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Mathematics Audio Guidelines

**Version 10.00**

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| 10.8.15 | 3.2 | Added language to populate inline choice items – Refer to page 7. | H Woodruff |
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# Introduction

This document provides recommended guidelines for the audio representation of Mathematics (Math) items from the New Meridian item bank that are included on state assessment forms. These are not intended to be stringent rules, but instead guidelines for creating read-aloud scripts and tags that help students access the content of items while continuing to adhere to the specific constructs being measured.

For each content element listed, this document provides (1) the relevant Audio Guidelines, (2) item examples, and (3) application of the Audio Guidelines to the example items.

For content that contains visual elements beyond text, two types of audio guidelines are presented: “Text Only” and “Text and Graphics.” The “Text Only” guidelines are for students who only need words and symbols read to them to access the content. Examples of “Text Only” users include students with language processing needs and English learners. The “Text and Graphics” guidelines are for students who need descriptions and graphics provided to them to access the content. “Text and Graphics” users include students who are visually impaired.

**Note**: The guidelines provided here are also included in appendices to multiple, state-specific Accessibility Features and Accommodations manuals. The standalone version of the guidelines is produced for situations in which representatives from multiple states review/determine the audio accessibility of items intended for use on shared forms.

# Visuals

## Guidelines for Text-to-Speech Descriptions

Use these guidelines to describe visuals for text-to-speech scripts:

Read the title.

Provide a general overview of the image. (i.e., A map of South America, a graphic organizer with a center circle and four circles radiating outward)

Begin with the main section of the image.

Describe the details in a succinct manner using grade-level appropriate vocabulary.

Omit minor details that are irrelevant (a box to the left of the person).

If facial expressions or body language are important, do not assume a blind student can interpret them. For example, it is better to describe a person as worried than to state they have furrowed brows.

When describing several people in an image, label each one clearly so they are not mixed up. (i.e., tall man, elderly man, little boy)

Describe only what is seen in the image, do not provide interpretation or additional information.

## Reading Inline Choice Items

**Audio Guideline**

Read the problem and the directions. Read the first part of the stem; read all inline choice options then read the rest of the stem and all inline choices.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Hank bought 5 meters of ribbon for $4.  Use the drop-down menus to complete the sentence.  The ribbon costs $0.008, $0.08, $0.80 per millimeter, centimeter, kilometer. |

## Reading Drag and Drop Items

**Audio Guideline**

Read the problem and the directions. Answer choices are read as: “a box containing XXXX, a box containing XXXX, a box containing XXXX, a box containing the number XXXXX.”

For specific item type and structure check the appropriate section in this document.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Answer choices are read as: a box containing the number 1, a box containing the number 5, a box containing the number 8, a box containing the number 10.  Read the table from left to right beginning with the left column.  Specific for Input/Output table read,  The table has 2 columns and 4 rows. The first Column heading is Input. The second Column heading is Output.  row 1 Input, 1, Output, 4 (pause)  row 2 Input, blank, output 6 (pause)  row 3 Input 5, Output blank, (pause)  row 4 Input blank, Output blank. |

## Classifications for Embedded Coding Scheme for Text Descriptions

An embedded code within the alt text will be included for all test items with visual elements. Accessibility experts will be trained on this embedded coding scheme during the item tagging phase of item development. The embedded code will be classified as a 1, 2 or 3.

|  |  |
| --- | --- |
| **The description of each level** | **Example** |
| [1] is not construct-relevant and can be eliminated (e.g., it is only there for engagement purposes). | a picture of an elephant added purely for engagement would have alt text that reads “elephant [1]” or “picture of elephant [1].” |
| [2] is construct-relevant and can be represented using accompanying textual description. | The graph title is Roller Rink costs. Key, dashed line represents Roller Rink A, solid line represents Roller Rink B. The *x*-axis is labeled number of people. The *y*-axis is labeled cost in dollars. The dashed line starts at zero people, sixty dollars and points to a little less than sixteen people, midway between one hundred and one hundred ten dollars. The solid line starts at zero people, a little less than ten dollars and points to a little more than fourteen people, a little less than one hundred ten dollars. [2] |
| [3] is construct-relevant and can be represented using accompanying textual description together with a tactile representation or physical manipulative. | The graph title is Roller Rink costs. Key, dashed line represents Roller Rink A, solid line represents Roller Rink B. The *x*-axis is labeled number of people. The *y*-axis is labeled cost in dollars. [3] |

# Symbols

## Money

**Audio Guidelines**

Read dollars and cents if there is a decimal point.

Do not read shortcuts for numbers. For instance, $0.25 should be read as twenty-five cents instead of a quarter and $1.50 should be read as one dollar and fifty cents instead of a dollar and a half or one fifty.

This will allow a more standardized presentation of monetary quantities.

If the amount is less than one dollar, read “X cents” and do not read the zero ($0.35 is “thirty-five cents” not “zero dollars and thirty-five cents”). Likewise, do not read “and zero cents” ($4.00 is read “four dollars” and not “four dollars and zero cents”).

Read the number place value unless the question is measuring place value (refer to the large number section for details).

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| $4.35 | Four dollars and thirty-five cents |
| $2.50 | Two dollars and fifty cents |
| $5,390 | Five thousand three hundred ninety dollars |

## Angles/Triangles (and )

Read angles and shapes by leading with “angle,” “shape,” etc. and then reading letters individually.

When reading a transformed angle or shape that uses “ ʹ ” (one mark) describe as “prime”, “ ʹʹ “ (two marks), describe as “double prime” and “ ʹʹʹ “ (3 marks) describe as “triple prime”.

Do not reference the case of the letter unless an item includes uppercase and lowercase letters. In this instance, refer to the uppercase letters’ guideline.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Angle RST |
|  | Triangle RST |
|  | Triangle R prime S prime T prime |

## Ratio (:)

**Audio Guideline**

Read as “the ratio x to y.”

Sometimes the ratio symbol is used for fractions. This can usually be determined by context. If this is the case, refer to the fraction guideline.

If the “the ratio of” is used in the item, read as “x to y” to avoid being redundant.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 3:2 | The ratio three to two |

## Equal Signs (=)

**Audio Guideline**

Read as “equals.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Two plus three equals five. |

## Pi ()

**Audio Guideline**

Read as “pi.”

## Other Greek letters

**Audio Guideline**

Read as the Greek letter in most cases, unless using the closest English letter is clearer.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| sin α = 0.5 | sine alpha equals zero point five |
| **Density Formula** | “ρ” is the Greek letter rho, should be read “P equals fraction with …” since (a) there is no “P” in the formula, (b) the Greek letter closely resembles the English letter, and (c) use of the word “rho” is likely to be more distracting than helpful for text-to-speech users, since English readers may not know what a “rho” is. It is advisable to avoid formulas like this in item development (a “D” replaces the rho in some US textbooks), but given an item with uncommon Greek letters (other than alpha, beta, delta, theta, and perhaps a few others as may be determined on a case-by-case basis), math content specialists have found it most helpful in the past to use the closest English equivalent. |

## Approximately equal to ()

**Audio Guideline**

Read as “is approximately equal to.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Pi is approximately equal to three point one four. |

## Inequality Symbols (<, , >, )

* **Less than (<)**

**Audio Guideline**

Read as “is less than.”

