NWEA Image Description Guidelines for Assessments

Making assessment accessible for all students

Table of Contents

Part 1. Introduction

Purpose of Guidelines

Image description, also known as text alternatives or alt text, is a message or description that provides information about an image (e.g., chart, diagram, graph, picture, table, poster). Image description may allow students who use refreshable braille and/or screen readers to answer questions that otherwise would be inaccessible. Image description is an unbiased way to provide accessibility to those test items that contain images.

The NWEA™ Image Description Guidelines for Assessments is intended as a general guide for the creation of descriptions for images in assessments. It is not meant to be definitive. NWEA recommends using it along with other sources and your own best judgment.

> "NWEA has taken the lead in preparing a comprehensive document that supports efforts toward helping all kids learn. This document will serve as a starting point to any education vendor looking to build an inclusive online assessment. When creating text alternatives for images for use within an assessment, there are many considerations that determine how an image will be described. It can be a much different and much more challenging task than creating image descriptions for instruction. These guidelines, based on research and practice, and generously shared by NWEA, should prove to be an invaluable resource."
> —The Carl and Ruth Shapiro Family National Center for Accessible Media at WGBH

About NWEA

Founded by educators nearly 40 years ago, we are a global, research-based, not-for-profit educational services organization known for our flagship assessment, MAP Growth®. More than 7,600 partners in US schools, school districts, education agencies, and international schools trust us to offer pre-kindergarten through grade 12 assessments that accurately measure student growth and learning needs, professional development that fosters educators' ability to accelerate student learning, and research that supports assessment validity and data interpretation. To better inform instruction and maximize every learner's academic growth, educators currently use NWEA assessments with nearly eight million students.

NWEA is dedicated to our mission of *Partnering to help all kids learn*® by ensuring an assessment experience that is most authentic to the student's everyday learning needs. NWEA is doing so by building questions and tests that are accessible to the most widely available and utilized accessibility software and computer native applications. This will allow for a more equitable assessment experience for all students. At the heart of NWEA efforts is a commitment to providing assessments that are flexible and adaptable to combinations of unique student learning needs and easily perceived and clear to each student. NWEA is also committed to capturing and yielding valid information about what each student knows and can do.

With support from the National Center of Accessible Media (NCAM) at WGBH, NWEA takes the unique approach of allowing students to use their own software and native devices (e.g., JAWs, ZoomText, and

VoiceOver) to provide accessibility. This approach pushes NWEA to the top of the competition. No other organization or assessment company has attempted this level of accommodation service. Therefore, NWEA will continue with our vision statement: We are the catalyst to create a world in which education is student-centric, relying on research-based evidence to inform each child's optimal learning path.

About NCAM

The Carl and Ruth Shapiro Family National Center for Accessible Media at WGBH (NCAM) has been working with NWEA since 2011 in an effort to improve the accessibility of online assessments and related materials (including in-test tools and accommodations).

NCAM is part of the WGBH Educational Foundation, the largest producer of websites for PBS online programs and online content in the United States. WGBH also has over 45 years of experience in making media and technology accessible for people with disabilities. NCAM brings to this partnership unparalleled expertise with the technologies used by people with disabilities and an esteemed history of developing and implementing proven technological solutions. Its staff have participated in many multimedia, streaming media, and web accessibility standards groups at the World Wide Web Consortium (W3C) and its Web Accessibility Initiative (WAI), of which NCAM is a founding member. Since the very first generation of the Web Content Accessibility Guidelines (WCAG) in 1999, NCAM has played an active role in the definition, clarification, and dissemination of accessibility information and training. In fact, NCAM's Geoff Freed was one of two professionals charged with designing and implementing the very first WCAG curriculum. NCAM staff served on the original Federal Access Board committee that created the recommendations for Section 508 of the Rehabilitation Act, and chaired the Audio-Visual Subcommittee of the 2007–2009 committee that refreshed these federal requirements (the Telecommunications and Electronic and Information Technology Advisory Committee).

NCAM is capable of determining and validating product testing protocols, assessment methodologies, remediation strategies, and tools to test websites and web applications, documents and product conformance to Section 508, state accessibility standards, and all conformance levels of WCAG 2.0. With a deep understanding of the regulations and continuous involvement and interaction with these groups, NCAM ensures that it understands not just the spirit but the letter of all applicable accessibility standards and the related technical requirements, and it can evaluate digital assets and train interested parties so that they can follow them meaningfully. The staff in the National Center for Accessible Media at WGBH have the tools, the experience, the materials, and the expertise to handle all manner of evaluation needs, from the most introductory to the most complex. For nearly five years, they have worked side by side with NWEA.

Part 2. General Guidelines for Image Descriptions

Introduction

When approaching the construction of an image description, it is important to keep in mind how visually impaired students access the world and how information communicated through images in assessments can be presented to maximize accessibility.

Image Description Principles

While the content of an image description will depend on the image itself and the item in which it resides, there are some guiding principles to keep in mind when writing image descriptions as a whole.

Validity
Determine if the image needs to be described. In instances where a description does not lend clarity to answer a question or where the image is explained by the surrounding text, it might suffice to simply state that there is an image (e.g., "There is an image of a car.") without providing detail. See section **When Image Descriptions Are Unnecessary** for further detail and additional scenarios.

Brevity
Provide the necessary information for the student to be able to answer the question. Avoid unnecessary long descriptions that do not appear essential to the item and might require greater short-term memory effort.

Clarity
Focus on making the image description as clear and straightforward as possible. If the student needs to listen to the description several times because it is presented in a confusing manner, then the image description is not accessible. Always read the whole item after writing the image description to ensure that the image description ties in seamlessly with the rest of the item.
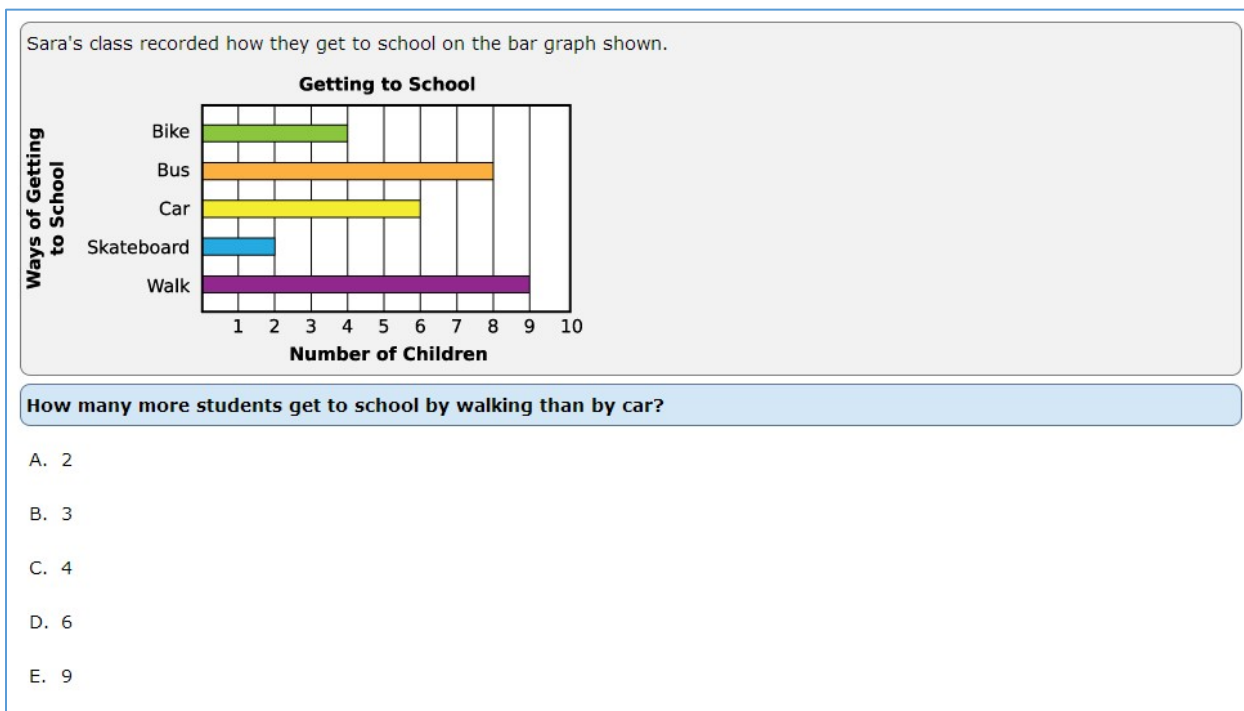
Language Complexity
Use simple, grade-appropriate, subject-related language. Where possible, use language that appears in the item itself and emphasize the tactile quality of what is depicted in an image.

