Georgia
# Milestones
Assessment System

# American Sign Language Guidelines
# 2017

This set of guidelines was produced by Data Recognition Corporation and The ADS Group using the Measured Progress document: Guidelines for the Development of American Sign Language Versions of Academic Content for K–12 Students as its basis.

# CONTACT INFORMATION

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## TEST SECURITY

Below is a list, although not inclusive, of actions that constitute a breach of test security:

- coaches examinees during testing, or alters or interferes with examinees' responses in any way;
- gives examinees access to test questions or prompts prior to testing;
- copies, reproduces, or uses in any manner inconsistent with test security regulations all or any portion of secure test booklets/online testing forms;
- makes answers available to examinees;
- reads or reviews test questions before, during (unless specified in the IEP, IAP, or EL/TPC), or after testing, this is applicable to both paper and online test forms;
- questions students about test content after the test administration;
- fails to follow security regulations for distribution and return of secure test materials as directed, or fails to account for all secure test materials before, during, and after testing (NOTE: lost test booklets constitute a breach of test security and will result in a referral to the Georgia Professional Standards Commission (GaPSC);
- uses or handles secure test booklets, answer documents, online testing logins/passwords/test forms for any purpose other than examination;
- fails to follow administration directions for the test;
- fails to properly secure and safeguard logins/passwords necessary for online test administration;
- erases, marks answers, or alters responses on an answer document or within an online test form;
- participates in, directs, aids, counsels, assists, encourages, or fails to report any of these prohibited acts.

## SECURE TEST MATERIALS—DO NOT COPY

All test booklets and supporting materials associated with the Georgia Milestones Assessment System are confidential and secure. No part of any test booklet or electronic online test form may be reproduced or transmitted in any form or by any means, including but not limited to electronic, mechanical, manual, or verbal (e.g., photocopying, photography, scanning, recording, paraphrasing—rewording or creating mirror items for instruction—and/or copying). Georgia Milestones materials must remain secure at all times and (excluding the *School and System Test Coordinator's Manual*, the *Paper-and-Pencil Examiner's Manual*, and the *Online Examiner's Manual*) cannot be viewed by any individual or entity prior to or after testing. To do so is a direct violation of testing policies and procedures established by Georgia law (§20-2-281) and State Board of Education (Rule 160-3-1-.07(4) in addition to copyright laws and the Georgia Code of Ethics for Educators. Georgia Milestones materials may not be provided to any persons except those conducting the test administration and those being tested. All test booklets (used and unused) and all supporting materials must be accounted for and returned at the completion of the test administration and in the manner prescribed in the *School and System Test Coordinator's Manual.*

# Table of Contents

# ADMINISTERING TESTS TO STUDENTS WITH AN AMERICAN SIGN LANGUAGE (ASL) ACCOMMODATION

The Video Sign Language (VSL) accommodation allows students to launch a video player within the INSIGHT system for items. The VSL accommodation will be available for all content areas: English Language Arts (ELA), Mathematics, Science, and Social Studies. To receive the VSL accommodation students need to have it listed in their IEP.

The Accommodations Chart can be found on the Georgia Department of Education (GaDOE) website at http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Documents/General%20Presentations/Allowable_Accommodations_for_Students_with_Disabilities_and_English_Learners_2016-2017.pdf

## Eligibility Guidelines: Reading of English Language Arts (ELA) Passages

### Guidance for Use of Conditional Accommodation 13: Sign ELA Passages

The use of this conditional accommodation for the English Language Arts (ELA) Georgia Milestones, regardless of grade level, must be restricted to only those students with IEPs who meet the **ALL** eligibility criteria outlined below:

1. The student is deaf and has a specific documented disability that severely limits or prevents his or her ability to decode text at any level of difficulty, even after varied and repeated attempts to teach the student to do so; **and**

2. The student has access to printed materials only through a sign-language interpreter or is provided with signed text or other electronic format during routine instruction; **and**

3. There are clear and specific goals within the student's IEP addressing the deficits which necessitate the need for this conditional accommodation.

Under secure conditions, supervised by the School or System Test Coordinator, the sign interpreter may review test materials prior to the test administration to plan appropriate signing. Please note a human interpreter must be used for those students who require reading of the English Language Arts passages.

## American Sign Language (ASL) Item Development Process

The process of developing high quality ASL representations of test items consists of five main steps: preparation, item drafting, video production, review and revision.