If there is more than one “less than” sign in a string, then read the whole relationship together. Read the last part as “is less than.”

* **Less than or equal to ()**

**Audio Guideline**

Read as “is less than or equal to.”

* **Greater than (>)**

**Audio Guideline**

Read as “is greater than.”

If there is more than one “greater than” sign read the whole relationship together. Start the last part as “is greater than.”

* **Greater than or equal to ()**

**Audio Guideline**

Read as “is greater than or equal to.”

* **Not equal to ()**

**Audio Guideline**

Read as “is not equal to.”

|  |  |  |
| --- | --- | --- |
| **Inequality Symbol** | **Example** | **Application of Audio Guidelines** |
| **Less than (<)** | 3<5 | Three is less than five. |
|  | x is less than y is less than z. |
| **Less than or equal to ()** |  | Two x is less than or equal to six. |
| **Greater than (>)** | 7>5 | Seven is greater than five. |
|  | x is greater than y is greater than z. |
| **Greater than or equal to ()** |  | Three x is greater than or equal to six. |
| **Not equal to** |  | Two |

## Dashes (–)

**Audio Guideline**

When the dash is used to reference material or as a group of conditions, use “through” for consecutive and non-consecutive numbers.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| Pages 3–7 | Pages three through seven |

## Temperatures (°F and °C)

**Audio Guideline**

Read as “degrees Fahrenheit” and “degrees Celsius.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 35°F | Thirty-five degrees Fahrenheit |
| 25°C | Twenty-five degrees Celsius |

Parallel Line Segments

**Audio Guideline**

Read as “is parallel to.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Line segment *RS* is parallel to line segment *XY*. |

## Perpendiculars ()

**Audio Guideline**

Read as “is perpendicular to.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Line segment *EF* is perpendicular to line segment *GH*. |

Abbreviations

**Audio Guideline**

Present abbreviations by speaking the whole word the abbreviation represents.

If the item measures the ability to identify the meaning of the abbreviation, then read the abbreviation letter by letter.

If speaking the abbreviation violates the construct being measured, then read letter by letter.

If the item has measurements that are all uppercase or lowercase, then it is not necessary to reference the cases.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 3ft. | Three feet |
| What is the correct abbreviation for kilometer?  A. kl  B. K  C. km  D. klm | What is the correct abbreviation for kilometer?  A. lower-case k lower case l,  B. upper-case K  C. lower-case k lower-case m  D. lower-case k lower-case l lower-case m |
|  | Four square centimeters |
|  | Five cubic centimeters |

Measurements with marks for units

**Audio Guideline**

Present measurements by speaking the whole word the symbol represents.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 6” | Six inches |
| 12’ | Twelve feet |

## Number Symbol (#)

**Audio Guideline**

Read as “number.”

Rule refers only to when the symbol is being used to signify “number” as opposed to other non-mathematical uses of the symbol (for example, the pound key and the hash key).

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| Refer to step #5. | Refer to step number five. |

Empty/Unknown Boxes

**Audio Guideline**

Refer to an empty box in a formula or equation as “blank.”

Refer to a box with a question mark in it as “question mark.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Four plus two x equals blank. |
|  | Three plus *y* equals question mark. |

## **Arc Notation**

**Audio Guideline**

Read as “arc.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Arc RT |

## **Infinity**

**Audio Guideline**

Read as “infinity.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| As | As x approaches infinity, f of x approaches negative infinity. |

## **Percent** (%)

**Audio Guideline**

Read as “percent.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 35% | Thirty-five percent |

Line Segment, Line, and Ray

**Audio Guideline**

Read as “line segment,” “line,” or “ray” when they appear above letters or numbers.

|  |  |  |
| --- | --- | --- |
| **Type** | **Example** | **Application of Audio Guidelines** |
| Line segment |  | Line segment *FG* |
| Line |  | Line JK |
| Ray |  | ray *LM* |

## 

## Similar to ()

**Audio Guideline**

Read as “is similar to.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Triangle *EFG* is similar to triangle *JKL*. |

## Therefore

**Audio Guideline**

Read as “therefore.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| *A*=*B* and *B*=*C*  *A*=*C* | *A* equals *B* and *B* equals *C,* therefore *A* equals *C*. |

## Congruent ()

**Audio Guideline**

Read as “is congruent to.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Angle *FGH* is congruent to angle *JKL*. |

## Factorial (!)

**Audio Guideline**

Read as “factorial.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Five factorial equals *x*. |

## Plus or Minus Symbols ()

**Audio Guideline**

Read as “plus or minus.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| The margin of error is | The margin of error is plus or minus zero point eight. |

Subscript

**Audio Guideline**

Read as “x subscript y.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  |  |
| represents the maximum amount of interest. | When the variable is the letter A.Read as “the letter *A* subscript *i* represents the maximum amount of interest.” |

# Numbers

## Negative/Positive Numbers

**Audio Guideline**

Read as “negative.” Do not read the negative sign as a minus sign.

In most cases, consecutive negatives that are intended to show the negative of a negative will be represented with a set of parentheses. If this is the case, then refer to the parentheses section.

If the negative of a negative does not include parentheses, read as “negative (pause) negative.”

Two consecutive negatives should not be read as “negative negative X” if the operation is focused on subtraction. In this case, read as “minus negative X.” Note that this rule refers to numbers only. If, instead of a number, X is actually a variable or expression that includes variables, refer to the section entitled “Variables/Letters” below for the correct reading of expressions like .

If a positive sign precedes a number and is not part of an operation, then read as “positive.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Negative four |
|  | Four minus negative five |
| What is the distance between and on the number line? | What is the distance between positive four and negative three on the number line? |

## Large Whole Numbers

**Audio Guideline**

For items not measuring place value, read large numbers by referencing each digit’s place value.

If the item measures place value knowledge, read the number digit by digit using commas.

If reading the number as a whole number violates the construct being measured, read the number digit by digit.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 103,457 | One hundred three thousand, four hundred fifty-seven  Note: Use this application unless cueing occurs; then use the application in Example 2. |
| The state of Virginia covers one hundred two thousand, five hundred fifty-eight square kilometers of land. Which shows this number?   1. 1,258 2. 12,558 3. 102,558 4. 1,200,558 | A: one comma two five eight  B: one two comma five five eight  C: one zero two comma five five eight  D: one comma two zero zero comma five five eight |

## Fractions

**Audio Guideline**

Read fractions as “numerator of\_\_\_\_ (pause) and denominator of \_\_\_\_\_”.

When a fraction has an operation in the numerator or denominator (addition, subtraction, multiplication, division or exponents) denote the numerator and denominator using the guideline above and use appropriate pauses based on the guidelines in this document.

When an operation follows a fraction, pause between the fraction and the next operation.

**Special guidelines for common fractions unless the guideline violates the construct being measured.**

Read common fractions by presenting the numerator as the number it represents and the denominator as the ordinal number using two words for the whole presentation.

If the denominator is 2, read as half or halves, e.g. read as one-half and read as five halves.

If the denominator is between 3 and 10 inclusively, read as third, fourth, fifth, sixth, seventh, eighth, ninth, or tenth.

