

Continuous Professional Development in Braille and Assistive Resources (CPDBAR)



BAR1142 Advanced Braille March 2022



FOREWORD

Inclusion of learners with Special Educational Needs (SEN) is Rwanda's national commitment articulated in the National Constitution of 2003 revised in 2015 especially in its articulation of the right to education for all (Article 20) and the State's duty to establish special measures facilitating the education of persons with disabilities (article 51).

The Government of Rwanda (GoR) has ratified the Convention on the Rights of Persons with Disabilities (CRPD) of 2006; and is committed to achieving the Sustainable Development Goals (SDGs) whose fourth goal focuses on education. Rwanda through law n° 27 of 07/09/2020 published in official gazette n° 013/2020 of 07/09/2020 has ratified the Marrakesh treaty of 2013 that aims at facilitating access to published works for persons who are blind, visually impaired, or otherwise print disabled.

Rwanda has policies and plans in place to ensure access to education for all learners including those with SEN. Of these, one can mention the Education Sector Policy of 2003, the current National Strategy for Transformation (NST1 2017-2024), the Education Sector Strategic Plan (ESSP-2019/2024) stating that all in-service and pre-service teacher training programs include components of inclusive education (priorities 5 & 7), the Special Needs and Inclusive Education policy and its Strategic Plan (2019-2024) and the National Policy of Persons with Disabilities (2021).

In respect of the above, Rwanda Basic Education Board (REB) in collaboration with the University of Rwanda (UR) through College of Education (CE) School of Inclusive and Special Needs Education has developed Training programmes; Continuing Professional Development Diploma in Braille and Assistive Resources (CPDDBAR) and, Continuing Professional Development Certificate in Braille and Assistive Resources (CPDCBAR) and relevant training modules to equip teachers in Rwandan schools with competences to meet the diverse learning needs of learners with SEN.

Rwanda Basic Education Board hereby introduces '**Advanced English Braille**' (**BAR1142**) as one of the modules in the programs and urges stakeholders to support its effective delivery.

Dr. Mbarushimana Nelson

Director General, Rwanda Basic Education Board

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First and foremost, REB is grateful to the Government of Rwanda that has demonstrated commitment through legal and policy framework and, other means to continuously improve the quality of life for all Rwandans including people with disabilities.

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This training module could not have been possible without the dedicated contribution from all the role players acknowledged.

In a special way, the outstanding contributions of the Presidency of the Rwanda Union of the Blind (RUB) is acknowledged, for the development and editing of the present Rwandan Sign language training manual. It was timely, critical and highly appreciated.

REB pledges collaboration with all stakeholders and service providers in relation to the education of learners with Special Educational Needs in Rwanda.

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Abbreviations and Acronyms

ADHD	Attention Deficit and Hyperactivity Disorder
CBID	Community-Based Inclusive Development
CBR	Community-based rehabilitation
CP	Cerebral Palsy
DB	Decibels
DPO	Disabled People's Organizations
EAC	East African Community
ECD	Early Childhood Development
EDPRS	Economic Development and Poverty Reduction Strategy
EFA	Education for All
EICV	Household Living Conditions Survey
ESSP	Education Sector Strategic Plan
HI	Hearing Impairment
ICF	International Classification of Functioning, Disability and Health
ICT	Information and Communication Technology
IEP	Individualized Education Plan/Program
LD	Learning Difficulties
M & O	Mobility and Orientation
MINALOC	Ministry of Local Government
MINEDUC	Ministry of Education
NCPD	National Council for People with Disabilities
NGO	Non-Government Organisation
NUDOR	National Union of Disability Organizations in Rwanda
PRSP	Poverty Reduction Strategic Plan
REB	Rwanda Basic Education Board
RNUD	Rwanda National Union of the Deaf
RSL	Rwanda Sign Language
RUB	Rwanda Union of the Blind
SDG	Sustainable Development Goals
SEN	Special Educational Needs.
SENA	Special Educational Needs Assessment
SNE	Special Needs Education
TTC	Teacher Training College
UDL	Universal Design for Learning
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Learners's Fund
UNCRPD	United Convention on the Rights of Persons with Disabilities
UR CE	University of Rwanda - College of Education
VI	Visual Impairment (VI)
WHO	World Health Organization
WIPO	World Intellectual Property Organization
7YGP	Seven Year Government Programme
9YBE	Nine Year Basic Education
12YBE	Twelve Year Basic Education

List of Icons



Learning outcomes



Activity & Self-assessment



Introduction



Reflective questions



Unit summary

MODULE INTRODUCTION

This module aims at introducing the trainee to the Advanced Braille. Unit 1 is an introduction to Advanced English Braille. It also intends to inform the trainee about the importance of using Advanced English Braille. This Advanced English braille system is a result of combining codes from the existing braille systems. These systems include Standard English Braille (SEB), Braille mathematics notation, English Braille American Edition (Literary Braille), Nemeth Braille Code for mathematics and science and Braille Science. The Music Braille Code has been excluded from the new system. The module contains the following units: Introduction to advanced English braille, Grade 2 English braille, advanced mathematical signs, Advanced tactile drawings and Advanced braille signs and symbols. Each of these units elaborates the indicated contents and provides practice exercises for you.

MODULE LEARNING OUTCOMES

By the end of this module, you should be able to:

- I. Understand the concept of Advanced English Braille
- II. Read and write Advanced English Braille effectively.
- III. Explain the logic behind the use of advanced braille writing
- IV. Transcribe the written materials from print to advanced braille and vis-versa
- V. Search for up-to-date information related to braille and assistive resources via the Internet and libraries,
- VI. Participate and contribute to campaigns, debates and popular media related to Braille and assistive resources,
- VII. Advocate for proper teaching of advanced Braille and improved educational services for people with visual difficulties and other difficulties,
- VIII. Feel part of the general and on-going quality improvement of educational services in Rwanda, in which inclusion of the educationally marginalized is part.

Indicative content

This module is comprised of the following units:

1. Introduction to advanced English braille
2. Grade 2 English braille
3. Advanced mathematical signs
4. Advanced tactile drawings
5. Advanced braille signs and symbols

Unit 1: Introduction to advanced English Braille

Introduction

This unit introduces you to the concept of English Braille and rationale of advanced English Braille

Unit learning outcomes

By the end of this unit, you should be able to:

- Differentiate forms of English Braille
- Explain the importance of advanced English Braille
- Discuss your contribution to the development of Rwandan Braille codes

Topics in this unit

Topic 1.1: The concept of English Braille

Topic 1.2: Rationale of Advanced English Braille

Topic 1.1: The concept of English Braille

In this topic you will be introduced to the concept of English Braille and different types of Braille

Activity 1

In pairs, discuss the different types of braille that you know

Braille is a tactile method of reading and writing for blind people. It was developed by Louis Braille (1809–1852) (REB, 2020). He was a blind Frenchman. It is made of six dots of the Braille cell, configured in 64 possible combinations (including the space which has no dots). Excluding the space, the remaining 63 Braille characters with dots are grouped in a table of seven lines. This table is used to establish "Braille order" for listing braille signs.

English Braille, also known as Grade 2 Braille. It consists of approximately 250 Braille letters used in English, numerals, punctuation, formatting marks, contractions, and abbreviations. Some English Braille letters, such as (⠠sh) correspond to more than one letter in print. English Braille has three levels of complexity: Grade 1 is the actual transcriptions of printed English alphabet and is used primarily in basic literacy. Grade 2 uses many contractions and

abbreviations such as (⠠sh mentioned above). Grade 3 is a more advanced form of grade 2 Braille is used only in personal letters, diaries, and notes. It is a kind of shorthand, with entire words shortened to a few letters.

1.1.1 Most common types of braille

There are braille codes for writing text, music, and even technical material for math and science. There are two forms of Text or literary Braille: **non-contracted or alphabetic Braille and contracted Braille** for saving space.

Alphabetic Braille is also known as Grade 1 Braille. In this type of Braille, each word and letter is written in the same way as it is in print. For example, the word “knowledge” is written using nine separate cells, one cell for each of the nine letters.

Literary Braille is also known as contracted Braille or Grade 2 Braille. In this type of Braille, contractions or abbreviations are used to represent a word or a group of letter. For example, “knowledge” is written in a contracted form using only one Braille cell that stands for letter “K” to represent the entire word. Most Braille books and magazines are written in literary Braille because it takes less space than alphabetic Braille.

