

# **TECHNICAL UPDATE TO UEB**

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This course requires the use of *The Rules of Unified English Braille, Second Edition 2013* and *Unified English Braille Guidelines for Technical Material, August 2014*. Both documents can be downloaded in print or braille from [www.iceb.org/ueb.html](http://www.iceb.org/ueb.html).

### **A.1 SIGNS OF OPERATION, COMPARISON AND OMISSION [3]**

The spacing of signs of operation and comparison is dealt with in 1.1. In particular note that inconsistency in print spacing is not preserved in braille.

See 3 for a list of signs of operation and comparison. The note to the second to last example in 3.1 explains that the ratio sign is unspaced in UEB. See 3.6 for omission marks.

See next practice.

### **A.2 GROUPING DEVICES (BRACKETS) [5]**

UEB grouping devices in technical material are the same as in literary material.

#### PRACTICE A

1. For the young learner:
  - $4 + 3 = 7$
  - $7 - 4 = 3$
2.  $4 \div 2 < 3 \times 1$
3. The square root of 25 is  $\pm 5$
4.  $10a + [a - (5a - 4)] \geq 0$
5.  $15 : 3 = 5 : 1$
6.  $4 + 5 = \underline{\quad}$   
 $4 + \quad = 9$   
 $4 \underline{\quad} 5 = 9$   
 $4 + 5 ? 9$
7.  $a(b + c) = ab + ac$
8. Find the distance from  $P(-3, 7)$  to  $Q(5, -4)$
9.  $[2, a, -4, 3b]$
10.  $|a + b| \leq |a| + |b|$



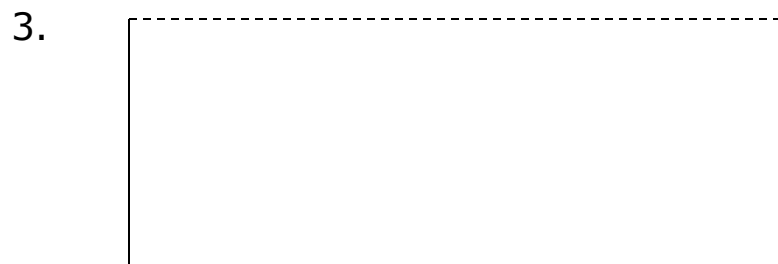
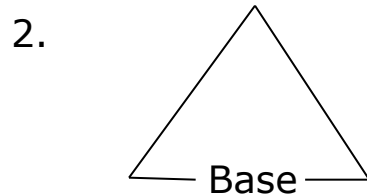
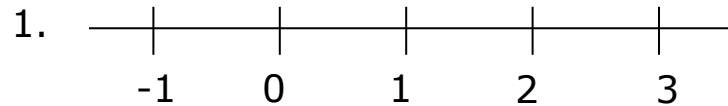
**B. LINE MODE [Rulebook, 16]**