Prior to the start of ASL item development, a decision was made regarding how to handle content specific terminology for which there are no widely recognized ASL signs. The Georgia Department of Education (GaDOE) and the Advanced Duplication Services (ADS) Group worked together to develop an ASL glossary of linguistically appropriate content signs. The glossary was designed to provide consistency of signing across different items, forms, and interpreters. The development of the glossary occurred prior to ASL item development and the final glossary will be available for review prior to assessment. It is important to note that since the content-specific terms included in the glossary may not be widely recognized, when used as part of assessment, the terms will also be fingerspelled to aid comprehension. Fingerspelling is the process of presenting each letter of an English word or term individually, instead of presenting the ASL sign for the term.

The glossary was developed to mirror the read aloud guidelines and expanded upon to include Georgia specific signing guidelines. The glossary will be a living document that will be added to as necessary.

## Preparation

Preparation for the creation of ASL videos included a review of all test items by the production team. The team was tasked with discussing approaches that ensured the ASL versions of the items represent the content presented in the English text without changing what is being measured or the meaning. To accomplish this, the team worked through the assessment item-by-item. For each item, the team carefully considered and determined the meaning and the construct being measured. In addition, they analyzed the lexicon, the grammatical structure, and the cultural context. Following this, the team reconstructed the same meaning and measured the same construct using the lexicon and grammatical structure of ASL. As part of the process, the team considered how to apply the ASL guidelines and discussed how to address any potentially controversial interpretation issues. Decisions were made to balance the most linguistically and academically correct representation from a content perspective with the most accessible and understandable representation from a test-taker's perspective. Linguistic elements such as verb directionality, noun/pronoun structure, item set-up, perspective, use of space, fingerspelling, plurality, and dimensionality were discussed and decisions documented for later reference. This documentation will serve as the basis for drafting and recording ASL drafts of a subset of items.

## Application of Style Guide

A critical element in the VSL forms development is the involvement of Georgia educators, along with GaDOE content and assessment specialists. The GaDOE and GA educators reviewed and approved the Georgia ASL guidelines and the glossary of terms. ADS developed VSL forms for Secure Practice Tests (SPT) and Experience Online Testing Georgia (EOTG) based on the Georgia ASL guidelines. There was an in-state educator review of the SPT and EOTG forms where the reviews focused on ensuring that the forms adhere to the ASL guidelines and further refine the guidelines and the glossary as needed.

Based on the approved Style Guide, the team identified a subset of items for which draft ASL representations of operational items were created. The team consists of a deaf content expert, a bilingual interpreter, video production personnel and representation from the GaDOE. The ADS Group performed glossing activities for the purpose of creating draft ASL representations which enabled each team member to review the items that will likely require extended discussion prior to video production. The intent is to increase the efficiency of the in-person video production session by allowing progress and documentation of ideas before the group meets in person. To this end, the subset of items included a variety of item features, text complexity, and items that in the preparation stage were identified as challenging for ASL interpretation. The deaf content expert and bilingual interpreter created ASL drafts of each identified item, with the deaf content expert signing the items and the bilingual interpreter narrating the ASL translation in spoken English, explicitly noting how the ASL item differs from the English version, whether in structure, presentation, or other aspects. Each team member reviewed the items, making note of any concerns with the translation to create an operational test form.

## Video Production

Signers and the video production team members met to discuss any concerns they had with the draft ASL representations of the items. At this point all high level issues; such as approach, set-up, identifying words to be fingerspelled, etc., have been agreed upon. After discussions were completed, the video production team created the high quality ASL videos. The bilingual specialist spoken English narration of the items was included with the video files so that during the production phase of associating video files with text-based items, people who may not be fluent ASL users can ensure that the correct video is affiliated with the correct test item. Video production then performed post production activities.

### Review and Revision

A review of the products occurred once the production team completed their initial cut of the ASL videos. Item revisions were conducted prior to considering the videos complete. All items are reviewed by a native ASL educator and a content area specialist who were not a part of the original item development process. The items should be reviewed in the format that will be used for delivery to students; that is the English text item with embedded ASL video. A native ASL educator and content specialist review the items to ensure that the ASL versions of the items represent the content presented in the English text version of the item.