Examples:

Knowledge is power	Grade one:
	Grade two:

1.1.2 Other Types of Braille

Other types of Braille codes include the **Nemeth codes, Music Braille and Unified English Braille (UEB)**.

The Nemeth Braille Code is used to encode mathematical and scientific notation (**Nemeth, 1952**). Usually, we use standard six-dot Braille cells for tactile reading. Individuals who are blind or who have low vision still need to learn mathematics. Nemeth (1952) introduced Braille version that used to transcribe mathematical equations, algebra, and calculus

Music Braille was created by the father of modern Braille (Louis Braille, who was also a musician. “Music Braille” uses combinations of the same six-dot cells as literary Braille to represent the pitch and rhythm of each note (Louis Braille, 1829).

There is a push toward Braille uniformity called **Unified English Braille** that was developed by the International Council on English Braille to unify the Braille codes used among English-speaking countries and to unify the Braille symbols used in literacy, numeracy and computing contexts (Simpson 2013).

1.1.3 Braille code

The Braille code was invented by Louis Braille (1809-1852), a French teacher who worked with students who were blind. It is a writing system which enables blind and partially sighted people to read and write through touch. Each Braille cell represents a letter, numeral or punctuation mark. Some frequently used words and letter combinations also have their own single cell patterns.



Self-assessment

1. Differentiate common types of English Braille
2. Explain English Braille Code Versions

Topic 1.2: Rationale of Advanced English Braille

The advanced English Braille was designed to deal with a wide range of subject matter at all levels of complexity while not drastically changing what makes the original six-dot Braille script easy to understand. It is systematically constructed so that as new symbols are introduced into the code, they don't conflict with those already in the code. It is also well-suited to technical use, so it is amenable to computer translation either from Braille to print or from print to Braille without the inaccuracies of previous Braille systems



Activity 2

1. Discuss the rationale of Advanced English Braille
2. Explain the major changes that Advanced English Braille made

1.2.1 The reasons of advanced English Braille for individuals

Advanced English Braille makes it easier to learn, read and write math in Braille for both primary and secondary school students. It retains the familiar single-cell signs for outer quotes, and offers a range of symbols for inner quotes. It uses specific two-cell signs for accent marks, rather than the non-specific accent sign (Papasalouros and Tsolomitis, 2017).

- It bears more consistency, less ambiguity, and fewer exceptions to Braille rules that will make Braille easier to produce and may remove some barriers people have while learning Braille.
- Advanced English Braille shows more symbols in Braille that gives the Braille reader better access to the same information that is available to print readers.

- Computer translation and back-translation could be produced more quickly and with less human intervention.
- It reduces errors and ambiguity experienced by those who read contracted Braille on refreshable Braille displays. Braille displays are the equivalent of a screen on a desktop computer or mobile device.
- Improve back-translation of Braille that is written using electronic devices, so that Braille users can write in Braille to communicate easily and accurately with non-Braille users.
- Increases the timeliness of many types of Braille production by permitting transcribers to put more focus on the advanced aspects of Braille production rather than spending time on routine matters.
- Reduces the labor required with Braille production, giving teachers more time to spend with the students instead of Brailing materials for them.
- Minimize, to some extent, difficulties experienced by a reader who is required to read computer-produced Braille that has been transcribed by someone who has not been properly trained in Braille transcription.

1.2.2 The major changes of Advanced English Braille

Advanced English Braille retains the general-purpose literary code as its base, while allowing the addition of new symbols, providing flexibility for changes as print changes, reducing the complexity of certain rules, and allowing greater accuracy in back translation.

The major changes include:

Spacing: Words that were written together such as "and the" were mandated to have a space between them as they do in print.

Elimination of some contractions: Owing to translation difficulties and confusion with other symbols, "ally," "ation," "ble," "by," "com," "dd," "into," "o'clock," and "to" were removed from Advanced English Braille.

Punctuation: A few punctuation marks, such as parentheses, were changed, while symbols for brackets, quotation marks, dashes, and others were added.

Indicators: Bold, underline, and italics each has its own indicator in Advanced English Braille.

Math symbols: Operational symbols such as plus and equals were incorporated. The code for letters and numbers are the same as they are in the literary code



Self-assessment

1. Explain the reasons of English Advanced Braille
2. Discuss the major changes that Advanced English Braille made

Unit summary

This unit discussed Advanced English Braille. Braille has codes for writing text, music, and even technical material for math and science. Text or literary braille has two forms: non-contracted or alphabetic braille and contracted braille for saving space.

The advanced English Braille was designed to deal with a wide range of subject matter at all levels of complexity while not drastically changing what makes the original six-dot Braille script easy to understand. It is systematically constructed so that as new symbols are introduced into the code, they do not conflict with those already in the code.



Reflection questions

1. Differentiate the most common types of English Braille
2. Explain English Braille Code Versions
3. Discuss the rationale of Advanced English Braille
4. Explain the major changes that Advanced English Braille made

References

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- Simpson, C. (2013). *The rules of unified English braille*, (2nd ed.). San Francisco: ICEB TTC Year one. Rwanda Education Board

Unit 2: Grade II English Braille

Introduction

This unit introduces you to the Braille contractions and abbreviations (also known as short-forms) used in English Braille.. We shall use Standard English Braille, with capitals, along with Braille Mathematics Notation, both of which are British Braille. In Grade 2 Braille, contractions and other short forms are employed to cut down on the space used for writing braille. Contractions and other related terms are defined in the sections below.

Unit learning outcomes

By the end of this unit, you should be able to:

- Read and write different contractions of English Braille
- Use short forms in writing and reading braille

Topics in this unit

Topic 2.1 Contractions

Topic 2.2 Reading and Writing short-forms

Topic 2.1 Contractions

This topic introduces you to group signs, lower word signs, upper group signs lower group signs, initial letter contractions and final letter group signs.

Contraction:

A contraction is a braille sign representing a word or a group of letters. For example, in the alphabetic braille signs, letter p represents the word ‘people’, letter q represents the word ‘quite’, etc. Therefore the alphabetic letters p and q are contractions for those respective words.

Wordsign:

This is a contraction which stands for a complete word. Hence the alphabetic letters p and q are both wordsigns, which fall under “Simple Upper Wordsigns”.

 **Activity 3**

1. Write down the words represented by the following alphabets: **n, q, k, z, p**
2. Write down the 5 common word-signs

2.1.1 Group signs

A group sign is a braille sign representing a group of letters. (BAUK, 2004). Let us look at some categories of group signs.

2.1.1.1 Five Upper Group signs (with h)

ch **gh** **sh** **th** **wh**
 ⠠⠆⠠⠆ ⠠⠆⠠⠆ ⠠⠆⠠⠆ ⠠⠆⠠⠆ ⠠⠆⠠⠆

These five group signs are formed by adding dot 6 to the letters a b c d e.

Thus:

- ch** a and dot 6
- gh** b and dot 6
- sh** c and dot 6
- th** d and dot 6
- wh** e and dot 6

These signs may be used in any part of a word for the letters they represent.

Examples:

chap ⠠⠆⠠⠆⠠⠆ high ⠠⠆⠠⠆⠠⠆ she ⠠⠆⠠⠆⠠⠆
 thy ⠠⠆⠠⠆ who ⠠⠆⠠⠆

2.1.1.2 Group signs ch sh th and wh are also used as wordsigns:

⠠⠆⠠⠆	⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆	child
⠠⠆⠠⠆	⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆	shall
⠠⠆⠠⠆	⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆	this
⠠⠆⠠⠆	⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆	which

Examples:

He is like a child. ⠠⠆⠠⠆⠠⠆ ⠠⠆⠠⠆⠠⠆ ⠠⠆⠠⠆⠠⠆⠠⠆ ⠠⠆⠠⠆⠠⠆⠠⠆

But

He is childlike. ⠠⠆⠠⠆⠠⠆ ⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆⠠⠆

2.1.1.3 Four upper Groupsigns (two with “e” and two with “o”)

ed **er** **ou** **ow**



ed dots 1 2 and 4 6

er dots 1 2 and 4 5 6

ou dots 1 2 and 5 6

ow dots 2 and 4 6

Of these four group signs only “ou” sign represents a complete word, and that is, the word **out**. This rule applies only when no other letters are joined to it (Risjord, 2009)

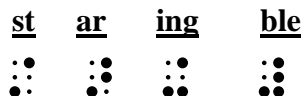
Example:

He is out: ⠠⠏⠢⠤⠠⠊⠎⠠⠤⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠤⠠⠤

But:

He is outside: ⠠⠏⠠⠤⠠⠤⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠤⠠⠤

2.1.1.4 The last four Upper Group signs



st dots 3 and 4

ar dots 3 and 4 5

Both of these signs may be used in any part of a word

Example:

stand: ⠠⠎⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤

are: ⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤

st by itself stands for the word “still”.

ing dots 3 and 4 6

ble dots 3 and 4 5 6

These signs (**ing** and **ble**) may be used in any part of a word except at the beginning.