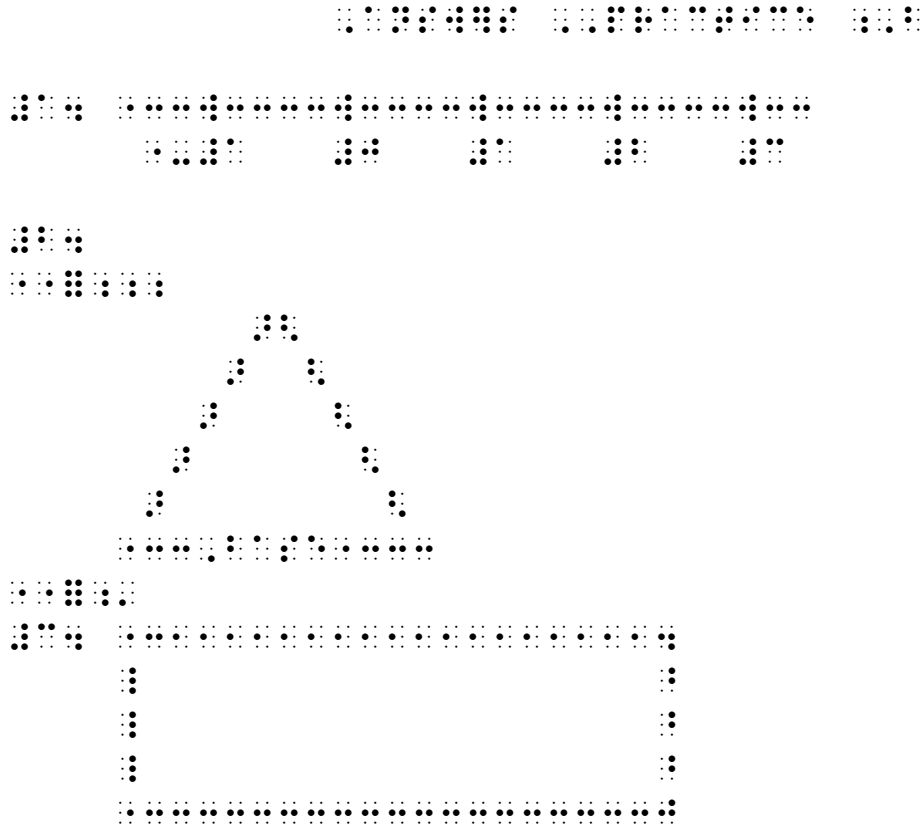
16.1 gives guidance on when line mode may be used.

In UEB, a horizontal line always starts with the indicator, dots 5-25. Horizontal lines are used for boxing lines, for number lines, and for separation lines in spatial arrangements, tabular material and financial statements, and may be used for line drawings such as geometric figures. See 16.2 for the complete provisions.

UEB provides for diagonal as well as vertical lines. See 16.3.

Combining various forms of lines is covered in 16.4. It is important that any form of vertical line segment be preceded and followed by a space [16.4.3].

**PRACTICE B**



### C. SPATIAL LAYOUT AND DIAGRAMS [GTM 4]

In UEB, the numeric indicator is used in spatial diagrams [4.1]. There is the option to use a numeric passage indicator before and the terminator after the expression [4.1] or exercise [4.1.7].

Although the Guidelines suggest that the layout may be changed to suit local teaching practices [4.1.1 and 4.1.3], for purposes of this course, follow print. Also follow print in regards to the length and position of any horizontal lines used in the Practices.

#### PRACTICE C

*Transcribe questions 1-2 using a numeric indicator for each number. Transcribe question 3 using a numeric passage indicator. Transcribe questions 4-7 using a numeric passage indicator and individual numeric indicators for each question number.*

$$1. \begin{array}{r} 435\ 639 \\ +2\ 345 \\ \hline \end{array}$$

$$2. \begin{array}{r} 904 \\ \times 21 \\ \hline 904 \\ 1808 \\ \hline 18984 \end{array}$$

$$3. \begin{array}{r} \underline{55} \\ 2)110 \\ \underline{10} \\ 10 \\ \underline{10} \\ 0 \end{array}$$

$$4. \begin{array}{r} 23 \\ +15 \\ \hline \end{array}$$

$$5. \begin{array}{r} 12.2 \\ -11.7 \\ \hline \end{array}$$

$$6. \begin{array}{r} 93.94 \\ +3.83 \\ \hline \end{array}$$

$$7. \begin{array}{r} \$4.99 \\ -1.02 \\ \hline \end{array}$$





## **D. FRACTIONS [6]**

Refer to 4.1.4 for examples of spatial fractions for teaching purposes.

Fractions in technical material are the same as in literary material. See 6.1 for simple numeric fractions and 6.4 for general fractions.

### Use of Grade 1 Mode

General fractions usually will require the use of grade 1 indicators. See 1.2 for guidance on the use of grade 1 mode and numeric mode.