Drill-Down Organization
Use drill-down organization when describing an image. Start with the title, give a brief summary of the image, and then provide specific data or description if necessary.

Example:

Sara's class recorded how they get to school on the bar graph shown.

Getting to School

Ways of Getting to School

Bike	4
Bus	8
Car	6
Skateboard	2
Walk	9

1 2 3 4 5 6 7 8 9 10
Number of Children

How many more students get to school by walking than by car?

A. 2

B. 3

C. 4

D. 6

E. 9

In the following image description, the text in parentheses would <u>not</u> appear in the actual image description.

<u>Alt text</u>: A bar graph. <u>Longdesc</u>: (title) A bar graph is entitled Getting to School. (summary) It shows Ways of Getting to School and Number of Children.

(details)
- Bike, 4.
- Bus, 8.
- Car, 6.
- Skateboard, 2.
- Walk, 9.

Integrity and Fairness

Assessments hold unique challenges for image descriptions. For accessibility without impacting the integrity of the item, it is important to keep the following points in mind.

Asset Image
a. Make sure the image description contains all of the vital information needed for the student to access and answer the question.
b. Make sure the asset image description <u>does not cue</u> the answer.
c. Reflect the distractors in the asset. Sometimes what might seem like extraneous information needs to be included because it relates to the distractors provided in the answer options.

Answer Option Images

a. Keep image descriptions of answer options consistent in description length, language complexity, and sentence structure.

b. Respect the rationales behind the answer options by making sure that the image descriptions reflect this information.

c. Make sure descriptions for answer options are unique within the item; no two answer option image descriptions can be identical.

Visual Bias

Visual bias as it pertains to images in assessments is the classification given to an image when it <u>cannot</u> be described for a given reason. The reason why an image has visual bias can be intrinsic to that image or related to the item and skill being assessed.

> **Note:** The context of an item can affect some images' visual bias. This means that the same image can cause visual bias in one item and be accessible with an image description in another item. It's important to evaluate the item as a whole before deciding whether an image makes the item visually biased.

When evaluating an item for visual bias, ask the following questions:

Does the item present a situational bias?

This is asking whether the skill or situation presented in the item involves situational information that a visually impaired student may not have access to.

Example:

A student who is blind or has a visual disability will most likely not be familiar with editing symbols since these are handwritten tools that have no keyboard or braille equivalent. Items that assess this skill are visually biased.
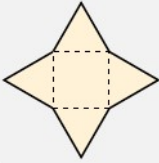
Does the item assess a sighted skill?

If a student needs sight to be able to perform the skill being assessed, the item has visual bias.
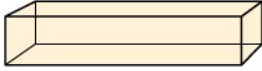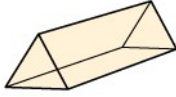
Example:

> The diagram shows the net of a three-dimensional figure.
>
>
>
> **What figure can be made from the net?**
>
> A.
>
> B.
>
> C.
>
> D.

This item requires a visual understanding of how a 2-D object transforms into a 3-D object. Since this is a visual exercise, the item has visual bias and should not be described.

Does the image description cue the key?

If the image description gives away the answer to an item, and there is no other way to describe the image appropriately, then the image has visual bias.

Example:

> **Use the picture to answer the question.**
>
>
>
> **Where is the cat?**
>
> 1. by the bed
> 2. on the bed
> 3. over the bed
> 4. under the bed

In this item, the words used to describe the image ("The picture shows a cat standing on a bed.") would cue the key (on the bed).
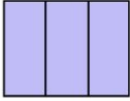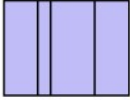
Does more than one answer option have the same image description?
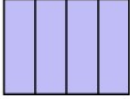
When the description of two or more answer options is identical and cannot be reworded clearly to make them different, the item is classified as having visual bias.
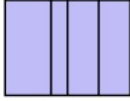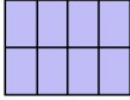
Example:

In this item, answer options B and D would have the same image description: A rectangle is cut into 4 unequal parts. While more description could be added to each to describe some difference (A rectangle is cut into 4 unequal pieces. The first piece and the fourth piece are nearly the same size; the second piece is very narrow; the third piece is the widest.), the results lack clarity and consistency with the other answer options (leading to outliers).
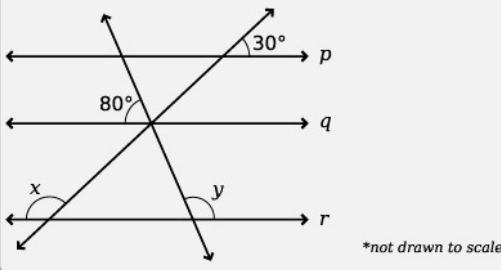
Is the image needing description too complex?

While most images can be described, it's important to keep in mind the skill being assessed, the language level of the intended learner, and the concept of cognitive overload. If the image needs so much description that a student would be unable to keep track of the information presented in the description, or if the description requires language too complex for the grade level being assessed, the image has visual bias.

Example:

The lines p, q, and r are parallel to each other.

30° p

80° q

x y r

not drawn to scale

What is the value of $x - y$?

A. 50°

B. 60°

C. 70°

D. 100°

Describing the specific positions of the angles and lines would require such detailed and lengthy descriptions that it would become difficult for a student to keep track of the information, leading to a cognitive overload.

When Image Descriptions Are Unnecessary

Not every image in an item needs a description. The following are situations when image descriptions may be skipped.

The image is strictly decorative.
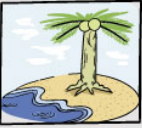
Not all images are necessary to an item. If the image is not referenced in the item and it does not present additional information needed to answer the question, then it does not need to be described. Remember: If the image is mentioned in the item (for example, if the directions say, "Study the picture and read the passage."), it may cause confusion if no image is described. In this case, if the image is decorative only, a brief description such as "A picture of a plane" is necessary.

Example:

In this item, the image of the beach and palm tree is decorative and it is not referenced in any other part of the item, so no image description is needed.
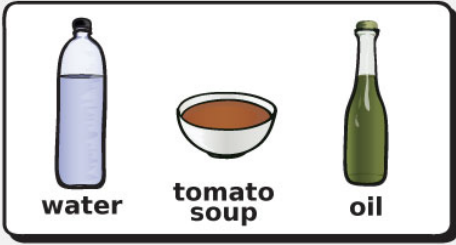
Descriptive words are present for the image.

If the images in the item are labeled appropriately, giving enough information to answer the question, then further description is unnecessary. Important: Check that the labels are not part of the image (that screen readers will be able to access the text). If the text is part of the graphic, each image will need to have an image description.
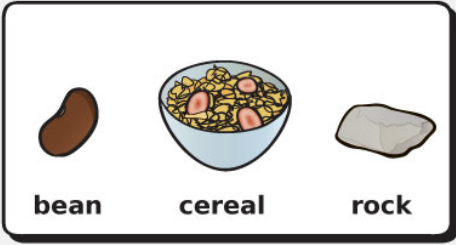
Example:

The picture shows objects sorted into two groups.

water | tomato soup | oil

bean | cereal | rock

Which object belongs in Group 1?

A. sugar

B. glass

C. ice

D. milk

E. cracker

In this item, each image in the answer options is labeled with a description of what the image shows, and that label text is not part of the image itself, so no image description is needed for the answer options. The text associated with the images in the ASSET of the item *are* part of the images themselves, so the asset images would need image descriptions.

Tactile Graphics

When an image is simple and composed of few parts but contains details that require precise locations or measurements (for example, angles, shapes, and lines), then a tactile graphic is a good fit. Image descriptions are still necessary for these items, but the descriptions will not need the detail required if they were not accompanied by a tactile graphic. The image description should succinctly describe the shape and parts to act as a guide as a student navigates the tactile graphic.

Example:

The diagrams show objects being pulled by forces in the same plane.

Which object is in equilibrium under the action of the given forces?

In this item, the language necessary to describe the directions and angles of the arrows would be so complex that the item would be classified as visually biased. However, with a tactile graphic and brief image descriptions, the graphics and the item become accessible.