Example:

bringing: ⠠⠢⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠤

doubled: ⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤⠠⠢⠠⠤⠠⠤

2.1.2 Lower word signs

A lower sign is one which lacks dots 1 and 4 (BAUK, 2004).

Some of the lower signs are also used as word signs to represent whole words. They can be grouped under three heads (Simpson, 2013):

- Those that must be spaced from all other signs
- Those lower word signs should be written unspaced from a word which follows



enough dots 2 and 6 (lower e)

in dots 3 and 5 (lower i)

These two signs, when used as word signs must be spaced from all other words, but they may be used adjoining punctuation signs provided the whole sequence is in contact with an upper sign.

Example:

Have you enough in that box?

Have you that box? “enough’s enough.”

“Teach-in”.

Have you enough?

2.1.3 Lower group signs (be con com dis ea bb cc dd ff gg en in)

These can be grouped under three headings:

Those that must be written at the beginning of a word or braille line

(be con com dis)

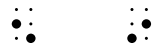


Those that must be written in the middle of a word

(ea bb cc dd ff gg)



Those that may be written in any part of a word: (en in)



2.1.4 Initial-letter contractions

Dots 4 5

upon
 these
 those
 whose
 word

Dots 4 5 6

cannot

⠠	⠠	had
⠠	⠠	many
⠠	⠠	spirit
⠠	⠠	their
⠠	⠠	world

Dot 5

⠠	⠠	day	⠠	⠠	right
⠠	⠠	ever	⠠	⠠	some
⠠	⠠	father	⠠	⠠	time
⠠	⠠	here	⠠	⠠	under
⠠	⠠	know	⠠	⠠	young
⠠	⠠	lord	⠠	⠠	there
⠠	⠠	mother	⠠	⠠	character
⠠	⠠	name	⠠	⠠	through
⠠	⠠	one	⠠	⠠	there
⠠	⠠	part	⠠	⠠	ought
⠠	⠠	question	⠠	⠠	work

2.1.5 Final-letter group signs

Dots 4 6

⠠	⠠	ound
⠠	⠠	ance
⠠	⠠	sion
⠠	⠠	less
⠠	⠠	ount

Dots 5 6

⠠	⠠	ence
⠠	⠠	ness



ment



ity



Self-assessment

1. Write down 5 words with initial word sign dot 5
2. Write down 3 words with initial word signs dots 4 5 6
3. Write down 2 contractions used at the beginning of the words
4. Why do you think contractions are used in Braille?

2.2 Reading and Writing short-forms

This topic introduces you to the use of short-form words in Braille



Activity 4

Write down five short-form words you know

Shortform words (abbreviations)



about



although



above



altogether



according



always



across



because



after



before



afternoon



behind



afterward



below



again



beneath



against



beside



almost



between



already



beyond



also



blind

⠠⠃⠗⠊⠇⠇⠑	braille	⠇⠇⠇	little
⠠⠉⠋⠇⠇⠑⠗⠎	children	⠇⠇⠇⠇	much
⠠⠉⠗⠇⠇⠑⠇	conceive	⠇⠇⠇⠇	must
⠠⠉⠗⠇⠇⠑⠇⠇	conceiving	⠇⠇⠇⠇⠇	myself
⠠⠉⠗⠇⠇	could	⠇⠇⠇⠇⠇	necessary
⠠⠉⠗⠇⠇⠇⠇	deceive	⠇⠇⠇⠇⠇	neither
⠠⠉⠗⠇⠇⠇⠇⠇	deceiving	⠇⠇⠇⠇⠇⠇	o'clock
⠠⠉⠗⠇⠇⠇	declare	⠇⠇⠇⠇⠇	oneself
⠠⠉⠗⠇⠇⠇⠇⠇	declaring	⠇⠇⠇⠇⠇⠇⠇	ourselves
⠠⠉⠗⠇⠇	either	⠇⠇⠇⠇	paid
⠠⠉⠗⠇⠇	first	⠇⠇⠇⠇⠇⠇⠇	perceive
⠠⠉⠗⠇⠇	friend	⠇⠇⠇⠇⠇⠇⠇⠇	perceiving
⠠⠉⠗⠇⠇	good	⠇⠇⠇⠇⠇	perhaps
⠠⠉⠗⠇⠇⠇⠇	great	⠇⠇⠇⠇	quick
⠠⠉⠗⠇⠇⠇⠇	herself	⠇⠇⠇⠇⠇	receive
⠠⠉⠗⠇⠇	him	⠇⠇⠇⠇⠇⠇⠇	receiving
⠠⠉⠗⠇⠇⠇⠇	himself	⠇⠇⠇⠇⠇	rejoice
⠠⠉⠗⠇⠇⠇⠇	immediate	⠇⠇⠇⠇⠇⠇⠇	rejoicing
⠠⠉⠗⠇⠇	its	⠇⠇⠇⠇	said
⠠⠉⠗⠇⠇	itself	⠇⠇⠇⠇	should
⠠⠉⠗⠇⠇	letter	⠇⠇⠇⠇	such
⠠⠉⠗⠇⠇⠇⠇⠇⠇	themselves	⠇⠇⠇⠇	tonight, to-night
⠠⠉⠗⠇⠇⠇⠇	thymself	⠇⠇⠇⠇	would
⠠⠉⠗⠇⠇	today, to-day	⠇⠇⠇⠇	your
⠠⠉⠗⠇⠇⠇⠇	together	⠇⠇⠇⠇⠇	yourself



tomorrow, to-morrow



yourselves

Rules governing short-form words

According to BANA (2002), the following rules should be respected while using short-form words:

- Short-form words should be used alone or as part of a word
- Short -form words must not be divided at the end of a line, but they may be separated from any syllable addition.
- A short-form word should be used as the whole proper name only
- An addition may be made to a short-form word provided it does not result in incorrect spelling
- An addition may be made to a short-form word only if it retains its original meaning and would not obscure recognition of the word
- An addition may be made to a short-form word provided the combination does not violate lower-sign rules
- An addition may be made to a short-form word provided the combination could not be mistaken for, or have the appearance of another word. The short-form words for “after” “blind,” or “friend” should not be used when followed by a vowel. However, they may be used when followed by a consonant, or a hyphen in a divided word
- A short-form word must not be used if it would cause confusion in pronunciation or in the recognition of an usual word
- The apostrophe should always be inserted in the exclamation “**h’m!**” (**hm!**) to distinguish it from the short-form word for “**him**” (**hm**). However, the apostrophe should not be inserted when two or more letter “m’s” are used in the exclamation
- When proper names such as ‘**Al**’ or “**Ab**” appear at the beginning of a sentence, they should be preceded by the letter sign to distinguish them from the short-form words for “**also**” or “**about**”



Self-assessment

Write down any four short-form words beginning with letter “a”, and two short-form words beginning with letter “t”



Unity summary

This unit discussed on the contractions such as strong word signs, strong group signs, lower word signs, lower group signs, initial letter contractions, final letter group signs; and short-forms



Reflection activity

Explain the importance of using Braille contractions and short-form words

References

Braille Authority of North America (BANA) (2002). *English Braille Authority Of North America*. American Printing House for Blind

Risjord, C. (2009). *Instruction manual for braille transcribing*. National Library Service for the Blind and Physically Handicaped

Simpson, C. (2013). The rules of unified English Braille. In *Round Table on Information Access for People with Print Disabilities Inc, Australia, Version I: June 2010*.

