

Appendix H: Mathematics Audio Guidelines

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.

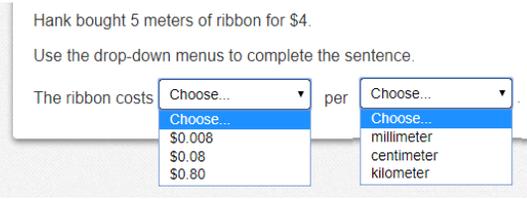
When describing several people in an image, label each one clearly so they are not mixed up. (i.e., tall man, elderly man, little boy)

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
<p>Hank bought 5 meters of ribbon for \$4. Use the drop-down menus to complete the sentence.</p> <p>The ribbon costs <input type="text" value="Choose..."/> per <input type="text" value="Choose..."/>.</p> 	<p>Hank bought 5 meters of ribbon for \$4. Use the drop-down menus to complete the sentence.</p> <p>The ribbon costs \$0.008, \$0.08, \$0.80 per millimeter, centimeter, kilometer.</p>

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										
<p>A partially filled input-output table is shown. Complete the table so that it represents a function. Drag and drop each number from the list into the correct Input or Output box.</p> <p><input type="text" value="1"/> <input type="text" value="5"/> <input type="text" value="8"/> <input type="text" value="10"/></p> <table border="1" data-bbox="239 1270 486 1459"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4</td> </tr> <tr> <td><input type="text"/></td> <td>6</td> </tr> <tr> <td>5</td> <td><input type="text"/></td> </tr> <tr> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </tbody> </table>	Input	Output	1	4	<input type="text"/>	6	5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>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.</p> <p>Read the table from left to right beginning with the left column.</p> <p>Specific for Input/Output table read,</p> <p>The table has 2 columns and 4 rows. The first Column heading is Input. The second Column heading is Output.</p> <p>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.</p>
Input	Output										
1	4										
<input type="text"/>	6										
5	<input type="text"/>										
<input type="text"/>	<input type="text"/>										

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 (\angle and Δ)

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

When reading a transformed angle or shape that uses “ ’ ” (one mark) describe as “prime”, “ ’ ’ ” (two marks), describe as “double prime” and “ ’ ’ ’ ” (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
$\angle RST$	Angle RST
ΔRST	Triangle RST
$\Delta R'S'T'$	Triangle R prime S prime T prime

Ratios (:)

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
$2 + 3 = 5$	Two plus three equals five.

Pi (π)

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
$\sin \alpha = 0.5$	sine alpha equals zero point five
Density Formula $\rho = \frac{m}{V}$	<p>“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.</p>

Approximately equal to (\approx)

Audio Guideline

ad as “is approximately equal to.”

Example	Application of Audio Guidelines
$\pi \approx 3.14$	Pi is approximately equal to three point one four.

Inequality Symbols ($<$, \leq , $>$, \neq)

- 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 (\leq)

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 (\geq)

Audio Guideline

Read as “is greater than or equal to.”

- Not equal to (\neq)

Audio Guideline

Read as “is not equal to.”

Inequality Symbol	Example	Application of Audio Guidelines
Less than (<)	$3 < 5$	Three is less than five.
Less than (<)	$x < y < z$	x is less than y is less than z.
Less than or equal to (\leq)	$2x \leq 6$	Two x is less than or equal to six.
Greater than (>)	$7 > 5$	Seven is greater than five.
Greater than (>)	$x > y > z$	x is greater than y is greater than z.
Greater than or equal to (\geq)	$3x \geq 6$	Three x is greater than or equal to six.
Not equal to	$2x \neq 7$	Two x is not equal to 7

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
$(\overline{RS} \parallel \overline{XY})$	Line segment RS is parallel to line segment XY.

Perpendiculars (⊥)**Audio Guideline**

Read as “is perpendicular to.”

Example	Application of Audio Guidelines
$\overline{EF} \perp \overline{GH}$	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
4cm ²	Four square centimeters
5cm ³	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 Signs (#)

Audio Guideline

Read as "number."

Rule refers only to when 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
$4 + 2x = \square$	Four plus two x equals blank.
$3 + y = \square$	Three plus y equals question mark.

Arc Notation (⌢)**Audio Guideline**

Read as “arc.”

Example	Application of Audio Guidelines
\widehat{RT}	Arc RT

Infinity (∞)**Audio Guideline**

Read as “infinity.”

Example	Application of Audio Guidelines
As $x \rightarrow \infty$, $f(x) \rightarrow -\infty$	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	\overline{FG}	Line segment FG
Line	\overleftrightarrow{JK}	Line JK
Ray	\overrightarrow{LM}	ray LM

Similar to (\sim)

Audio Guideline

Read as “is similar to.”

Example	Application of Audio Guidelines
$\triangle EFG \sim \triangle JKL$	Triangle EFG is similar to triangle JKL .

Therefore (\therefore)

Audio Guideline

Read as “therefore.”

Example	Application of Audio Guidelines
$A=B$ and $B=C \therefore A=C$	A equals B and B equals C , therefore A equals C .

Congruent (\cong)

Audio Guideline

Read as “is congruent to.”

Example	Application of Audio Guidelines
$\angle FGH \cong \angle JKL$	Angle FGH is congruent to angle JKL .

Factorial (!)**Audio Guideline**

Read as “factorial.”

Example	Application of Audio Guidelines
$5! = x$	Five factorial equals x.

Plus or Minus Symbols (\pm)**Audio Guideline**

Read as “plus or minus.”

Example	Application of Audio Guidelines
The margin of error is ± 0.8	The margin of error is plus or minus zero point eight.

Subscript**Audio Guideline**

Read as “x subscript y.”

Example	Application of Audio Guidelines
x_1	x subscript <i>one</i>
A_i represents the maximum amount of interest.	When the variable is the letter A. Read as “the letter A subscript <i>i</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 $-y$.

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

Example	Application of Audio Guidelines
-4	Negative four
4- -5	Four minus negative five
What is the distance between +4 and -3 on the number line?	What is the distance between positive four and negative three on the number line?

Large Whole Numbers

Audio Guidelines

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? A. 1,258 B. 12,558 C. 102,558 D. 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 Guidelines

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 $\frac{1}{2}$ as one-half and read $\frac{5}{2}$ 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
$\frac{1}{2} + \frac{3}{8}$	One-half plus three-eighths.
$\frac{3}{14} + \frac{15}{100} - \frac{x}{2y}$	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
$\frac{3x+y}{z}$	Fraction with numerator of three X plus Y (pause) and denominator of Z
$\frac{6}{3}$	Six-thirds
$\frac{3x}{5} + x$	Fraction with numerator of three x (pause) and denominator of 5 (pause) plus x.