Descriptions:

A. A round object is pulled by 2 forces. Clockwise from top: 5 N, 5 N.
B. A round object is pulled by 3 forces. Clockwise from top: 2 N, 3 N, 5 N.
C. A round object is pulled by 3 forces. Clockwise from top: 2 N, 3 N, 5 N.
D. A round object is pulled by 4 forces. Clockwise from top: 5 N, 3 N, 5 N, 3 N.

Creating a Smoother User Experience

Image Description Categories
There are two categories of image descriptions: alternative text (alt text) and long descriptions (longdesc).

- When an image can be succinctly described within 150 characters, use alt text for the description.
- When an image requires a lengthier description, or when the use of bullet or numbered lists and/or tables would make the information in the image description easier to navigate, use longdesc. **Note:** When you need to write a longdesc, the image will also need an introductory alt text. Keep this very brief ("A picture," "A diagram," "A graph," etc.), leaving the details for the longdesc. If the image is named elsewhere in the item (e.g., the directions of the item show, "Use the diagram to answer the question."), use the same term in the alt text ("A diagram.") and longdesc ("The diagram shows . . .").

Consistency
It is _very_ important to maintain consistency throughout the item. If the answer options show the measurements abbreviated or the stem shows the acronym with the letters not spaced out, repeat those choices in the image description. It is better for a student to hear the same garbled word in the image description and the answer option or stem than to hear two different presentations that might interfere with key selection.

Screen Readers

Students will access image descriptions, and the item as a whole, through screen readers. Therefore, image description writers should familiarize themselves with how screen readers read text and access image descriptions. Test the image descriptions with a screen reader to make sure that they are being read in a comprehensible manner.

Punctuation

Punctuation plays a part in how a screen reader will read text and image descriptions, and this can vary between screen readers and can vary based on the settings of the screen reader. Make thoughtful decisions about punctuation use in image descriptions and be consistent. Here are a few things to keep in mind:

- Periods, colons, semicolons, and commas all cause a screen reader to pause, but they may create pauses of different lengths of time, or some screen readers may read the name of the punctuation (e.g., the default setting on some screen readers will cause ";" to be read as "semicolon" instead of just pausing). Test different punctuation within a sentence or in a list to see what works best for the phrasing of the image description. Remember to end each line with a period to avoid the screen reader moving on to the next line with no pause.
- Instead of using a hyphen between numbers to show a range, use the word "to."

Numbers

Numbers written as numerals will be read as the number (37 will be read as "thirty-seven"), so there is no need to spell out numbers. However, to make sure the meaning of the numbers in the item context is appropriately conveyed, keep the following concepts in mind:

- For negative numbers, spell out the word "negative" instead of using the symbol.
- For positive numbers, spell out the word positive in instances where there are both negative and positive numbers in the same item.
- For 4-digit numbers, use commas (e.g., 1,980); some screen readers may read 4-digit numbers without commas as years (1980 = nineteen eighty).

Dates

Dates may appear in different formats in different items (e.g., 12/31/1999; Dec. 31, 1999; 12-31-1999). Screen readers will vary on how they read these dates. When describing a date in an image, consider the date/image in the context of the item and evaluate the skills being assessed. If reading the date is <u>not</u> the skill being assessed, consider interpreting the date (e.g., write 12/31/1999 as "December thirty-first, nineteen ninety-nine"). Remember: If the date appears elsewhere in the item, you should be consistent with how the date is presented: match the date in the image description to the format of the date in the rest of the item.

Emphasis (bold, italics, underlining)

Emphasis may appear in the text of an image. If a student needs to be made aware of emphasis on the text of an image, use the standard phrases "Start emphasis" and "End emphasis" around the text. If specific emphasis needs to be called out (for example, text is underlined, signifying a book title, and that aspect of the item is being assessed) use the appropriate emphasis type ("Start underline" and "End underline.")

Currency

Currency may appear in items, and screen readers will vary on how they read currency. When describing currency in an image, consider the context of the item and evaluate the skills being

assessed. If reading the currency is <u>not</u> the skill being assessed, consider interpreting the currency (e.g., write $1.49 as "a dollar forty-nine" or "one dollar and forty-nine cents," depending on the context). <u>Remember:</u> If currency appears elsewhere in the item, you should be consistent with how it is presented. Match the currency in the image description to the format of currency in the rest of the item.

Abbreviations, Acronyms, and Letters Used as Letters

These may cause some challenges between image descriptions and answer options. For best screen reader behavior, apply the following tips. Keep in mind the importance of consistency throughout the item when choosing to apply the tips.

- Spell out measurements when they appear in the image. For example, if the image shows a triangle with a side labeled "5 cm," the image description should read "5 centimeters."
- Spell out symbols. For example, write π as "pi."
- For information about element symbols in images, see **Chemical Elements** in the science section.
- For "a.m." and "p.m." as related to time, space out the letters following time (e.g., 5:00 A M).
- Keep a space between the letters used to name a shape. For example, Triangle ABC should be written as "Triangle A B C" in the image description for better screen reader behavior. <u>Important:</u> If you are using a math tool to create and/or describe math symbols, equations, coordinates, figure names, etc., keep the language in the image description consistent with how screen readers will read the math tool notations.
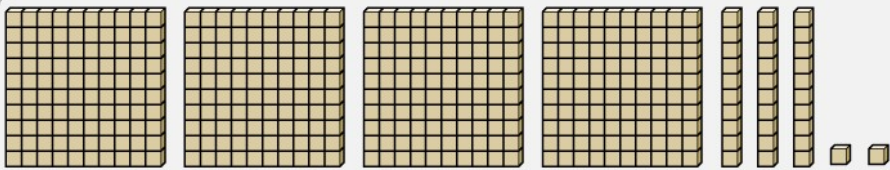
Part 3. Math

Where symbols, equations, point labels, figure names, etc. appear in the example item text, a math tool was used to ensure that these would be read as optimally as possible. For example, we used a math tool to ensure that "ΔABC" in the text of an answer option would be read by screen readers as "triangle A B C." While the text may appear different, the language in the image descriptions given here is consistent with how screen readers will read the text (through the math tool) in other parts of each item.

Base-Ten Blocks

    a.   Use "one-hundred-cube flat" to describe a group of 100 cubes.

    b.   Use "ten-cube rod" to describe a group of 10 cubes.

    c.   Use "unit cube" to describe an individual cube.

    d.   Example:

Use the blocks to answer the question.

Which number do the blocks represent?

A. 234

B. 324

C. 432

D. 702

Alt text: 4, one-hundred-cube flats. 3 ten-cube rods. 2 unit cubes.

Charts and Graphs

Bar and Line Graphs

1.   Data lands directly on labeled points.

    a.   Briefly describe the chart and give a summary if one is immediately apparent.

    b.   Describe the title and axis labels. Describe the visual attributes of the bars (e.g., dark blue, light blue) only if there is an explicit need such as a question referring to the colors.

    c.   Give data points in a bullet list, separating information with commas. Use a list format when the graph does not contain a lot of data. A table format might be a better choice when data needs to be accessed using keystrokes.

    d.   Example:

Sara's class recorded how they get to school on the bar graph shown.

Getting to School

Ways of Getting to School (vertical axis): Bike, Bus, Car, Skateboard, Walk

Number of Children (horizontal axis): 1 2 3 4 5 6 7 8 9 10
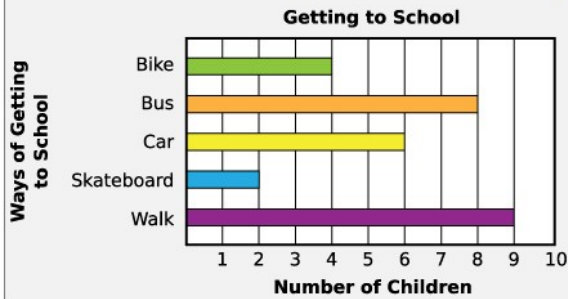
How many more students get to school by walking than by car?

A. 2

B. 3

C. 4

D. 6

E. 9

Alt text: A graph. Longdesc: The bar graph is entitled Getting to School. It shows Ways of Getting to School and Number of Children.

- Bike, 4.
- Bus, 8.
- Car, 6.
- Skateboard, 2.
- Walk, 9.