Unit 3: Advanced Braille signs and symbols

Introduction

This unit introduces you to advanced Braille signs and symbols, mathematical signs, and science signs. Braille Signs and symbols are important to be well known because some of them may replace words. The information found in this unit is friendly prepared in such way that you will easily understand it through doing practical activities and by referring to the examples given in each topic.

Unit learning outcomes

By the end of this unit, you should be able to:

- Read and write advanced Braille literacy signs and symbols
- Read and write different mathematical signs
- Read and write general science signs

Topics in this unit

Topic 3.1: Advanced Braille signs and symbols

Topic 3.2: Advanced mathematical signs

Topic 3.3: Science signs/symbols

Topic 3.1: Advanced Braille signs and symbols

This topic introduces you to advanced Braille signs and symbols

Activity 5

Write down any Braille signs/symbols you learnt in Module one (BAR1141, Basic Braille Literacy and Numeracy)

3.1.1 Advanced Braille literacy signs and symbols

Braille signs and symbols are signs and symbols used in literacy, mathematics and other sciences such as Chemistry, Physics and Biology (Simpson, 2013).

1. General Symbols and Indicators

i. Ampersand ⠠⠠⠠⠠⠠⠠

Ampersand is this sign & which stands for *and*.

Examples:

Marks & Spencer ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

AT & T ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠

B&B ⠠⠠⠠⠠⠠⠠⠠⠠⠠

&c (etc) ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

ii. Arrows

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠

Examples of arrows and where they are used:

1. Road signs of → and ← mark detours.

⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

2. This (↑) arrow on the map indicates north.

⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

4. Enter arrow

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ↵ this arrow looks down with sharp turn right

5. Asterisk ⠠⠠⠠⠠⠠⠠ dagger ⠠⠠⠠⠠⠠⠠ and double dagger ⠠⠠⠠⠠⠠⠠⠠⠠⠠

Note: The dagger may be used as a reference mark or as the Latin or Christian cross to signify death or a member of the clergy. Asterisk and sometimes the dagger and double dagger appear raised from the baseline in print. This is not considered the superscript position.

Examples:

M*A*S*H ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠

Spelling words marked with an * have a silent letter.

To access your voicemail, strike *98 on your telephone

3.1.2 Braille grouping indicators

Braille grouping indicators are used to ensure that the preceding braille symbol or indicator applies to all the symbols enclosed by the braille grouping indicators rather than just to the symbol immediately following.

Examples:

Spoon

mass_{sun}

i. **Bullet**

It is used when you want to maintain sentence structure and paragraphing, and have a short list.

Example:

Nutritional considerations include:

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

a. Ditto mark ⠠⠠

Examples :

Wed "Science " Art

⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠

⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠

⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠

b. Dot locator for "mention" ⠠⠠⠠

When a dot locator for "mention" is used, do not list the dot numbers of the Braille symbol

c. Dot locator for "use" ⠠⠠⠠⠠

Use a dot locator for "use" unspaced before a Braille symbol to assure that it will be physically recognizable. A Braille symbol preceded by a dot locator for "use" retains its normal effect on text

e. Feet ⠠⠠ and inches ⠠⠠

Note: The foot may be shown in print by an apostrophe and the inch by a non-directional double quote. This can be followed in braille.

Examples:

6' ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ 9" ⠠⠠⠠⠠⠠⠠⠠⠠

5'10" ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ 4' 11" ⠠⠠⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠

X" long ⠠⠠⠠⠠⠠⠠ ⠠⠠⠠⠠⠠⠠⠠⠠

 Self-assessment

1. Give the dots for the following signs and symbols

- i. Arrow
- ii. percent sign
- iii. degrees
- iv. minutes
- v. Seconds

2. write the following signs and symbols in print

- i. ⠠⠠⠠⠠⠠⠠
- ii. ⠠⠠⠠⠠⠠⠠
- iii. ⠠⠠⠠⠠⠠⠠
- iv. ⠠⠠⠠⠠ ⠠⠠⠠⠠

Topic 3.2: Advanced mathematical signs

This topic introduces you to advanced Braille mathematical signs.










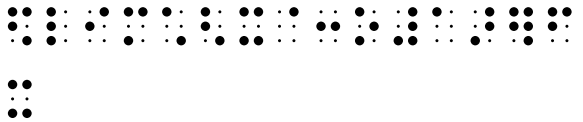











Activity 7

Write any 4 advanced Braille mathematical signs

3.2.1 Advanced Braille mathematical signs

Mathematical Braille symbols are characters that are used to indicate a mathematical relation or operation. In the table below there are different commonly used Braille mathematical signs/symbols (UKAAF, 2019).

Braille	Print and description
$\cdot\cdot\cdot\cdot$	Sin
$\cdot\cdot\cdot\cdot\cdot\cdot$	Sin^{-1} , arcsin
$\cdot\cdot\cdot\cdot$	Cos
$\cdot\cdot\cdot\cdot\cdot\cdot$	cos^{-1} , arccos
$\cdot\cdot\cdot\cdot\cdot\cdot$	Tan
$\cdot\cdot\cdot\cdot\cdot\cdot$	tan^{-1} , arctan
$\cdot\cdot\cdot\cdot$	Sec
$\cdot\cdot\cdot\cdot\cdot\cdot$	sec^{-1} , arcsec
$\cdot\cdot\cdot\cdot$	Cosec
$\cdot\cdot\cdot\cdot\cdot\cdot$	cosec^{-1} , arccosec
$\cdot\cdot\cdot\cdot$	Cot
$\cdot\cdot\cdot\cdot\cdot\cdot$	cot^{-1} , arccot
$\cdot\cdot\cdot\cdot$	\perp perpendicular symbol
$\cdot\cdot\cdot\cdot$	\int integral)

	\oint Contour integral (closed line integral)
	! (factorial)
	\in (Element of or a member of)
	\cap (intersection)
	\cup (union)
	Σ (sum)
	\AA (Angstrom symbol)
	% (percent)
	$\sqrt{\quad}$ (Square root)
	$\lim_{x \rightarrow l} f(x)$
	' prime
	# pound
	" prime, double
	[square bracket, opening
] square bracket, closing
	{ curly bracket, opening
	} curly bracket, closing
	\subset Subset of (is contained in)
	\supset Superset (contains)
	\subseteq Subset or equal to
	\supseteq Superset or equal to

	\notin Is not an element of
	\emptyset Empty set
	Δ triangle
	\square parallelogram



Self-assessment

1. Write the following symbols in Braille
 - a. integral (\int)
 - b. Square root ($\sqrt{\quad}$)
 - c. Sin
 - d. \tan^{-1} , arctan
 - e. $\operatorname{cosec}^{-1}$, $\operatorname{arccosec}$
2. Write the following symbols in print
 - a.
 - b.

Topic 3.3: Science signs/symbols

This topic introduces you to Braille chemical, Physics and Biology signs/symbols.



Activity 8

1. Write down any five braille chemical symbols you know
2. Write at least three iconic Braille symbols

3.3.1 Chemical symbols

Generally in Chemical symbols, a single letter symbol is preceded by **dot 6** while a two letter symbol is preceded by **dot 5** (RNIB, 2008).

Examples:

Element	Symbol	Braille
Hydrogen	H	⠠⠏
Carbon	C	⠠⠉
Oxygen	O	⠠⠕
Sodium	Na	⠠⠠⠠⠠⠠⠠
Magnesium	Mg	⠠⠠⠠⠠⠠⠠
Aluminium	Al	⠠⠠⠠⠠⠠

Note that, as with units and elsewhere, a single letter symbol possibly followed by a subscript number, standing alone in ordinary text requires dots 5, 6 also.

Example:

H ⠠⠠⠠⠠ (when standing alone)

3.3.2. Ionic symbols

Use the appropriate number of + or – signs unspaced from the symbol

Print	Braille
H ⁺	⠠⠠⠠⠠⠠⠠
K ⁺	⠠⠠⠠⠠⠠⠠
Zn ²⁺	⠠⠠⠠⠠⠠⠠⠠⠠
Al ³⁺	⠠⠠⠠⠠⠠⠠⠠⠠
F ⁻	⠠⠠⠠⠠⠠⠠
O ²⁻	⠠⠠⠠⠠⠠⠠⠠⠠
N ³⁻	⠠⠠⠠⠠⠠⠠⠠⠠

N.B: The Braille Science Code includes the alternative notation for ionic charges of +/- 2 or greater using a superscript number followed by a + $\begin{smallmatrix} \cdot & \cdot \\ \cdot & \cdot \end{smallmatrix}$ or - $\begin{smallmatrix} \cdot & \cdot \\ \cdot & \cdot \end{smallmatrix}$ sign (Nemeth, 1972).