Section 1.7 deals with choosing which grade 1 indicator to use in each situation (symbol, word or passage). (You will find the Guidelines themselves are not consistent in applying the principles in its examples.) Often there is more than one method of conveying the information. Teachers may decide on a particular method to assist in teaching a new concept to their student.

For the purpose of this course, follow these preferences for technical material:

1. When the use of contractions is an issue, use the method which allows words to be shown in their normal contracted form. Consider the last example in section 6.4 at the top of page 33. For this course, the third method of transcription is preferred, i.e. using grade 1 symbol indicators.

2. In other situations, it is preferred to use a grade 1 word indicator or a grade 1 passage indicator in order to avoid interrupting a mathematical expression with a grade 1 symbol indicator. This will sometimes mean that more cells are used.

## PRACTICE D

*Transcribe number 1 as spatial fractions for teaching purposes.*

$$1. \frac{2}{16} + \frac{2}{16} = \frac{4}{16} = \frac{1}{4}$$

$$2. \frac{6}{12} \quad 6\frac{1}{2} \quad 6\frac{1}{2} \quad \frac{6.12}{2} \quad 6/12 \quad \frac{6\ 120\ 000}{2\ 000} \quad \frac{6,120}{20,000}$$

$$3. \frac{2}{y} \quad \frac{x}{y} \quad 4cm/8m$$

$$4. \frac{\frac{1}{2}}{\frac{3}{6}} \quad \frac{\frac{x}{y}}{\frac{y}{x}} \quad \frac{\frac{7}{x}}{\frac{8}{x} + \frac{4}{x}}$$

$$5. \text{length} = \frac{\text{area}}{\text{width}}$$

$$6. \frac{3}{5} \quad x/11 \quad 9/x \quad 9/11 \quad \frac{\$3.00}{5}$$



## **E. SUPERSCRIPTS AND SUBSCRIPTS [7]**

In UEB, superscripts and subscripts in technical material are done the same way as in literary material. Since the superscript and subscript indicators refer only to the next "item" (as defined in 7.1), it is not necessary to use a baseline indicator.

If there is more than one symbol in the superscript or subscript position, use braille grouping indicators to create a UEB "item" (see number 7 in 7.1). See also 7.4 and 7.5.

Remember that in UEB the degree symbol is considered to be superscript and does not need a superscript indicator [2.10].

For simultaneous superscripts and subscripts, follow 7.7.

Transcribing modifiers directly above and below is explained in 7.9.

For the sigma notation in the following practice, see the list of Greek letters in 11.7.

## PRACTICE E

1.  $A = 3.14r^2 b^3 \text{ CO}_2$

2.  $p^3q \ p^{3q} \ a^{3b}$

3.  $m^3 + n \ m^{3+n} \ m^{3+n} - 6$

4.  $y^{3/5} \ \frac{y^3}{5}$

5.  $\frac{x^2 + y^2}{z^3}$

6.  $p = q^{\frac{r}{st}}$

7.  $x^{y^3} \ x^{(y^3)}$

8.  $2^{2^2}$

9.  $V_{i^2} \ V^{i_2}$

10.  $c^{-3d}$



12.  $m_x^y \ m_x^y$

13.  $-3 + +7 = +4$

14.  $2.7 \times 10^7 \text{ }^\circ\text{F}$

15.  $\sum_{x=1}^5 x_n^8$



## F. SQUARE ROOTS AND OTHER RADICALS [8]

8.1 explains the method of transcribing square roots. Refer to 8.2 for the transcription of a radical index. Note a nested radical is shown in the last example of 8.2.

8.3 illustrates the symbol for the square root sign without a vinculum. This sign may also be used as the symbol for the check mark.

### PRACTICE F

1.  $\sqrt{x^2 + 1}$
2.  $3\sqrt{\frac{x}{y}} + 2$
3.  $\sqrt[3]{2}$
4.  $\sqrt[m+n]{p + q}$
5.  $\sqrt{\sqrt{x}}$
6. Use  $\checkmark$  for square roots.