2. Data lands between labeled points.
   a. Describe the chart and give a summary if one is immediately apparent.
   b. Describe the title and axis labels. Describe the visual attributes of the bars (e.g., dark blue, light blue) only if there is an explicit need such as a question referring to the colors.
   c. Give data points in a bullet list, separating information with commas. Use a list format when the graph does not contain a lot of data. A table format might be a better choice when data needs to be accessed using keystrokes.
      i. When students do not need an exact number to answer the question, you may provide the nearest labeled number.
      ii. When reading the graph is the skill being assessed, explain the position of where the data point or bar lands using language such as "halfway between 4 and 6."
      iii. When calculation with the graph data is the skill being assessed, you may provide the exact values, or you may choose to describe the end position in relation to surrounding numbers. Use your best judgment to decide what is appropriate within the context of each item.

d. Example:

The graph shows the favorite season for students at Patrick's school.

Favorite Season

How many more boys voted for summer than winter as their favorite season?

A. 13

B. 18

C. 26

D. 52

E. 70

Alt text: A graph. Longdesc: A double bar graph entitled Favorite Season shows Season on the x-axis and Number of Students on the y-axis, from 0 to 70 by tens.

- Winter. Boys, halfway between 20 and 30. Girls, almost at the line for 20.
- Spring. Boys, almost at the line for 40. Girls, more than halfway past the line for 30.
- Summer. Boys, just past the line for 50. Girls, halfway between 60 and 70.
- Fall. Boys, halfway between 10 and 20. Girls, just past the line for 20.

3. Describing different line types
   a. Describe the labels on the x- and y- axes.
   b. Describe the shape of each line and/or trend for each graph.
   c. Example:

A band manager estimates that the number of fans for her band will increase 20% every month.

Which graph best represents this estimate?

A. <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Months on the x-axis, from 0 to 10, and Fans on the y-axis, from 0 to 3500. Four short horizontal lines step up from the bottom left to the middle of the graph.
- 0 to 2 months, 500 fans.
- 2 to 4 months, 700 fans.
- 4 to 6 months, 900 fans.
- 6 to 8 months, 1100 fans.

B. <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Months on the x-axis, from 0 to 10, and Fans on the y-axis, from 0 to 3500. A line starts at (0, 500) and curves as the value increases quickly at first, and then slowly to (10, 3000).

C. <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Months on the x-axis, from 0 to 10, and Fans on the y-axis, from 0 to 3500. A straight line starts at (0, 500) and slants upward to (10, 1500).

D. <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Months on the x-axis, from 0 to 10, and Fans on the y-axis, from 0 to 3500. A line starts at (0, 500) and curves as the value increases slowly at first, and then quickly to (10, 3000).

Circle Graphs

a. Give the title of the graph and describe how it is divided.

b. If the graph is divided into unequal parts, describe the parts from largest to smallest using a bullet list.

c. It is not necessary to describe the colors of the parts unless they are mentioned in other parts of the item.

d. Example:

Use the graph to answer the question.

Favorite Subjects among Fourth Grade Students
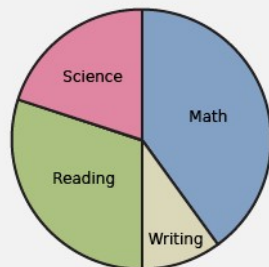
Which subject did <u>most</u> fourth grade students choose as their favorite?

A. Math

B. Reading

C. Writing

D. Science

<u>Alt text</u>: A graph. <u>Longdesc</u>: A circle graph is titled Favorite Subjects among Fourth Grade Students. It is divided into 4 unequal parts. From largest to smallest, the parts are:
- Math.

- Reading.
- Science.
- Writing.

Number/Hundreds Charts

a. Give the number range.

b. State which numbers are circled or shaded.

c. Example:

The shaded squares in the chart show a skip-counting pattern.

51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What skip-counting pattern is shown in the chart?

A. add 5

B. add 6

C. add 7

D. add 8

Alt text: A skip-counting chart shows numbers 51 through 100. These numbers are shaded: 53, 59, 65, 71, 77, 83, 89, 95.

Pictographs

a. Provide the pictograph title (if shown) and the units.

b. Describe the key. If the key shows a picture that is identical to what it represents, include the word "picture" to distinguish the art (e.g., One car picture equals one car.). If the key shows a picture that is different from what it represents, you do not need to include the word "picture" (e.g., One sun equals one day outside.).

c.   Example:

> **Use the chart to answer the question.**
>
> | | |
> |---|---|
> | pizza | 🍕🍕🍕🍕🍕 |
> | tacos | 🌮 |
> | home lunch | 🛍️🛍️🛍️🛍️ |
>
> **Key**
> 🍕 = 1
> 🌮 = 1
> 🛍️ = 1
>
> **How many more students picked pizza than tacos?**
>
> A. 1   D. 6
>
> B. 4   E. 10
>
> C. 5

Alt text: A pictograph. Longdesc: The pictograph shows names of lunches and pictures of lunches. A key shows one pizza picture equals one pizza, one taco picture equals one taco, and one brown bag equals one home lunch.

- Pizza, 5 pizza pictures.
- Tacos, 1 taco picture.
- Home lunch, 4 brown bags.

Scatter Plot

a.   Give the title of the scatter plot and tell what it shows.

b.   Describe the axes and the number of points, so students receive the setup of the scatter plot.

c.   Describe the correlation by telling students if the points are concentrated, if they show a trend, or if they are spread out.

d.   If the scatter plot has a trend, describe the pattern and describe the line of best fit, if it is shown. Line of best fit can be described by stating how many of the points are above, on, and below the line, or by giving the slope. How you describe the line of best fit depends on the skill being assessed.

e.   Depending on the item, each point's location may need to be described. Use your best judgement to determine when the need to describe the individual points would lead to cognitive overload and a necessity to declare the image as having visual bias.

f.   Example:

Barb started selling chili-flavored ice cream, but as daily temperatures increased, her sales decreased.

Which graph could represent Barb's sales?
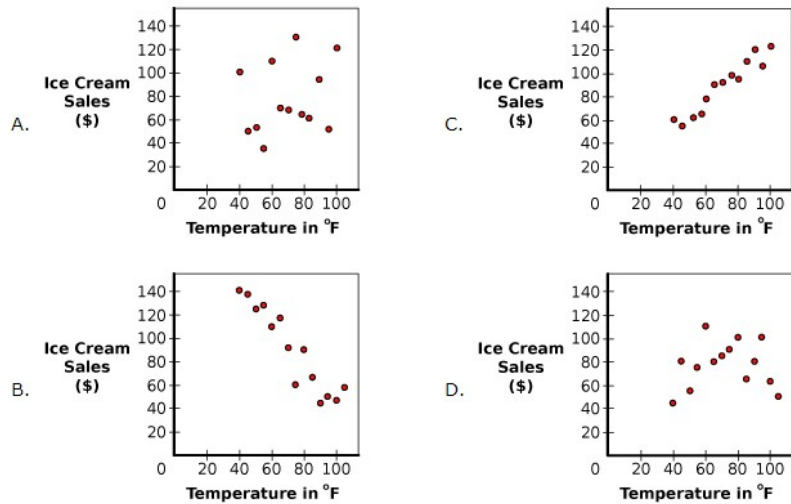
A.   Alt text: A scatter plot. Longdesc: The scatter plot shows Temperature in degrees Fahrenheit on the x-axis and Ice Cream Sales in dollars on the y-axis. Points are loosely scattered all over the graph.

B.   Alt text: A scatter plot. Longdesc: The scatter plot shows Temperature in degrees Fahrenheit on the x-axis and Ice Cream Sales in dollars on the y-axis. Points show a downward trend.

C.   Alt text: A scatter plot. Longdesc: The scatter plot shows Temperature in degrees Fahrenheit on the x-axis and Ice Cream Sales in dollars on the y-axis. Points show an upward trend.

D.   Alt text: A scatter plot. Longdesc: The scatter plot shows Temperature in degrees Fahrenheit on the x-axis and Ice Cream Sales in dollars on the y-axis. Points are scattered in the middle of the graph.

Tally Chart

While many tables and charts can be created using screen reader accessible HTML, tally charts often need to remain images, as the tally marks themselves are graphics.

