

Test Access: Making Tests Accessible for Students with Visual Impairments: A Guide for Test Publishers, Test Developers, and State Assessment Personnel*



Second Edition

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***Book Number Two in the TEST ACCESS Series, promoting accessibility of testing materials for persons who are blind or visually impaired.**

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Work in Progress: This document represents a set of guidelines for making tests accessible to students with visual impairments. These guidelines are a "work in progress" and will be routinely updated and revised as additional information is collected and research results are learned. Please address questions, concerns, and suggestions regarding these guidelines to the director of APH's Accessible Tests Department at 800-223-1839 or e-mail them to tests@aph.org

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Introduction

Purpose of Document

The American Printing House for the Blind (APH) is committed to ensuring that educational materials are accessible to students with visual impairments. Students with visual impairments include those with some usable vision, as well as students with no usable vision. This document is provided as a guide for making tests accessible in tactile, large print, and audio formats. It is anticipated that this guide will be used as a tool for implementing appropriate guidelines as test publishers, test developers, test editors, and state assessment personnel are developing and adapting tests and assessments. Prior planning using the contents of this document will help ensure that tests are accessible and will reduce the need to retrofit a test. Questions concerning this document, the specific guidelines, or resources discussed can be addressed to APH's Accessible Tests Department at 1-800-223-1839.

Federal and State Mandates

Federal and many state laws require that all students be assessed through state assessment procedures using the appropriate accommodations. By the school year 2005-2006, states will be required to assess all students' progress annually in mathematics and reading in grades 3-8 and once in grades 9-12. In addition, by 2007-2008, states will be required to assess all students' progress in science, at least once in grades 3-5, 6-9, and 10-12. The reporting of these assessment results to the public will be required, as will their inclusion in a state's accountability plan. Satisfying these federal requirements will require careful attention to making tests accessible for students with visual impairments. In particular, students with visual impairments have some unique communication needs that must be addressed as tests and assessments are made accessible for them. Merely converting a test into braille, large print, or audio format fails to guarantee that the items are accessible. For example, test items that instruct the student to "draw the results of the following" or "write a story based on the picture" are not truly accessible to braille readers, even if the items are presented in a readable medium. Other examples of this misconception are discussed within each media-specific section of this document. Careful planning during test development can help ensure that tests are accessible, while maintaining the rigor intended.

Expectations for Students with Visual Impairments

If students with visual impairments are to participate effectively in state and national testing programs, they must have opportunities to learn those skills that will be assessed. Often these opportunities are overshadowed by special skills training to such students, who may miss all or part of academic classes in order to obtain the skills essential for using braille, assistive technology training, or independent living skills, including orientation and mobility. In addition to providing the training of special skills, school personnel must attend to each student's need for instruction in all academic areas. This may entail extended days or school years or supplemental instruction by other agencies that serve students with visual impairments.

Students with visual impairments must spend their educational time working toward academic content standards, learning special skills needed for independent living, exploring appropriate media for access to printed material, and evaluating ways of communication that are effective for them. Access to printed material may include braille, tactile graphics, regular print with magnification devices, large print, the use of a human reader, auditory access, or computer access that provides braille, print, or auditory information. No one method will work for every student, and educational personnel must ensure that students are exposed to and have opportunities to try all options of access that are available. See Appendix A for a discussion of braille versus auditory access. A student's communication mode must be based on what works for him or her.

Education personnel must maintain high expectations for the learning of students with visual impairments. If opportunities to learn are present in the curriculum, students will have the experiences needed to learn difficult skills such as map and graph reading,

production of graphs and charts, reading technical materials, or computation of advanced mathematics. Students cannot be denied their right to learn difficult skills just because they have a visual impairment. It is these more difficult skills that are being assessed routinely on most state and national assessments of student progress in reading, mathematics, and science.

Universal Design

In the construction of tests, the concept of universal design can ensure accessibility for a very large number of students. A position paper authored by Sandra Thompson and Martha Thurlow, titled *Universally Designed Assessments: Better Tests for Everyone!* (2002) and *Universal Design Applied to Large Scale Assessments* (NCEO Synthesis Report 44, 2002), provides excellent guidance for the implementation of universal design. Among the concepts posed in this paper are the following:

- Inclusive assessment population
- Precisely defined constructs
- Accessible, non-biased items
- Amendable to accommodations
- Simple, clear, and intuitive instructions and procedures
- Maximum readability and comprehensibility
- Maximum legibility

The Center for Applied Special Technology, CAST (www.cast.org) is an educational, not-for-profit organization that is committed to helping students achieve their academic goals through an instructional approach known as Universal Design for Learning (UDL). Emphasizing the importance of flexible learning materials and methods, UDL allows educators to design and implement curricula based specifically on the student's background, learning style, and disability.

The elements of universally designed assessments are the basis for many of the guidelines provided in this document. Additionally, the references listed at the end of this document have been written by individuals involved in ensuring the accessibility of materials for students with visual impairments.

It should be noted that there is a fine line of distinction between the implementation of these universal design elements for the purposes of making tests more accessible to a larger population of students and constructing a test for braille, large print, or audio production. This document describes guidelines that allow for braille, tactile graphics, large print, and audio production. These guidelines may not necessarily reflect universal design concepts or match test publisher design policies. For example, pictures pose a particular problem for braille production, but test publishers may want to maintain pictures to enhance readability and interest for the regular print reader.

General Guidelines for Test Formats to Be Used by Blind and Visually Impaired Students

Students with visual impairments may require testing materials in regular print, large print, braille, tactile graphics, audio formats, or some combination of these formats. The provision of a test and related materials in braille, large print, or audio to an individual student should be based on the use of that medium by the student, as identified on the Individualized Education Program (IEP) document. Alternate format tests should be used only by students who use that medium to access printed textbooks and other instructional materials. Students with visual impairments can be, and must be, made part of the state's assessment program through use of accommodations that allow them to demonstrate their knowledge and skill acquisition, as outlined in each state's assessment system specifications. Regardless of the media chosen, students will need access to special materials such as braille paper, bold line writing paper, talking calculators, abacuses, raised or bold line rulers, braillewriters, slates and styluses, word processors, or other materials and devices. A more thorough discussion of accommodations typically used by students with visual impairments is provided in the section on Accommodations in Testing Students with Visual Impairments. The following general guidelines are recommended for all formats that are developed for accommodating students with visual impairments. Various aspects of the test construction and implementation are addressed in this section.

Contract Development

1. Contracts between states and test publishers/producers must include provisions for state approved alternate media (braille, large print, audio editions of tests, and scripts for oral presentation of tests) including answer sheets and practice tests.
2. Test publishers need to have the capability of providing the test administration manual in braille, large print, or audio for test administrators who are visually impaired and need accessible media. The contract should state if test administration manuals are needed in accessible media.
3. Contracts must include timelines for development of braille, large print, and audio test formats and accompanying practice materials.
4. Contracts regarding accessible media should guarantee that each medium of test materials and practice materials is produced by the same entity to ensure consistency in format and graphic production techniques. Every effort should be made to ensure consistency of presentation from one year to the next, and from one level of the test to the next.
5. Contracts may need to include plans to ship special versions of tests separately from regular print versions so that distribution of the accessible formats occurs in a timely manner.

Accessible Test Development

1. To ensure that quality materials are developed, state assessment programs should contract with an agency or persons experienced in producing braille, tactile graphics, large print, or audio formats.
2. Production of the alternate format test includes the editing, transcription, reformatting, design, and proofreading of the alternate media.
3. The name and phone number of the customer's primary contact person needs to be provided to the producer of accessible media to facilitate timely production.
4. Accessible format producers will need access to a primary contact person, as well as item specifications that include information about the skill and construct being assessed.
5. Test items should be deleted or substituted only if the item cannot be provided in braille, tactile graphics, large print, or audio format without significantly changing the item and the intent of the question. Although not recommended, some test items may need to be omitted if they are not adaptable as determined and advised by item reviewers with expertise in the format under consideration. The deletion or substitution of items should happen infrequently, particularly if educators with specialization in visual impairments have been involved in the item development process. Attention to universal design during test development will also reduce the probability that a test item will have to be deleted.
6. If items are omitted in alternate versions, the test scoring criteria must be rescaled so that braille, large print, and audio format participants are not unfairly penalized and so that scores can be obtained for diagnostic and accountability use.
7. Substituted items should assess the same skill and have equal value and validity. Substituted items must maintain the correct answer in the same position as that of the original test item.
8. All field test items and sample questions need to be included in accessible format test versions.
9. Test contracts must indicate preferred publication strategies, such as braille on both sides of the braille paper (referred to as interpoint), preferred methods of producing graphics, and binding of the braille test materials. Assistance with determining these specifications is available from APH.
10. Braille tests are generally produced using contracted braille, a space-saving method for creating braille in which braille cells can be used individually or joined together to represent braille contractions and whole words. If the test is for a young child or a new braille reader, be sure to specify if the test is needed in

uncontracted braille, whereby every letter of every word is represented by an individual braille cell.