Reviewers will consider the amount of information presented in each item. If too little information is presented, the item may not provide students with appropriate access. Too much information may be a distraction to test-takers or provide an unfair advantage. The ASL educator will ensure that signing, including facial expressions, is clear and pacing is appropriate; that content vocabulary is signed whenever possible in order to support full comprehension. If a reviewer has major concerns about how the content is represented in ASL, they will suggest changes.

The final step in the item drafting process is the creation of VSL operational forms for Georgia Milestones End of Grade and End of Course assessments. There will be an educator review of the operational forms and revisions will be re-recorded.

## ASL Guidelines

When the language of an assessment changes, it raises concerns about the validity of inferences made from the test scores. In order for test scores on translated tests to be comparable with those from assessments administered in English, it is imperative that the translated test items represent the content presented in the English text in a way that does not change what is being measured. Maintaining the meaning of the test item does not entail a literal or direct word for word translation of the English text into the other language; in fact, this is highly likely to alter the original meaning. Rather, the translation must convey the same essential meaning of the original text while also adhering to the linguistic rules and conventions of the language into which the items are being translated. In order for the translated test to be fair and lead to valid conclusions about student proficiency in the target content area, the translation cannot alter the constructs measured by the item, lead or cue students to a particular response, or give an unfair advantage or disadvantage to the students who receive the translated version over students who receive the English version.

The purpose of these guidelines is to provide specific information on how to achieve this balance of conveying the construct in a manner that reflects the linguistic rules and conventions of ASL while at the same time maintaining the essential meaning of the item. This section contains guidelines on two important topics in ASL test item development: ASL Grammar and Content Guidelines. The *ASL Grammar Guidelines* section highlights key grammar rules that should be reviewed and considered for incorporation in all items.

## ASL Grammar Guidelines

1. **Syntax/grammatical structure.** Like all languages, ASL is rule-governed, operating on a specific set of linguistic principles that distinguish it from other languages, including English. ASL and English can express the same content, but employ different rules to do so. When creating ASL versions of test items, every sentence must be signed in a manner that conforms to rules governing ASL word order, sentence type, subject-verb-object agreement, prosody, and classifier constructions.
    a. **Word order.** ASL follows a set of syntactical (word order) rules in the composition of sentences. It is imperative when translating test items to adhere to the rules governing ASL syntax, rather than defaulting to the word order of the sentences as written in the English item. In order to convey the exact meaning of the test item, and prevent confusion, sentences must be composed carefully and thoughtfully, with respect to ASL syntax. For example, the first five words of the English sentence "Jamie goes to the store [to buy magazines]", is structured differently in ASL: the object is stated first (the store), the subject second, (Jamie), and finally the verb (goes).
    b. **Sentence types.** A variety of sentence types are used in ASL. Decisions about which sentence type to use should be guided by the content in the item, what is being measured, and maintaining students' interest and engagement. Some example sentence types are as follows:
        i. **Rhetorical questions.** In ASL, sentences can include rhetorical questions. For example, the English sentence "Jamie goes to the store to buy magazines" can be structured in ASL as "STORE, JAMIE GOES-to-it, WHY? to-BUY MAGAZINES."
        ii. **Conditionals.** Conditional sentences express hypothetical situations and their consequences, or factual implications. In ASL, non-manual grammatical features distinguish the dependent clause containing the conditional "if he buys two magazines" and the main clause conveying the consequence "how much money will he have left?" In addition, a brief pause after the dependent clause marks the transition to the main clause.
        iii. **Topic comment.** ASL sentences may be presented in a topic-comment structure. The topic is declared at the beginning of a sentence, and marked with linguistically correct non-manual grammatical features. The remainder of the sentence relates to the established topic, and is marked as the comment. To convey the same meaning as the English sentence "School is on Monday morning" the signer first introduces the topic, SCHOOL, and then completes the phrase by commenting on the topic, is-on-MONDAY MORNING.

    c. **Prosody.** Prosody in any language plays an important role in the production and perception of every utterance. Prosody provides mechanisms for organizing, sequencing, shifting topics, separating ideas, and providing hierarchy. In spoken languages, prosody manifests as pausing, inflection, and emphasis, expressed by altering the speech stream through stress, lengthening, and volume. In ASL, visual prosodic features also include pausing, inflection, and emphasis, and are expressed by altering the sign stream through stress, lengthening and varying use of sign space. It is important when developing ASL videos of test items that prosodic features are used in a linguistically appropriate manner to provide structure and organization, thereby ensuring that students have clear access to the test content.

