11.2, p169):

Equals	=	: :
Less than	<	
Greater than	>	: : :

NOTE: Comparison signs are generally spaced on either side, but this is not a hard rule. Spacing can follow local teaching practice.

Indicators:

Grade 1 Mode: A grade 1 indicator is used to set grade 1 mode when the grade 1 meaning of a symbol could be misread as a contraction meaning or a numeric meaning (5, p51-53).

Grade 1 symbol	: :
indicator	
Grade 1 word	
indicator	
Grade 1 passage	: : : : : : : : : : : : : : : : : : :
indicator	
Grade 1 passage	: : ::
terminator	

Numeric Mode: A "number sign" initiates numeric mode. The following symbols may occur in numeric mode: The ten digits, decimal (period), comma, the numeric space, simple numeric fraction line, and the continuation indicator. Any other symbol will terminate numeric mode.

Numeric mode indicator is also sets grade 1 mode. When grade 1 mode is set by the numeric indicator, it is terminated by a space, hyphen or dash. A grade 1 indicator will not be required unless lower case letters a-j are immediately following a digit, decimal (period) or comma. The numeric passage indicator is sets numeric mode and grade 1 mode for all text until it is terminated by the numeric terminator is (1.2.2, p 2, Technical Material).

Ordinal Numbers, Dates, Time (2, p9-10)

```
Examples:

1st

4th

10/05/1995

10-05-1995

10:15 pm
```

Spacing (1.1, p 1, Technical Material):

 The braille should follow the print as much as possible. Best practice is having operation signs unspaced on both sides. For younger learners, including spaces on either side of the operation sign may be beneficial. Spacing should be consistent throughout the same work.

$$2.5 + 2.5 = 5$$

```
<u>x 11</u>
 321
<u>3210</u>
3531
::::::
      :: :: ::
    :: :: :: ::
    :: :: ::
    :: :: :: :: ::
::::::
                                  OR
 321
<u>x 11</u>
 321
<u>3210</u>
3531
** *: *:
      :: :::
      ** *: *:
         ** *: *: *:
        ** ** ** **
:::::
<u>3</u>
7)21
```

```
::::::
         :: ::
                                              : :: :: ::
    : :: :: :: ::
                                           ::
                                              ::::::
                             OR
 <u> 195</u>
5)975
 <u>5</u>
 47
 45
  25
  <u>25</u>
   0
 * * * * *
          •
                                    •
                                          • • •
    •
       : :: ::
          •
                                    ::::
                                          ::::
          : :: ::
          :: ::
                                    · · · ·
          ::::
                                     • •
                                          •: •:
          : : :: ::
            • •
                                    . . . .
            • •
                                       ....
             •
```

Numeric Space (6, p63): Spaces should be represented with a : when they are clearly numeric spaces. If it is not clear that a space is a separator in a single number it should be treated as an ordinary space.

Examples:

```
population: 3 500 000
```

date: 2000 11 12

ISBN: 899 1 7689

Here's an example where you would NOT use numeric spaces:

We went to Florida with my children (5 9 10).

Continuation Indicator: the continuation indicator is used when it is necessary to divide a number or expression between two lines of braille. It is important to place the break in a logical space (after a comma or numeric space). Use the one-cell line continuation indicator (i) when the break occurs after a separating comma, or between two digits in a number which comprises a large string of digits with no separators. Use the two-cell line continuation indicator (i) when the division occurs at a numeric space (6.10, p66-67).

^{*}We do not know if the numbers are referring to a date or the ages of the children.

Example:

Angles (11, p50, Technical Material):

Angle Sign	۷	
Measured Angle Sign	4	:: :: ::
Measured Right Angle Sign	L	
Degree	0	****

Example:

∠ABC is 45°

Fractions (6, p31-33, Technical Material):

Simple numeric fraction line	:
General fraction line	: : ::
General fraction open indicator	:
General fraction close indicator	

A simple **numeric fraction** line is one whose numerator and denominator contain only digits, decimal points, commas or separator spaces and whose fraction line in print is drawn between two vertically (or nearly vertical) arranged numbers. A numeric fraction line *does not* terminate numeric mode.

Examples:

```
6
9
```

6/9

The **general fraction indicator** is used when the numerator or denominator is not entirely numeric (consists of only digits, decimal points, commas or numeric spaces). The general fraction open and closing indicators are also used.

Examples:

$$\frac{x}{y}$$

$$y = \frac{x}{2}$$

Mixed Numbers:

Mixed numbers should be treated as two unspaced numeric items.

Example:

$$2^{3}/_{4}$$

Superscripts and Subscripts (7, p34-38, Technical Material):

Level change down (subscript)	: :
Level change up (superscript,	:
exponent or power)	

^{**} In a grade 2 passage where a subscript or superscript appears, it may need a grade 1 indicator to avoid it being read as the "en" or "in" contraction.

Examples:

```
x^{2}
x^{2}y
x_{1}, x_{2}
x_{2} = x_{1}
```

NOTE: The superscript and subscript only apply to the next "item".

Braille Grouping: are used to "group" an expression so that they are all affected by a preceding indicator or considered an "item" (11.4, p172).

It may be necessary to use **braille grouping symbols** when using superscript and subscripts in algebraic equations.

Examples:

```
x^{2+y}
X_{y^2}
```

Radicals (Roots) (8, p40-41, Technical Material):

Open radical (root)	• • · · · · · · · · · · · · · · · · · ·
Close radical (root)	:

^{**} In a grade 2 passage where an open or close radical sign appears, it may need a grade 1 indicator to avoid it being read as a contraction.

The expression inside the square root sign in print should be preceded by the open radical sign and followed by the close radical sign.

Examples:

$$\sqrt{4} = 2$$

$$\sqrt{a^2 + b^2}$$

Other roots are expressed as a superscript immediately following the opening radical symbol.

Examples:

$$\sqrt[3]{8}$$

$$mn\sqrt{xy}$$

Shapes (14, p65, Technical Material):

Shape indicator	#:
Shape terminator	::
Equilateral triangle	** ** **
Square	
Circle	!: !!

^{**} For more shape indicators please see section 14.1 in the UEB Guidelines for Technical Material.

A Grade 1 indicator may be required before the shape indicator.

If a shape is followed by a space, then no termination symbol is needed.

Example:

 Δ DEF

ΔDEF

Arrows (13, Technical Material):

Arrow indicator	• • • • • • • • • • • • • • • • • • • •
Bold arrow indicator	:: ::
Simple right pointing arrow (east)	!! !!
Simple left pointing arrow (west)	##
Simple up pointing arrow (north)	###
Simple down pointing arrow (south)	** **

^{**} The arrow indicator may need a Grade 1 indicator. The bold arrow indicator will not need one as it does not have a Grade 1 meaning.

Chapter 13 in the Guidelines for Technical Material provides additional information on arrows and unusual arrows.

Examples:

```
n \rightarrow s

input \rightarrow process \rightarrow output
```

Some Examples of Chemistry (16, p74-82, Technical Material):

 O_2

:: **::** :: :: :: ::

 H_2O

 $^{238}_{\ \ 92}U$

 $2NaOH + H_2SO_4 \rightarrow N\alpha_2SO_4 + 2H_2O$

Let's Practice!

1. $4-2^{3}/_{4}$

2. 9 + 9 = 18

3. 2500

4. y = x + 8a

 $5. \ 3x - 4y + y^2 = x^2$

6. $\frac{x^2+2x}{1+x^2}=1$

7. $\sqrt{625} = 25$

```
.........
 :: ::
  * * * * *
 ***
  :: :: :: ::
 ::::::
```