If the denominator is greater than 10, then read the number without reading it as ordinal, e.g., read denominator as eleven, instead of eleventh.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | One-half plus three-eighths |
|  | Fraction with numerator of 3 (pause) and denominator of 14 (pause) plus fraction with numerator of fifteen (pause) and denominator of one hundred (pause) minus fraction with numerator of x(pause) and denominator of two y |
|  | Fraction with numerator of three X plus Y (pause) and denominator of Z |
|  | Six-thirds |
|  | Fraction with numerator of three x (pause) and denominator of 5 (pause) plus x. |

## Mixed Numbers

**Audio Guideline**

Read with “and” between the whole number and the fraction.

Use fraction audio guidelines for reading fraction portion of mixed numbers.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Four and three fourths |
|  | Five and (pause) fraction with numerator of thirteen (pause) and denominator of 28 |

## Decimal Points

**Audio Guideline**

Describe the series of numbers or digits, and include the decimal using the word “point”. Read numbers from left to right. Do not include place value information, if providing place value information violates the construct being measured.

When there are more than six digits in the number or there is a comma in the number pause before continuing.

Read “repeating” where “…” or a line over a digit or digits represents the digit or digits that repeats.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 40.65 | Forty point six five |
| 3,450.084 | Three thousand pause four hundred fifty point zero eight four |
| 0.000000002 | Zero point zero zero zero (pause) zero zero zero (pause) zero zero two |
| 0.333. . . | Zero point three repeating |
|  | Five point one eight repeating one eight |

## Time

**Audio Guideline**

Read the time literally without using shortcuts or reading the time in reference to a different version of time (e.g., noon, quarter of six, ten after five).

Read a.m. and p.m. without adding language about the time of day (e.g., “in the morning” or “at night.”)

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 6:30 | Six thirty |
| 9 a.m. | Nine a m |
| 5:45 | Five forty-five |
| 5:00 p.m. | Five o’clock p m |

## Date

**Audio Guideline**

Read years as they would be read in plain language usage. For years after 1999, read “two thousand six” (for example) before 2010 and “twenty twelve” for years after 2009. However, when years comprise the axis of a graph or a sequence of table cells, maintain consistency in going from 2009 … 2010 … 2011 and use either convention (both are acceptable usage), except do not use the “two-thousand” style for years after 2019. For years after 2099, use the same style as for years between 1900 and 1999.

Read months as the full name even if abbreviations are presented in text.

Read days as you would when reading a date instead of reading the day as number (e.g., “second” instead of “two,” “third” instead of “three,” or “fourth” instead of “four”).

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| 1976 | Nineteen seventy-six |
| Feb. 5, 2003 | February fifth, two thousand three |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Population of Two Cities from 1975 to 2025 | | | | | | City | 1975 | 2000 | 2010 | 2025 | | Tokyo | 26.6 million | 34.4 million | 36.9 million | 37.1 million | | Delhi | 4.4 million | 15.7 million | 21.9 million | 28.6 million | | … city … nineteen seventy-five … two thousand … two thousand ten … twenty twenty-five … (Refer to the section entitled “Tables” for more information.) |

## Ordered Pairs

**Audio Guideline**

Read coordinate pairs as “ordered pair X, Y.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| Point R is | Point R is ordered pair negative two, four. |

## Probability

**Audio Guideline**

“P(text)” is the notation for probability. When reading a probability, do not read parentheses as “open parenthesis/closed parenthesis.” Read as “P of” word in parentheses “is” remaining text.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Probability of orange is one-sixth |

# Expressions/Equations/Operations

## Multiplication

**Audio Guideline**

Read the multiplication symbol as “times” when it appears in a math item.

When a number, symbol, or another set of parentheses appears before a set of parentheses, read the number or symbol as is and “open parenthesis” before what is within the parentheses. When multiple sets of parentheses appear consecutively, read as “open parenthesis” and “closed parenthesis.”

If there are two variables or a variable and a number consecutively, do not read “times” to represent implied multiplication.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Three times five equals *X*. |
|  | plus four *x* equals ten. |
|  | Open parenthesis three plus x, closed parenthesis, (pause) open parenthesis y minus two, closed parenthesis. |
|  | Five open parenthesis x plus one closed parenthesis |

## Addition

**Audio Guideline**

Read as “plus.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Four plus two plus three |

## Subtraction

**Audio Guideline**

Read as “minus.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Five minus three |

## Division

**Audio Guideline**

Read as “divided by.”

If the item presents the remainder as “R” read as “remainder” unless the item is measuring the meaning of “R.” In this case, read it as “R.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Twelve divided by four |
| What is  A: 10 R7  B: 11 R2  C: 12 | What is fifty-seven divided by five?  A: ten, remainder seven  B: eleven, remainder two  C: twelve |

## Parentheses

**Audio Guideline**

Read the parentheses by referring to the opening of the parentheses using the language “open parenthesis” and the closing of the parentheses using the language “closed parenthesis.”

It is important to reference the close of the parentheses to be clear on when the parenthetical expression ends.

When reading an equation or expression with multiple parts and sets of parentheses, pause to help differentiate between sections.

Read brackets using the same language as parentheses in the first guideline.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Three (pause) open parenthesis x plus y closed parenthesis (pause) equals six. |
|  | Two (pause) open parenthesis x plus three closed parenthesis (pause) plus (pause) fraction with numerator of open parenthesis y minus two closed parenthesis (pause) and denominator of three (pause) equals nine. |
|  | Open parenthesis x plus four closed parenthesis (pause) open bracket, open parenthesis, x plus four closed parenthesis (pause) minus open parenthesis x minus two closed parenthesis (pause) close bracket. |

Mathematical Exponents

**Audio Guideline**

Read the base first—the base can be either a numeral or a variable.

If the exponent has a value of 2, then read “squared.” If the exponent has a value of 3, read “cubed;” otherwise, read “raised to the \_\_\_ power” where \_\_\_ denotes either the ordinal of the number (fourth, fifth, negative seventy-fifth, etc.) if the exponent is an integer or the expression, as specified elsewhere in these guidelines, if the exponent is anything other than an integer.

To indicate a return to the base, use a pause.

Read fraction exponents following the fractions rule.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | y equals x squared. |
|  | y equals four raised to the fifth power (pause) plus two. |
|  | y equals two raised to the x plus five power (pause) plus three. |
|  | Sixteen raised to the three halves power equals eight squared. |
|  | Three raised to the five point five power equals open parenthesis Z plus 8 closed parenthesis, raised to the fraction with numerator of x (pause), and denominator of 2 power. |

## Variables/Letters

**Audio Guideline**

Read lowercase variables in a math item without referring to case.

If uppercase variables are used in a math item along with lowercase variables, then specify both cases using the language “lowercase” and “uppercase.”

If an uppercase variable appears in a math item without a lowercase variable, then do not specify uppercase.

If a variable is preceded by a negative sign, read as “opposite of” pause then read the variable, rather than the “negative of” the variable.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | *X* plus *y* equals three. |
| In the triangle, what is the measurement of angle A that is opposite side a? | In the triangle below, what is the measurement of angle uppercase A that is opposite side lowercase a? |
|  | *N* plus four |
|  | Opposite of (pause) x squared |

## Logs

**Audio Guideline**

Read “log” followed by the base, the word “of,” and then the number or variable.