d. **Classifier constructions.** Classifier construction uses the body, space, and time to represent settings, objects, and events. For example in the English sentence, "A car went up a hill and parked at the top", the signer would first sign CAR, then use a thumb up three hand-shape (thumb, forefinger and middle finger with thumb pointing up) to represent the car as a classifier, and a specific movement pattern to represent the car going up a hill and parking at the top. Manner and other adverbial information are also efficiently and appropriately conveyed in classifier constructions; e.g., a car moving quickly up a hill is represented differently than a car moving slowly.

e. **Non-manual grammar.** Non-manual grammar in sign languages is most often expressed on the face and conveys a rich array of information such as sentence type, topic marking, and adjectival and adverbial modifications. Grammatical markings include changing facial expressions through the eyes, cheeks, and mouth, and shifting body movements. Non-manual elements are very important components of ASL grammar as they add a layer of obligatory linguistic information "across" the signs being uttered.

   i. **Inflectional facial expression/sign movement.** Facial changes such as raised eyebrows, puffed cheeks, pursed lips, clenched teeth can all be used to show size, degree, manner, and temporal aspect (time) of what is being signed. As an example, the word "large" might be shown through a sign, where "huge" is shown using the same sign, with altered hand movement, puffed cheeks, and raised eyebrows.

   ii. **Negation/affirmation.** Non-manual markings for negation or affirmation can be layered across a sign, phrase or sentence, by simultaneously signing while also nodding the head "yes" or shaking the head "no." Timing is an important element in negation and affirmation; the correct signal must be applied over the correct string of signs to accurately convey the information desired. For example, to express "not" in the sentence "I will not be going tonight", the signer may add the non-manual marker of the head shaking "no" across the entire sentence. If "I will not be going tonight," is followed by, "but I will be going tomorrow," the initial negation quickly switches to affirmation at the appropriate moment.

2. **Noun/pronoun structures.** In ASL discourse a noun must first be stated before it can be referred back to as a pronoun. Pronouns in ASL involve pointing to a referent if it is physically present and visible to the signer. If the referent is not present, it is identified with a sign then designated as a referent in a location close to the signer's body. As an example, in the English sentences "A boy has five cakes. He sold three cakes at the school carnival," the boy would first be introduced with the sign for BOY, and then "assigned" a physical referent space close to the signer. From that point on, BOY would not be signed, rather the physical location that the signer previously established serves as a pronoun [equivalent to saying "he" in English]. Test items that contain proper names, such as "Jason has five boxes" are introduced according to this rule. The signer will begin by stating that there is a boy and his name is Jason. After introducing Jason, a physical referent point will be established, which, when pointed to, is the pronoun for Jason. Alternatively, the name will be fingerspelled to reintroduce Jason.

3. **Numbers and Plurality.** More than a dozen numbering systems have been identified in ASL; as a result, pluralization of actions and nouns are a complex process in ASL; some nouns and verbs can be inflected for plurality via numeral incorporation or a process known as reduplication and some cannot. When numeral incorporation or reduplication is ungrammatical, plurality must be expressed with additional signs, e.g., the sign for CAT followed by THREE to indicate three cats. Therefore, careful consideration should be given to presentation of numbers and plurality in test items. Two examples are presented below.
    a. **Number incorporation.** Number incorporation occurs when a number is included in a sign. For example, in the sign for "three years-old" the sign for AGE and the number THREE are combined to simultaneously include both pieces of information. To do so, the signer starts with the number three hand-shape in ASL (thumb, forefinger and middle finger) touching the chin at the tip of the forefinger. The THREE hand shape then moves away from the chin in a specific sweeping motion, which is the sign for "years old" or "age", creating one sign that has the equivalent meaning of a two or three word phrase in English.
    b. **Pluralization.** When nouns are pluralized, the linguistically correct movement such as sweeping, inflection of movement, reduplication, and repositioning must be used. For example, "he" changes to "they" by inflecting the single movement in the sign for "he" to a sweeping motion of the dominant hand to indicate there is more than one person.