Print	Braille
Mg ²⁺	$\begin{smallmatrix} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{smallmatrix}$
Al ³⁺	$\begin{smallmatrix} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{smallmatrix}$
SO ₄ ²⁻	$\begin{smallmatrix} \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{smallmatrix}$

The notation using the appropriate number of + or – signs is preferred by teachers.


Note: Use + ($\begin{smallmatrix} \cdot & \cdot \\ \cdot & \cdot \end{smallmatrix}$) unspaced from the following item. The → spaced on both sides is preferred to = unspaced from the following item.

Print **Braille**

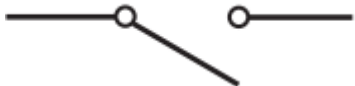
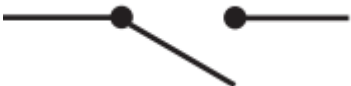
→ $\begin{smallmatrix} \cdot & \cdot \\ \cdot & \cdot \end{smallmatrix}$

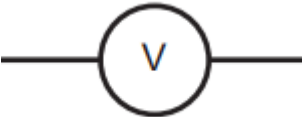
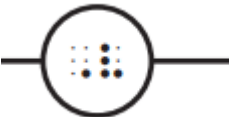
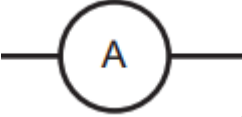

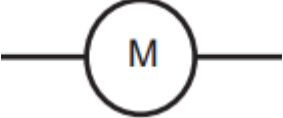





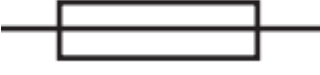
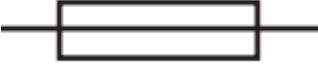
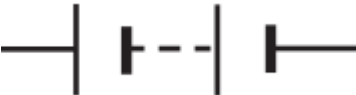
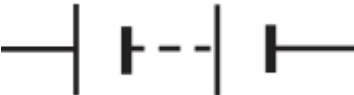
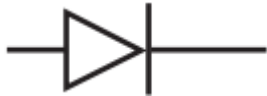

3.3.2 Physics symbols

The commonly used symbols in Physics

 **Activity 9**
Write down any five Braille symbols used in Physics



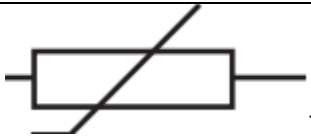
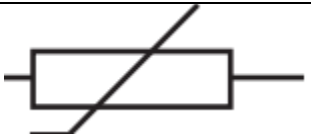
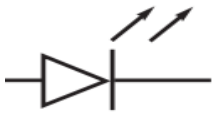
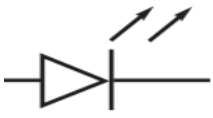
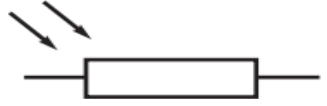
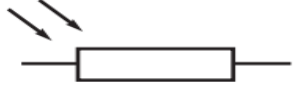

The following symbols are used to produce raised circuit diagrams. Where a symbol is thought to be unfamiliar the name of the component is often added in Braille under the symbol.

Print	Braille
 <p style="text-align: right;">Switch (open)</p>	

 <p>Voltmeter</p>	
 <p>Ammeter</p>	
 <p>Motor</p>	
 <p>Cell</p>	
 <p>Lamp</p>	
 <p>Fuse</p>	
 <p>Battery</p>	
 <p>Diode</p>	

All of these symbols will need to be enlarged by a factor of at least two before they can be used by a student working by touch alone.

Print	Braille
--------------	----------------

 Capacitor	
 Thermistor	
 Light emitting diode (LED)	
 Light dependent resistor (LDR)	
Ω Ohm sign	

These examples are not exhaustive but they should give a good idea of how the majority of symbols can be enlarged and presented in a tactile form. If there is a doubt about a particular example the name can be provided below the symbol in Braille.

3.3.3 Symbols in Braille used in Biology

There are no many symbols used in Biology except in the topic of Genetics

The study of Genetics requires students to solve problems which require a standard code in print.

The key to the code involves the use of the dot 6 capital letter sign to identify upper case letters in the code and the dots 5, 6 letter sign to identify the lower case letters.

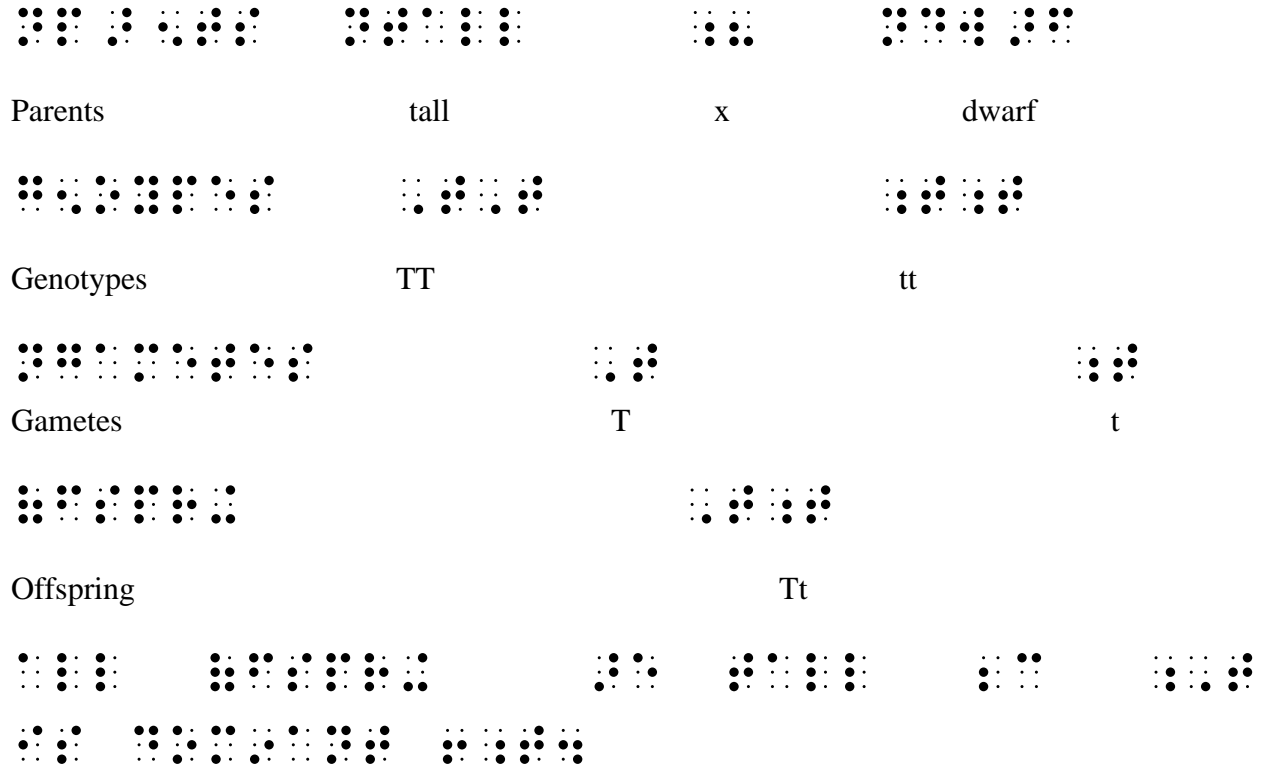
Activity 10

Write down any three symbols in Braille used in Biology

The following examples use Braille but have the layout that is used in print. This means that students' answers can be easily transcribed and anyone with a limited amount of Braille knowledge can follow the steps used by the student to solve the problem.