Mixed Numbers

Audio Guidelines

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
$4\frac{3}{4}$	Four and three fourths
$5\frac{13}{28}$	Five and (pause) fraction with numerator of thirteen (pause) and denominator of 28

Decimal Points

Audio Guidelines

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
$5.18\overline{18}$	Five point one eight repeating one eight

Time

Audio Guidelines

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 Guidelines

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															
<p style="text-align: center;">Population of Two Cities from 1975 to 2025</p> <table border="1"> <thead> <tr> <th>City</th> <th>1975</th> <th>2000</th> <th>2010</th> <th>2025</th> </tr> </thead> <tbody> <tr> <td>Tokyo</td> <td>26.6 million</td> <td>34.4 million</td> <td>36.9 million</td> <td>37.1 million</td> </tr> <tr> <td>Delhi</td> <td>4.4 million</td> <td>15.7 million</td> <td>21.9 million</td> <td>28.6 million</td> </tr> </tbody> </table>	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	<p>... city ... nineteen seventy-five ... two thousand ... two thousand ten ... twenty twenty-five ... (Refer to the section entitled “Tables” for more information.)</p>
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												

Ordered Pairs

Audio Guideline

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

Example	Application of Audio Guidelines
Point R is $(-2, 4)$	Point R is ordered pair negative two, four.

Probability

Audio Guideline

“ $P(\text{text})$ ” 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
$P(\text{orange}) = \frac{1}{6}$	Probability of orange is one-sixth

Expressions/Equations/Operations

Multiplication

Audio Guidelines

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
$3 \times 5 = X$	Three times five equals X .
$xy + 4x = 10$	xy plus four x equals ten.
$(3 + x)(y - 2)$	Open parenthesis three plus x , closed parenthesis, (pause) open parenthesis y minus two, closed parenthesis.
$5(x + 1)$	Five open parenthesis x plus one closed parenthesis

Addition

Audio Guideline

Read as “plus.”

Example	Application of Audio Guidelines
$4 + 2 + 3$	Four plus two plus three

Subtraction

Audio Guideline

Read as “minus.”

Example	Application of Audio Guidelines
$5 - 3$	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
$12 \div 4$	Twelve divided by four
What is $57 \div 5$ 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
$3(x + y) = 6$	Three (pause) open parenthesis x plus y closed parenthesis (pause) equals six.
$2(x + 3) + \frac{y-2}{3} = 9$	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.
$(x + 4)[(x + 4) - (x - 2)]$	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 Guidelines

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
$y = x^2$	y equals x squared.
$y = 4^5 + 2$	y equals four raised to the fifth power (pause) plus two.
$y = 2^{x+5} + 3$	y equals two raised to the x plus five power (pause) plus three.
$16^{3/2} = 8^2$	Sixteen raised to the three halves power equals eight squared.
$3^{5.5} = (z+8)^{x/2}$	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
$x + y = 3$	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?
$N + 4$	N plus four
$-x^2$	Opposite of (pause) x squared

Logs

Audio Guidelines

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
$\log_{10} 100 = 2$	Log base ten of one hundred equals two.
If $\log 2 \approx 0.301$ and $\log 3 \approx 0.477$, what is the approximate value of $\log 72$? A. 0.051 B. 7.778 C. 0.861 D. 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?
$\ln x$	Natural log of x

Radicals

Audio Guidelines

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., $3\sqrt{2}$), 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. $\sqrt[3]{2x-y}$ 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
$\sqrt{2}$	The square root of two
$\sqrt[4]{144} = x\sqrt{288}$	The fourth root of one hundred forty-four equals the x root of two hundred eighty-eight.
$\sqrt[m]{x+y}$	The m root of quantity x plus y
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	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 Guidelines

Read as “the absolute value of.”

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

Example	Application of Audio Guidelines
$ -16 $	The absolute value of negative sixteen
$ 2 + 7 $	The absolute value of the quantity two plus seven
$ x + 1$	The absolute value of x (pause) plus one.

Functions ($f(x)$)

Audio Guidelines

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 “f inverse of x.”

Example	Application of Audio Guidelines
$f(x) = 5$	f of x equals five
$f(x + 1)$	f of open parenthesis x plus one closed parenthesis
$f(g(x))$	f of g of x
$f^{-1}(x) = -\frac{2}{3}x - 2$	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](#) 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								
<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>14</td> </tr> <tr> <td>7</td> <td>30</td> </tr> <tr> <td>9</td> <td>38</td> </tr> </tbody> </table>	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	y								
3	14								
7	30								
9	38								
<table border="1"> <thead> <tr> <th>x</th> <td>3</td> <td>7</td> <td>9</td> </tr> </thead> <tbody> <tr> <th>y</th> <td>14</td> <td>30</td> <td>38</td> </tr> </tbody> </table>	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.
x	3	7	9						
y	14	30	38						

Example	Application of Audio Guidelines										
<p>A partially filled input-output table is shown. Complete the table so that it represents a function.</p> <p>Drag and drop each number from the list into the correct Input or Output box.</p> <p>1 5 8 10</p> <table border="1" data-bbox="245 327 499 520"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4</td> </tr> <tr> <td><input type="text"/></td> <td>6</td> </tr> <tr> <td>5</td> <td><input type="text"/></td> </tr> <tr> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </tbody> </table>	Input	Output	1	4	<input type="text"/>	6	5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>The table has 2 columns and 4 rows. The first Column heading is Input. The second Column heading is Output.</p> <p>row 1 Input, 1, Output 4 (pause)</p> <p>row 2 Input blank, output 6 (pause)</p> <p>row 3 Input 5, Output blank, (pause)</p> <p>row 4 Input blank, Output blank</p>
Input	Output										
1	4										
<input type="text"/>	6										
5	<input type="text"/>										
<input type="text"/>	<input type="text"/>										

System of Equations/Inequalities

Audio Guidelines

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
$\begin{cases} x + y = 4 \\ x - y = 2 \end{cases}$ <p>What is the solution to the system of equations?</p>	<p>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?</p>
<p>Which point lies in the solution set for the system</p> $\begin{cases} 2y - x \geq -6 \\ 2y - 3x < -6 \end{cases} ?$ <p>A (-4, -1) B (3, 1) C (0, -3) D (4, 3)</p>	<p>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.</p>