4. **Verbs.** ASL verbs can be modified to show the type of action, incorporate subject and object information, and can include things like repeated action or action over time.
    a. **Appropriate directionality, pronoun and subject/object incorporation rules for ASL verbs.** Those verbs that are indexical, or incorporate information about subjects and objects, are signed in a specified path from subject to object. This movement path is the only way to differentiate such English sentences as "Sally walked home from school," and"Sally walked to school from home."
    b. **Temporal actions/repeated actions.** In ASL there are no grammatical tense markings on verbs; additional signs are used to mark past, present, or future action. However, there are many ways to modulate ASL verbs for verbal aspect, framing the action with respect to time (frequency or duration) using linguistically patterned signing, movements and beats. These are known as reduplication and aspect (placing the verb in an aspectual frame). Through reduplication, aspectual framing, or a combination of both, signers can show if something is happening regularly, continually, repeatedly or for an extended period of time. This process often differs from one ASL verb to the next. Verbal aspect is a complex linguistic process with somewhat unusual rules in ASL; therefore, careful consideration must be given to ensure appropriate choices are made when preparing ASL test items. In the ASL version of the sentence "Rachel and Joe study together every week" the verb STUDY is inflected with a specific movement pattern and beat to indicate that the studying happens regularly.

## Content Guidelines

This section describes guidelines for presenting specific types of test content in ASL: mathematical terms; mathematical expressions and equations; and graphs and images.

### Mathematical Terms

Test items in mathematics often include specific mathematical terms that are integral to the construct being measured. Many states' sign guidelines explicitly assert that some math terms need to be represented in English via fingerspelling because there is a concern that signing these terms may cue students to the correct answer and/or provide extra information. Fingerspelling is the process of presenting each letter of an English word or term individually, instead of presenting the ASL sign for the term.

- **When creating ASL versions of test items, it is important to consider construct violation issues and examine the extent to which a math sign provides comparable, more, or less information than the English word in print.** When item development teams engage in discussions about construct violation, it is important for team members to critically evaluate the meaning conveyed by both the individual ASL term(s) and the individual English term(s), as well as the meaning of the entire item conveyed in each language. For example, consider the term "triangle." The ASL term TRIANGLE is signed as a shape with three sides. If a test item is designed to assess whether or not students can identify a triangle from among a group of shapes, or describe the properties of a triangle, one might argue that the sign for triangle cues students to the correct answer because of its physical representation of a three sided figure. However, one might also argue that the word "triangle" when printed in English provides two key cues to students that could give them an advantage in answering the test item 1) "tri" could signal to the student that there are three of something and 2) "angle" tells the student that the shape includes angles. Looking at the meaning conveyed from these two perspectives, it is clear that the ASL sign and English word for triangle provide potential cues to the meaning of the word. This example illustrates the importance of critically examining both the ASL and English text for the term in question and examining each from multiple perspectives. Words in ASL and English provide meaning; sometimes the two languages provide different cues, but even then often of a similar type. It is important to use each language to convey the test content without focusing on direct or word-to-word translation.

- **Consider the additional cognitive complexity that is added to the test item when a term or terms are fingerspelled rather than signed.** Choosing to fingerspell terms over using ASL signs may add to the cognitive complexity of the test item because it requires students to decode and comprehend the English spelling of the term. Fingerspelling a word that has an ASL sign to a deaf student during an assessment is comparable to requiring a hearing student to listen to a word spelled aloud rather than allowing them to read the word in print. In both cases, the cognitive complexity is increased because the student has to first recognize a word that is being conveyed in an uncommon format before they can consider the meaning of the word. This increase in cognitive load could make it more difficult for the students to understand and respond to the item. There may also be issues related to cumulative fatigue when a high quantity of terms are fingerspelled across the assessment. In addition, it is important that fingerspelling used in assessment is consistent with the way fingerspelling is used during instruction.

- **Limit fingerspelling to cases where most students are unlikely to be familiar with an ASL term and where fingerspelling a term would be linguistically appropriate. When there is an ASL term available, it should be signed.** It is recommended to limit fingerspelling to cases where most students are (a) unlikely to be familiar with a sign and (b) where fingerspelling a term would be linguistically appropriate. Some examples include "quadrilateral", "estimates", and "function". When fingerspelling is used, the ASL term should be presented first, followed by the fingerspelled English term.

## Mathematical Expressions and Equations

Mathematical expressions and equations are a form of notation often incorporated into test items (e.g., X + Y = 45). Including mathematical expressions and equations in ASL assessment items could present two challenges to students' understanding of the content in the item. First, when items contain long or complex expressions and equations, the number of signs in the item increases greatly; this may add construct-irrelevant cognitive complexity to the information that a student needs to process while viewing the ASL version of the item. The second issue is that there can be more than one way to sign expressions and equations and if the method used in the ASL version of the item is not consistent with instruction, the student may be confused, resulting in compromised access to the test content.