Example 1

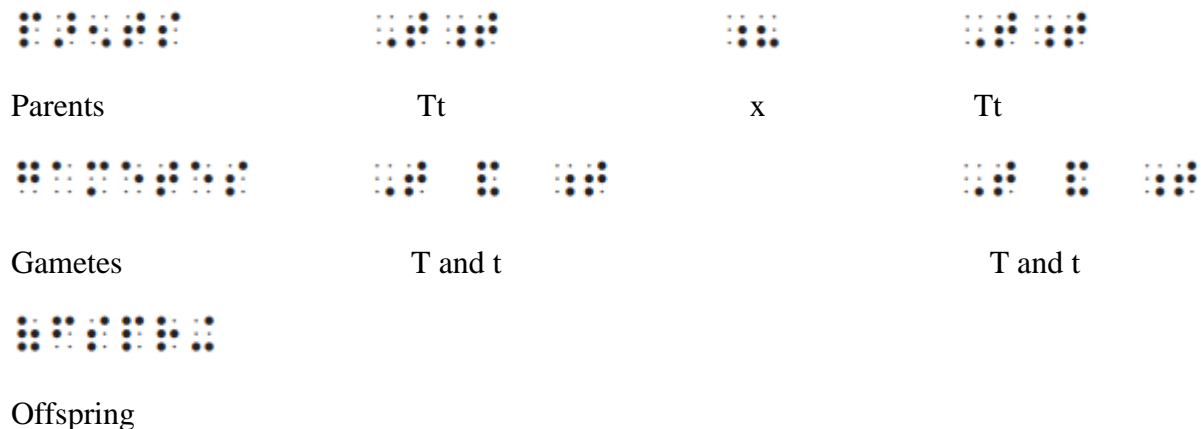
The original parents are from two pure breeding strains where the dominant allele codes for a tall individual and the recessive allele codes for a dwarf individual. The dominant allele is represented by **T** and the recessive allele by **t**.

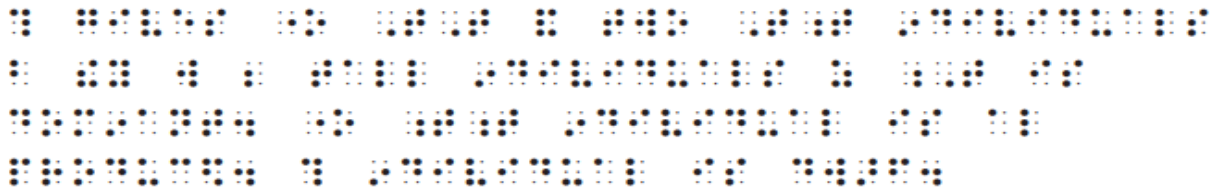
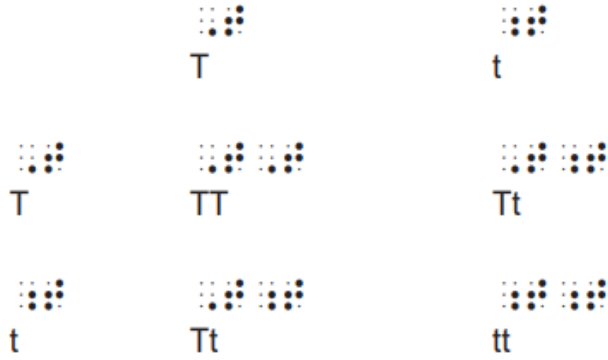


All offspring are tall because **T** is dominant to **t**



If these offspring now interbreed






This gives one **TT** and two **Tt** individuals but they will be tall individuals as **T** is dominant. One **tt** individual is also produced. This individual is dwarf. Please note that the Braille table above is identical to the Punnet square used by those working in print. Some teachers use arrows to link the various gametes to form the offspring. This process will not work for students working in Braille and is confusing for many partially sighted students. Therefore teachers should be encouraged to use the Punnet square method.

Note: In general the table below shows genetic Braille symbols for female and male.

Name	Symbols	Braille
Female	♀	⠠⠠⠠⠠⠠⠠
Male	♂	⠠⠠⠠⠠⠠⠠

 **Self-assessment**

Write the following symbols in print

a. ⠠⠠⠠⠠⠠⠠ b. ⠠⠠⠠⠠⠠⠠ c. ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠ d. ⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠

Unity summary

In this unit we discussed about advanced Braille signs and symbols, these signs and symbols were grouped into two categories namely: mathematical signs and science signs. Braille signs and symbols are important to be well known because some of them may replace words. We have seen that mathematical Braille symbols are characters that are used to indicate a mathematical relation or operation and should generally be used to represent the corresponding print signs whatever their meaning. We have also seen that for chemical symbols, a single letter symbol is preceded by **dot 6** while a two letter symbol is preceded by **dot 5**. We also discussed about Braille symbols used in Biology. The study of Genetics requires students to solve problems which require a standard code in print. The key to the code involves the use of the dot 6 capital letter sign to identify upper case letters in the code and the dots 5, 6 letter sign to identify the lower case letters.

Reflective question

With examples differentiate between literacy, mathematical and general science Braille signs and symbols

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Unit 4: Advanced tactile drawing



Introduction

Learners with visual difficulties unlike the sighted ones who have access to a wide variety of written texts, images in books and videos, the blind learners rely on text or verbal descriptions. This necessitates the use of tactile graphics that respond to the learning needs of learners with visual difficulties. This unit focuses on designing and labelling different advanced tactile graphics. Relevant equipment, materials, and captions for designing and labelling advanced tactile graphics are explained.



Unit learning outcomes

By the end of this unit, you should be able to:

- Identify equipment and materials for tactile graphics
- Classify tactile graphics according to their production methods
- Label tactile graphics

Topics in this unit

Topic 4.1: Equipment and materials for tactile graphics

Topic 4.2: Classifications of tactile Graphics

Topic 4.3: Descriptions and captions of graphics

Topic 4.1: Equipment and materials for tactile graphics

This topic introduces you to some equipment and materials used in developing tactile graphics. The equipment and materials include Stencil Embossing Kit (Crafty Graphics), Thermoform, Capsule paper, Embosser with graphic capabilities, Tactile Graphics Kits, Chang Tactual Diagram Kit, Tactile Graphics Software, Omnifix® Cubes, and Picture Maker.



Activity 11

Identify any 5 equipment and materials you think that should be used for tactile graphics

1. Stencil Embossing Kits or Crafty Graphics:



The Crafty Graphics Stencil Embossing Kit is a tactile drawing kit designed for creating tactile graphics for use by individuals who are blind or have low vision. This kit, available through American printing house (APH), provides supplemental tools to be used with the original Crafty Graphics. Those are stencils, embossing tools, and other items needed to create tactile

graphics by dry pressure embossing (Carmen, 2010).

2. Tactile Graphics Kits:

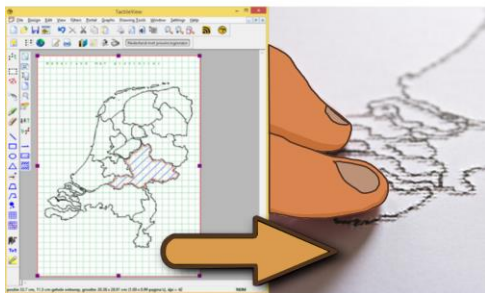


This is a collection of tools that are used in creation of maps, graphs, diagrams, and charts on heavy gauge aluminium foil or paper. Such tools include geometry tools like protractors, rulers, slates, styluses, compass, eraser, rubber embossing pad, and foil sheets.

Tactile graphics are a means of conveying non-textual information to people who are blind or visually impaired.

A person with a visual impairment can feel these raised lines and surfaces in order to obtain the same information that people who are sighted get through looking at pictures or other visual images (Carmen, 2010)

3. Tactile Graphics Software



This is a computer program that designs pictures to be embossed by braille printer. Tactile View is the perfect software when it comes to tactile graphics, while Duxbury Braille Translator (DBT) is widely used as a tool to create perfect Braille translations. By combining Tactile View with DBT, you can create documents that contain both tactile graphics and braille texts (Thinkable,

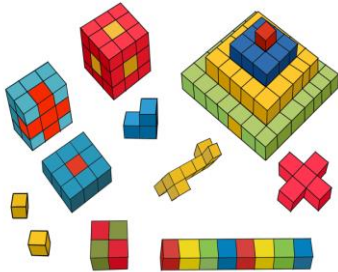
2021). The embossed pictures make it possible for learners with visual difficulties to understand the nature of things.