If the log is shown without an explicit base, then read as “log” and the number or variable shown. Do not interpret the implied base of 10 if it is not written.

Read “ln x” as “natural log of x.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Log base ten of one hundred equals two. |
| If log 2 0.301 and log 3 0.477, what is the approximate value of log 72?   1. 0.051 2. 7.778 3. 0.861 4. 1.857 | If log two is approximately equal to zero point three zero one and log three is approximately equal to zero point four seven seven, what is the approximate value of log seventy-two? |
|  | Natural log of x |

## Radicals

**Audio Guideline**

For radicals with an implied radical index of two, read as “the square root of x.”

For radicals with a radical index of three, read as “the cube root of x.”

For radicals with a number for a radical index other than two or three, start by reading the index as “the nth root of.”

If the radical index is a variable, read as “the x root of y.”

When multiplying numbers by radicals (e.g., ), say “x times the square root of y.”

When the radicand (what is under the line that extends from the radical symbol) has more than one term then the radicand should be referenced as the quantity e.g. should be read the cube root of the quantity 2x minus y instead of the cube root of 2x minus y.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | The square root of two |
|  | The fourth root of one hundred forty-four equals the x root of two hundred eighty-eight. |
|  | The *m* root of quantity *x* plus *y* |
|  | X equals, fraction with numerator of, opposite of B, plus or minus the square root of the quantity, B squared minus four A C (pause), and denominator of two A. |

## Absolute Values

**Audio Guideline**

Read as “the absolute value of.”

Pause if an absolute value is part of a larger expression or equation.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | The absolute value of negative sixteen |
|  | The absolute value of the quantity two plus seven |
|  | The absolute value of x (pause) plus one. |

Functions ()

**Audio Guideline**

For function notation in general, read the first letter shown then the word “of,” followed by the variable and/or number in parentheses.

When the expression inside the parentheses is more complex or includes another function, use the same rule of reading the letter first, then the word “of,” followed by the variable or expression in parentheses.

When the inverse of a function is presented, read it as “the inverse of f of x”.

|  |  |
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| **Example** | **Application of Audio Guidelines** |
|  | f of x equals five |
|  | f of open parenthesis x plus one closed parenthesis |
|  | f of g of x |
|  | The inverse of f of x equals negative two-thirds x minus two. |

**For function tables where one column/row is paired with one row/column:**

The table should be read as it is organized, as (*x*, *y*) pairs, according to the [Tables](#_Text_and_Graphics) section of this document. (If the orientation of the table lends itself to reading the table information column by column and this is a more logical manner to present the table, then do so.)

Input/Output Tables: If reading each row as an ordered pair violates the construct being measured then read the table has two columns and XX rows. The first Column heading is Input. The second Column heading is Output. Read row 1, Input, *value or blank*, output *value or blank*, pause, row 2 *input value* or blank, output *value or blank* and so on.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| |  |  | | --- | --- | | *x* | *y* | | 3 | 14 | | 7 | 30 | | 9 | 38 | | The table has two columns and three rows. The first column heading is, x; the second column heading is, *y*. First row, 3, 14; second row, 7, 30; third row, 9, 38. |
| |  |  |  |  | | --- | --- | --- | --- | | ***x*** | 3 | 7 | 9 | | ***y*** | 14 | 30 | 38 | | The table has two rows and three columns. The first-row heading is, x; the second-row heading is, y. First column, 3, 14; second column, 7, 30; third column, 9, 38. |
|  | The table has 2 columns and 4 rows. The first Column heading is Input. The second Column heading is Output.  row 1 Input, 1, Output 4 (pause)  row 2 Input blank, output 6 (pause)  row 3 Input 5, Output blank, (pause)  row 4 Input blank, Output blank |

## System of Equations/Inequalities

**Audio Guideline**

Start by reading “system of equations” or “system of inequalities.” Then read the information in the system starting from the top to the bottom; reference the row position and insert a pause between rows.

Read equations and inequalities according to equation and inequality guidelines above.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
| What is the solution to the system of equations? | System of equations. Top row, x plus y equals four (pause) bottom row, x minus y equals two. What is the solution to the system of equations? |
| Which point lies in the solution set for the system  ?   1. (-4, -1) 2. (3,1) 3. (0, -3) 4. (4,3) | Which point lies in the solution set for the system, top row, two y minus x is greater than or equal to negative six (pause) bottom row, two y minus three x is less than negative six. |

## Trigonometry

**Audio Guideline**

Read the abbreviated versions of trigonometry functions in full words unless doing so does violates the construct being measured.

Sin reads as “sine”.

Cos reads as “cosine”.

Tan reads as “tangent”.

Cot reads as “cotangent”.

Sec reads as “secant”.

Csc reads as “cosecant”.

Use the Greek alphabet in reading trigonometric functions and items. The most used letter is theta (θ).

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines** |
|  | Sine fifteen degrees equals cosine seventy-five degrees |
|  | Tangent theta equals negative 1 |

# Tables and Graphs (Text Only & Text & Graphics)

## Tables

**Audio Guideline**

**Text Only**

Read the table title only. Allow for all content elements in the table to be read on demand.

**Text and Graphics**

Read the table title, and then state the number of rows and columns. Then read the column headings from left to right followed by reading the information in each row from left to right.

If the orientation of the table lends itself to reading table information column by column and this is a more logical manner to present the table, then do so.

Read the units of measure for each cell unless they are specified in the table.

When reading a data table that has blank cells, skip over them if they are unnecessary to answer the question. Blank cells should be read if this information is essential to answer the item.

Remain consistent with the style of reading from table to table. Using a standardized version will help students better understand the patterns of the descriptions.

Many charts that are set up in a table format can be read in the manner described. Determine the layout of such charts before deciding the best way to read the information being presented.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics** |
| Seashell Collection   |  |  | | --- | --- | | Size | Number of Seashells | | Small | 3 | | Medium | 6 | | Large | 4 | | The table title is Seashell Collection. The table has two columns and three rows. The first column heading is Size, the second column heading is Number of Seashells; first row, Small, three seashells; second row, Medium, six seashells; third row, Large, four seashells. |

## Tally Charts

**Audio Guideline**

**Text Only**

Read the tally chart title only. Allow for all content elements in the chart except for the tally marks to be read on demand.

**Text and Graphics**

Read the tally chart title, column headings, and row headings.

Read the number of tally marks only if it does not violate the construct being measured. If reading tally marks does violate the construct being measured, tactile representation is required to make this item accessible to blind students and some low-vision students.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | The tally chart has two columns and four rows. The first column heading is Name, and the second column heading is Number of Votes; first row, Tigers, six votes; second row, Rockets, three votes; third row, Sharks, seven votes; fourth row, Bobcats, four votes. |

## Bar Graphs

**Audio Guideline**

**Text Only**

Read the bar graph title. Allow for all words and numbers on the bar graph to be available to be read on demand.