11. The format of an accessible media test edition must follow the print format as much as possible. That is, ideally the number of test items and test sections should match that of the print format, as should the order of the test items and test sections. All deviations from the print version of the test must be outlined in a print copy of Test Administration Notes for the altered format. Test Administration Notes must include reference to print versions with associated accessible format page numbers, identify passages and items by page (print and altered format), and provide indication of any changes made to the altered format. (Appendices B and C contain templates for creating Test Administration Notes for braille and large print formats.)
12. Special requirements, such as an independent proofreading of test materials and exact print reproductions of the braille/tactile test items, need to be considered and included in the contract.
13. APH's policy in accessible test production includes close collaboration with, and approval from, test publishers and content specialists to ensure that edited items are acceptable as edited.
14. Test security and confidentiality standards must be upheld during the process of developing accessible formats.

Test Development

1. Test development should ensure that test score inferences reflect intended constructs and not disability characteristics (AERA, 2000).
2. The construct to be measured must be specified in documents that are accessible to persons who will be producing the accessible formats and persons administering tests to those with visual impairments.
3. Availability of construct specifications is essential in determining appropriate accommodation use and in the reproduction of test items to be presented in braille, tactile, large print, or audio formats.
4. Test publishers must maintain access to experts in the media of braille, large print, and audio, who can provide information concerning test development and transcription, who is able to proofread test materials before mass duplication, and otherwise ensure that materials are provided in a timely and accurate manner. Proofreading the braille, large print, or audio version of the test before multiple copies are made confirms that the material is readable and that the adapted test follows the print copy in numbering and lettering of test items and answer choices, and that the graphics are readable and in the correct location. The proofreader should also check for proper formatting.

5. Validity issues concerning all accessible formats and accommodation needs should be discussed during test development (Phillips, 1994). The provision of a test in accessible media should be considered a valid accommodation as long as it does not change the construct that the test was designed to measure. If a performance item requires drawing, consider allowing an explanation or description as an allowable response option. If this is allowed, scoring criteria will need to include information on this option.
6. All directions on a test should be worded to allow for alternate response methods. For example, use of directions like "circle the answer" should be replaced with "indicate or mark the answer."
7. Specific guidelines on any test format changes, allowable accommodations (including time allowances), and general assistance that can be provided to the student must be stated in the test administration manual or supplemental administration materials.
8. Test content committees should be made aware of alternate media issues regarding the use of complicated and nonessential pictures and graphics.

Item Development and Review

1. Educators with specialization in the field of visual impairments must be included in the test item development process.
2. All test items must be reviewed by persons familiar with visual disability issues to ensure that no test item is biased or discriminatory toward persons with visual impairments.
3. It is recommended that as much information as possible be included in the text of a test item. This will help prevent the introduction of pictures that contain information necessary for selection of the correct answer, but which cannot be adequately brailled, presented in large print, or described in audio format.
4. In general, use of "vision specific" language can be maintained, e.g., "Look at the following list of animals."
5. The test item pool must be large enough for bias and item review committees to replace items determined to be inaccessible in braille, large print, or audio formats.
6. A representative sample of students with visual impairments needs to be included in any field-testing of the assessment, as prescribed in Standard 10.3 (p. 106) of the Standards for Educational and Psychological Testing (1999).

7. All practice materials must be provided in accessible format at the same time that print practice materials are provided. Allow sufficient time for accessible format preparation.
8. Provisions should be made to conduct item analyses for accessible format test items.

Test Administration

1. Computers and adaptive technology, electronic notetakers, cassette player/recorders, the cassettes, CDs, etc., must be inspected for proper functioning prior to their use during a test. The test administrator or proctor should be instructed on how to proceed if equipment fails or malfunctions during administration of the test.
2. Each test administrator or proctor of a student using an alternate medium test or a combination of media should be assigned a testing packet that includes a list of materials needed (approved technology or other manipulatives, such as a talking calculator, braille or large print ruler, braille paper, bold line writing paper, raised line graph paper, etc.)
3. The test administrator or proctor needs to ensure that special tools and materials noted on the student's IEP and used for instructional purposes as accommodations are available, as needed, to students in the test-taking environment. For example, if a visually impaired student routinely uses an abacus in the classroom when sighted students are allowed to use a pencil and paper for computational purposes, then an abacus must be available during a test. (See Appendix D for further explanation on the use of an abacus in test-taking situations.) Specialized tools and materials should not be provided if their use presents an unfair advantage.
4. In preparation for test administration, the test administrator needs to review the original test(s), the alternate format/s of the test/s, the original test administration manual(s), the test administration manual/s for accessible media, and the test administration notes for the special format/s. It is recommended that these materials be provided to the test administrator under secure and confidential means two full days prior to test administration. This time is needed so the test administrator can plan appropriately for the accessible media test administration.
5. Prior to testing, the test administrator or teacher needs to ensure that the test is available in a student's primary or preferred reading medium or combination of media, and that the student has sufficient proficiency in use of this medium.

Braille and Tactile Graphics

The information in this section describes methods for developing and implementing assessments for students with visual impairments who require braille text or tactile

graphics. While some technology provides auditory access to print, braille is critical to literacy and must be an option for those students who routinely use it. See Appendix A for a discussion of braille versus auditory access.

Generally, learning to read braille is no more difficult than learning to read print. The tactile process is different from the visual process and creates the following considerations:

- Braille (tactile reading) consumes more time than does visual reading, as students who read braille typically read at fewer words per minute than do students who read print (Trent & Truan, 1997).
- Braille reading requires tactile training in page orientation and reading and interpretation of graphic material.

Braille Translating (Transcription) Process

The following are types of test items that are difficult to reproduce in braille:

- Complicated tessellations
- Rotation items that use letters of the alphabet (letters on a sign or other letters rotated or flipped in print)
- Science items that use complicated pictures to demonstrate experiments and other scientific concepts or processes (cell, digestive or muscle systems, etc.)
- Map reading items that depend on visually recognizable and unlabeled continents, countries, or states, e.g., Africa, Italy, or Florida
- Visual recognition items (interpreting a picture without supporting text)
- Items that require interpretation of complicated drawings that display multiple layers or cross-sections
- Visual illusion items (optical illusion)

These types of items frequently require extensive revision during braille production. The producer of the braille test may ask a test publisher to consider substituting such items with those that can be made more accessible and which will retain similar, if not identical, concepts and have the same weighted score. Consideration of these points will facilitate the production of test materials in braille format for students with visual impairments.

1. Test developers and publishers must ensure that contracts for braille materials specify the use of braillists who are certified in Nemeth Code translations for mathematics and science transcriptions and literary braillists who are certified by the National Library Service in literary braille for other translations (reading, writing prompts, general literary testing such as social studies and science literary text). Braille formats must be modeled after those of the Braille Authority of North America (BANA) Guidelines, found in *Braille Formats: Principles of Print to Braille Transcription*, 1997.

2. As a test is edited for braille transcription, necessary changes will be made to make the material accessible to braille readers. Correct braille transcription also requires that BANA specifications be observed. Simplification of some graphic material may be necessary. Simplification entails the elimination of some artistic features, removal of some superfluous material (without eliminating distracters and other text material that is necessary to maintain the validity of the test item), or movement on the braille page of some text or graphic components for more efficient readability by the braille reader (moving a scale, legend, or compass rose on a map to a different location). Note that simplification is performed relative to the construct being tested. If during the test editing process, it is not clear what is being tested, the test publisher will be consulted for clarification before simplifications or changes occur.
3. Reproduced references, such as table of contents, dictionary pages, or indices, may need to be shortened in the braille test version while maintaining appropriate distracters and correct answers. This is done to contain the braille version to one page, if possible.
4. Provision of performance items in braille format must indicate to the braille reader the amount of space provided for the answer. Directions must specify the space provided by suggesting the time needed to complete the item or by indicating the approximate page area or the number of paragraphs. Generally, one page of print is equal to about two pages of braille. Directions may indicate that there are four print lines or eight braille lines available for responding.
5. Unnecessary boxes and framing of material should be omitted unless the framing provides a separation of graphic material from text or encloses a group of scattered items.
6. Specific braille codes exist for transcribing literary works, mathematics, and science materials into braille. When brailleing the content of the print version of the test, braille transcribers must follow the standards of code for braille transcription. These codes are provided in English Braille American Edition, 1994; The Nemeth Braille Code for Mathematics, 1972 Revision; and Braille Formats: Principles of Print to Braille Transcription, 1997. All three manuals are available from the American Printing House for the Blind.
7. Test security and confidentiality standards must be upheld by braille test transcribers. This includes the following:
 - Keeping testing materials in a secure place to inhibit access by unauthorized persons
 - Not sharing information or implying content contained in the testing materials with other persons
 - Maintaining discretion about the work being done
 - Returning all materials to the contracting source
 - Regarding the contents of the test as confidential

8. An experienced braille proofreader must be utilized for proofreading all materials and, in particular, examining all tactile graphics to ensure readability and accuracy.
9. Experienced braille transcribers might also need to transcribe students' braille responses into print for scoring. (See the section on Guidelines for Braille and Large Print Test Response Transcription).
10. Braille versions of a test must include transcriber's notes (notes to the braille reader from the braille transcriber about changes in wording, use of special symbols, and use of any special formats). Transcriber's notes must be written in print within the Test Administration Notes for Braille Edition (Appendix B). The number of transcriber's notes in tests should be kept to a minimum.