Trigonometry

Audio Guidelines

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
$\sin 15^\circ = \cos 75^\circ$	Sine fifteen degrees equals cosine seventy-five degrees
$\tan \theta = -1$	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								
<p>Seashell Collection</p> <table border="1"> <thead> <tr> <th data-bbox="240 422 360 485">Size</th> <th data-bbox="360 422 512 485">Number of Seashells</th> </tr> </thead> <tbody> <tr> <td data-bbox="240 485 360 548">Small</td> <td data-bbox="360 485 512 548">3</td> </tr> <tr> <td data-bbox="240 548 360 611">Medium</td> <td data-bbox="360 548 512 611">6</td> </tr> <tr> <td data-bbox="240 611 360 674">Large</td> <td data-bbox="360 611 512 674">4</td> </tr> </tbody> </table>	Size	Number of Seashells	Small	3	Medium	6	Large	4	<p>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.</p>
Size	Number of Seashells								
Small	3								
Medium	6								
Large	4								

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										
<table border="1"> <thead> <tr> <th data-bbox="240 1354 360 1381">Name</th> <th data-bbox="360 1354 571 1381">Number of Votes</th> </tr> </thead> <tbody> <tr> <td data-bbox="240 1381 360 1415">Tigers</td> <td data-bbox="360 1381 571 1415"> </td> </tr> <tr> <td data-bbox="240 1415 360 1449">Rockets</td> <td data-bbox="360 1415 571 1449"> </td> </tr> <tr> <td data-bbox="240 1449 360 1482">Sharks</td> <td data-bbox="360 1449 571 1482"> </td> </tr> <tr> <td data-bbox="240 1482 360 1516">Bobcats</td> <td data-bbox="360 1482 571 1516"> </td> </tr> </tbody> </table>	Name	Number of Votes	Tigers		Rockets		Sharks		Bobcats		<p>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.</p>
Name	Number of Votes										
Tigers											
Rockets											
Sharks											
Bobcats											

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.

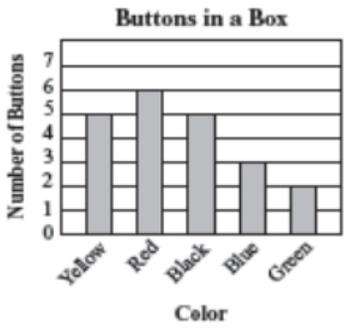
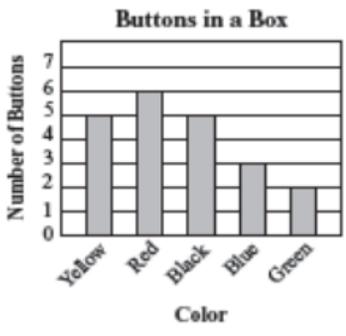
Text and Graphics

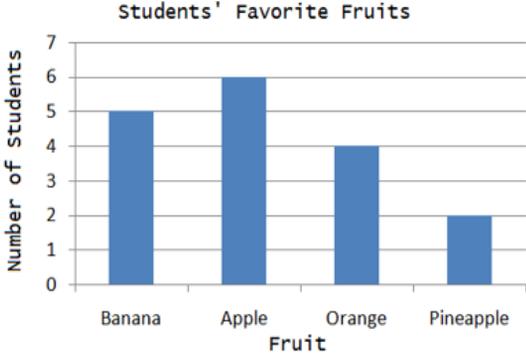
Read the bar graph title first, followed by the horizontal label and the vertical label as long as horizontal and vertical are grade level appropriate vocabulary words. Avoid using x-axis and y-axis when describing bar graphs unless specified. Do not read values on either axis until describing the bars.

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
 <p>The bar graph is titled "Buttons in a Box". The vertical axis is labeled "Number of Buttons" and ranges from 0 to 7. The horizontal axis is labeled "Color" and lists five categories: Yellow, Red, Black, Blue, and Green. The bars represent the following values: Yellow (5), Red (6), Black (5), Blue (3), and Green (2).</p>	<p>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.</p>
 <p>The bar graph is titled "Buttons in a Box". The vertical axis is labeled "Number of Buttons" and ranges from 0 to 7. The horizontal axis is labeled "Color" and lists five categories: Yellow, Red, Black, Blue, and Green. The bars represent the following values: Yellow (5), Red (6), Black (5), Blue (3), and Green (2).</p> <p>How many red buttons are in the box?</p>	<p>(Note: this item specifically asks students to identify the value associated with a bar)</p> <p>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.</p>

Example	Application of Audio Guidelines for Text and Graphics
<p>Kate asked the students in her class what their favorite fruit was. The results of her survey are shown in the graph below.</p>  <p>The bar graph shows the number of students who chose each fruit. The vertical axis is labeled 'Number of Students' and ranges from 0 to 7. The horizontal axis is labeled 'Fruit' and lists Banana, Apple, Orange, and Pineapple. The bars represent the following data: Banana (5), Apple (6), Orange (4), and Pineapple (2).</p>	<p>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.</p>

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.

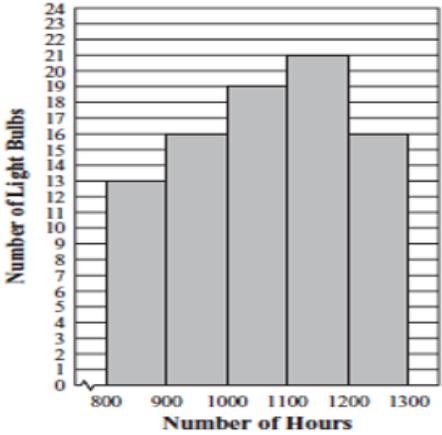
Describe each bar, being careful to consider the question, so as not to violate the construct being measured. In each description, use the units of measure for the values of the labels, if applicable.

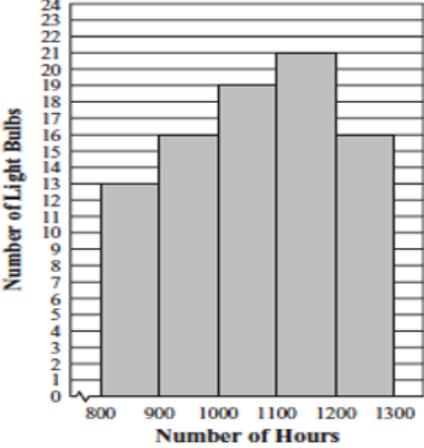
Describe each bar range on the horizontal axis, being careful to consider the question, so as not to violate the construct being measured. In each description use the units of measure labels on the horizontal and vertical axes, if applicable.