4. Chang Tactual Diagram Kit

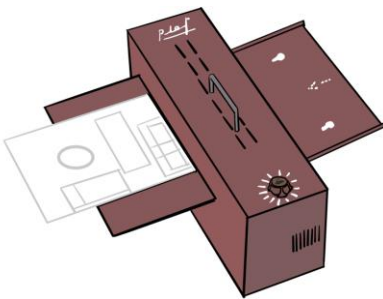
A chang is a tactile map skills training kit designed for use by children who are blind or have low vision. It enables teachers to construct diagrams and maps accessible by learners with visual difficulties. The kit includes different flat geometric forms in different shapes and sizes (BANA, 2012).

5. Omnifix® Cubes



Omnifix® Cubes consists of cubes that can be joined in any direction to create geometric and abstract forms and to explore spatial relationships.

6. Picture Maker



A picture maker is a device that produces high-quality tactile graphics using heat sensitive capsule paper, known as the Tangle Magic Paper.

The image maker causes black lines, letters or shapes that are drawn, printed, or copied onto the capsule paper to swell. This leads to formation of a tactile graphic. It can be used in schools as well as at workplaces (Carmen, 2010)

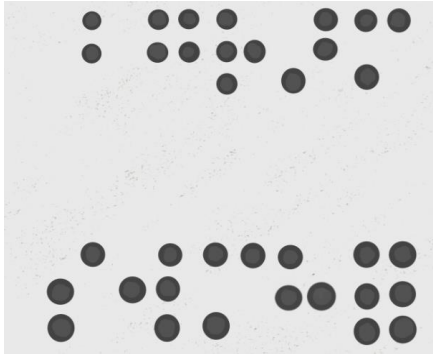
7. Thermoform



Thermoform is not writing equipment but it is a machine for mass production of braille copies. It works with the same principles as the duplicating machine. It is however slow because the production is one page at a time.

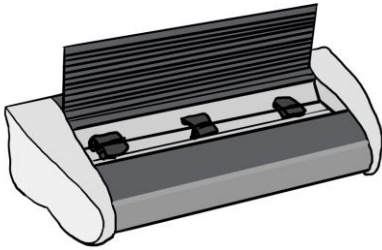
It is easy to operate and uses a special paper known as brailon. This paper is expensive and not locally available. The brailon is placed on top of the master copy and by heating and suction, the embossed dots are copied on the brailon (REB, 2020)

8. Capsule paper



Stereocopying is a type of tactile graphic used to convey graphical information, such as maps and charts to blind people. Due to its simple preparation, it is widely used in schools (Rowell & Ungar, 2003). These tactile graphics can include a graphical image and braille as legends. However, braille on capsule paper, is not sufficiently legible.

9. Embosser with graphic capabilities



Similar to ink printers, braille embossers emboss braille characters onto paper for tactile reading by a blind reader. They can be for personal use at home, the office, or mass production.

Self-assessment

Explain the use of the following tactile equipment and materials

- a. Stencil embossing kits
- b. Tactile graphic software
- c. Chang tactual diagram kits
- d. Omnifix® cubes
- e. Thermoform
- f. Capsule paper
- g. Embosser with graphic capability

Topic 4.2: Classifications of tactile Graphics

This topic introduces you to the categories of tactile graphics according to their production methods.

Activity 12

Categorize the tactile graphics you know

We classify tactile graphics according to the following production methods:

- Embossed braille
- Micro capsule
- Vacuum form
- Collage

1. Embossed Braille Graphics



When producing embossed braille graphics with a braille embosser, an image is generated using software for both braille and graphics which are then printed on a graphics embosser.

The production and duplication equipment required are: a computer, braille translation software, graphics software, specific braille fonts, braille paper, and a graphics embosser.

This picture is example of **Embossed Braille Image**.

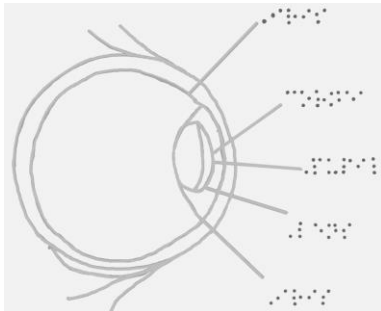
The computer image will likely require simplification before embossing. After the image has been manipulated and Braille labels and/or text are added, it is sent to the embosser for the hard copy to be printed.

Images can be imported into some Braille translation software and embossed as part of a regular Braille document.

When embossed graphics lack definition, their tactual quality can be enhanced by adding embellishments such as collage to the page.

The Tiger® braille printers use proprietary software (Tiger Software Suite) and specific Braille fonts (Braille 29) for their embosser output.

2. Microcapsule Graphics



Microcapsule graphics are tactile graphics that are produced on special paper also known as Minolta, Swell paper, Flexi-paper, Puff paper, or Stereocopy paper.

An image may be computer-generated using Braille and graphics software. It is then transferred to microcapsule paper using a photocopier or printer, and then the tactile graphic is developed by a heating device known as a “fuser” or “enhancer.”

Production and duplication equipment required: computer, Braille translation software, graphics software specific Braille fonts, photocopier or printer, microcapsule paper, and a fuser.

3. Vacuum-formed Graphics



Vacuum-formed graphics is a simplified version of thermoforming, where by a sheet of plastic is heated to a forming temperature, stretched onto a convex, or onto a concave, single surface mold, and forced against the mold by a vacuum.

When creating graphics to be vacuum formed, a hard copy master is created using other tactile graphic production methods. The heating component and vacuum pump of the vacuum-form machine mold a plastic sheet (Brailon® thermoform sheet) to the shape of a hard copy master. This process forms a plastic duplicate copy while retaining the master for future use.

The following list provides some important considerations for creating vacuum-formed tactile graphics:

- The weight (thickness) of the plastic
- Temperature of the heating element
- The length of time the vacuum pump runs all contribute to the quality of the copy.

NOTE: Some materials are not suitable for the vacuum-form process because they may melt, dry out, crease, fall off, or give off toxic fumes. This can happen when heated at high temperatures



4. Collage

Collage is a piece of art created by combining photos, clippings or small objects onto a surface. An example of a collage is a picture of a flower made with many pictures of friends and family.

Self-assessment

1. What are the considerations when creating Vacuum form tactile graphics?
2. Explain the use of tactile graphics according to different production methods

Topic 4.3: Descriptions and captions of graphics

Use of textual description of images in digital documents is vital in ensuring inclusion of people with visual difficulties. This helps to have information presented in a digital graphic, accessible

to anyone who may not be able to physically see the visual format. This topic focuses on key concepts and the principles of describing and captioning graphics.

Activity 13

1. What are the key concepts you think are used in graphic descriptions?
2. Explain the principles you think can be used in graphic descriptions

4.3.1 key concepts used in graphic descriptions

- a. Accessibility:** Accessibility can be viewed as the "**ability to access**" and **benefit** from some system or entity. This is about making things accessible to all people (whether they have a disability or not). It is the sense considered here refers to the design of products, devices, services, or environments so as to be usable by people with Disabilities. The concept of accessible design and practice of accessible development ensures both "direct access" (i.e. unassisted) and "indirect access" meaning compatibility with a person's assistive technology (for example, computer screen reader).
- b. Captions:** refers to the sentence or group of words that is written on or next to the picture to explain what is being shown. For visual impaired persons, these words should be written in Braille system.

4.3.2 Principles of Describing and captioning graphics.

It is important to ensure that images intended to convey any information to an audience in particular people with visual difficulties conform to key principles. The principles to consider while designing images include the following:

1. The purpose of describing images

An image description is used to convey the information contained in an image to a person who cannot access it in its original form. It is essential that blind and partially sighted users receive the same information as their sighted peers. Image description enables users to:

- Achieve the learning outcome intended by the author
- Participate in discussions based on the information within the image.

2. What counts as an image?

Images include graphs, charts, diagrams, photographs, illustrations and artworks. They also include mathematical equations, chemical formula, musical notation and special symbols, as a screen reader will not be able to access these to read them aloud.

Many blind and partially sighted readers use screen readers to access electronic materials on screen. Within an electronic document a screen reader will not be able to access an image, so will pass over it. If images on the web do not have alt text, again a screen reader will pass over it; likewise, in an audio or DAISY file, the information will be missed unless the image is mentioned in the text.

A person using magnification software to read printed material may struggle to see the details of an image and may only see a small part of an image at a time. An image overview will help them understand what is being shown.