1.   When reading the tally chart is the skill being assessed
   a.   If reading the tally chart is the skill being assessed, use descriptive language and avoid providing totals.
   b.   There is no need to mention the diagonal slash; instead, group tally marks by fives (i.e., for 13 tally marks, describe as "two groups of five and one group of 3").

c. Example:

Sarah asked 15 students to name their favorite summer activity. She wrote the responses in the table shown.

Baseball	Soccer	Bike	Baseball	Skateboarding
Skateboarding	Baseball	Skateboarding	Soccer	Baseball
Soccer	Swim	Baseball	Swim	Skateboarding

Which table shows Sarah's data?

A.

FAVORITE SUMMER ACTIVITY

Activity	Number of Students
Baseball	THL
Bike	I
Skateboarding	IIII
Soccer	III
Swim	II

C.

FAVORITE SUMMER ACTIVITY

Activity	Number of Students
Baseball	THL
Bike	IIII
Skateboarding	III
Soccer	II
Swim	I

B.

FAVORITE SUMMER ACTIVITY

Activity	Number of Students
Baseball	I
Bike	II
Skateboarding	III
Soccer	IIII
Swim	THL

D.

FAVORITE SUMMER ACTIVITY

Activity	Number of Students
Baseball	II
Bike	III
Skateboarding	IIII
Soccer	I
Swim	THL
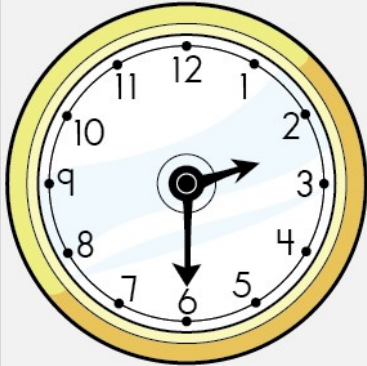
(**Note:** The title for the tally charts was not included in the image description for each answer option for the sake of brevity; as the title is consistent across all answer options and the information has already been conveyed in the text above the asset table, it is not necessary to restate in the answer options.)

A. Alt text: A tally chart. Longdesc: The tally chart shows Activity and Number of Students.
- Baseball, 1 group of 5.
- Bike, 1 group of 1.
- Skateboarding, 1 group of 4.
- Soccer, 1 group of 3.
- Swim, 1 group of 2.

B. Alt text: A tally chart. Longdesc: The tally chart shows Activity and Number of Students.
- Baseball, 1 group of 1.
- Bike, 1 group of 2.
- Skateboarding, 1 group of 3.
- Soccer, 1 group of 4.
- Swim, 1 group of 5.

C. Alt text: A tally chart. Longdesc: The tally chart shows Activity and Number of Students.
- Baseball, 1 group of 5.
- Bike, 1 group of 4.
- Skateboarding, 1 group of 3.
- Soccer, 1 group of 2.
- Swim, 1 group of 1.

D. Alt text: A tally chart. Longdesc: The tally chart shows Activity and Number of Students.
- Baseball, 1 group of 2.
- Bike, 1 group of 3.
- Skateboarding, 1 group of 4.
- Soccer, 1 group of 1.
- Swim, 1 group of 5.

2. When the item asks the student to do something with the data (not simply interpret the total tallies in a given category)

a. Provide the total amount of tally marks in numerals.

b. Example:

> Brad put some red, blue, and green blocks into a sack. There are 12 blocks in the sack. Brad had Maria pick, record, and return the blocks to the sack. Here are the results.
>
> | red | blue | green |
> |---|---|---|
> | 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 // | 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 /// | 𝍷𝍷 𝍷𝍷 𝍷𝍷 𝍷𝍷 |
>
> **Which combination of colors is _most_ likely?**
>
> A. 1 red, 1 blue, 10 green
>
> B. 2 red, 8 blue, 2 green
>
> C. 5 red, 2 blue, 5 green
>
> D. 4 red, 4 blue, 4 green
>
> E. 8 red, 3 blue, 1 green

Alt text: A tally chart has 3 columns: red, blue, and green. Red, 17 marks. Blue, 63 marks. Green, 20 marks.

Clocks

Analog

a. When describing analog clocks, consider the grade level. For lower grade levels, use "short hand" and "long hand." For higher grade level, use "minute hand" and "hour hand." You may also choose to use "short hour hand" and "long minute hand" for lower grades.

b. Use the expression "between # and #" to refer to where the hands point when they appear between two numbers.

c. Provide the number of marks before or after the nearest number for clocks with minute markers.

d. Example:

> **Use the clock to answer the question.**
>
>
>
> **What time is shown on the clock?**
>
> A. 2:00
>
> B. 2:30
>
> C. 3:00
>
> D. 3:30

Alt text: A clock shows the short hour hand is halfway between 2 and 3. The long minute hand points to 6.

Digital

a. Use a number-colon-number format when the skill being assessed is recognition of time to avoid cuing the answer.

b. Example:

> **Which clock shows six o'clock?**
>
>
>
> A. 6:00
>
> B. 6:30
>
> C. 7:00
>
> D. 7:30

A. Alt text: The digital clock shows six colon zero zero.
B. Alt text: The digital clock shows six colon three zero.
C. Alt text: The digital clock shows seven colon zero zero.
D. Alt text: The digital clock shows seven colon three zero.

Writing Out the Time

a. When the construct being assessed is not reading time, you can write the time out (e.g., six thirty) if this approach will not cue the answer.

b.   Example:

The Alvarez family arrived at the beach at the time shown on the clock.

It took the family 1 hour and 15 minutes to get to the beach.

What time did the family leave their house?

A. 1:55   D. 3:55

B. 2:35   E. 4:35

C. 2:55

<u>Alt text</u>: A clocks shows the time is three ten.

Coordinate Planes

Figures
a.   Tell students that the figure is on a coordinate plane.
b.   Introduce the type of figure/shape. Be consistent with how the screen reader will read the figure/shape names in the other parts of the item.
c.   Describe the points in the graph by naming the coordinates for each apex of the figure.
d.   Keep a space between the letters used to name a shape (Triangle A B C, <u>not</u> Triangle ABC) for better screen reader behavior. However, be consistent with how a screen reader will read the name as it appears in other parts of the item.

e.   Example:

Triangle TUV is dilated by a scale factor of 2.5.
The center of dilation is point T.
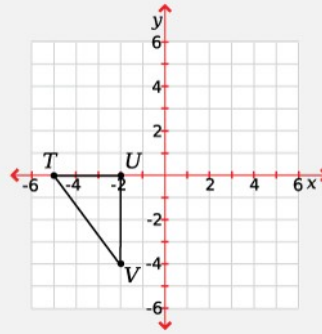
What are the coordinates of U'?

A. $(2.5, 0)$

B. $(2.5, -2)$

C. $(0.5, 0)$

D. $(0.5, -2)$

Alt text: Triangle T U V is on a coordinate plane. Point T is at (negative 5, 0). Point U is at (negative 2, 0). Point V is at (negative 2, negative 4).

Lines

1. Basic lines
   a.   Tell students there is a coordinate plane.
   b.   Describe the shape of the line.
   c.   Describe the *x*- and *y*-intercepts, from left to right, by giving their coordinates.

d. Example:

The graph of a line is shown.
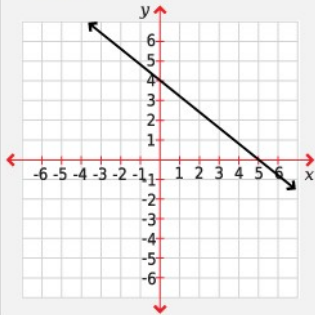
Which equation is parallel to the line shown on the graph?

A. $y = -1.25x + 5$

B. $y = -0.8x + 5$

C. $y = 4x + 5$

D. $y = 5x + 5$

Alt text: On a coordinate plane, a straight line with a negative slope crosses the y-axis at (0, 4) and the x-axis at (5, 0).