Tactile Graphics

This section offers information regarding the use of graphics when testing students with visual impairments. Graphic material, which includes maps, charts, graphs, diagrams, and illustrations, frequently contains information that is difficult to present in a tactile format. Research supports the use of tactile graphics and "the idea that visual experience and visual imagery are not required for the perception of simple tangible pictures . . ." (Heller, et al., 2002, p. 352). It is possible to provide many types of graphic material in braille or raised line drawings. However, certain types of graphic materials either cannot be provided in braille or tactile formats, or they are so complex that doing so produces a graphic that is unreadable for the braille user.

Most maps, charts, graphs, and diagrams can be made tactual if the test publisher will allow some editing. Editing could involve eliminating shading used solely for visual effect, reducing the number of distracters, providing two or three charts to present the same information as a complex print chart, using descriptions to supplement or replace graphics, or using symbols and words with a key to provide information. All changes to braille tactile graphics should be approved by test developers or publishers.

Many print materials use graphics to emphasize a point, provide another format for information, or provide visual appeal. Because graphics are common in text, training in reading graphic material and interpreting a written description of a graphic are important skills for the student with a visual impairment to learn.

Guidelines for tactile graphic materials include the following:

1. Graphics in mathematics tests must follow provisions of the Nemeth Code and Guidelines for Mathematical Diagrams, BANA (1983).
2. Graphic material should be simplified without omitting needed information or creating an unfair advantage by alluding to the answer.

3. Pictures lacking vital information or clues to the answer will be omitted from braille materials.
4. Picture descriptions should be presented concisely within the student's test booklet if information in the picture is vital to answering any test item. Picture descriptions will appear as transcriber's notes throughout the test and must be included in the Test Administration Notes.
5. Some graphics are best handled by supplementing the image with a heading, label, description, or key. Edits must be made carefully so that the braille reader is not unintentionally given an advantage or led to the correct answer.
6. Graphics depicting measurements must maintain accurate and true proportions to match the answer choices. If answer choices must be changed, the correct response must be located in the same place as the original correct response option.
7. Keys or legends that supplement reading graphics should be located at the top left of the tactile graphic or on the left-hand facing page. This adaptation provides a consistent location for such information, provides information needed by the braille test taker prior to examination of the tactile graphic, and enables easy access by the braille reader.
8. Braille labeling on graphics will be presented horizontally.
9. Charts and graphs should be maintained on one page when possible. If graphics and the accompanying test item require more than one page, use facing pages to present graphics and the accompanying test item if possible.
10. If a braille test participant is asked to produce a graphic as part of the test item, such a task can be achieved through the use of tactile graphic materials that are familiar to the braille reader. Another option that may be acceptable to test developers is for the student to describe or explain data or other information. This option must be approved by the test contractors and included in the scoring criteria. The test administrator and the braille reader's teacher, using the braille reader's current IEP, must collaborate prior to the administration of the test to ensure that appropriate materials are provided. For the purpose of scoring, student-produced graphics will need to be hand-scored or transcribed into a print graphic by persons familiar with braille, braille readers, and the content area being tested. (See section on Guidelines on Braille and Large Print Test Response Transcription.)
11. An experienced braille reader must proofread all tactile graphics prior to mass production of the braille test to ensure readability and accuracy.

(Kapperman, G., Heinze, T. & Sticken, J., 2000; Poppe, K. & Otto, F., 2002; Ross, D. B. & Robinson, M. C., 2000; Spence, D. & Osterhaus, S., 2000)

Large Print Formats and Graphics

Some students with visual impairments read regular print materials and enlarge the print by using optical devices. Others read large print materials. This section offers information regarding the development and implementation of assessments for students with visual impairments who require large print materials. Generally, two popular methods exist for enlarging tests. The regular print test can be enlarged through photocopying, or an electronic version of the test can be manipulated to reformat test items and enlarge or change the font as needed. The latter method is preferable unless issues outlined in this section have been addressed during the test development and the regular print test has been designed using universal design principles. Manipulating an electronic version of the test can best yield a large print version that incorporates the optimum reading mode for the student who uses large print.

Generally, reading skills that are difficult for a person with low vision who reads print include the following:

- Visual scanning and skimming of text
- Differentiating between subtle colors and patterns used in pictures or graphs
- Reading at a speed commensurate with regular print readers
- Shifting gaze from a picture or graph to test item and back again
- Shifting gaze from test booklet to answer sheet documents
- Capturing an entire picture
- Moving from one line of text to the next
- Interpreting pictures (particularly complex pictures)
- Reading for extended periods of time (Koenig & Rex, 1996)

Consideration of these points, particularly in relation to universal design of test format and printed text, will facilitate the production of test materials in large print format. Information provided on font, spacing, shading and contrast, pagination, and test booklets is the compilation of work done by Elaine Kitchel, presented as "Reading, Topography, and Low Vision," a PowerPoint presentation (APH, 2002). Research completed by G. E. Legge and peers (Reported in "Psychophysics of Reading" 1985 through 2002 in *Vision Research*) supports the guidelines listed in the following section.

Test Format

1. Large print versions of a test and test practice materials should be reformatted from the regular print version so that adaptations can be made to font style, print size (point size), spacing, shading, graphics, the number of items on a page, and other quality assurance issues.
2. Items that typically present the most difficulty during conversion to large print format include the following:
 - Complicated, multi-shaded drawings with extensive details
 - Gray-scale drawings that provide little contrast

- Colors that cannot be differentiated by persons with color-blindness
 - Large maps that cannot be contained on one page if enlarged
 - Extensive charts with multiple columns
 - Charts and graphs that extend over several pages
3. If testing materials are enlarged merely through photocopying (not generally recommended), the font size will vary depending on the original print font. When tests are enlarged, the font size rarely meets the 18-point size required. Enlarged materials must be reviewed and proofread before mass copying or distribution to ensure that print and background contrast are adequate and that pictures and graphs are readable and complete on the page.

Font

1. Print measuring 18 points is considered large print. Point sizes between 12 and 18 points are considered enlarged print.
2. Occasionally a test will be requested in a print size larger than 18 point. In such cases, the publisher must determine if material can be adequately presented in a larger point size.
3. Decisions about the size of print and font style must be made by the test publisher and discussed with a person who has knowledge of large print use and the intended test takers.
4. Font styles that are decorative or cursive should be avoided. Standard serif or sans serif fonts with easily recognizable characters are recommended. Overall, sans serif is a better choice. Verdana, APHont, Antique Olive, and Helvetica are reliable choices. Note: APHont, a font for low vision developed by the American Printing House for the Blind (APH), embodies characteristics needed by low vision readers as identified by research. A free version of APHont is available from APH.
5. Large print should have x-heights (distance from the top to bottom of a lower case x) and t-heights (distance from the bottom of the "t" to the cross bar of the "t") of at least 1/8" with a thickness of 2 points. Eighteen point Verdana, APHont, Antique Olive and Helvetica meet this standard.
6. The use of bold print, underlined print, or quotation marks for highlighting text is preferable to using italics. Italics should only be used when absolutely necessary. Moreover, sample sentences, if provided, should be presented sans italics and in the same font size and style as that used for the remainder of the test. Further, letters incorporated into math problems, e.g., letters within algebraic equations, are also more readable when displayed in a sans italic, sans serif font.

7. Headings and subheadings (captions, titles of diagrams and charts and text inside diagrams) should be larger and bolder than regular print and set in a font style that differs from that of the general text. Acceptable typefaces for this use include Arial Black, Helvetica Black Bold, Lucida Sans Bold, Era Bold ITC, Verdana Bold, Antique Olive Bold, and Helvetica Bold.
8. All text and graphic materials, including labels and captions on pictures, diagrams, maps, charts, exponential numbers, notes, and footnotes, must be presented in at least 18-point type, a size that meets the APH definition of large print (Kitchel, 2001).

Spacing

1. Leading or spacing between lines should be at least 1 1/4 spaces to allow persons with low vision to effectively move from line to line in the text.
2. Block style formatting and 1" margins are recommended.
3. Format should include no indentation of paragraphs, justification of left margins, and unjustification of right margins for ease in reading and transferring from line to line.
4. Divided words should be avoided.
5. Columns of text, excluding graphic material, should be at least 39 characters in line length. Generally, for efficient reading, columns should be avoided.
6. Test items and accompanying diagrams, pictures, and graphics should be located close to each other and on the same page if spacing permits. If this is not possible, test items and graphics should be on facing pages. Answer choices should be contained on one page if possible.
7. Research indicates that readers with low vision and readers with normal vision read a monospaced font faster and with better comprehension than they read a variable-spaced font (Chung, Mansfield, & Legge, 1998).