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
<p>Abe tested 85 Brand X light bulbs to determine their life spans. The histogram below shows the results of his test.</p> <p style="text-align: center;">Life Spans of 85 Brand X Light Bulbs</p>  <p>What was the total number of Brand X light bulbs that had life spans greater than or equal to 1000 hours?</p> <p>A. 72 B. 56 C. 51 D. 21</p>	<p>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.</p>

Example	Application of Audio Guidelines for Text and Graphics												
<p>13 Abe tested 85 Brand X light bulbs to determine their life spans. The histogram below shows the results of his test.</p> <p style="text-align: center;">Life Spans of 85 Brand X Light Bulbs</p>  <table border="1" data-bbox="311 415 735 863"> <caption>Data from Histogram: Life Spans of 85 Brand X Light Bulbs</caption> <thead> <tr> <th>Number of Hours (Interval)</th> <th>Number of Light Bulbs</th> </tr> </thead> <tbody> <tr> <td>800 - 900</td> <td>13</td> </tr> <tr> <td>900 - 1000</td> <td>16</td> </tr> <tr> <td>1000 - 1100</td> <td>19</td> </tr> <tr> <td>1100 - 1200</td> <td>21</td> </tr> <tr> <td>1200 - 1300</td> <td>16</td> </tr> </tbody> </table> <p>What was the total number of Brand X light bulbs that had life spans greater than or equal to 1000 hours?</p> <p>A. 72 B. 56 C. 51 D. 21</p>	Number of Hours (Interval)	Number of Light Bulbs	800 - 900	13	900 - 1000	16	1000 - 1100	19	1100 - 1200	21	1200 - 1300	16	<p>(item specifically asks student to read information from one of the bars)</p> <p>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.</p>
Number of Hours (Interval)	Number of Light Bulbs												
800 - 900	13												
900 - 1000	16												
1000 - 1100	19												
1100 - 1200	21												
1200 - 1300	16												

Line and Piece-wise Linear Graphs

Audio Guidelines

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.

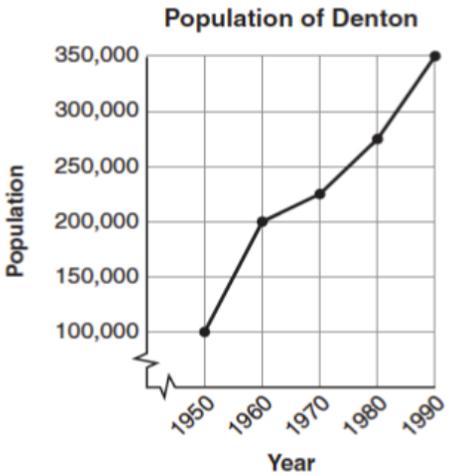
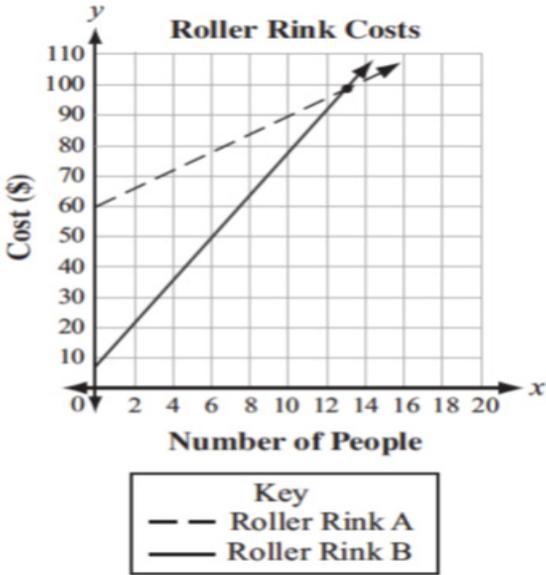
When describing the graph, be as concise as possible while providing the necessary information to understand and answer the question.

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
	<p>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.</p>
	<p>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.</p>

Box Plots

Audio Guidelines

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

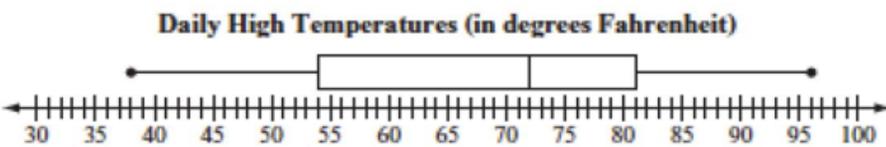
Start by reading the title of the plot and reference that it is a box plot. Read the box titles or any other words on the plot if applicable.

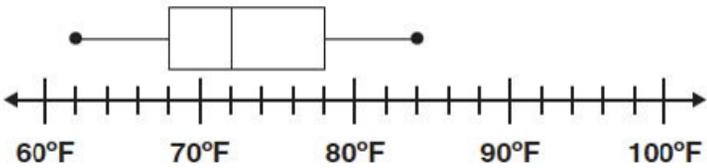
Read the information along the bottom of the graph from left to right.

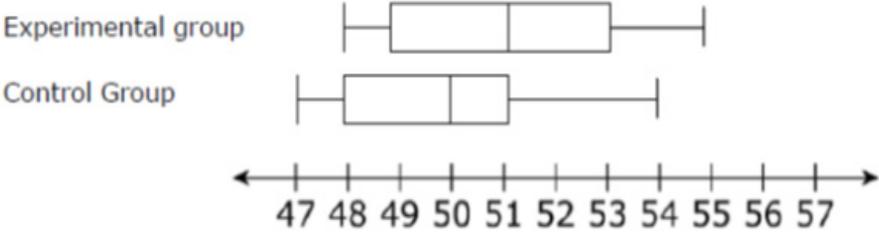
Describe the graph elements using specific box plot terminology—including whiskers, quartiles, box, and median—unless doing so violates the construct being measured.