Modified images such as large print and tactile diagrams will need the layout of the image and describing its parts before the information within the image can be understood.

3. Do all images need describing?

For practical purposes, the answer to this has to be 'no'. There are images which are decorative or summarize information in the text and a description would not add anything of use to a blind or partially sighted user. An image needs describing if:

- It contains essential information which is not readily accessible anywhere else
- There is data within an image that needs to be conveyed
- There is data within an image which needs to be interpreted
- It is an image used as a basis for discussion
- It is a visual summary of a long section which has no text summary
- It is decided that a caption is needed or the existing caption is not adequate
- It introduces a type of diagram commonly used in the subject area
- It is a modified graphic such as a large print image or tactile diagram
- It has been removed from a transcribed version of a document, so this information is missing
- It is being used to teach how to use a particular type of diagram.

For charts, graphs and diagrams where the image summarizes data and other essential information: it is this data and essential information that needs to be described.

For images where a subjective response is required, or if the image is teaching a visual discrimination skill, then the appearance of the image will need to be carefully described.

For modified large print images and tactile diagrams, it is crucial that the layout of the image is described before the features of the image. This will enable a user to understand what features are in the image and what it is showing.

If an image is purely decorative and adds nothing to the text, then a description may not be necessary; or depending on the context a short note for example 'photograph of John Smith' will

help a reader who has a small amount of vision to decide whether to spend time studying it with a magnifier.

4. Who should write the description?

Ideally, the best person to write descriptions is the author of the material. The author knows the purpose of the image and its importance and can be satisfied that any descriptions contain the intended information.

However, within the publishing chain the author may not see the final image and within education a transcriber or support worker may need to describe existing materials. If this is the case, it is crucial they understand the original intention of the image.

5. What kind of description does the image need?

The level of information needed in a description will depend on the context of the image and how it is going to be used. Due to the extra time needed to read and understand an image, a description needs to be concise:

- A single sentence listing the key features or trends may be sufficient.
- Information from a graph can be effectively written as numerical data, or presented as a table.
- Complex diagrams may need a description that is the equivalent of several pages of text.

6. Incorporating image descriptions into a document

You will need to consider where to incorporate a description, as it can be written into the main text or provided as an additional document.

It is important that images reference the original material, by including any page numbers, figure references and titles. If a separate document containing the image descriptions is provided, this can be in the recipient's preferred format; such as Braille, audio or large print.

Electronic materials: If authoring original material, a description can be written into the main text. Short descriptions can also be written into formatted captions or alternative (alt) text.

Audio materials: Depending on where images appear within the material, a description can be read after an image is first mentioned; or at the end of a chapter. It is important to mark the beginning and end points of an audio description to ensure a blind or partially sighted user can distinguish the original material from information given in addition. A separate audio file that references the images may need to be produced if there are many images and it is felt that descriptions will interrupt the flow of the text too much.

Presentations: Any images given within a presentation will need their data and other key information read aloud to the audience.

Business documents: Any documents containing images, charts and graphs containing data, can be summarized within the text after the image appears; or a separate document produced which references the images can be provided.

Published material: A separate document can be produced which contains the descriptions of the published images. Any references such as image titles, image references and page numbers will need to be included.

Accessible images: These are generally produced separately along with a description. This description may be in a braille, print or audio format to accompany the image.

Educational materials: If an author of a course is not able to write descriptions, they should at least give an indication of the type of description needed to save unnecessary work later. For example, a note could be attached to each diagram such as:

- Adequately covered in the text or caption.
- Needs a couple of sentences about trends on the graph.
- Understanding of this type of diagram is desirable for communicating with others in this field.
- This diagram is too complex to describe adequately; students are recommended to consult their tutor.

A description can then be written and incorporated according to the format of the materials (UK Association for Accessible Formats, 2012)



Self-assessment

1. Discuss the Principles of describing and captioning graphics



Unit summary

In this unit you learnt different ways of creating images in accessibility ways to enable people with visual difficulties understand electronic texts and Principles of Describing and captioning graphics



Reflection questions

1. Identify and explain 5 equipment and materials for tactile graphs
2. Classify tactile graphics according to their production methods
3. What are the key concepts that are used in graphic descriptions?
4. Discuss the Principles of Describing and captioning graphics

References

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TRAINING MONITORING AND EVALUATION TOOL

Instructions:

The present form is completed in the course of training or at the end. It is designed to monitor, evaluate and help in improving the training. Please complete the form, and be as honest as you can

Training Location

Training site/venue: _____ District: _____ Province.....

Identities of the trainee (Please Tick (√) where appropriate

Status	Male	Female	Married	Has a disability	Minority	Other
Training background	TTC	B. Ed trainee	Not trained t	Trained on the job	Under training	Other
Trainee's placement	Primary	Secondary	Special	Inclusive	Tertiary	Other

The training Session(s)

Module (s) covered: CodeUnit (s) Topics Covered:

Please tick (√) under the appropriate response of your choice (Excellent, Very Good, Good, or poor)

SN	Statement	Excellent	Very Good	Good	Poor
Section 1: Content					
1.1	The importance of the training in relation to my job				
1.2	The organization of the training content				
1.3	The clarity of the content learned				
1.4	The easiness of language used by the trainers				
1.5	The trainer's mastery of the content				
1.6	The amount of the content learned				
1.7	Achievement of training objectives				
1.8	Meeting of my expectations				
Section 2. Methodology for content delivery					
2.1	The methods used by trainer in delivering the content				
2.2	The language used by the trainer				
2.3	Instructions were clear and understandable				
2.4	Appropriateness of the duration of the training.				
2.5	Mastery of the content by the trainer				
2.6	Trainees' active participation in learning activities				
2.7	Usefulness of training resources used by the trainer				
2.8	Consideration of trainees with disabilities' needs				
Section 3. Online learning support					
3.1	Clarity of online instructions				
3.2	Ease in accessing and using online Learning platform				
3.3	Benefits of online learning resources				
3.4	Support by IT Technician on online learning platform				
3.5	Accommodation for people with disabilities				
Section 4. Logistics					
4.1	The appropriateness of the training venue				
4.2	Facilities at the venue (Furniture, electricity, WC, etc.)				
4.3	The network connection & accessibility				
4.4	Other logistical issues				
4.5	Accessibility and facilities for People with disabilities				

Any additional comment:

Thank you

Special Educational Needs identification tool¹

The University Rwanda (UR) and all its partners uphold equal opportunities for persons with disabilities and other Special Needs in all its programs and services. All students/trainees and staff with disabilities or other challenges that impact on equal participation and performance, are encouraged to complete the present form. Personal information provided herewith shall be treated confidentially (if required), and shall be strictly used for processing and/or designing reasonable accommodation wherever possible.

Section A: Personal Information

1st Name:Middle & Family Name (s):Gender:Date of Birth: /.../...

Place of origin: Country: Province:District. Sector:Cell:

Identification: Passport/ ID No: Student's Reg. No:

Contact address: Personal Email: Tel: Personal physician's address (if any):

Section B: Academic program Details

Program of Study²: School: Department: ... Current Academic Year of study:

Section C: Special Educational Needs Details

Special Educational Needs (Difficulty that deters performance and/or access to UR CE services)	Specify support provisions received (if any) (Please, tick where appropriate ✓)	Specify in details (Types, sizes, placement, etc.) of support provision you require in order to participate with minimum hindrances.
Physical challenges		
Visual difficulties		
Hearing difficulties		
Speech/communication difficulties		
Chronic Illness/Allergy		
Mental health challenges		
Specify any other.....		

Section D:

Details of authentic evidences available (Please, tick where appropriate ✓)

Psychologist's report Medical practitioner's Statement Others (specify)

.....

.....

.....

Section E: Student's declaration

I do confirm that all the information declared in the present document are true and authentic, and do agree to supply any other related documentations regarding my special needs/disabilities to UR CE departments entrusted with the responsibility of accommodation and support provisions for students with special needs.

Done at:/...../..... **Signature of Student/trainee** _____ **Date:** /.../...

¹N.B.: Reasonable accommodation or support provisions shall be restricted to students who have duly completed the present form, only after the declared Special Needs (difficulties) are assessed, established, and registered by authorized UR offices.

² Use codes to demote the College, School, and Department