- **Sign mathematical expressions and equations in ASL versions of test items.** It is recommended to sign mathematical expressions and equations in ASL test items and embed video clips of expressions and equations into items in such a way that viewing them is optional for the students, particularly when they appear in the answer options.

## Graphs and Images

When presenting test items in a visual-spatial language such as ASL it is important to consider how to pronominalize by establishing and referring to information in the space around the signer. In ASL, both abstract and concrete information can be presented spatially in a number of ways. Graphs and images are presented as viewed from the signer's perspective, not from the viewer's perspective, consistent with the rules of ASL.

- **Provide brief ASL descriptions of graphics and images.** Include brief descriptions of graphics and images over items where no description is provided.
- **When describing graphs, the characteristics of the graph in the ASL version should be consistent with the text-based version of the graph.** For example, if a line graph is being referred to, the signer should orient the graph from his/her own perspective on the horizontal or vertical plane and depict the line in the same direction and slope as the graph on the computer screen.
- **Graphs will be presented in the most linguistically appropriate way. In most cases this will be in general space in front of the signer's body.** The general space strategy is the most linguistically appropriate and easily seen on video.

## ASL Filming Considerations for Assessment Content

In addition to using video production specialists with prior experience developing ASL videos, high quality equipment to produce clear videos is also important. The following specifications and equipment will be utilized:

- Videos will be filmed at 1080 high definition.
- A teleprompter will be used that will allow for a "flip" from the computer screen to the monitor so that the signer, interpreter, and assessment/accessibility specialist can view the test item being signed and allows the team to edit the item with notes as needed.
- High quality lighting with a background that contrasts with the signer's skin tone will be used during filming.
- The signer will wear a similarly contrasting long sleeve shirt of a slightly darker or lighter shade so it doesn't blend in with the background. The signers clothing and jewelry will not be distracting.
- The signer will hold his/her hand in front of this backdrop or shirt and facing the camera when fingerspelling or signing numbers to ensure color contrast and visibility of all five fingers.
- The signer will present all content directly into the camera, orient their eye gaze correctly toward the video's "audience" and show their full face, torso, and both hands clearly. Pacing will be consistent with instruction.
- Videos will be shot from the waist up with enough room to the side and above the signer's body to allow for item set-up in space while maintaining a tight shot that all of the signer's non-manual grammar can be seen clearly.

Audio recording of the interpreter stating what was being signed and when during item production will be included to ensure that the correct video is associated with each item.

## Glossary - Guidelines for Specific Test Elements

Use the information described in the table below for examples of signing symbols, numbers, formulas, abbreviations, and other special information found in the Georgia assessments.

### Conventions

| DESCRIPTION | CONTENT AREA | HOW TO SIGN | EXAMPLE |
|---|---|---|---|
| Abbreviations | All | If a unit of measurement is abbreviated, sign each letter in the abbreviation versus each word being abbreviated. | "kg," NOT "kilograms" |
| All caps | All | Words in all caps will be signed as a word versus fingerspelled | BEST |
| Apostrophes | All | Signer should not sign "s" as "ess". It will be signed as the plural form of the word. | "Evelyn's table" should be signed as "Evelyns table" |
| Bullet points | All | Signer will pause between bullets and phrases. | |
| Dates | All | Dates will be signed using the complete words for days of the week, months of the year, and years. Numbers will be signed as appropriate. | June 16, 1978: "June sixteenth nineteen seventy-eight"<br>June 16th: June sixteenth"<br>1978: "Nineteen seventy-eight"<br>1900: "Nineteen hundred" |
| Time | All | When "AM" and "PM" appear in conjunction with a time zone, there will be a pause between the time of day and the time zone. | "2:30p.m. eastern" will be signed as "two thirty P M eastern" |