**Text and Graphics**

Read the bar graph title first, followed by the horizontal label and the vertical label as long as horizontal and vertical are grade level appropriate vocabulary words. Avoid using x-axis and y-axis when describing bar graphs unless specified. Do not read values on either axis until describing the bars.

Describe each bar, being careful to consider the question, so as not to violate the construct being measured. In each description, use the units of measure for the values of the labels, if applicable.

If a bar is between two horizontal lines, then do not estimate or approximate numbers. Instead, use more general language such as “a little less than,” “a little more than,” and “midway between.”

If the item measures the student’s ability to identify the number associated with the bar, then describe the graph without noting the heights of the bars. In this case, tactile representation is required to make this item accessible to blind students and some low-vision students.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | Description of graph:  The bar graph title is Buttons in a Box. The horizontal label is Color, and the vertical label is Number of Buttons; Yellow bar, five buttons; Red bar, six buttons; Black bar, five buttons; Blue bar, three buttons; Green bar, two buttons. |
| How many red buttons are in the box? | (Note: this item specifically asks students to identify the value associated with a bar)  The bar graph title is Buttons in a Box. The horizontal label is Color and shows five colors: Yellow, Red, Black, Blue, and Green. The vertical label is Number of Buttons. |
| Kate asked the students in her class what their favorite fruit was. The results of her survey are shown in the graph below.student_fruit | The bar graph title is Students’ favorite fruits. The horizontal axis label is Fruit, and the vertical axis is label is Number of students. Four bars are shown, from left to right, banana, apple, orange, pineapple. |

## Histograms

**Audio Guideline**

**Text Only**

Read the histogram title. Allow for all words and numbers on the histogram to be available to be read on demand.

**Text and Graphics**

Read the histogram title first, followed by the horizontal label and the vertical label. Avoid using x-axis and y-axis when describing histogram unless specified. Do not read values on either axis until describing the bars.

Describe each bar, being careful to consider the question, so as not to violate the construct being measured. In each description, use the units of measure for the values of the labels, if applicable.

Describe each bar range on the horizontal axis, being careful to consider the question, so as not to violate the construct being measured. In each description use the units of measure labels on the horizontal and vertical axes, if applicable.

If a bar is between two horizontal lines, then do not estimate or approximate numbers. Instead, use more general language such as “a little less than,” “a little more than,” and “midway between.”

If the item measures the student’s ability to identify the number associated with the bar, then describe the graph without noting the heights of the bars. In this case, this item is not accessible to blind and some low-vision students without tactile representation.

If there are a large number of bars (more than 10) consider associating bars together or focusing on trends or more general frequency in your description.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | The histogram title is Life Spans of Eighty-Five Brand X Light Bulbs. The horizontal label is Number of Hours and the vertical label is Number of Light Bulbs; bar one, eight hundred through eight hundred ninety nine hours, thirteen light bulbs; bar two, nine hundred through nine hundred ninety nine hours, sixteen light bulbs; bar three, one thousand through one thousand ninety nine hours, nineteen light bulbs; bar four, one thousand one hundred through one thousand one hundred ninety nine hours, twenty one light bulbs; bar five, one thousand two hundred through one thousand two hundred ninety nine hours, sixteen light bulbs. |
| Description: Macintosh HD:Users:jenniferhiggins:Desktop:MCAS histogram.tiff | (item specifically asks student to read information from one of the bars)  The histogram title is Life Spans of Eighty-Five Brand X Light Bulbs. The horizontal label is Number of Hours and the vertical label is Number of Light Bulbs. Five bars show the number of light bulbs with a life span of eight hundred through eight hundred ninety nine hours, nine hundred through nine hundred ninety nine hours, one thousand through one thousand ninety nine hours, one thousand one hundred through one thousand one hundred ninety nine hours, one thousand two hundred through one thousand two hundred ninety nine hours. |

## Line and Piece-wise Linear Graphs

**Audio Guideline**

**Text Only**

Read the graph title only. Allow for all words and numbers in the graph area to be available to be read on demand.

**Text and Graphics**

For all graphs, read the title first.

Read the Key title and then key section (refer to Key rule specifically).

Read the axis labels.

When describing the graph, be as concise as possible while providing the necessary information to understand and answer the question.

If a line or point being described falls between two marked x- (horizontal) or y-(vertical) axis values, then do not estimate or approximate numbers. Instead, use more general language such as “a little less than,” “a little more than,” and “midway between.”

It is not necessary to describe the visual attributes of the graph unless there is an explicit need, such as a key that references line types or an item referencing the attributes or if doing so would help the student in reading a tactile or a magnified version of the test.

If the description violates the construct being measured, then consider amending it to give less specific information. In this case, tactile representation is required to make this item accessible to blind students and some low-vision students.

When possible, reference the starting and ending point of the line segments or starting points of rays to provide context to the student.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | The graph title is Population of Denton. The horizontal label is Year, and the vertical label is Population. The piecewise linear graph starts at nineteen fifty, one hundred thousand, rises to nineteen sixty, two hundred thousand, then nineteen seventy, midway between two hundred and two hundred fifteen thousand, then nineteen eighty, midway between two hundred fifty and three hundred thousand, and ends at nineteen ninety, three hundred fifty thousand. |
|  | The graph title is Roller Rink Costs. Key, dashed line represents Roller Rink A, solid line represents Roller Rink B. The x-axis is labeled Number of People. The y-axis is labeled Cost (in dollars). The dashed line starts at zero people, sixty dollars and moves up through midway between twelve and fourteen people, one hundred dollars and fourteen people, a little more than one hundred dollars. The solid line starts at zero people, a little less than ten dollars and moves up through between twelve and fourteen people, one hundred dollars and fourteen people, a little less than one hundred ten dollars. |

## Box Plots

**Audio Guideline**

**Text Only**

Read the box plot title. Allow for all words and numbers on the box plot to be available to be read on demand.

**Text and Graphics**

Start by reading the title of the plot and reference that it is a box plot. Read the box titles or any other words on the plot if applicable.

Read the information along the bottom of the graph from left to right.

Describe the graph elements using specific box plot terminology—including whiskers, quartiles, box, and median—unless doing so violates the construct being measured.

If the item measures knowledge of the box plot or if the description violates the construct being measured, then describe the box plot without using specific terminology such as whiskers, quartiles, or median. In this case, tactile representation is required to make this item accessible to blind students and some low-vision students.

If a line or point being described falls between two marked values, then do not estimate or approximate number. Instead use more general language such as “a little less than,” “a little more than,” and “midway between.”