## G. FUNCTIONS [9]

Follow 9.3 for the spacing of function names. Note that contractions are used unless grade 1 mode is in effect, such as following a numeric indicator (see the final example in 9.3.3).

### PRACTICE G

1.  $\sin 30^\circ$ ,  $\cos x$ ,  $\tan \theta$
2.  $a \csc x$ ,  $3 \sin 45^\circ$ ,  $\cos^{-1} 0.2$
3.  $\log_a x$ ,  $\log_8 x$





**H.1 SET THEORY, GROUP THEORY AND LOGIC [10]**

Use the appropriate symbols. Symbols of comparison are spaced and symbols of operation are unspaced (see the examples).

See next practice.

**H.2 MISCELLANEOUS SYMBOLS [11]**

Note which symbols can be found here e.g. integral, asterisk, infinity, angle, hollow dot (not degree sign [2.10]) etc.

**PRACTICE H**

1.  $A \cap B, X \subset Y$

2.  $\int_{x=a}^{x=b} f(x) dx$

3.  $\sum_{n=0}^{\infty} a_n$

4.  $\therefore \angle ABC < 90^\circ$

5.  $\{(x, y) \mid x = |y|\}$

6.  $\frac{n!}{r!(n-r)!}$



## I. BARS AND DOTS ETC. OVER AND UNDER [12]

These symbols follow the "item" which they are over or under. Note that several of these symbols have contracted meanings and will need to be in grade 1 mode. The definition of an item is repeated in 12.1.

### PRACTICE I

*Do number 6 as a spatial arrangement.*

1.  $\bar{y} \neq 0$
2.  $1.\overline{45}$   $1.4\dot{5}$   $D\hat{E}F$
3.  $\underset{\sim}{x}$
4.  $\vec{v}$
5.  $\overline{AB}^2$
6.  $\frac{3}{\underset{2}{\cancel{8}}} \times \frac{\overset{4^1}{\cancel{4}}}{7} = \frac{3}{14}$

## J. ARROWS [13]

Simple arrows are defined and their transcription is explained in 13.1. 13.2 deals with arrows with unusual shafts and 13.3 lists symbols for unusual tips. If it is necessary to determine the direction of the arrow, follow the provisions at the bottom of page 62. The order for transcribing the elements of an unusual arrow is given at the top of page 63.

### PRACTICE J

1.  $x \rightarrow \infty$
2.  $\lim_{\theta \rightarrow 0} \cos \theta$
3.  $x \neq y \Leftrightarrow \neg(x = y)$
4.  $x \mapsto y$



## K. SHAPE SYMBOLS AND COMPOSITE SYMBOLS [14]

The shape indicators are listed in 14. Note the list of specific shapes. For a rectangle, the symbol for parallelogram may be used. Refer to 14.1 to determine when a terminator is required for a shape. Once in shape mode, grade 1 indicators are not required.

Follow 14.2 for a transcriber-defined shape. Refer to 3.26 in the Rulebook to determine when the use of a transcriber-defined *symbol* is preferred to a transcriber-defined *shape*.

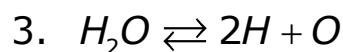
The use of composite symbols is described in 14.3. Note that each is shown with a grade 1 symbol indicator preceding it.

Often calculator keys are shown enclosed within a box. The preferred method for their transcription is given in 3.5.

See 3.6 for a square used as a mark of omission.

### PRACTICE K

1.  $9 - 5 \square 4$



5. Press calculator keys  $\boxed{\sqrt{\phantom{x}}}$   $\boxed{4}$ .

6.  $\binom{n}{0} = \binom{n}{n} = 1$



## L. MATRICES AND VECTORS [15]

Using the enlarged grouping symbols from 5, follow the provisions in 15 for matrices [15.2], determinants [15.3] and vectors [15.6]. Note that 15.4 deals with omission dots, 15.5 gives guidance on wide matrices and 15.7 shows the use of enlarged grouping symbols for grouping of equations.