2. Lines including shading
   a. Tell students there is a coordinate plane.
   b. Identify the type of graph shown.
   c. Describe the x- and y-intercepts, from left to right, by giving their coordinates.
   d. Describe the line as "solid" or "dashed."
   e. Describe the slope of the line (positive, negative, etc.).
   f. Describe the shaded area in relation to the line, using language such "below and to the right of" or "above and to the left of."

g. Example:
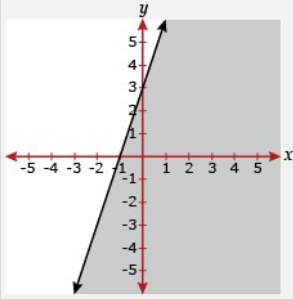
> **Use the graph to answer the question.**
>
>
>
> **Which statement describes the graph?**
>
> A. $y < 3x + 3$ D. $y \geq 3x + 3$
>
> B. $y > 3x + 3$ E. $y = 3x + 3$
>
> C. $y \leq 3x + 3$

Alt text: A graph. Longdesc: A coordinate plane with a solid line with a positive slope crossing the x-axis at (negative 1, 0) and the y-axis at (0, 3). The area below and to the right of the line is shaded.

3. Log functions
    a. Tell students there is a coordinate plane.
    b. Describe the shape of the line (using the phrase "curved line" or "logarithmic graph"), and give the coordinates of the *y*-intercept.
    c. Example:
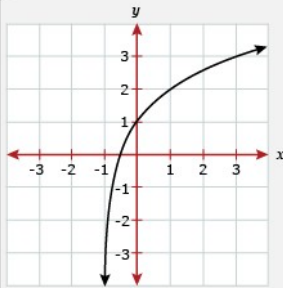
> **Use the graph to answer the question.**
>
>
>
> **Which equation describes the graph?**
>
> A. $y = \log_2 (x - 1) - 1$ C. $y = \log_2 (x - 1) + 1$
>
> B. $y = \log_2 (x + 1) - 1$ D. $y = \log_2 (x + 1) + 1$

Alt text: A graph. Longdesc: On a coordinate plane, a curved line approaches the grid line at x equals negative 1, crosses the x-axis between negative 1 and 0, and crosses the y-axis at point (0, 1).

OR

Longdesc: On a coordinate plane, a logarithmic graph is asymptotic to a grid line at x equals negative 1, crosses the x-axis between negative 1 and 0, and crosses the y-axis at point (0, 1).

Parabolas and Absolute Graphs

a.   Describe graphs with two or fewer curves. When there are three curves on one graph, the description becomes too long and complicated, with too many numbers and pieces of information to hold in a student's working memory, causing visual bias.

b.   Tell students there is a coordinate plane.

c.   Describe the graphs in order from left to right.

d.   Describe the shape of the graph (parabola, curve, hyperbola, etc.).
   i.   For a parabola, describe the direction the graph opens (right, left, up, and/or down).
   ii.   For other absolute graphs, describe the curve as "asymptotic to" an axis or line, and give the direction the curve opens and the quadrant(s) it is in.

e.   Describe the vertex and *x*- and *y*-intercepts. If there is no intercept (or the intercepts are difficult to identify), provide nearest point with integer coordinates.

f.   Example:

Which is the graph of $y = \frac{k}{x^2}$, where k is a constant?

A.   Alt text: A graph. Longdesc: On a coordinate plane, a parabola opens up. It goes through (negative 4, 8), has a vertex at (0, 0), and goes through (4, 8).

B.   Alt text: A graph. Longdesc: On a coordinate plane, a curve opens up and left in quadrants 1 and 2. The curve is asymptotic to the negative x-axis, and curves up sharply, going through (2, 8).

C.   Alt text: A graph. Longdesc: On a coordinate plane, a curve opens up and left in quadrant 2 and another curve opens up and right in quadrant 1. Both curves are asymptotic to the positive y-axis and have a horizontal asymptote at y equals 2.

D.   Alt text: A graph. Longdesc: On a coordinate plane, a hyperbola with center at the origin has a curve in quadrant 2 and a curve in quadrant 4. The curve in quadrant 2 is asymptotic

to the negative x-axis and the positive y-axis. The curve in quadrant 4 is asymptotic to the positive x-axis and the negative y-axis.

E. <u>Alt text</u>: A graph. <u>Longdesc</u>: On a coordinate plane, a curve opens up and right in quadrants 1 and 4. It starts at the top of the graph, crosses the x-axis at (4, 0), and goes through (8, negative 4).

Piecewise Graphs

a. Tell students there is a coordinate plane.

b. Describe the endpoints (open or closed circles, arrows, etc.), give the coordinates of the endpoints (if available), and describe the direction of the line.

c. If the graph shows more than three lines, reduce the cognitive overload with these graphs by summarizing the trend and giving the left- and right-most step coordinates.

d. Example:

The shipping charge on a package is a function of the weight of the package, as shown on the graph.
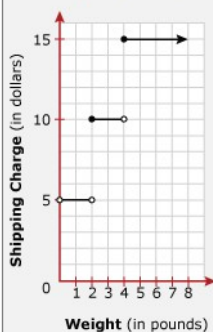
What is the range of the function?

A. all weights greater than 0 pounds

B. all shipping charges greater than $0

C. weights that are positive multiples of 2 pounds

D. shipping charges that are positive multiples of $5 but less than $20

<u>Alt text</u>: A graph. <u>Longdesc</u>: On a coordinate plane, a graph shows Weight in pounds on the x-axis and Shipping Charge in dollars on the y-axis. A piecewise function has 3 lines.

- The first line has an open circle at (0, 5), continues horizontally at y equals 5, then has an open circle at (2, 5).
- The second line has a closed circle at (2, 10), continues horizontally at y equals 10, then has an open circle at (4, 10).
- The third line has a closed circle at (4, 15), continues horizontally at y equals 15 with an arrow instead of an endpoint.

e.   Example of a summary graph:
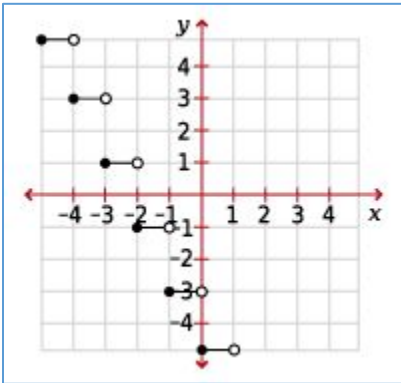
Alt text: A graph. Longdesc: On a coordinate plane, a step graph has horizontal segments that are each one unit long. The left end of each segment is a closed circle. The right end of each segment is an open circle. The left-most segment goes from (negative 5, 5) to (negative 4, 5). Each segment is two units lower and one unit farther to the right than the previous segment. The right-most segment goes from (0, negative 5) to (1, negative 5).

Points

a.   Tell students there is a coordinate plane.

b.   Use the origin as the point of reference (instead of the axes) to describe the points.

c.   If there are more than three points, provide a bulleted list with one introductory sentence.

d.   If a point is on an axis, do <u>not</u> say zero units.

e.   Example:
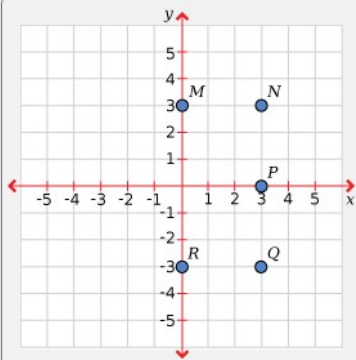
Alt text: A graph. Longdesc: The graph shows a coordinate plane with x- and y-axes and points M, N, P, Q, and R.
- Point M is on the y-axis and 3 units up from the origin.
- Point N is 3 units right from the origin and 3 units up from the origin.
- Point P is 3 units right from the origin and on the x-axis.

- Point Q is 3 units right from the origin and 3 units down from the origin.
- Point R is on the y-axis and 3 units down from the origin.

Trigonometric Functions

a. Name the function shown, as long as it does not give away the answer.
b. Give the minimum and maximum values of the sine wave.
c. Describe the number of complete cycles that occur in an interval, 0 to 2π.
d. Spell out π as "pi," but make sure to be consistent with how screen readers will read it if it appears in other parts of the item.
e. Example:

Use the graph to answer the question.
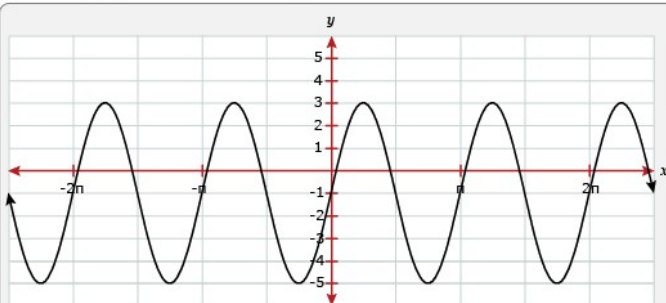
Which trigonometric function is represented by the graph?