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics Application of Audio Guidelines** |
| C:\Users\flanlo\Desktop\box plot.jpg The box plot shows the distribution of the daily high temperatures, in degrees Fahrenheit, in the town of Clifton during the year 2004.  Based on the box plot, in which of the intervals of temperatures is it most likely that exactly 50% of the daily high temperatures are located? | The title of the box plot is Daily High Temperatures (in degrees Fahrenheit). The number line ranges from thirty degrees Fahrenheit to one hundred degrees Fahrenheit. The whiskers range from thirty-eight degrees to ninety-six degrees and the box ranges from fifty-four to eighty-one degrees with a median of seventy-two degrees. |
| C:\Users\flanlo\Desktop\box plot.jpgThe box plot represents the daily high temperatures at a beach in April.  What was the median daily high temperature? | The title of the box plot is Daily High Temperatures. The number line ranges from sixty degrees Fahrenheit to one hundred degrees Fahrenheit with markers every ten degrees. The whiskers range from sixty-two degrees to eighty-four degrees and the box ranges from sixty-eight degrees to seventy-eight degrees with **an interior vertical line segment at seventy-two degrees.** |
|  | The title of the box plot is Heights of Plants (centimeters). The number line ranges from 47 to 57 with markers every whole number. For the experimental group, the whiskers range from 48 centimeters to 55 centimeters and the box ranges from 49 centimeters to 53 centimeters with a median of 51 centimeters. For the control group, the whiskers range from 47 centimeters to 54 centimeters and the box ranges from 48 centimeters to 51 centimeters with a median of 50 centimeters. |

## Scatter Plots

**Audio Guideline**

**Text Only**

Read the title of the scatter plot. Allow for all words and numbers on the scatter plot to be available to be read on demand.

**Text and Graphics**

For scatter plots, start by reading the title and axes labels. Include the horizontal and vertical ranges if necessary, to access the item. The axes may or may not be labeled x and y. In some cases, the rightmost extension of the horizontal axis and/or topmost extension of the vertical axis has no value specified. When specifying the ranges, use either the greatest number listed or the actual value at the rightmost or topmost extension of the axes, whichever is more appropriate.

For a scatter plot with fewer than ten data points, reference each data point. Include units of measure while describing data points only if deemed relevant.

If a line or point being described falls between two marked values do not estimate or approximate numbers. Instead use more general language such as “a little less than,” “a little more than,” and “midway between.”

If a scatter plot has more than ten data points, then focus on the change of concentration. When possible, read at least a few data points (first and last point and points throughout the scatter preferably) to put the plot into context.

For some items with scatter plots, tactile representation is required to make the item accessible to blind students and some low-vision students.

|  |  |
| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics** |
| Shipping Shoes | The graph is a scatter plot titled “Middle School Enrollment.” The horizontal axis is labeled Number of Years Since 1997 and ranges from zero to fifteen in increments of one. The vertical is labeled Number of Students Enrolled and ranges from zero to three hundred eighty in increments of twenty. The scatter plot has a beginning point at zero, a little less than one hundred eighty and an end point at fourteen a little more than three hundred twenty. There is a point at three, a little more than two hundred twenty, a point at seven two hundred sixty and a point at twelve a little more than three hundred. |
|  | The graph is a scatter plot titled Rainfall and Plant Growth. The horizontal axis is labeled Average Rainfall, in units of millimeters per year and ranges from zero to four thousand and is marked in increments of five hundred. The vertical axis is labeled Plant Tissue Production in units of grams per meter squared per year, ranging from zero to three thousand and is marked in increments of two hundred fifty. The graph has approximately eighty-five points scattered in a pattern beginning in the lower-left corner where Plant Tissue Production and Average Rainfall are the lowest. The pattern extends toward the upper-right corner where Plant Tissue Production and Average Rainfall are the highest. The majority of points are concentrated in the lower-left corner and diminishes in concentration as the pattern extends toward the upper-right corner. |

## Coordinate Plane

**Audio Guideline**

**Text Only**

Start by reading the title of the coordinate plane. Allow for all words and numbers on the coordinate plane to be available to be read on demand.

**Text and Graphics**

Read the title of the coordinate plane and state that this item contains a two-dimensional coordinate plane.

Read the range of each axis. In some cases, the extensions of the x- and/or y-axis have no value specified. When specifying the ranges, use either the greatest (or least for bottom and left extensions) number listed or the actual value at the furthest extension of the axes, whichever is more appropriate.

Read the points or words on the coordinate plane in a logical manner referencing their location without violating the construct being measured. Read in the same order that is provided in the text of the item which is either clockwise or counterclockwise so that corresponding vertices align if there are multiple figures.

If a line or point being described falls between two marked x- or y-axis values, then do not estimate or approximate numbers. Instead, use more general language such as “a little less than,” “a little more than,” and “midway between.”

If reading the location of the points violates the construct being measured, do not read the point, but reference that they are on the grid. In this case, tactile representation is required to make the item accessible to blind students and some low-vision students.

If there is a shape on the grid, then read the type of shape or name of it as provided in the text of the item, and then reference vertices and other points, if relevant. If referencing the axis points violates the construct being measured, then provide a description of the shape without these points.

If an empty grid is presented in an item as part of the prompt, question, or answer then read the title and the x- and y- axes scale.

| **Example** | **Application of Audio Guidelines for Text and Graphics** |
| --- | --- |
|  | A coordinate plane with x- and y-axes ranging from negative six to six; point Q, negative five, negative four; point R, negative three, two; and point W, one, three. |
|  | A coordinate plane with x- and y-axes ranging from zero to six. The grid shows the location of the four schools: Jackson, Prairie View, Cedar Crest, and Lincoln. |
|  | A coordinate plane with *x*- and *y*-axes ranging from negative six to six. Rectangle *ABCD* is shown on the grid. |

## Graphs of Non-linear Functions

**Audio Guideline**

**Text Only**

Start by reading the title of the graph. Allow for all words and numbers on the graph to be available to be read on demand.

**Text and Graphics**

Read the title of the graph.

Read the range of each axes and any words or symbols that are on the graph. In some cases, the extensions of the x- and/or y-axis have no value specified. When specifying the ranges, use either the greatest (or least for bottom and left extensions) number listed or the actual value at the furthest extension of the axes, whichever is more appropriate.

Describe the shape of the graph. Use relevant points including starting and ending points or x or y intersection points to aid the description.

If a graph or point being described falls between two marked x- or y-axes values, then do not estimate or approximate numbers. Instead use more general language such as “a little less than,” “a little more than,” and “midway between.”

If reading the location of any points violates the construct being measured, then do not read these points. If describing the shape or direction of the graph violates the construct, then do not read the details of the shape of the graph. In this case, tactile representation is required to make the item accessible to blind students and some low-vision students.

| **Example** | **Application of Audio Guidelines for Text and Graphics** |
| --- | --- |
|  | A graph showing the function y equals f of x. The x-axis ranges from negative four (or three) to seven (or six), and the y-axis ranges from negative six (or negative four) to five (or four). The graph is in the shape of a wave. The graph starts at negative three zero, goes through zero negative four, then two zero, then four three, then six zero, and ends with an arrow pointing up at a midway between six and seven, one. |
|  | A graph showing y equals x squared. The x-axis range is from negative six to positive six. The y-axis range is from negative six to six. The graph is a parabola that starts with an arrow at midway between negative two and negative three, six, and then the graph moves down through zero zero, and goes up and ends with an arrow midway between two and three, six. |

## Graphs of a System of inequalities

**Audio Guideline**

**Text and Graphics**

When reading a system of inequalities, read the range of each axes and any words or symbols that are on the graph. State the type of graph and the number of graphs, e.g. one line and one parabola are graphed, as long as it does not violate the construct being measured. Describe whether or not each constraint is dotted or solid. Describe the shaded area using “above” and “below” with appropriate colors. Use “left” and “right” when a graph is vertical.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
| Which graph represents the solution to this system of inequalities?  y > 2x — 4 3x — 6y ≥ 6 | **Text and Graphics**  **A system of inequalities and a graph such as this would be described as follows:**  Which graph represents the solution to this system of inequalities, top row, Y is greater than 2 X minus 4; bottom row, 3 X minus 6 Y is greater than or equal to 6.  A graph showing two lines and three shaded regions. The x axis ranges from negative 9 to 9. The y axis ranges from negative 11 to 5. A solid line starts at negative 9, a little less than negative 5; rises to zero, negative 1; then 2, zero; and ends at 9, a little more than 3. The area below the solid line is shaded gray. A dashed line starts at a little less than negative 3, negative 11; rises to zero, negative 4; then 2, zero; and ends at a little more than 4, 5. The area above the dashed line is shaded gray. The area of overlap is shaded darker gray. |

# Diagrams/Figures/Keys

## Tree Diagram

**Audio Guideline**

**Text Only**

Read the tree diagram title. Allow for all words and numbers on the tree diagram to be available to be read on demand.