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
<p>The box plot shows the distribution of the daily high temperatures, in degrees Fahrenheit, in the town of Clifton during the year 2004.</p> <p style="text-align: center;">Daily High Temperatures (in degrees Fahrenheit)</p>  <p>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?</p>	<p>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.</p>

Example	Application of Audio Guidelines for Text and Graphics Application of Audio Guidelines
<p>The box plot represents the daily high temperatures at a beach in April.</p> <p style="text-align: center;">Daily High Temperatures</p>  <p>What was the median daily high temperature?</p>	<p>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.</p>

Example	Application of Audio Guidelines for Text and Graphics Application of Audio Guidelines
<p style="text-align: center;">Heights of Plants (cm)</p>  <p>Experimental group</p> <p>Control Group</p> <p style="text-align: center;">← 47 48 49 50 51 52 53 54 55 56 57 →</p>	<p>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.</p>

Scatter Plots

Audio Guidelines

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

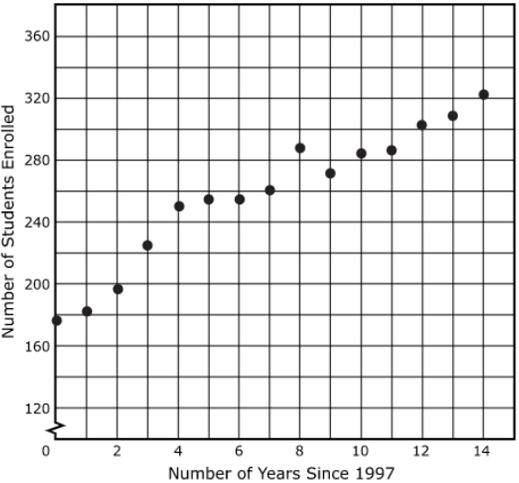
and y. In some cases, the rightmost extension of the horizontal axis and/or topmost extension of the vertical axis has no value specified. When specifying the ranges, use either the greatest number listed or the actual value at the rightmost or topmost extension of the axes, whichever is more appropriate.

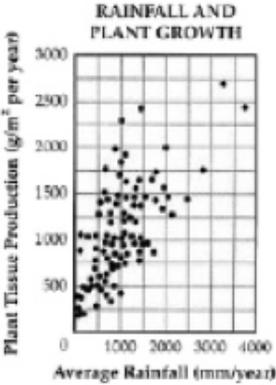
For a scatter plot with fewer than ten data points, reference each data point. Include units of measure while describing data points only if deemed relevant.

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																																
<p style="text-align: center;">Middle School Enrollment</p>  <table border="1" data-bbox="199 913 718 1396"> <caption>Data points from the 'Middle School Enrollment' scatter plot</caption> <thead> <tr> <th>Number of Years Since 1997</th> <th>Number of Students Enrolled</th> </tr> </thead> <tbody> <tr><td>0</td><td>180</td></tr> <tr><td>1</td><td>185</td></tr> <tr><td>2</td><td>200</td></tr> <tr><td>3</td><td>225</td></tr> <tr><td>4</td><td>250</td></tr> <tr><td>5</td><td>255</td></tr> <tr><td>6</td><td>255</td></tr> <tr><td>7</td><td>260</td></tr> <tr><td>8</td><td>290</td></tr> <tr><td>9</td><td>275</td></tr> <tr><td>10</td><td>285</td></tr> <tr><td>11</td><td>290</td></tr> <tr><td>12</td><td>310</td></tr> <tr><td>13</td><td>320</td></tr> <tr><td>14</td><td>330</td></tr> </tbody> </table>	Number of Years Since 1997	Number of Students Enrolled	0	180	1	185	2	200	3	225	4	250	5	255	6	255	7	260	8	290	9	275	10	285	11	290	12	310	13	320	14	330	<p>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 and 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.</p>
Number of Years Since 1997	Number of Students Enrolled																																
0	180																																
1	185																																
2	200																																
3	225																																
4	250																																
5	255																																
6	255																																
7	260																																
8	290																																
9	275																																
10	285																																
11	290																																
12	310																																
13	320																																
14	330																																

Example	Application of Audio Guidelines for Text and Graphics
	<p>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.</p>

Coordinate Planes

Audio Guidelines

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.

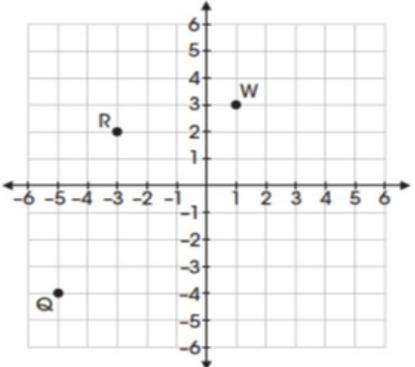
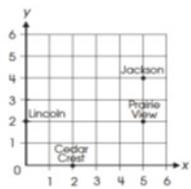
Read the points or words on the coordinate plane in a logical manner referencing their location without violating the construct being measured. Read in the same order that is provided in the text of the item which is either clockwise or counterclockwise so that corresponding vertices align if there are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

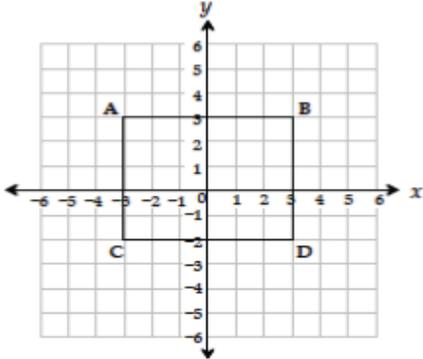
If a line or point being described falls between two marked x- or y-axis values, then do not estimate or approximate numbers. Instead, use more general language such as “a little less than,” “a little more than,” and “midway between.”

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
<p>23. Points Q, R, and W are plotted on the coordinate grid.</p>  <p>Where should point Z be plotted so that parallelogram QRWZ is formed?</p> <p>A. (-2, -6) B. (-1, -3) C. (3, -2) D. (2, -1)</p>	<p>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.</p>
<p>18. Mr. Yang is driving to the school located at (2, 0) on the coordinate grid.</p>  <p>Which school is located at (2, 0)?</p> <p><input type="radio"/> A. Cedar Crest <input type="radio"/> B. Jackson <input type="radio"/> C. Lincoln <input type="radio"/> D. Prairie View</p>	<p>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.</p>

Example	Application of Audio Guidelines for Text and Graphics
<p>Use the diagram below to answer question 7.</p>  <p>7. Which ordered pair identifies the location of vertex C?</p> <p>A (-3, -2) B (-3, 3) C (3, -2) D (-2, -3)</p>	<p>A coordinate plane with x- and y-axes ranging from negative six to six. Rectangle ABCD is shown on the grid.</p>

Graphs of Non-linear Functions

Audio Guidelines

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.