If a grade 1 passage indicator is used, it may be placed on a line by itself (replacing the blank line) preceded by the dot locator for "use" (dots 5-5-123456). See 3.14 in the Rulebook. The grade 1 terminator would also be placed on a line by itself following the arrangement and preceded by the dot locator for "use".

### PRACTICE L

$$1. \begin{pmatrix} 1 & -2 \\ -3 & 4 \end{pmatrix}$$

$$2. \begin{bmatrix} -m & n \\ p & 3q \end{bmatrix}$$

$$3. \begin{vmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \cdot & \cdot & \cdots & \cdot \\ a_{r1} & a_{r2} & \cdots & a_{rn} \end{vmatrix}$$

$$4. \overline{XY} \quad \underline{XY}$$

$$5. \mathbf{v} = \begin{bmatrix} r \\ \angle \theta \end{bmatrix}$$

$$6. f(n) = \begin{cases} n + 5 & \text{if } n \text{ is even} \\ n - 5 & \text{if } n \text{ is odd} \end{cases}$$



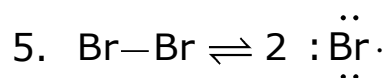


**M. CHEMISTRY [16]**

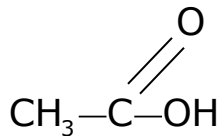
When transcribing chemistry, refer to 16.2 for capitalization. Subscripts and superscripts for atomic mass numbers are in 16.3 and for electronic configuration are in 16.4. Examples of chemical equations are shown in 16.5. Print uses various methods of showing electrons which may be represented by the corresponding UEB signs as illustrated in 16.6. Structural formulae are covered in 16.7. Note that there are UEB symbols given in 16 which are used for line bonds. Refer to 16: Line Mode in the Rulebook for the transcription of lines in structural formulae.

**PRACTICE M**

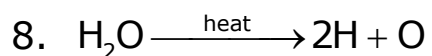
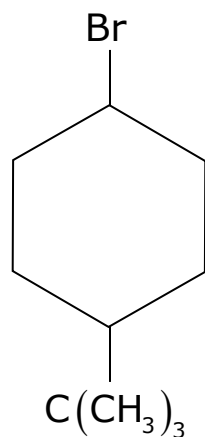
1.  $\text{H}_2\text{O}$     $\text{H}-\text{O}-\text{H}$
2.  $\text{Fe}^{2+} + 2\text{e}^- \rightarrow \text{Fe}$
3.  $R = 8.31\text{dm}^3 \cdot \text{kPa}/\text{mol} \cdot \text{K}$
4.  ${}_{94}^{244}\text{Pu}$  for Plutonium



6. Acetic acid (vinegar):



- 7.





## N. COMPUTER NOTATION [17]

17.1 gives a definition of computer notation and explains what is meant by "displayed" and "inline". The line arrangement for displayed computer notation and its spacing are discussed in 17.2. Use uncontracted braille for displayed computer notation and any associated excerpts [17.3].

### PRACTICE N

This example of a C++ program was found at <http://www.cs.indiana.edu/~sabry/teaching/intro/fa96/code/prime.C>. It is used to check if a number is prime.

```
#include <iostream.h>

int smallldiv (int n) {
    int count;
    count = 2;

    while (count < n && n % count != 0) {
        count = count + 1;
    }
    return(count);
}

int main () {
    int n;
    cout << "Enter a natural number: ";
    cin >> n;
    if (n == smallldiv(n)) {
        cout << n << " is a prime number" << endl;
    }
    else {
        cout << n << " is not a prime number" << endl;
    }
    Return(0);
}
```

1111 2222 3333 4444 5555 6666 7777 8888 9999 0000

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