**Text and Graphics**

Read the tree diagram title and brief description along with stating the direction of the tree diagram.

Start with the innermost parts of the tree and describe the different limbs in an order that is easy to follow.

Describe all the elements of the tree diagram with standardized language.

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| **Example** | **Application of Audio Guidelines** |
|  | A tree diagram showing outfit combinations of shirts, pants, and shoes. The diagram displays information from left to right starting with shirts on the leftmost branches. On the top half of the tree, white shirt branches to blue pants, black pants, and tan pants. Each of these pants branches stems to the outermost branches of white shoes and black shoes. On the bottom half of the tree, red shirt branches to blue pants, black pants, and tan pants. Each of these pants branches stems to the outermost branches of white shoes and black shoes. |

## Keys

**Audio Guideline**

**Text Only**

Read the word Key after reading the graph/diagram title. Allow for all words and numbers in the key to be available to be read on demand.

**Text and Graphics Guidelines**

Read the graph/diagram title and then the key.

Describe the key in detail, including shapes, shades, and so on. Use “represents” to associate icon with text. (e.g., –10 miles. Dashed line represents ten miles.)

Read the graph/diagram using the key symbols. (e.g., May, white bar, two; May, gray bar, a little less than one)

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | The bar graph title is Museum Visitors. In the Key, the white bar represents Art Museum Visitors, while the gray bar represents Science Museum Visitors. The horizontal axis shows five months; the vertical axis is labeled Number of Visitors (thousands); May, white bar, two; May, gray bar, a little less than one; June, white bar, four; June, gray bar, midway between seven and eight; July, white bar, a little more than seven; July, gray bar, six; August, white bar, a little more than five; August, gray bar, six; September, white bar, a little less than five; September, gray bar, a little more than seven. |

## Line Plots

**Audio Guideline**

**Text Only**

Read the line plot title. Allow for all words and numbers on the line plot and on the key to be available to be read on demand.

**Text and Graphics**

Read the title of the line plot, the key, and then the horizontal label.

Use the key symbol to describe the line plot instead of interpreting the symbol.

If there are no x’s or symbols above a number, then read this as zero instead of skipping it.

Be careful not to violate the construct being measured. Read the range of numbers on the horizontal axis without reading the data, if necessary. In this case, tactile representation is required to make the item accessible to blind students and some low-vision students.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | The title of the line plot is Books We Read in May. The key shows that an x represents one student. The number line title is Number of Books and ranges from one to seven in increments of one; at line plot one, zero x’s are shown; at line plot two, one x is shown; at line plot three, two x’s are shown; at line plot four, one x is shown; at line plot five, two x’s are shown; at line plot six, five x’s are shown; and at line plot seven, four x’s are shown. |

## Shaded Figures (Grids, Bars, and Shapes)

**Audio Guideline**

**Text Only**

Read the title of the shaded figure. Allow for all words and numbers in the figure to be available to be read on demand.

**Text and Graphics**

Read the title if there is one, and then describe the dimensions of the figure first. If possible, read the dimensions of the figure (ten by ten) instead of just the number of boxes.

Explain how many boxes are shaded, but do not use “x of y boxes are shaded”. This creates the fraction for the student and will often violate the construct being measured.

When students should use information from the figures to determine the number of boxes shaded, do not state the total number of boxes shaded, e.g., read seven columns of ten boxes shaded, instead of seventy boxes.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | A fraction of the fish shown below is shaded gray. The graphic shows four fish. Three of them are shaded gray.  Which grid below is shaded gray to represent a fraction with the same value?  A. ten by ten box grid with seven boxes shaded  B. ten by ten box grid with three columns of ten boxes shaded  C. ten by ten box grid with eight columns of ten boxes shaded and five additional boxes shaded  D. ten by ten box grid with seven columns of ten boxes shaded and  five additional boxes shaded |

## Pictographs

**Audio Guideline**

**Text Only**

Read the title of the pictograph. Allow for all words and numbers in the pictograph or key to be available to be read on demand.

**Text and Graphics**

Start by reading the title of the pictograph and then the key.

If the pictograph is in a table format, then refer to the table guidelines.

If the pictograph is in a graph format, then refer to the graph guidelines.

Reference the picture being used in general terms without describing it in detail. Use the key to read the pictograph without interpreting it. When describing a pictograph, reference “picture of x,” since the scale may not be one to one.

In some cases, tactile representation is required to make the item accessible to blind students and some low-vision students.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | The pictograph title is Dogs at the Park. The Key shows a picture of a dog represents one dog. The table has two columns and four rows; column heading one is Type of Dog; column heading two is Number of Dogs; row one, Beagle, picture of two dogs; row two, Collie, picture of three dogs; row three, Poodle, picture of one dog; row four, Dalmatian, picture of four dogs. |

## Figures/Illustrations

**Audio Guideline**

**Text Only**

Read the title of the figure/illustration or any caption that is being used in the title format. Allow for all words and numbers in the pictograph or key to be available to be read on demand.

**Text and Graphics**

Read the title of the figure or illustration. Include the caption in the description if it is not included in the surrounding text.

Read any scale before describing parts of the figure.

Remember that the goal is to help the student understand the pertinent information in the diagram. Try to include descriptions of all shapes and figures. Do not to overload the student with descriptions that are overly wordy or not needed to answer the question. Separate the information into pieces using sentences, bullet points, or lists. Use similar language to describe all parts of the diagram or illustration. Standardized language will help ensure comprehension.

Do not use definitions or parts of definitions that are part of the construct being measured. If the description could violate the construct being measured, then adjust the description to be vague.

In some cases, tactile representation is required to make the item accessible to blind students and some low-vision students.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
| The shape shown has a perimeter of 34 feet.  What is the length of the side that is missing a number? | The shape shown has a perimeter of 34 feet.  A five-sided shape is shown. The length of each side is labeled as follows:  question mark feet,  eight feet,  10 feet,  4 feet, and  5 feet  What is the length of the side that is missing a number? |
|  | Example 2  A diagram showing a rectangular section of a river is illustrated. Triangle PQR shows Pam’s trip across the river with all three points of the triangle touching a side of the river. Point P is on the left side of the river, and points Q and R are on the right side of the river. Point Q is the vertex of a right angle. The distance from P to Q is one hundred feet. The distance from Q to R is sixty feet. |

## Number Lines

**Audio Guideline**

**Text Only**

Read the title of the number line only or any caption that is being used in the title format. Allow all letters, words, and number on the number line to be available on demand.