### Numbers

| DESCRIPTION | CONTENT AREA | HOW TO SIGN | EXAMPLE |
|---|---|---|---|
| Whole large numbers | All | Large numbers (numbers with more than 6 digits) will be signed as the numbers in order. If equation follows. If non-equation follows, normal rules. | "453,562,908" will be signed as "Four five three pause five six two pause nine zero eight" |

| DESCRIPTION | CONTENT AREA | HOW TO SIGN | EXAMPLE |
|---|---|---|---|
| Fractions | Math, Science, Social Studies | Simple fractions will be signed as "numerator over denominator"<br><br>Mixed numbers will be signed as "whole number and numerator over denominator"<br><br>Fractions that contain expressions and/or variables in the numerator or denominator will be signed as described in the example column. | $\frac{3}{4}$ will be signed as "three over four", NOT "three fourths"<br><br>$2\frac{3}{4} + 6\frac{7}{8}$ will be signed as "two and three over four, plus six and seven over eight"<br><br>$\frac{(3 - l)}{4 + 8 \div 2 \times 3}$ will be signed as "open parenthesis three minus one, close parenthesis, over four plus eight divided by two times three" |
| Exponents | Math, Science | For exponents 2 and 3; these will be signed as "squared" and "cubed". All other numeric exponents will be signed as "to the nth power"<br><br>An exponent of 0 will be signed as "to the zero power."<br><br>Variables presented as exponents will be signed as they appear. | $2^2$ will be signed as "two squared"<br><br>$6^{-5}$ will be signed as "six to the negative fifth power"<br>$3^0$ will be signed as "three to the zero power"<br><br>$2^x$ will be signed as "two to the x power" |
| Decimals | All | Decimals will be signed as "point". Digits after the decimal will be signed individually. | "3.504" will be signed as "three point five zero four"<br><br>"46.8" will be signed as "forty-six point eight" |

## Mathematical Symbols

| DESCRIPTION | CONTENT AREA | SYMBOL | HOW TO SIGN (ASL) |
|---|---|---|---|
| Denominations (money) | All | $ | $13.50 will be signed "dollar sign, thirteen point fifty"<br><br>$45.00 will be signed "dollar sign, forty-five point zero, zero"<br><br>$100.05 will be signed "dollar sign one hundred point zero five"<br><br>$0.45 "dollar sign point forty-five" |
| Mathematical Symbols | Math, Science | < | 5 < 10 will be signed "five is less than 10" or scale |
| Mathematical Symbols | Math, Science | > | 10 > 5 will be signed "ten is greater than 5" or scale |
| Mathematical Symbols | Math, Science | ≤ | A ≤ B will be signed "A is less than or equal to B" or scale |
| Mathematical Symbols | Math, Science | ≥ | A ≥ B will be signed "A is greater than or equal to B" |

| DESCRIPTION | CONTENT AREA | SYMBOL | HOW TO SIGN (ASL) |
|---|---|---|---|
| Mathematical Symbols | Math, Science | ~ | A ~ B will be signed “A is similar to B” |
| Mathematical Symbols | Math, Science | ≈ | A ≈ B will be signed “A is approximately equal to B” |
| Mathematical Symbols | Math, Science | ≠ | A ≠ B will be signed “A is not equal to B” |
| Mathematical Symbols | Math, Science | ≅ | A ≅ B will be signed “A is congruent to B” |
| Mathematical Symbols | Math, Science | + | A + B will be signed “A plus B” |
| Mathematical Symbols | Math, Science | – | A – B will be signed “A minus B” |
| Mathematical Symbols | Math, Science | ± | A ± B will be signed “A plus or minus B” |
| Mathematical Symbols | Math, Science | × | A × B will be signed “A times B” or not watch X |
| Mathematical Symbols | Math, Science | ÷ | A ÷ B will be signed “A divided by B” |
| Mathematical Symbols | Math, Science | –5 | This will be signed “negative five” |
| Mathematical Symbols | Math, Science | \|5\| | This will be signed “the absolute value of five” |
| Mathematical Symbols | All | °F | 75 °F will be signed “Seventy-five degrees Fahrenheit” or degree F |
| Mathematical Symbols | All | °C | 45 °C will be signed “forty-five degrees Celsius” or degree C |
| Mathematical Symbols | Math, Science | √ | This will be signed “radical” or R√ |
| Mathematical Symbols | Math, Science | Π | This will be signed “pi” |
| Mathematical Symbols | Math, Science | * | A * B will be signed “A times B” or Not watch X |
| Mathematical Symbols | Math, Science | $\theta$ | This will be signed “Theta” |
| Mathematical Symbols | Math, Science | α | This will be signed “Alpha” |
| Mathematical Symbols | Math, Science | ∞ | This will be signed “Infinity” |
| Mathematical Symbols | Math, Science | { } | {10,20,30,40} will be signed “the set of ten, twenty, thirty, forty” |