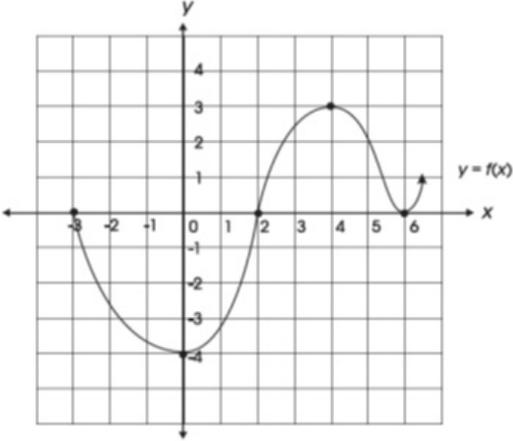
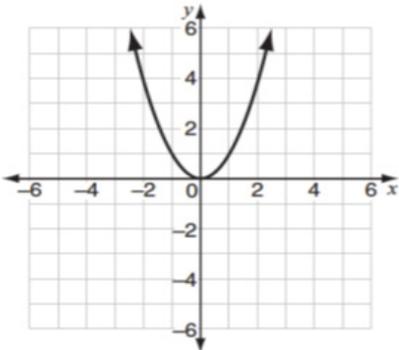
Read the range of each axes and any words or symbols that are on the graph. In some cases, the extensions of the x- and/or y-axis have no value specified. When specifying the ranges, use either the greatest (or least for bottom and left extensions) number listed or the actual value at the furthest extension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

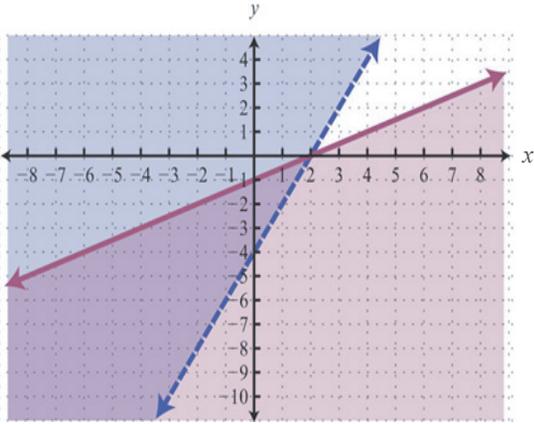
Example	Application of Audio Guidelines for Text and Graphics
<p>31. The graph of the function $f(x)$ is shown below.</p>  <p>Which of the following is NOT a zero of $f(x)$?</p>	<p>A graph showing the function y equals f of x. The x-axis ranges from negative four (or three) to seven (or six), and the 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.</p>
<p>10 Look at this graph of $y = x^2$.</p>  <p>If $y = x - 2$ is graphed on the same coordinate plane, at how many points would the two graphs intersect?</p> <p>A. 0 B. 1 C. 2 D. 3</p>	<p>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.</p>

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.

Example	Application of Audio Guidelines for Text and Graphics
<p>Which graph represents the solution to this system of inequalities?</p> $y > 2x - 4$ $3x - 6y \geq 6$ 	<p>Text and Graphics A system of inequalities and a graph such as this would be described as follows:</p> <p>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.</p> <p>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.</p>

Diagrams/Figures/Keys

Tree Diagram

Audio Guidelines

Text Only

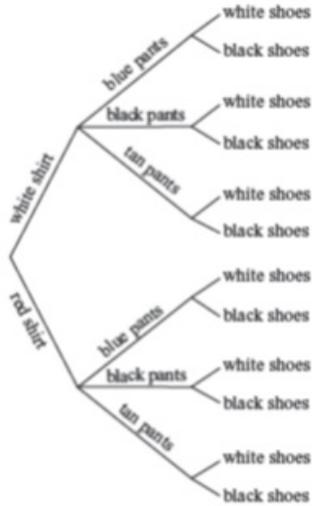
Read the tree diagram title. Allow for all words and numbers on the tree diagram to be available to be read on demand.

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.

Example	Application of Audio Guidelines
<p>11 The tree diagram below shows all of the outfits Jay can choose to wear today. An outfit has one color of shirt, one color of pants, and one color of shoes.</p>  <p>What is the total number of possible outfits with a white shirt?</p> <p>A. 9 B. 6 C. 3 D. 1</p>	<p>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.</p>

Keys

Audio Guidelines

Text Only

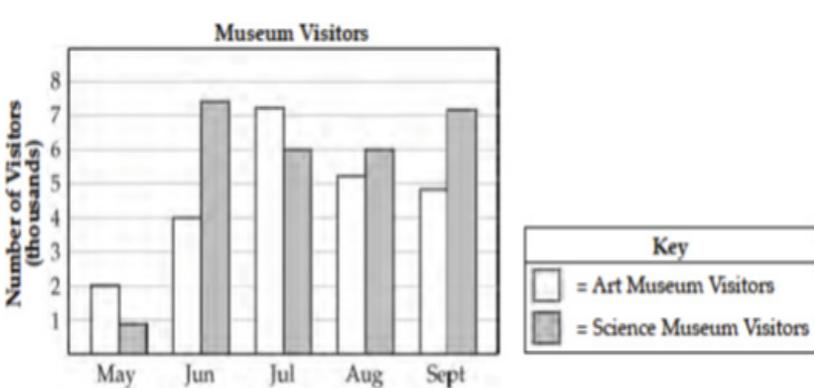
Read the word Key after reading the graph/diagram title. Allow for all words and numbers in the key to be available to be read on demand.

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)

Example	Application of Audio Guidelines for Text and Graphics																		
 <p>Museum Visitors</p> <p>Number of Visitors (thousands)</p> <p>Key</p> <ul style="list-style-type: none"> □ = Art Museum Visitors ■ = Science Museum Visitors <table border="1"> <caption>Data from Museum Visitors Graph</caption> <thead> <tr> <th>Month</th> <th>Art Museum Visitors (thousands)</th> <th>Science Museum Visitors (thousands)</th> </tr> </thead> <tbody> <tr> <td>May</td> <td>2</td> <td>1</td> </tr> <tr> <td>Jun</td> <td>4</td> <td>7.5</td> </tr> <tr> <td>Jul</td> <td>7.2</td> <td>6</td> </tr> <tr> <td>Aug</td> <td>5.2</td> <td>6</td> </tr> <tr> <td>Sept</td> <td>4.8</td> <td>7.2</td> </tr> </tbody> </table>	Month	Art Museum Visitors (thousands)	Science Museum Visitors (thousands)	May	2	1	Jun	4	7.5	Jul	7.2	6	Aug	5.2	6	Sept	4.8	7.2	<p>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.</p>
Month	Art Museum Visitors (thousands)	Science Museum Visitors (thousands)																	
May	2	1																	
Jun	4	7.5																	
Jul	7.2	6																	
Aug	5.2	6																	
Sept	4.8	7.2																	

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.