Shading and Contrast

1. Gray-scale and shading should be avoided, particularly where pertinent information is provided.
2. The highest possible contrast should be used for text and background, with attention to the use of color. Certain color combinations other than black and white may be unreadable to persons with low vision or persons with color blindness. A good rule of thumb on use of colors is to use colors that are far apart on the color wheel and avoid using colors that have similar saturation (color

- depth). Blue and yellow, for example, provide a high degree of contrast when used together.
3. Large print must not be used over a background design or other graphic material.
 4. Glossy paper may cause unnecessary glare. Dull finish paper in white, ivory, cream, or yellow is recommended and best complemented with black print.
 5. Unnecessary boxes and framing of material should be omitted unless the framing provides a separation of graphic material from text or encloses a group of scattered items.

Pagination

1. Repagination of materials is preferable to increasing the overall page size.
2. While double-sided pages are generally preferable, avoid double sided copying if print will "bleed" or show through or otherwise obstruct clear reading.
3. Where blank pages must appear, type the words "Blank Page" near the top of the page.

Test Booklets

1. Depending on test size, large print copies may need to be separated into several booklets.
2. Generally, the test booklet should be no larger than 9" x 12", particularly for young students.
3. The binding of the large print booklet(s) should allow each page to lie completely flat for whole page viewing and ease of handling.

Large Print Graphics

The following guidelines provide information concerning the use of graphics in testing students with visual impairments who use large print formats. Work by the Large Print Atlas Focus Group (2001), who met at the American Printing House for the Blind, is included in this discussion.

Graphic material, which includes maps, charts, graphs, diagrams, and pictures, can pose particular problems when adapted for large print. Further, the complexity of some graphic materials prohibits their being provided in large print unless they are modified to become more readable when enlarged. Most maps, charts, graphs, and diagrams can be enlarged if the test publisher agrees to some editing. Editing could involve the elimination of shading, the reduction of distracters, the insertion of a key, or the separation of one chart into two or three.

Guidelines for large print graphics include the following:

1. Graphics in large print must exhibit good contrast, clarity, and accurate details and information.
2. With attention to universal design for all test takers, it is recommended that information included in a picture also be included in the test text. No test item should rely solely on a picture for information needed to answer the test item.
3. Generally, pictures should be retained in the large print format. Editing for shaded material and clarity will very likely be necessary. Some pictures that would need extensive editing and have only artistic value may be considered for elimination.
4. Overlaid print on a diagram or graph should be avoided. While visually pleasing in some instances, this technique is difficult for persons with low vision to read.
5. Multi-color graphs that use closely related colors may conceal vital information from the test taker who is unable to distinguish the colors. Two to three contrasting colors or black and white are recommended.
6. All graphs should contain short, descriptive headings or titles.
7. Compass points, numbers, and vital information on graphs must be enlarged sufficiently for the low vision reader.
8. Map symbols must be easily distinguishable and relevant.
9. Map legends should appear near the top left-hand corner of a map, if possible, and include a visually distinctive border. Use contrasting colors and distinguishable symbols rather than reproducing different sizes of the same symbol.
10. If possible, map scales, too, should be positioned near the top left-hand corner of the map.
11. Labels should be arranged within the boundaries of the country or state borders whenever possible.
12. Symbols used should be reasonable and meaningful representations, e.g., a fish for fishing.
13. Boundaries between countries should be bolder and thicker than boundaries between states or provinces on a map.
14. Pictures and graphs used in test questions requiring measurement must be true to the size intended in order to ensure that a correct answer is available.
15. Test publishers and contractors will need to address the degree of accuracy that is expected for questions involving measuring or drawing. For example, some large

print readers may not be able to distinguish between 7/16" and 8/16" on a ruler. The degree of accurate measurement for large print readers may need to be adjusted from the degree of accuracy required of the regular test taker unless this condition inhibits the large print reader from meeting the assessment objective.

16. If a graph or table does not exceed one page in the original materials, then the large print version should be edited to fit on one page, if possible. Pertinent information and distracters must be maintained.

Some Guidelines for Providing Audio Versions of a Test

This section is written to provide assistance to test publishers and national and state education assessment personnel in the development and implementation of accessible tests for students with visual impairments who require audio versions of a test. Audio formats include cassette tape, video, or CD test versions. Although an audio version of a test may be made available, the audio version will need to be accompanied by a print or braille version of the test or a supplement of large print or tactile graphics so that a student may have access to complicated graphic material that may not be described, or only minimally described on the audio version of the test. Consideration of these points will facilitate the production of test materials in audio format. (See Appendix A for a discussion regarding braille versus auditory access.)

1. An experienced test editor should be involved in editing for an audio presentation of a test. The audio edition will need to be coordinated with other media in which the test will be provided.
2. Ascertaining whether the audio format will be administered on an individual basis or in a small group setting is important, as the information on the audio format and the information to be provided by the test administrator may vary depending on the setting.
3. Students using audio versions of a test should have had an adequate amount of experience using the specific audio medium and audio equipment independently before the testing situation.
4. Audio versions of a test serve to standardize oral delivery of the test content and may reduce the number of school staff needed for proctoring or administering tests orally.
5. Test publishers may only have the capability of providing one version of a test in audio format. The version selected for formatting should be parallel in content and difficulty to other versions.
6. Test publishers must ensure that narrators follow confidentiality and security assurance standards of test materials. Security measures taken when working with audio formats should mirror those required for handling print or braille materials (*Kentucky Core Content Test Administration Manual Supplement*, 2000).

7. Test publishers must give attention to packaging and labeling of the audio test. Audio tests may need to be packaged for each individual student, with the appropriate print and/or braille supplements needed by the student and the test administrator.
8. Audio versions should be developed using the resource *The Art and Science of Audiotape Book Production* published by the National Library Service for the Blind and Physically Handicapped, Library of Congress. Requirements for narrator, monitor, and proofreader are provided in this document.
9. The National Braille Association in *Tape Recording Manual, Third Edition* (1979) provides instructions for reading mathematic instructional materials. This source recommends that graphic materials be described, if possible, and accompanied by print or tactile versions of the graphics. Such modifications need to be approved by the test publisher. Moreover, the audio descriptions, print, and tactile versions of the material need to be coordinated. If different departments within the same company or different vendors are responsible for developing and producing the accessible media, one source should be responsible for ensuring that the media are coordinated to the extent specified.
10. Audio versions of the test must be accompanied by print or braille versions to allow students access to charts, pictures, and other graphic material that may be needed to answer questions on the test. Some graphic material can be described orally, while other graphic material cannot be described without revealing the answer or providing an unfair advantage to the audio user.
11. The audio test should instruct the student to stop at certain points. Steps in packaging and/or measures to be employed by the test administrator or proctor must be established to ensure that test takers work only on allowable sections of the test. For example, select subtests may be recorded on different cassette tapes or CDs and then collected as required.
12. Narration of print materials must follow National Library Service (NLS) specifications of minimum acceptable requirements (Specifications #300 and #304).
13. Test administration materials should indicate the equipment required by the student for using audio versions of a test. For a cassette tape version of a test, a standard two-track tape player/recorder and headphones will be needed. An audio test on CD will require use of a common CD player or a digital talking book player, depending on the audio file type of the CD. Regardless of the player used, a backup player capable of playing the same audio medium should be available. Access to electrical power or sufficient batteries for player/recorder use should be indicated. Test administrators should be instructed to inspect the equipment functions before testing begins.

14. Provisions must be made in the test administration manual for the malfunctioning of audio equipment. Students may have to be tested at a later time if malfunctioning occurs. Students must not be denied access to the administration of a test because of equipment malfunctioning or failure.
15. Test administrators will need to monitor student "movement" through audio versions to ensure that the student maintains the appropriate place in the test and to ensure that the audio version is playing properly. When using a two-sided cassette tape, students may need to be reminded to play the other side of a tape. Prior to administering the test, and in the absence of students, test proctors should spot check audio formats to ensure proper operation of the audio medium and equipment.
16. Students using an audio version of a test must be seated in a quiet area and away from other students so that other students are not disturbed by the audio medium or equipment operation. Students can choose to use headphones.
17. Test publishers must select an experienced narrator with appropriate voice, speech, accuracy, and pronunciation skills. (Pronunciation resources are available from NLS.)
18. Narration must be evaluated and proofread to ensure that test content is conveyed accurately and that questions are presented without unintended emphasis on correct answers.
19. A person with identical test materials should monitor the narrator to ensure accuracy during audio production. A third person should be used for the proofreading of audio materials.

Some Guidelines for Oral Reading or Signing of a Test

Students who are visually impaired or deaf blind may need the accommodation of a reader or sign language interpreter. Occasionally, an audio version of a test is not produced, and a test publisher, developer, or assessment personnel will allow the reading or signing (use of sign language) of a test or portions of a test for students whose Individualized Education Program (IEP) specifies this accommodation. Before using oral reading or sign language as an accommodation, careful attention must be given to the constructs being measured. For example, if a section of the test is designed to assess reading as a decoding skill, then the reading or signing of the test to a student would invalidate the results for the intended purpose. In these instances, consider an alternate test or redefine the construct for the individual student. Always check with the test publisher or test developer to determine the construct intent and accommodation use for particular sections of a test.