A. $y = 4\cos(2x) - 1$

B. $y = 8\cos(2x) - 1$

C. $y = 4\sin(2x) - 1$

D. $y = 8\sin(2x) - 1$

Alt text: The graph shows a sine wave with a minimum value of negative 5 and a maximum value of 3. The wave completes 2 cycles in an interval from 0 to 2 pi.

Unit Circles

a. Since the unit circle is a standard image for this grade level (9–12), we can assume students are familiar with it. Therefore, it isn't necessary to describe every point on the circle.
b. Focus on what students need to know in order to answer the question.
c. Write out Greek symbols if they don't appear in other parts of the item.
d. Describe angle theta in radians.

e.   Example:

> **Use the unit circle diagram to answer the question.**
>
>
>
> **What is the value of $\sin\theta$?**
>
> A. $-\dfrac{\sqrt{3}}{2}$ C. $\dfrac{1}{2}$
>
> B. $-\dfrac{1}{2}$ D. $\dfrac{\sqrt{3}}{2}$
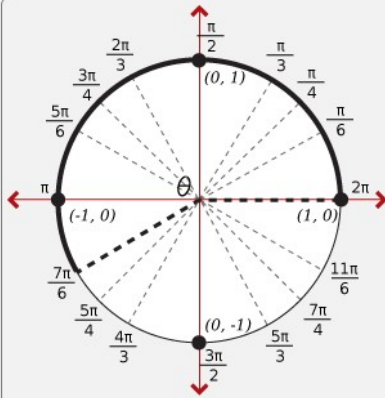
Alt text: On the unit circle diagram, the arc length of angle theta is the fraction 7 pi over 6 radians.

Vectors

a.   Tell students there is a coordinate plane.

b.   Describe the coordinates of the vector's head and tail.

c.   For more complex vector graphs (showing 2 or more vectors), state whether the vectors are connected. You may also consider using the phrase "goes from (*coordinates*) to (*coordinates*)" instead of "the tail of vector x is at (*coordinates*) and the head is at (*coordinates*)" to reduce the cognitive load.

d.   Example (simple):

Use the vector to answer the question.
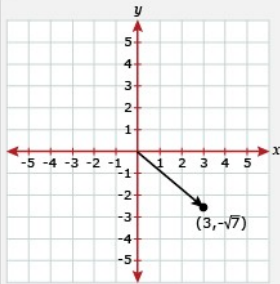
What is the magnitude of the vector?

A. $\sqrt{7}$

B. 3

C. $\sqrt{10}$

D. 4

E. $3\sqrt{7}$

Alt text: A vector is on a coordinate plane. The tail is at the origin. The head is at point (3, negative square root of 7).

e.   Example (complex):

Use $\overrightarrow{v}$ to answer the question.
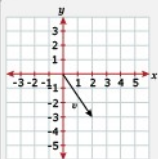
Which set of vectors has a sum that results in $\overrightarrow{v}$?

A.

B.

C.

D.

Asset: Alt text: On a coordinate plane, vector v goes from the origin (0, 0) to (2, negative 3).

Answer options:

A. <u>Alt text</u>: A graph. <u>Longdesc</u>: On a coordinate plane, 2 disconnected vectors are graphed. The first vector goes from (negative 1, 1) to (2, 2). The second vector goes from (3, 2) to (2, negative 2).

B. <u>Alt text</u>: A graph. <u>Longdesc</u>: On a coordinate plane, 2 connected vectors are graphed. The first vector goes from (0, negative 2) to (2, negative 3). The second vector goes from (1, 0) to (2, negative 3).

C. <u>Alt text</u>: A graph. <u>Longdesc</u>: On a coordinate plane, 2 disconnected vectors are graphed. The first vector goes from (2, 3) to (4, 2). The second vector goes from (3, negative 2) to (3, negative 5).
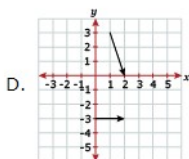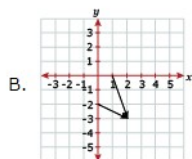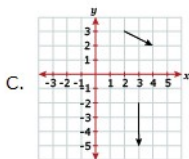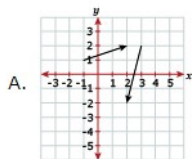
D. <u>Alt text</u>: A graph. <u>Longdesc</u>: On a coordinate plane, 2 disconnected vectors are graphed. The first vector goes from (0, negative 3) to (2, negative 3). The second vector goes from (1, 3) to (2, 0).

Equations Represented as Images (Vertical Equations)

a. Read the equation as a number sentence.
b. Use numerals for given numbers.
c. Use mathematical term (*plus*, *minus*, *times,* or *equals*) after each number. Refer to the bottom line as *equals*.
d. Example:

What is the answer?

$$52$$
$$10$$
$$+\ 37$$

A. 89

B. 90

C. 99

D. 100

E. 109

<u>Alt text</u>: 52 plus 10 plus 37 equals.

Figures and Shapes (Geometry)
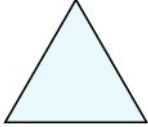
Keep a space between the letters used to name figures (Triangle A B C, <u>not</u> Triangle ABC) for better screen reader behavior. However, be consistent with how a screen reader will read the name as it appears in other parts of the item.
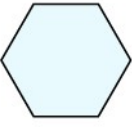
2-D Shapes

1. Identification of shapes
   a. Describe shape using side and/or angle details. **Note:** Many of these items will contain visual bias. For example, if the language needed to describe the shapes is above the grade level at which the item is testing, or if the image descriptions of two or more answer options overlap, then the item contains visual bias. Only when the shapes can be described with grade-appropriate language, using similar structure, and with no overlap between answer option image descriptions does the item <u>not</u> contain visual bias.
   b. Example:
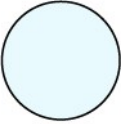
Which shape is a rectangle?

A.

C.

B.

D.

   A. <u>Alt text</u>: A shape with 3 sides. All sides are the same length.
   B. <u>Alt text</u>: A shape with 4 sides. 2 sides are short, and 2 sides are long.
   C. <u>Alt text</u>: A shape with 6 sides. All sides are the same length.
   D. <u>Alt text</u>: A shape that is round, with 1 side.

2. Calculation with 2-D shapes
   a. State name of the shape, and then give more detailed information (measurements and labels).
   b. Make sure the student has all the information needed to solve the problem.
   c. Spell out the abbreviated measurements if they don't appear in other parts of the item.

d. Example:
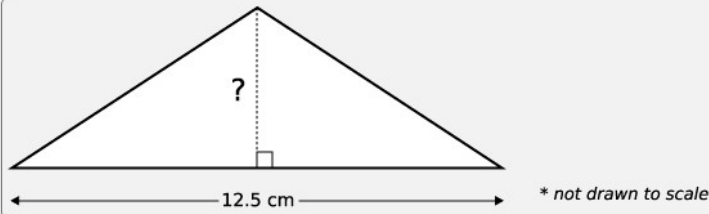
> **Use the diagram to answer the question.**
>
>
>
> 12.5 cm   * not drawn to scale
>
> **The area of the triangle shown is 40.00 cm².**
>
> **What is the height of the triangle?**
>
> A. 3.20 cm
>
> B. 6.40 cm
>
> C. 13.75 cm
>
> D. 27.50 cm

Alt text: The diagram shows a triangle with a base of 12.5 cm.

e. Example:
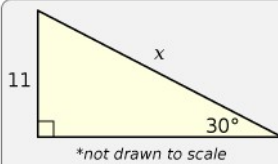
> **Use the diagram to answer the question.**
>
>
>
> 11   x   30°   *not drawn to scale
>
> **What is the value of x?**
>
> A. 22
>
> B. $11\sqrt{2}$
>
> C. $11\sqrt{3}$
>
> D. $\frac{11\sqrt{2}}{2}$
>
> E. $\frac{11\sqrt{3}}{3}$

Alt text: A diagram. Longdesc: The diagram shows a right triangle. The height is labeled 11, the hypotenuse is labeled x, and the base is unlabeled. The angle opposite the height is 30 degrees.

Circles

1. Including angles and lines
   a. Repeat the plain text to set up the description.

b. Whenever the diagram says "not drawn to scale," pay particular attention to the actual measures provided.

c. Describe the line segments, followed by the arc they form.

d. Example:

$\overline{FH}$ is a diameter of $\odot N$.