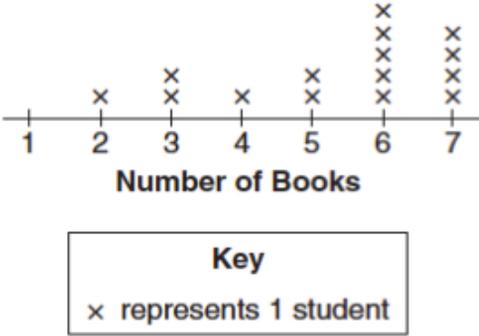
Text and Graphics

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.

Example	Application of Audio Guidelines for Text and Graphics
<p>16 Look at this line plot.</p> <p style="text-align: center;">Books We Read in May</p>  <p style="text-align: center;">Number of Books</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Key</p> <p style="text-align: center;">x represents 1 student</p> </div>	<p>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.</p>

Shaded Figures (Grids, Bars, and Shapes)

Audio Guidelines

Text Only

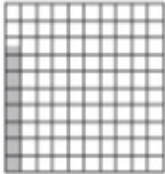
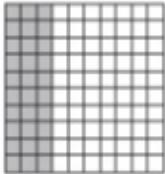
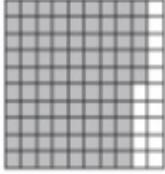
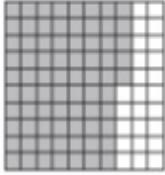
Read the title of the shaded figure. Allow for all words and numbers in the figure to be available to be read on demand.

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.

Example	Application of Audio Guidelines for Text and Graphics
<p>1 A fraction of the fish shown below are shaded gray.</p>  <p>Which grid is shaded gray to represent a fraction with the same value?</p> <p>A. </p> <p>B. </p> <p>C. </p> <p>D. </p>	<p>A fraction of the fish shown below is shaded gray. The graphic shows four fish. Three of them are shaded gray.</p> <p>Which grid below is shaded gray to represent a fraction with the same value?</p> <p>A. ten by ten box grid with seven boxes shaded</p> <p>B. ten by ten box grid with three columns of ten boxes shaded</p> <p>C. ten by ten box grid with eight columns of ten boxes shaded and five additional boxes shaded</p> <p>D. ten by ten box grid with seven columns of ten boxes shaded and five additional boxes shaded</p>

Pictographs

Audio Guidelines

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

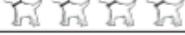
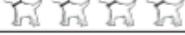
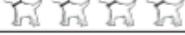
Start by reading the title of the pictograph and then the key.

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.

Example	Application of Audio Guidelines for Text and Graphics											
<p style="text-align: center;">Dogs at the Park</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th data-bbox="197 520 477 562">Type of Dog</th> <th data-bbox="477 520 756 562">Number of Dogs</th> </tr> </thead> <tbody> <tr> <td data-bbox="197 562 477 611">Beagle</td> <td data-bbox="477 562 756 611"></td> </tr> <tr> <td data-bbox="197 611 477 659">Collie</td> <td data-bbox="477 611 756 659"></td> </tr> <tr> <td data-bbox="197 659 477 707">Poodle</td> <td data-bbox="477 659 756 707"></td> </tr> <tr> <td data-bbox="197 707 477 756">Dalmatian</td> <td data-bbox="477 707 756 756"></td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;"> <table border="1" style="display: inline-table;"> <tr> <td style="text-align: center;"> <p>Key</p>  represents 1 dog </td> </tr> </table> </div>	Type of Dog	Number of Dogs	Beagle		Collie		Poodle		Dalmatian		<p>Key</p>  represents 1 dog	<p>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.</p>
Type of Dog	Number of Dogs											
Beagle												
Collie												
Poodle												
Dalmatian												
<p>Key</p>  represents 1 dog												

Figures/Illustrations

Audio Guidelines

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

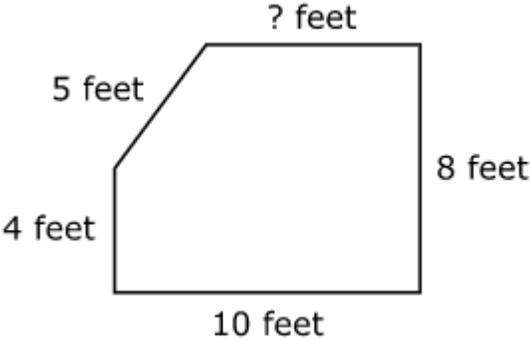
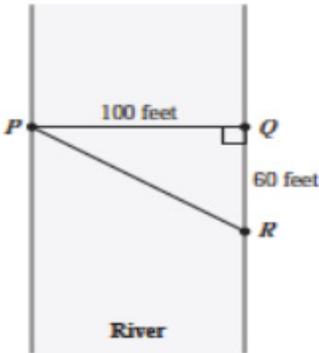
Read the title of the figure or illustration. Include the caption in the description if it is not included in the surrounding text.

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.

Example	Application of Audio Guidelines for Text and Graphics
<p>The shape shown has a perimeter of 34 feet.</p>  <p>What is the length of the side that is missing a number?</p>	<p>The shape shown has a perimeter of 34 feet.</p> <p>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</p> <p>What is the length of the side that is missing a number?</p>
<p>40 Triangle PQR in the diagram below represents Pam's trip across a river.</p>  <p>In the diagram, \overline{PQ} represents her planned trip across the river, and \overline{PR} represents her actual trip across the river.</p> <p>Based on the dimensions in the diagram, which of the following is closest to the length of \overline{PR}?</p> <p>A. 104 feet B. 117 feet C. 120 feet D. 160 feet</p>	<p>Example 2</p> <p>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.</p>

Number Lines

Audio Guidelines

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

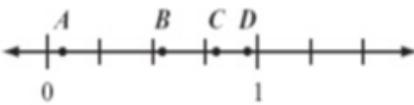
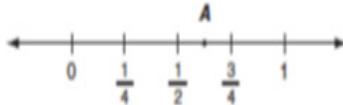
Start by reading the title of the number line.

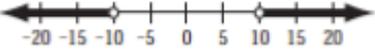
Read the range on the bottom along with the increments displayed.

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.