The Educational Testing Service recently posted on their web site *ETS Guidelines for a Test Reader*, which have been made available in Appendix F of this document through special permission from ETS. This document is helpful in outlining the characteristics of

a good reader, providing general information for readers, indicating special considerations for multiple-choice tests, addressing mathematics reading, and providing test center procedures for using a reader. In addition, consideration of the following points will ensure appropriate provision of oral reading or signing of a test or portion of a test.

1. Test security and confidentiality standards must be upheld.
2. The test purpose must be specified to ensure that reading or signing a test or portions of a test do not invalidate results or preclude how the results will be reported.
3. An experienced test editor and professionals involved in working with students who require readers or interpreters need to be included in the team of persons that adapt tests which are to be read or signed.
4. A prepared script will help ensure a consistent, standardized presentation of the test items.
5. A reader or sign language interpreter must have skills in presenting various types of test materials. For example, someone familiar with mathematical symbols is needed in order to correctly read and convey higher level math formulas and equations.
6. A standard video presentation of the test in sign language is recommended to ensure quality, consistency, pacing, and accuracy.
7. The person selected to read a test to a student should have the characteristics of good voice quality and appropriate speed and tone.
8. The person signing a test must be a trained interpreter and be able to translate in the same method of sign language typically used by the student. It is not recommended that the student's teacher be the interpreter for the testing situation unless a second person is present to monitor for quality and fairness during administration of the test.
9. Voice inflection (regional dialect and pronunciation) familiarity is recommended.
10. The narrator or interpreter must avoid voice inflection that stresses or otherwise indicates the correct answer to test items.
11. Students tested through oral reading of the exam must be tested individually to prevent the testing situation from becoming a group effort. Moreover, testing individually helps ensure that each student receives the specific oral reading structure required by his or her individual needs.
12. Directions can be read or signed to groups of students.

13. Prior to the testing situation, difficult words must be reviewed by the person who is going to read or sign the test. Use pronunciation dictionaries as references.
14. Oral readers and interpreters will need to pause at appropriate intervals to provide the student an opportunity to answer test items or access graphic material provided in print or tactile formats.
15. Graphic materials may be described as detailed in the prescribed script, but must also be made available in print or tactile formats.
16. Oral readers or interpreters must avoid providing an answer to a student's question concerning clarification of testing content. Doing so would provide an unfair advantage. Developing some standard responses to students' questions prior to the testing situation is helpful. For example, you can encourage the student to listen to the question again.
17. Readers or interpreters may need to provide multiple readings or signings of passages, parts of passages, or items. Unless instructed otherwise in the Test Administration Manual, professional judgment and any guidance provided in the IEP should be used to determine the number of readings necessary.
18. If the oral reader or interpreter is also completing an answer sheet for a student, the transfer of answers must be performed carefully to ensure that the student's answers are recorded as intended. (See section on Guidelines for Braille and Large Print Test Response Transcription.)
19. Two readers or interpreters should be used for presenting a test or portions of a test to a student. Using two readers or interpreters helps ensure accuracy of test presentation and provides the opportunity for readers or interpreters to rest after 15-20 minutes of presenting test material.

Accommodations in Testing Students with Visual Impairments

Accommodations are intended to level the playing field for any student with a disability. There are, by nature of the disability, certain accommodations that are needed by students with visual impairments. Not all of the accommodations discussed in this section are intended for all students with visual impairments. Likewise, some accommodations needed by students with visual impairments may not be discussed in this section.

Accommodations and technologies exist to provide learners with visual impairments access to academic instruction and testing. The term "technology" comes under the definition of assistive technology as described in federal law and is considered an accommodation to the testing of students with visual impairments.

The need for accommodations is the decision of the Individualized Education Program team and must be recorded on the IEP. Accommodations used in testing should match those used by the student for classroom instruction. Accommodation use is determined by evaluating factors unique to each student and must be implemented as outlined on the IEP. Evaluation of the effectiveness of accommodations for individual students is highly recommended. Further, students must be trained to use accommodations. For example, providing a test orally or on a computer might actually penalize a student who has not been trained to listen to orally presented material or trained to use a computer for assessment. Accommodations should be continually evaluated to ensure that they are effective for the student. Some accommodations should be eliminated when and if the student arrives at a point where he or she either does not need the accommodation or the accommodation is ineffective.

This section provides an overview of accommodations that might be effective for students with visual impairments. General accommodations for students with visual impairments are discussed, and specific accommodations for braille readers, large print readers, and audio users are presented.

General Accommodations for Students with Visual Impairments

Presentation Accommodations

1. Some students who are visually impaired may need directions or some test items, other than those assessing reading as a decoding skill, read to them. (See section on Some Guidelines for Oral Reading and Signing of a Test.)
2. Computer assisted testing is an accommodation that has received some attention through research, though studies concerning its benefit are inconclusive (Tindal & Fuchs, 1999). Generally, however, when a student uses a computer for daily classroom activities, then this accommodation may prove useful during testing if the concepts being tested are not undermined. There are several programs and peripheral materials that can be used to adapt the computer for use by persons with visual impairments. Screen readers, text to speech technology, and accessible keyboard access through braille or switches are all available. Depending on the construct being tested, test administrators must verify that the student is inhibited from accessing software or hardware that may provide an unfair advantage. For example, if a student's basic math skills are being assessed and the intent is not to use a calculator, then the keyboard functions or software used for computations must be blocked.
3. When testing allows the use of non-scientific or scientific calculators, students with visual impairments should be permitted to use an equivalent device that has been adapted for use by the visually impaired user, e.g., a non-scientific or scientific talking calculator. Should a state provide non-scientific or scientific calculators for the sighted population taking the test, then non-scientific or scientific, talking calculators should be provided to students with visual impairments who are taking the test.

4. Sometimes students may want to use manipulative devices, such as a ruler or template, to maintain placement on a line of braille or print.

Response Accommodations

1. Students with visual impairments may need to present answers orally to a test administrator who completes the answer sheet. (See section on Some Guidelines for Braille and Large Print Test Response Transcription.)
2. Students with visual impairments may need to write answers in the test booklet or on separate paper using a braillewriter or slate and stylus. The student's answers will then need to be transcribed and transferred to the answer sheet. (See section on Some Guidelines for Braille and Large Print Test Response Transcription.)
3. Students may need to write answers using a word processing system, to be transferred to the answer sheet. Depending on the construct being tested, test administrators must verify that students are inhibited from accessing software or hardware that may provide an unfair advantage. For example, if a student is responding to a writing prompt and the writing will be judged based on correct spelling and grammar, then the spell check function and grammar functions must be disabled.
4. If a student must draw or somehow demonstrate a response, it is essential that accessible tools and materials that are typically used by the student for instructional purposes be made available in the testing environment as long as no unfair advantage is provided. On items such as these, it is very important that scoring criteria be well defined.

Timing Accommodations

1. The use of extended time for test completion is a testing accommodation that has received considerable attention since state testing and accountability systems have been implemented. Research investigating the use of extended time has yielded little conclusive information about its benefit (Tindal & Fuchs, 1999). However, students with visual impairments will usually require extended time during testing because using braille, large print, and audio formats require more time than does reading regular print with acceptable visual acuity. A study by Wetzel and Knowlton (2000) suggests that experienced adult braille readers may need no more than 50% additional time than the stated duration, with additional time allowed for the manipulation of an audio device or the marking of an answer sheet. In contrast, an earlier researcher found that braille readers with far less braille-reading experience than the subjects mentioned in the Wetzel and Knowlton study may need between 2 and 3 times as much time as their sighted peers to read the same material (Nolan, 1966, p.1).

Traditionally, extended time for testing large print readers has been 1 1/2 time, and for braille readers time allotted has been twice as much time as that allowed for

the regular print reader (Lowenfeld, Abel, & Hatlen, 1969, pp. 91-92). Regardless of the time allowed, the student should be carefully monitored to ensure time is being used appropriately. If students need an inordinate amount of time, educators may need to investigate the efficiency of the chosen reading mode or initiate remediation to improve speed. Generally, timing accommodations should be individualized according to the test taker's reading rate and testing situation (Wetzel & Knowlton, 2000). (See Appendix E on the "Use of Extended Time.")

2. Reading braille or large print and listening to material presented orally, especially when accompanied by graphic material, can be a fatiguing and often frustrating experience in a high stakes testing environment. Therefore, students may need several brief sessions in which to take the test. Additional break options should also be considered.
3. Students may need to be tested over a longer time period, a week rather than two days, for example. However, any alteration of the timetable will necessitate close supervision to ensure test security.
4. Students may need to be tested at different times of the day depending on their optimal functioning time.

Setting Accommodations

1. Some visually impaired students may need to be administered a test or select subtests individually or in small groups, as recommended on the IEP, to help maximize the students' performance or to ensure that the text accommodations needed by the students are implemented without interference to the concentration and test taking results of other students.
2. If a student is being read to, is recording answers by using technology that is noisy, or is recording answers orally, then he or she must take the test individually and under the supervision of a test administrator in order to avoid distracting or influencing the responses of other students.