| DESCRIPTION | CONTENT AREA | SYMBOL | HOW TO SIGN (ASL) |
|---|---|---|---|
| Mathematical Symbols | Math, Science | (5, –6] | This will be signed as “open parenthesis, five, pause, negative 6, bracket” |
| Mathematical Symbols | Math, Science | $f(x)$ | This will be signed as “F of X” |
| Mathematical Symbols | Math, Science | (f o g)(x)= | This will be signed “the composition of ‘f’ of ‘x’ and ‘g’ of ‘x’ =” |
| Operations with boxes or shapes | Math | Δ + □ = 26 | This will be signed as “triangle plus box equals twenty-six” |

| DESCRIPTION | CONTENT AREA | HOW TO SIGN (ASL) |
|---|---|---|
| Formulas | Math, Science | Letters and numbers of mathematical formulas will be fingerspelled exactly as they are printed; no representations of letters will be made:<br>$A=bh$ will be signed as “Capital A equals b h” NOT “area equals base times height” |
| Elements or Compounds | Science | The chemical symbols and subscripts in a chemical formula will be signed as letters and numbers:<br>“$H_2O$” will be signed as “H two O”<br>“NaCl” will be fingerspelled as “N A C L”<br>In a chemical formula, a quantity before a chemical symbol or chemical formula is signed as a number. A right-facing arrow (or a double headed equilibrium arrow) will be signed as “yields”:<br>“$6CO_2 + 6H_2O + \text{Energy} \rightarrow C_6H_{12}O_6 + 6O_2$” will be signed as “six C O two plus six H two O plus energy yields C six H twelve O six plus six O two” |
| Angles and points | Math | Angles will be signed as they are named and without pauses:<br>When variables on a figure appear, such as Q’ R’ S’ T’, it will be signed as Q prime, R prime, S prime, T prime”<br>Angle ABC will be signed as “Angle ABC” |
| Line segments | Math | Line segments will be signed as “line segment XX”<br>$\overline{XY}$ will be signed as “line segment XY” |
| Trigonometric functions | Math | Trigonometric functions will be signed as full words.<br>“Sin 15°” will be signed as “sign fifteen degrees”. |

## Graphs

| DESCRIPTION | CONTENT AREA | HOW TO SIGN (ASL) |
|---|---|---|
| Venn Diagrams | All | The elements of Venn diagrams will be signed in the following order: titles, and then labels in the diagram |
| General | All | Sign the words in the graph or table, but do not interpret them in any way |

| DESCRIPTION | CONTENT AREA | HOW TO SIGN (ASL) |
|---|---|---|
| Coordinate Grids | All | Sign the title associated with the coordinate grid, as well as any headers or labels on the X- and Y-axes<br>Ex:<br>The Coordinate Grid is titled 'grid title'<br>The X-axis is titled 'X-axis'<br>The Y-axis is title 'Y-axis' |
| Graphs | All | Sign the title associated with the graph, as well as any headers<br>Ex:<br>The graph is titled 'world population'<br>The graph shows 'number of people' and 'Year' |
| Tables | All | Sign the titles of tables and any headers. Words within the table should be signed. Numbers should not be signed.<br>If the header of a row or column is a number, such as in a list, the numbers should be signed in this case.<br>Ex:<br>The table is titled 'Cars'<br>Columns are labeled 'makes' and 'models'<br>'Makes' are labeled 'Ford, Chevrolet, Toyota, etc.'<br>'Models' are labeled '2-Door, Sedan, SUV, etc.' |
| Line Plots | All | Sign text within line plots<br>Ex: The plot shows 'X' and 'Y' |
| Flowcharts | All | Sign text from left to right<br>Ex: The flowchart shows 'X', 'Y', and 'Z' |
| Pictures | All | If text in image is circled, highlighted, or called out in any way it should be signed. |
| Pie Charts | All | Sign words within pie charts by starting at the top and then working clockwise |
| Scatter Plot | All | Sign the title associated with the scatter plot, as well as any headers on the X- and Y-axes<br>Ex:<br>The scatter plot is titled 'grid title'<br>The X-axis is titled 'X-axis'<br>The Y-axis is title 'Y-axis' |