Example	Application of Audio Guidelines for Text and Graphics
<p>Which point on the number line below best represents 0.8?</p>  <p>A. point <i>A</i> B. point <i>B</i> C. point <i>C</i> D. point <i>D</i></p>	<p>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.</p>
<p>Look at this number line.</p>  <p>Point <i>A</i> is halfway between $\frac{1}{2}$ and $\frac{3}{4}$. What fraction does point <i>A</i> represent? Show your work or explain how you know.</p>	<p>A number line shows zero and one with three tick marks in between: one-fourth, one-half, and three-fourths. Point <i>A</i> is marked midway between one-half and three-fourths.</p>

Example	Application of Audio Guidelines for Text and Graphics
<p>37 The graph below is the solution of which of the following inequalities?</p>  <p>A. $x > 10$</p> <p>B. $x < 10$</p> <p>C. $x > 10$</p> <p>D. $x < -10$</p>	<p>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.</p> <p>An open circle is located ten. A bold line extends right to a bolded arrow on the right end.</p>

Spinners

Audio Guidelines

Text Only

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

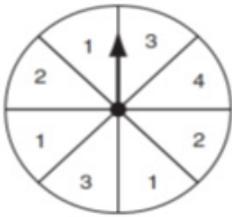
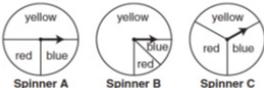
Text and Graphics

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.

Example	Application of Audio Guidelines for Text and Graphics																
<p>10 Look at this spinner.</p>  <p>On what number is the arrow least likely to land?</p> <p><input type="radio"/> A. 1 <input type="radio"/> B. 2 <input type="radio"/> C. 3 <input type="radio"/> D. 4</p>	<p>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.</p> <p>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.</p>																
<p>11 Look at these spinners.</p>  <p>Julie, Greg, and Lori each used a different spinner to record the results of 40 spins.</p> <p>a. This table shows Julie's results.</p> <p style="text-align: center;">Julie's Spinner Results</p> <table border="1" data-bbox="252 1041 392 1115"> <thead> <tr> <th>Color</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>yellow</td> <td>12</td> </tr> <tr> <td>blue</td> <td>14</td> </tr> <tr> <td>red</td> <td>14</td> </tr> </tbody> </table> <p>Which spinner did Julie most likely use? Show your work or explain how you know.</p> <p>b. This table shows Greg's results.</p> <p style="text-align: center;">Greg's Spinner Results</p> <table border="1" data-bbox="252 1241 392 1314"> <thead> <tr> <th>Color</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>yellow</td> <td>30</td> </tr> <tr> <td>blue</td> <td>5</td> </tr> <tr> <td>red</td> <td>5</td> </tr> </tbody> </table> <p>Which spinner did Greg most likely use? Show your work or explain how you know.</p> <p>c. Lori used the remaining spinner. Make a table to show the most likely results of Lori's 40 spins. Explain your reasoning.</p>	Color	Frequency	yellow	12	blue	14	red	14	Color	Frequency	yellow	30	blue	5	red	5	<p>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.</p>
Color	Frequency																
yellow	12																
blue	14																
red	14																
Color	Frequency																
yellow	30																
blue	5																
red	5																

Coins and Dollars

Audio Guidelines

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 Section of this document.

Example	Application of Audio Guidelines for Text and Graphics
<p>● Cindy had \$1.00. Then she bought a pencil for \$0.37. How much money does she have now?</p> <p>○ A. </p> <p>○ B. </p> <p>○ C. </p> <p>○ D. </p>	<p>A. shows two quarters, one dime, and three pennies.</p> <p>B. shows two quarters, two dimes, and three pennies.</p> <p>C. shows three quarters and two pennies.</p> <p>D. shows one one-dollar bill, one quarter, one dime, and two pennies.</p>

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

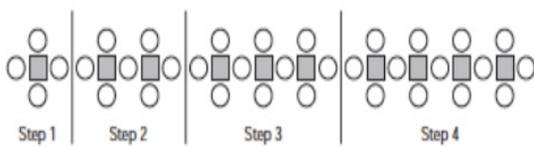
Read the title of the diagram and a brief orientation of what the diagram shows.

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.

Example	Application of Audio Guidelines for Text and Graphics Application of Audio Guidelines
<p>9 Don made a pattern using circles and squares. The first four steps of his pattern are shown below.</p>  <p>If Don continues his pattern, what is the total number of circles he will need to make Step 10?</p> <p>A. 30 B. 31 C. 38 D. 40</p>	<p>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.</p>

Geometric Figures

Audio Guidelines

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

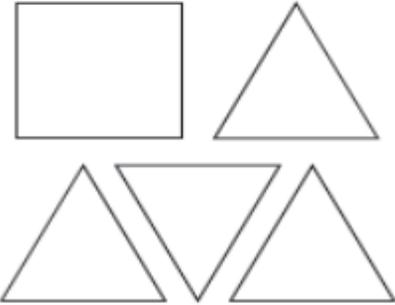
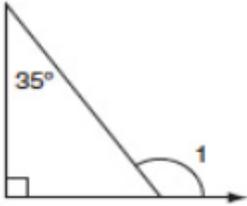
Simple shapes (any 2D shape with eight sides or fewer): Reference simple shapes as is unless the item is measuring identification of a shape. If the item contains a simple shape, reference it without description. If there are unique attributes to the shape, describe those attributes in as few words as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

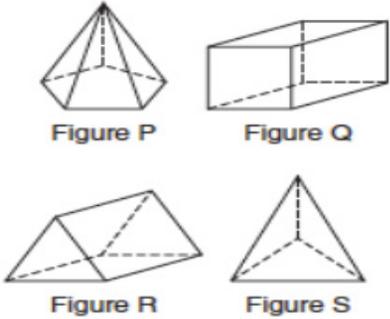
3D shapes/figures: Reference the type of figure.

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.

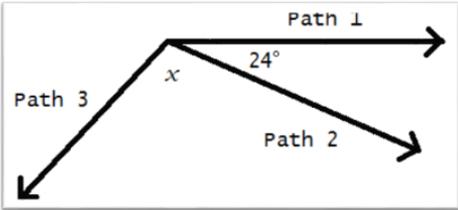
Example	Application of Audio Guidelines for Text and Graphics
<p>These shapes are the 5 faces of a three-dimensional figure.</p>  <p>What is the three-dimensional figure?</p> <p>A. cube B. cone C. prism D. pyramid</p>	<p>A square and four triangles that have the same size and shape are shown.</p>
<p>Look at this diagram.</p>  <p>What is the measure of $\angle 1$?</p> <p>A. 55° B. 115° C. 125° D. 135°</p>	<p>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.</p>

Example	Application of Audio Guidelines for Text and Graphics
<p>Look at these figures.</p>  <p>Figure P Figure Q</p> <p>Figure R Figure S</p> <p>Which two figures have the same number of faces?</p> <p>A. Figure P and Figure Q B. Figure S and Figure R C. Figure P and Figure R D. Figure S and Figure Q</p>	<p>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.</p>

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.

Example	Application of Audio Guidelines for Text and Graphics
<p>Bicyclists at National Park can choose one of three bike paths from the visitors' center, as shown in this diagram.</p> 	<p>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.</p>