Specific Accommodations in Testing Visually Impaired Students

Braille, large print, and audio are accommodations that some visually impaired students will use interchangeably. A student may, for example, read a passage in braille and prefer to access a table or chart in an enlarged version of the test. Therefore, students should be allowed to use a large print (or regular print with magnification) and a braille version of the test, if requested.

An abacus is often useful for students when mathematics problems are to be worked without a calculator. The abacus functions as paper and pencil for some students with visual impairments who have received instruction and practice on the use of the abacus. (See Appendix D for the position paper "Using the Abacus in Test-Taking Situations.")

Other tools available for use by visually impaired students include braille or large print rulers and protractors, raised line or bold line graph paper, or raised line or bold line writing paper. Contact the American Printing House for the Blind (APH) for more information or to request a catalog of available materials, or visit APH on the Internet at www.aph.org

Specific Accommodations in Testing Readers Who Require Enlarged or Large Print

Enlarged print is that which is 14 point, 16 point, or regular print that has been enlarged using magnification devices. Large print is 18-point type and larger. Enlarged print and large print are accommodations.

Some students may choose to use a regular print test and enlarge it manually with a magnification device with which they are familiar. Magnification devices include eyeglass-mounted magnifiers, free standing or handheld magnifiers, and electronic equipment such as the closed circuit television (CCTV), or a computer that has text enlargement software installed. These devices do not provide a student with an unfair advantage. Rather, they are devices that the student requires to access print, and they should be allowed as standard accommodations. Should a computer be used as an accommodation, the test administrator must ensure that computer options other than screen enlargement are not used unless approved as accommodations for a particular test.

Proper lighting and freedom from glare, while sometimes overlooked, are critical for many readers with visual impairments. Lighting that has been adjusted to suit the student's particular visual needs and minimize glare will help promote sustained reading efficiency.

Specific Accommodations for Audio and Oral Test Administration

Students using an audio version of a test or having the test orally administered as an accommodation should also be allowed to have print (large print or regular print with a magnification device) and braille versions of the test, if requested. A student may wish to listen to a passage by way of audio, but access a table or chart in a large print or braille version of the test. Listening to an oral description of a geometric figure can be difficult or impossible to follow unless an enlarged graphic or a tactile graphic accompanies the oral description.

Some Guidelines for Braille and Large Print Test Response Transcription

Some students with visual impairments will use the accommodation of oral response, written response (on the test booklet or on paper other than the test answer sheet provided by the test publisher), or taped response. Each of these accommodations requires that a

person transcribe the answers onto the answer sheet or booklet that will be scored. These guidelines are provided to ensure that transcription is performed appropriately.

1. Confidentiality of the test materials and the student's individual responses is critical. Transcribers must treat the testing materials and the student responses in a secure and confidential manner to ensure test and student identification security.
2. Response transcribers must know braille if transcribing braille responses.
3. It is best if the response transcriber is a "neutral" person, not someone with a vested interest in the student's scores.
4. Response transcribers must provide the exact answers that the student has written using the same punctuation, spelling, and grammar structure. They cannot guess what the student might have meant if answers are incomplete.
5. It is recommended that the response transcriber have a second person proofread the responses to ensure accuracy and fairness to the student. When transcribing graphics that a student has produced, two transcribers should work together in transferring student answers to the answer sheet or booklet.
6. For a period of time, student responses must be maintained in a secure file with test name, copyright year, form and level administered so that the student's actual responses can be reviewed if questions arise.

Reporting Test Results of Students with Visual Impairments

Following the requirements of federal law, the scores of students who take assessments in accessible format must be reported for accountability purposes. When reporting the results of students with visual impairments, care must be taken to protect the student's privacy while appropriately representing the test score in consideration of the accommodation(s) used. Students must not be penalized for use of approved accommodations that do not change the test construct and do not provide an unfair advantage to the test taker. Reporting of scores should be a consideration during the test development phase so that all parties understand the purpose of the testing and how the results will be reported and used.

Reporting Test Results for Braille Editions

For most assessments, braille test versions should be regarded as appropriate accommodations for students who use braille daily. Any rescaling of braille test versions that is performed because of item omission should be reported. The scores of those students taking a test in braille should be considered valid as long as the test has been prepared using the guidelines presented in this document. Students who read braille daily need to use braille to respond to test items. This dual use provides an

instructional/assessment validity match. Extensive efforts to "prove" a braille test invalid because of a difference in format are neither recommended nor useful. If the purpose of a test is to determine educational skill progress, the validity can be addressed by confirming that the media used for instruction matches that which is used for assessment.

Reporting Test Results for Large Print Editions

Frequently, large print versions of tests also qualify as appropriate accommodations for use during the assessment of students who use large print daily. Unless the assessment has been reformatted, the large print version is a camera-enlarged version of the original version. If the test is altered through removal of shading, or other clutter from graphics, the use of the large print format should be considered an appropriate and valid accommodation. Generally, if reformatting is performed in a manner preserving the original test content, the reformatted version should be considered valid. Producers of large print must work with test publishers to verify that the test material has not been altered in content or purpose to maintain test validity.

Reporting Test Results for Audio and Orally Administered Tests

Regarding most assessments, the use of audio and orally administered tests should be considered appropriate accommodations for students who use audio and oral formats on a routine basis to access materials. For tests that assess reading as a decoding skill (visually or tactually), audio and orally administered versions may change the skill being tested, and this should be noted in any report of scoring.

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Appendix A

Braille Versus Auditory Access: A Discussion

Federal law requires that consideration be given to accommodations in testing students with disabilities. With this focus comes the responsibility of the educator to identify needed and useful accommodations for students with disabilities. For students with visual impairments, accommodations that provide access to print can vary considerably. The range of accommodations includes braille, tactile graphics, large print, regular print with magnification, auditory media, or any combination of these access media. This discussion suggests methods for identifying the most appropriate access media, identifies uses of braille and audio materials, and provides recommendations for consideration in choosing testing media.

Since the early 1990s authors have identified methods of evaluating the "mode of reading" or method of print access for students with visual impairments (Koenig & Holbrook, 1993; Wormsley & D'Andrea, 1997). Federal law indirectly requires that print access be evaluated by defining the consideration of braille as a mode of reading for students with visual impairments as part of the Individualized Education Program process. A major part of the early and ongoing assessment of a student with visual impairment's unique needs is the use of media to access printed materials. Identification and use of appropriate media includes:

- Determination of the student's primary and secondary sensory channels for learning through observation of the student's use of vision, use of touch, and use of hearing in familiar and unfamiliar settings, at structured times and unstructured times, and in outdoor settings as well as indoor settings (Koenig & Holbrook, 1993)
- Attention to the student's current print access needs, instruction and remediation in access media, and recognition of future needs in print access for the student
- Provision of initial sensory channel identification and ongoing sensory channel use to determine changes in use and need for instruction in additional media access skills
- Instruction in a variety of access media that could be used by the student
- The opportunity to learn skills that enable the student to choose the appropriate access media for various tasks

Specifically, the appropriate uses for braille are determined by each individual who uses braille. Most blind individuals access printed materials by using a combination of media. One detriment to using braille is the lack of braille materials. Currently, there are improved methods of providing braille materials through the expansion of technology. Computer software and hardware that translate print to braille, provide refreshable braille displays on computer keyboards, and emboss braille from the translated program are readily used to provide braille in a timely, quality fashion. Further, Congress is considering legislation that would ensure accessibility of instructional materials in braille for students with visual impairments.

Persons with visual impairments routinely use audio materials to access large volumes of literary or recreational reading material, such as novels or magazines. Moreover, the expansion of technology and the ability to translate printed text into speech has enabled persons with visual impairments to access information via computer software and/or hardware. Additionally, many persons with a visual impairment make use of a screen reader for print access, a skill that requires some training.

The availability of a wide range of print access choices is important for persons with visual impairments. This range of availability should exist for students but should not be confused with, or used as a replacement for, the skill of learning to read (decode

language). If society values the reading of materials as a decoding skill, then access to printed material for students who are visually impaired must include the learning of reading through tactual or visual processes. For some individuals the reading process is too tedious to be efficient. These individuals may choose to use primarily auditory materials as adults, but as students they should be given the opportunity to learn reading as a decoding skill.

The skills involved in reading braille, reading print, and listening to audio materials are unique to each medium. Therefore, during the development of test items, test publishers must be clear about which constructs are to be assessed by a particular item. If reading as a decoding skill is to be assessed, then a fair assessment can only result if the student is provided with material that can be visually or tactually read. If comprehension is the construct being assessed, then the test developer must determine whether reading comprehension or listening comprehension is the skill to be assessed. Comprehension would need to be defined to ensure that students are using appropriate accommodations when taking a particular test.

The following recommendations should be reviewed when considering the use of braille or audio materials for students with visual impairments:

1. Braille and tactile graphics interpretation should be taught as an access media skill so that students may learn the skill of reading as a decoding skill and have the option of using braille materials.
2. Auditory listening skills should be taught as an access media skill so that students can learn listening comprehension skills and have the option of using audio materials.
3. Test publishers must be certain about the construct being assessed on all test items so that educators and test administrators can make valid judgments about appropriate accommodations for students with visual impairments during test administration.