**Text and Graphics**

Start by reading the title of the number line.

Read the range on the bottom along with the increments displayed.

Read the letters or words on the number line along with their location. Be careful not to violate the construct being measured in doing so. In some cases, tactile representation is required to make the item accessible to blind students and some low-vision students.

If a point being described falls between two marked values, then do not estimate or approximate numbers. Instead, use more general language such as “is located a little after,” “is located a little before,” “is closer to,” and “is midway between.”

For bolded number lines, describe which parts are bolded.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | A number line is shown with points A, B, C, and D and three equally spaced tick marks between the values of zero and one. Point A is located between zero and the first tick mark, and is closer to zero; point B is located between the second and third tick marks, and is much closer to the second tick mark; while point C and point D are closer to the value one. |
|  | A number line shows zero and one with three tick marks in between: one-fourth, one-half, and three-fourths. Point A is marked midway between one-half and three-fourths. |
|  | A number line shows from negative twenty to positive twenty in increments of five. An open circle is located at negative ten. A bold line extends left from negative ten to a bolded arrow on the left end.  An open circle is located ten. A bold line extends right to a bolded arrow on the right end. |

## Spinners

**Audio Guideline**

**Text Only**

Read the title of the spinner only. Allow for all letters, words, and numbers on the spinner to be available on demand.

**Text and Graphics**

Read the title of the spinner and reference it as a spinner.

Read any words, symbols, or numbers in the spinner, starting at the top and moving clockwise.

If necessary, describe the sizes of each section. Be sure not to violate the construct being measured in doing so. In some cases, tactile representation is required to make the item accessible to blind students and some low-vision students.

When describing the size of sections, do not estimate or approximate a specific size if it is not labeled. Instead, use more general language such as “less than,” “more than,” and “half of.” Exceptions are for one-fourth, one-third, one-half, two-thirds, and three-fourths that are immediately apparent.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | **Grades 7 and lower:** A spinner is divided into eight sections of the same size. One number in each section is shown. From the top moving clockwise, the sections read three, four, two, one, three, one, two, one.  **Grades 8 and higher:** A spinner divided into eight congruent sections. One number in each section is shown. From the top moving clockwise, the sections read three, four, two, one, three, one, two, one. |
|  | There are three spinners shown labeled Spinner A, Spinner B, and Spinner C. Each spinner is divided into three sections. In Spinner A, one-half of the spinner is labeled yellow, one-fourth of the spinner is labeled blue, and one-fourth of the spinner is labeled red. In Spinner B, three-fourths of the spinner is labeled yellow, and the other part is divided evenly and labeled blue and red. In Spinner C, about one-third of the spinner is labeled yellow, about one-third of the spinner is labeled red, and about one-third of the spinner is labeled blue. |

# Coins and Dollars

**Audio Guideline**

**Text and Graphics**

Describe the money using standard language (penny, dime, quarter, or dollar).

Be sure to read each currency symbol as a symbol and not to interpret the value. (e.g., two quarters instead of fifty cents, or three dimes instead of thirty cents).

If reading the currency symbols violates the construct being measured, tactile representation is required to make the item accessible to blind students and some low-vision students.

See Symbols [Money](#_Money) Section of this document.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | 1. shows two quarters, one dime, and three pennies. 2. shows two quarters, two dimes, and three pennies. 3. shows three quarters and two pennies. 4. shows one one-dollar bill, one quarter, one dime, and two pennies. |

## Numbered/Step Diagrams/Patterns

**Audio Guideline**

**Text Only**

Read the title of the diagram only. Allow for all letters, words, and numbers on the diagram to be available to be read on demand.

**Text and Graphics**

Read the title of the diagram and a brief orientation of what the diagram shows.

In logical order (left to right or top to bottom), read the steps or diagram numbers along with a description of the figures in each step.

Describe the figures with enough detail to understand the item. Unless necessary, do not detail the specific characteristics of the figures being used. (e.g., color, size, location, shape, etc.)

If the description violates the construct being measured (e.g., if the question asks, “How many circles are in step 1?”), then adjust the description to be vague.

In this case, tactile representation is required to make the item accessible to blind students and some low-vision students.

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| **Example** | **Application of Audio Guidelines for Text and Graphics Application of Audio Guidelines** |
|  | A diagram shows four steps of a pattern using circles and squares. Step one shows a square and four circles, step two shows two squares and seven circles, step three shows three squares and ten circles, and step four shows four squares and thirteen circles. |

## Geometric Figures

**Audio Guideline**

**Text Only**

Read the title of the shape(s) only. Allow for all labels of sides or angles to be available on demand.

**Text and Graphics**

Simple shapes (any 2D shape with eight sides or fewer): Reference simple shapes as is unless the item is measuring identification of a shape. If the item contains a simple shape, reference it without description. If there are unique attributes to the shape, describe those attributes in as few words as possible. Be sure to reference labels of sides, angles, and so on, as long as doing so does not violate the construct being measured.

3D shapes/figures: Reference the type of figure.

If relevant and does not violate the construct being measured, describe the figure including the number of faces. In some cases, if a certain description would violate the construct, tactile representation is required to make the item accessible to blind students and some low-vision students.

Be sure to reference labels of faces, angles, and so on.

Refer to the coordinate plane section for reading shapes on coordinate planes.

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| --- | --- |
| **Example** | **Application of Audio Guidelines for Text and Graphics** |
|  | A square and four triangles that have the same size and shape are shown. |
|  | A diagram shows a right triangle. The triangle shows a right angle in the left bottom corner, a thirty-five-degree angle at the top, with no angle reference in the bottom-right corner. A ray extends from the right angle and forms an angle on the outside of the triangle at the bottom right corner. Outside the bottom-right corner of the triangle there is a symbol marking an exterior angle labeled one. |
|  | Four figures are shown. Figure P is a pentagonal pyramid, Figure Q is a rectangular prism, Figure R is a triangular prism, and Figure S is a triangular pyramid. |

## For geometric figures with multiple lines

**Audio Guidelines**

Diagrams with internal angles should generally be described clockwise, beginning at the 12:00 position or a logical point of origin in the diagram or in the order that is provided in the text of the item.

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| **Example** | **Application of Audio Guidelines for Text and Graphics** |
| Bicyclists at National Park can choose one of three bike paths from the visitors’ center, as shown in this diagram. | A diagram shows three rays, each originating at the same point. The first ray, drawn horizontally to the right, is labeled Path 1. The second ray, labeled Path 2, is drawn downward and toward the right. The angle formed by Path 1 and Path 2 has a measure of 24 degrees. The third ray, labeled Path 3, is drawn downward and to the left. The angle formed by Path 2 and Path 3 has a measure of x degrees. |

# 

# References

*Smarter Balanced Assessment Consortium: Mathematics Audio Guidelines* <https://portal.smarterbalanced.org/library/en/ela-audio-guidelines.pdf>