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Appendix B

Template for Test Administration Notes for Braille Tests

[Printable Version of Template \(PDF\)](#)

Name of Test

Edition of Test

Section

Preliminary Pages Transcriber's Notes:

Special Symbols Page:

General Test Direction Notes:

Print Page Number(s)	Braille Page Number(s)	Accompanying Test Administration Manual Page Number(s)	Item Number(s)	Notes

Explanation of Fields within Test Administration Notes for Braille Tests

Name of Test: Provide the full and exact name of the test.

Edition of Test: Provide the copyright or other edition listing to further identify the test.

Section: Provide the section name and other identifying information.

Preliminary Pages Transcriber's Notes: Provide in print the exact wording of transcriber's notes that refer to preliminary pages in the braille version of the test. Indicate the page number of the transcriber's notes.

Special Symbols Page: Provide in print the exact wording of the special symbols page that may be present within the braille version of the test. Indicate the page number of the special symbols page.

General Test Direction Notes: Provide information about the methods a student may use when responding to test items that differ from print test versions and which require special equipment or attention.

Print Page Number(s): Provide the location of test material within the regular print version of the test.

Braille Page Number(s): Provide the location of test material within the braille version of the test.

Accompanying Test Administration Manual Page Number(s): Provide the page number(s) in the test administration manual that correspond with each regular print test page.

Item Number(s): Provide the test item number(s) that appear on that print page.

Notes: Provide comments that indicate transcriber's notes specific to particular pages, changes made to the braille version of the test, and changes made to directions, as listed in the test administration manual or on the test.

Appendix C

Template for Test Administration Notes for Large Print Tests

[Printable Version of Template \(PDF\)](#)

Name of Test

Edition of Test

Section

General Test Direction Notes:

Print Page Number(s)	Large Print Page Number(s)	Accompanying Test Administration Manual Page Number(s)	Item Number(s)	Notes

Explanation of Fields within Test Administration Notes for Large Print Tests

Name of Test: Provide the full and exact name of the test.

Edition of Test: Provide the copyright or other edition listing to further identify the test.

Section: Provide the section name and other identifying information.

General Test Direction Notes: Provide information about the methods a student may use when responding to test items that differ from print test versions and which require special equipment or attention.

Print Page Number(s): Provide the location of test material within the regular print version of the test.

Large Print Page Number(s): Provide the location of test materials within the large print version of the test.

Accompanying Test Administration Manual Page Number(s): Provide the page number(s) in the test administration manual that correspond with each regular print test page.

Item Number(s): Provide the test item number(s) that appear on that print page.

Notes: Provide comments that indicate changes made to the large print version of the test and changes made to directions as listed in the test administration manual or on the test.

Appendix D Position Paper: Using an Abacus in Test-Taking Situations

By Terrie Terlau and Fred Gissoni

Definition and Description

The mathematical abacus is a frame containing beads or balls that can be slid on wires or in slots for calculating or teaching arithmetic. The abacus has been used as a calculation device in Europe, Japan, China, and the Middle East since the third century A.D. It continues to be used widely in Japan (<http://www.syuzan.net/english/education/education.html>).

The Cranmer abacus was developed as a calculation device for persons who are blind or visually impaired and is currently produced by the American Printing House for the Blind. The Cranmer abacus frame is made of high impact plastic, measures 6-1/8 x 3-1/4 x 7/16 inches, and contains thirteen vertical rods and one horizontal cross bar. Four beads can be moved vertically on each of the thirteen rods below the cross bar and one bead can be moved vertically along the rods above the cross bar.

Abacus Functionality

When calculating with the Cranmer abacus, vertical rods represent units, tens, hundreds, etc. Numbers are recorded and manipulated by moving beads toward the cross bar on their respective rods.

The abacus is a passive device. It is not a calculator or a slide rule. The abacus neither performs mathematical operations nor contains information that would enable an abacus user to achieve calculation results without a solid knowledge of mathematical concepts and relationships. Abacus users produce calculations as a result of their understanding of the behavior of numbers, not because of any inherent property of the abacus.

Both abacus and pencil-and-paper users must learn strategies for performing mathematical operations. The primary difference in the activity of abacus and pencil-and-paper users is that pencil-and-paper users apply and record steps in these operations by writing while abacus users apply and record these processes by moving abacus beads.

Persons who are blind or visually impaired and who have had appropriate abacus instruction can use the abacus to perform addition, subtraction, multiplication, and division, and can calculate square and cube roots. The abacus does not permit permanent storage of problem solutions because beads must be rearranged to perform subsequent problems. After each calculation performed with an abacus, answers can be recorded in a variety of formats including braille, large print, voice recording, word processing, or dictation into an electronic device.

Position Statement

Whenever a test taker is allowed to use a pencil and paper for working calculations, an abacus should be considered an equivalent substitution.

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Appendix E

Position Paper: Use of Extended Time

Introduction

In addition to braille and large print, the use of extended time is also a commonly used accommodation for students with visual impairments. This position paper provides a brief summary of the results of research on the use of extended time in testing students, while suggesting best practices for implementing this accommodation.

Research

For several years, researchers have suggested that students with a visual impairment need more time to complete assignments and tests (Harley & Lawrence, 1984; Kederis, Nolan, & Morris, 1967; Morris, 1974; Spungin, 2002; Bradley-Johnson, 1994).

Moreover, some researchers have reported results indicating that students with a visual impairment generally read at a slower rate than students without a visual impairment (Packer, 1989; Legge, et. al., 1985, 1989; Wetzel & Knowlton, 2000). Not only does the reading of braille and large print generally require more time than reading regular print, but the time needed to explore and interpret pictorial information presented as tactile or enlarged graphics can be a tedious and time-consuming process. Therefore, extended time seems to be an obvious accommodation for this population. Some suggested time extensions based on classroom experience or research include

- 1.5 to 2 times for students with low vision (Gompel, van Bon, & Schreuder, 2004),
- 2.5 times for braille and 1.5 times for large print (Morris, 1974),
- 1.5 times for all students with a visual impairment (Spungin, 2002),
- 2 times for braille (Kederis, Nolan & Morris, 1967),
- More than 2 times for braille and a little less than 2 times for visually impaired readers who read print (Packer, 1989), and
- .5 times for experienced adult braille readers (Wetzel & Knowlton, 2000).

The most recent synopsis of research on accommodations demonstrates the wide range of results among studies seeking to validate the use of extended time during testing. Based on the varied results, authors recommend that a well-designed test for standard administration be untimed (Tindal & Haladyna, 2002).

Research conducted by the National Center on Educational Outcomes (NCEO) summarizes at least four studies in which the use of extended time had a positive effect

on student test scores. NCEO provided preliminary results of a Universal Design Research project which suggest that unlimited time reportedly helps students "think better," a conclusion drawn after interviewing students who had completed a universally designed test (with no time limits) and a regular test (with time limits) (Presentation: Universal Design Research, C. Johnstone & A. Morse, June 24, 2003 at CCSSO Large Scale Assessment Conference, San Antonio, TX).

Several authors seem to agree that timed conditions may not allow students to reflect their full abilities on achievement tests (Tindal & Fuchs, 1999) and that adequate time should be provided for all students. Parr, et. al. (1996) argue that extended time examinations taken under ideal circumstances can be more equitable and practical than timed examinations. In another investigation, Marquart (2000) found that extended time failed to significantly improve the test scores of disabled students. The author, however, does conclude that extended time likely produces a more accurate measure of a student's skill by helping to reduce test anxiety and by allowing a greater opportunity to use good test taking strategies.

Conclusions

Extended time is a commonly used accommodation for students with visual impairments. Some literature concerning the subject recommends that the accommodation of extended time be of specific duration, e.g., 2.5 times for braille readers and 1.5 times for large print readers. Certainly, a topic in need of additional information is a comparison of time used among the following: a braille reader who must explore and interpret tactile graphics, a large print reader who must visually examine and synthesize enlarged graphics, and a sighted student using a regular print test. Moreover, several current researchers suggest placing less emphasis on designating a uniform, "one size fits all" duration of extended time as an accommodation for disabled students during testing. Rather, these researchers suggest that the accommodation of extended time consist of "adequate time." That is, a specific length of time, which must be determined by educators through careful assessment of the student's physical disability, skills, and needs. In lieu of extended time, some test administrators are finding that more frequent breaks are effective for braille and large print test takers. Once the need for, and duration of, adequate time and/or breaks has been assessed, educators should include that information on the student's IEP, ensure use of the accommodation, and monitor its use.

Position Statement

To implement extended time or adequate time for students with visual impairments, four basic steps should be followed:

1. Assess the need for extended time and frequent breaks.
2. Include specific information about extended time and the need for breaks on the student's Individualized Education Plan (IEP).

3. Ensure that extended time and frequent break accommodations are implemented as specified during testing.
4. Monitor the student's use of extended time to assure that the student uses extended time/break time appropriately and that the student is on task.

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Appendix F

ETS Guidelines for a Test Reader

The following guidelines will assist in providing the testing accommodation of a reader for a test-taker with disabilities. If you have questions about a specific test, please contact a testing program representative.

Characteristics of a Good Reader

1. Ability to read aloud clearly, at a normal pace, and with good pronunciation.
2. Familiarity with the words, terms, symbols, or signs that are specific to the test content.
3. Ability to follow instructions to read, verbatim, only the words in the test book or on the screen, without changing or adding words or assisting the test-taker in selecting a response.
4. Willingness to be patient and to understand that the test-taker may need to have many test questions repeated several times.
5. Ability to work with the test-taker comfortably and compatibly without creating unnecessary pressure or unrealistic expectations.

General Information for Readers

1. You must review the test format, subject matter, and sample test questions in the testing program's information bulletin or by visiting the testing program's Web site.
2. Prior to beginning the test, you will have the opportunity to meet with the test-taker, who should be encouraged to discuss matters that will affect test

performance, e.g., how to determine the amount of remaining time and how you can help pace the test-taker through the test. The opportunity to discuss such questions and concerns before the test administration begins will make the test administration more effective and fair and will help to minimize misunderstandings and misinterpretations.

3. Test-takers who are blind or who have low vision may also have special tools or equipment (e.g., abacus, braille, slate, stylus) that have been approved for use during the test. These tools offer neither an unfair nor a special advantage; they are comparable to paper and pencil and accomplish the same task. The most important consideration is for you and the test-taker to have the same set of expectations about what is to happen, how much time is allowed, and how all the tasks will be accomplished.
4. The test-taker may require all or portions of the test to be read aloud. The test-taker depends on the reader to read the test questions accurately, to pronounce words correctly, and to speak in a clear voice throughout the test, which may go on for several hours. It is a demanding and somewhat tedious task, and not everyone is suited to do it. Drinking water should be available for you.
5. Your task is to read only the test questions. Do not try to solve problems or determine the correct answer as you read because this may result in an unconscious pause or change in inflection that could be misleading or disconcerting to the test-taker. The expression on your face should remain neutral. Do not look at the test-taker or smile or frown to indicate approval or disapproval.
6. Read each question as clearly as possible. Give special emphasis to words printed in boldface, italics, or capitals, and tell the test-taker that the words are printed that way. Do not give your own emphasis to words not emphasized in print.
7. If you find an unfamiliar word or one that you are not sure how to pronounce, advise the test-taker of your uncertainty about the word and spell it.
8. When reading a word that is pronounced like another word with a different spelling, if there can be any doubt about which word is intended, spell the word after you have pronounced it.
9. Spell any words requested by the test-taker.
10. Avoid getting into conversation about the test questions, but try to respond to the test-taker's questions by repeating the item, words, or instructions as needed.
11. When reading passages, be alert to all punctuation marks. Read the passage through once so that the test-taker can grasp the content of the passage. Some test-takers may ask for the passage to be read through a second time with punctuation marks indicated. When required or asked to read, with punctuation, specific lines within a passage, indicate all punctuation found within those lines.

12. When test questions refer to particular lines of a passage, reread the lines before reading the question and answer choices. For example, you might say, "Question X refers to the following lines..." Reading the lines referred to would then be followed by reading question X and its response options.

Special Considerations for Multiple-Choice Tests

1. Be particularly careful to give equal stress to each response option and to read all of them before waiting for a response. The test-taker will record the answer or provide the answer to the test administrator (writer), who will record it for the test-taker.
2. If you are recording answers and if the test-taker designates a response choice by letter only ("D", for example), ask if you should reread the complete response before the answer is recorded.
3. If the test-taker chooses an answer before you have read all the answer choices, ask if you should read the other response options.
4. Allow the test-taker to pause before responding. However, if the test-taker pauses for a considerable time following your reading of the answer choices, say: "Do you want me to read the question again...or any part of it?" In rereading questions, be careful to avoid any special emphasis on words not emphasized in the printed copy by italics or capitals.

Mathematics Reading

A test-taker is permitted to ask the reader to write notes and to assist with intermediate steps in computing mathematics problems, especially if the test-taker has no tools or equipment for taking notes or is unable to do so. For example, in the multiplication of numbers (e.g., 17×521), a test-taker may say, "Seven times one is seven. Put down the seven. Seven twos are fourteen. Put down the four to the left of the seven and carry the one." The test-taker should be specific in directions to the reader as to what he or she writes, in which column to write it, what to carry, etc.

Mathematical expressions must be read precisely and with care to avoid misrepresentation for a test-taker who has no visual reference. For math items involving algebraic expressions or other mathematical notation, it may be preferable for the reader to silently read the entire question before reading it aloud to the test-taker. Use technically correct yet simple terms, and be consistent in the treatment of similar expressions. Some typical expressions and the manner in which they should be read follow:

1. (a)

Lowercase letters that are juxtaposed should be read as a multiplication expression: e.g.,

xy should be read as "x y," unless it is part of a complex expression or this reading is otherwise unclear, in which case read it as "x times y."

2. (b)

Capital and lower-case letters should be differentiated because they can have different meanings in mathematical or scientific expressions.

e.g. $R - 2y = 6$ should be read as "Capital R minus two y equals six."

3. (c)

Simple numerical fractions should be read as fractions: e.g.,

$5/6$ should be read as "five sixths."

However, similar letter expressions can be read as one letter "over" another: e.g.,

a / b should be read as "a over b."

4. (d)

To prevent confusion, complicated fractions (those that contain other mathematical operations) should be read in terms of their numerators and denominators: e.g.,

$b + d / c$ should be read as "a fraction with numerator b plus d and denominator c."

If there is any question as to where the fraction ends, say "end fraction."

5. (e)

Negative numbers should be read as "negative": e.g.,

-5 should be read as "negative five," not "minus five."

When a subtraction operation is involved, read the sign as "minus," e.g.:

$x - 5$ should be read as "x minus five."

6. (f)

Expressions containing multiple mathematical operations should be read exactly as they appear. Expressions containing parentheses or brackets can be read in any of the following three ways:

1. quantity, close quantity
2. paren, close paren (or bracket, close bracket)
3. left paren, right paren (or left bracket, right bracket)

For "paren, close paren" or "left paren, right paren," it is also acceptable to use "parenthesis" instead of "paren."

If you use the term "quantity," in complicated expressions, announce where enclosed portions end by saying "end quantity."

e.g., $(2x - 6y) - 10$ could be read

- As "The quantity two x minus six y, close quantity, minus ten;"
- As "paren, two x minus six y, close paren, minus ten;"
- Or as "left paren, two x minus six y, right paren, minus ten."

$a(x - y)$ could be read as "a, parenthesis, minus y, close parenthesis."

$a \times b^2$ could be read as "a times the square of b."

Use pauses to audibly group sections of an expression together.

$z + (-a)$ could be read as "z plus [PAUSE] paren negative a close paren."

(g)

If equations are used in the test you will be reading:

Since equations are a shorthand means of stating relationships between quantities, the reader's job is to translate this shorthand back into everyday English. Read equations in this order:

1. If the equation is numbered, read its number first.
2. Give the meaning of each letter or symbol.
3. Read the equation.

e.g.:

$$E = mc^2$$

E = energy in ergs

M = mass in grams

c = speed of light in cm./sec.

Eq. 6-2

Read as "Equation six dash two. Capital E equals energy in ergs, m equals mass in grams, and c equals the speed of light in centimeters per second. Then, Capital E equals m c squared."

Test Center Procedures for Using a Reader

1. An approved reader should be admitted to the test center with the test-taker. The reader's photo-bearing identification should be checked.
2. Prior to the start of the exam, the test center administrator/supervisor will review the Guidelines with the test-taker and the reader and will set the ground rules for the conduct of the examination.
3. The test administrator must remain in attendance at all times during the test administration.
4. An approved reader is not present to function as an aide to the test center staff. It is inappropriate to ask the reader to perform clerical duties of any kind. The reader should not be asked to assume any responsibilities belonging to either the center staff or the test-taker.
5. Test center staff must ensure that proper test security is maintained at all times. It is important that the test administrator ask questions and avoid any hasty interpretations of what may be communication of test content or exchange of information between the test-taker and the reader that might give the test-taker an unfair advantage. The task requested by the test-taker might be acceptable once understood. Discussion or communication concerning interpretation of test content is not permitted. If such discussion occurs and cannot be controlled, or if test center staff observe anything they deem unusual, the situation should be

reported on the Supervisor's Irregularity Report (SIR) or the Electronic Irregularity Report (EIR) and the test-taker advised of this action.

6. The test center administrator may also stop the test and dismiss the test-taker if he or she believes that the reader has provided the test-taker with any unfair advantage. In such instances, ETS reserves the right to cancel the test-taker's score.

References

Educational Testing Service. (2003). *ETS Guidelines for a Test Reader*. Retrieved November 26, 2003, from http://ets.org/search97cgi/s97_cgi

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