*not drawn to scale
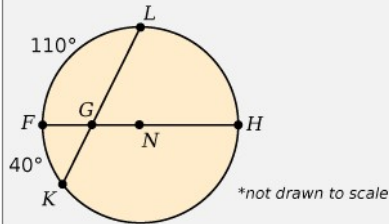
What is $m\angle LGH$?

A. 40°

B. 55°

C. 70°

D. 85°

(**Note:** The degree symbol was maintained in the image description—instead of being spelled out as "degrees"—since students will also encounter it in the answer options.)

Alt text: A diagram. Longdesc: Line segment F H is the diameter of a circle with center N.
- Chord K L intersects diameter F H at point G.
- Angle F G L intercepts an arc that measures 110°.
- Angle F G K intercepts an arc that measures 40°.

2. Inscribed shapes
   a. If the circle is named (center point labeled), give the name of the circle and the shape inscribed in it.
   b. Describe lines and angles of the inscribed shape.
   c. Sometimes it is a good idea to repeat information given in the text surrounding the image, so the information of the image is presented in a logical progression that may be more easily understood by a visually-impaired student.
   d. Example:

The diameter of the circle shown is $\overline{AC}$.

What is $m\angle BCA$?

A. 14°

B. 28°

C. 31°

D. 62°
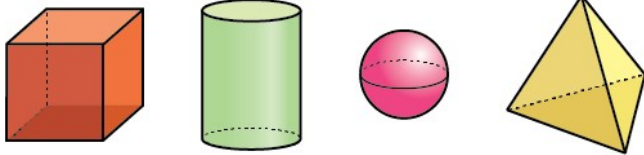
(**Note:** The degree symbol was maintained in the image description—instead of being spelled out as "degrees"—since students will also encounter it in the answer options.)
Alt text: A circle is inscribed with Triangle A B C. Line A C is a diameter of the circle. Angle C A B is 62°.
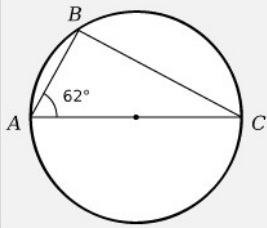
3-D Shapes

1. Identification
   a. Describe the shape using the definition of the shape, or a close equivalent. Describing the number of sides or angle details may help. **Note:** Many of these items will contain visual bias. For example, if the language needed to describe the shapes is above the grade level at which the item is testing, or if the image descriptions of two or more answer options overlap, then the item contains visual bias. Only when the shapes can be described with grade-appropriate language, using similar structure, and with no overlap between answer option image descriptions does the item <u>not</u> contain visual bias.

b. Example:

> **Select the cube.**
>
>

A. <u>Alt text</u>: A shape with a flat square bottom, a flat square top, and 4 flat square sides.
B. <u>Alt text</u>: A shape with a round flat bottom, a round flat top, and one curved side.
C. <u>Alt text</u>: A shape that is round with one curved side, like a ball.
D. <u>Alt text</u>: A shape with a flat triangle bottom and 3 sides that connect at a top point.

2. Calculation with 3-D shapes
   a. State name of the shape, and then give more detailed information (measurements and labels).
   b. Make sure the student has all the information needed to solve the problem.
   c. Spell out the abbreviated measurements if they don't appear in other parts of the item.
   d. Example:

> John is filling the sandbox shown with sand.
>
>
>
> 0.3 m
>
> 2.5 m
>
> 3.4 m
>
> **Approximately how much sand will it take to fill the sandbox 0.3 meters deep?**
>
> A. 1.77 m^3
>
> B. 2.55 m^3
>
> C. 3.54 m^3
>
> D. 6.20 m^3

<u>Alt text</u>: The sandbox is in the shape of a rectangular prism. It is 3.4 m long and 2.5 m wide.

Line and Angle Relationships

a. Describe each parallel line and the angles created by the intersecting line(s), starting with the upper left angle and moving in a clockwise direction.
b. Use "blank" to describe the angles that are not labeled in the image.
c. Use your best judgment to determine when the description is too complex or lengthy for a nonsighted student to access. If it is, the image/item should be marked as having visual bias.

d. Example:

Line *k* shown intersects the parallel lines *m* and *n*.
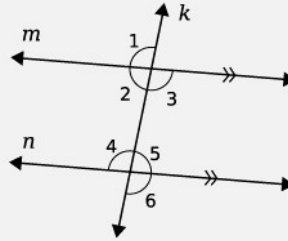
Which series of statements prove that ∠1 ≅ ∠4?

A.
m∠1 + m∠2 = 360°	Linear Angles
m∠2 = m∠5	Alt. Int. Angles
m∠1 + m∠5 = 360°	Substitution
m∠5 + m∠4 = 360°	Linear Angles
m∠1 − m∠4 = 0°	Subtraction
m∠1 = m∠4	Algebra
∠1 ≅ ∠4	Angle Congruence

C.
m∠1 + m∠2 = 180°	Linear Angles
m∠2 = m∠5	Alt. Int. Angles
m∠1 + m∠5 = 180°	Substitution
m∠5 + m∠4 = 180°	Linear Angles
m∠1 − m∠4 = 0°	Subtraction
m∠1 = m∠4	Algebra
∠1 ≅ ∠4	Angle Congruence

B.
∠1 ≅ ∠3	Vertical Angles
∠3 ≅ ∠5	Alt. Int. Angles
∠5 ≅ ∠4	Linear Angles
∠1 ≅ ∠4	Transitive Property

D.
∠1 ≅ ∠6	Alt. Int. Angles
∠6 ≅ ∠4	Vertical Angles
∠1 ≅ ∠4	Transitive Property

Alt text: A diagram. Longdesc: On line m where it intersects line k, 4 angles are created. Labeled clockwise, from upper left: angle 1, blank, angle 3, angle 2. On line n where it intersects line k, 4 angles are created. Labeled clockwise, from upper left: angle 4, angle 5, angle 6, blank.

Fractions (Represented by Shaded Parts of a Shape)

a. Describe the shape.
b. Describe how the shape is divided.
c. Give the number of shaded parts.
d. Example:

Which picture shows $\frac{1}{4}$ of the circle shaded?
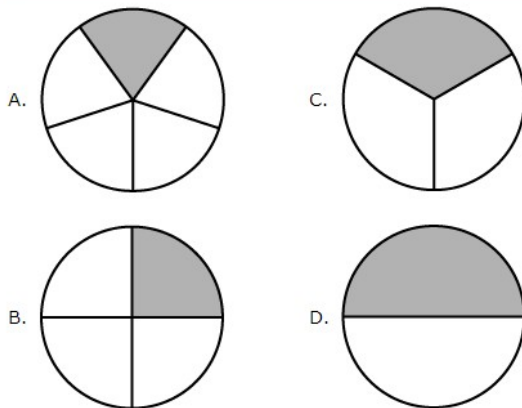
A. <u>Alt text</u>: A circle is divided into 5 equal parts. 1 part is shaded.
B. <u>Alt text</u>: A circle is divided into 4 equal parts. 1 part is shaded.
C. <u>Alt text</u>: A circle is divided into 3 equal parts. 1 part is shaded.
D. <u>Alt text</u>: A circle is divided into 2 equal parts. 1 part is shaded.

Groups and Patterns

Groups

a. For consistency, use the same categories and descriptions from the answer choices in the description, providing they don't cue the answer.
b. Use a bulleted list for student-controlled navigation.
c. Example:

Ruby sorted the objects into two groups.

What rule did Ruby use to sort the objects?

A. large or small

B. black or white

C. striped or solid

D. socks or mittens

<u>Alt text</u>: Two groups of objects. <u>Longdesc</u>:

Group 1:
- 2 large, blue and red striped mittens.
- 1 small, blue and red striped mitten.
- 1 large, red and white striped sock.
- 1 small, red and white striped sock.

Group 2:
- 2 large solid yellow mittens.
- 2 small solid yellow mittens.
- 1 large solid white sock.
- 1 small solid white sock.

Patterns

1. Changes within an image
   a. Give students an overview of the image in order to understand the pattern.
   b. Remain consistent in word choice within the item and, ideally, with similar items in your assessment bank.
   c. Describe the aspects of the pattern that are necessary to select the answer. In the example below, there is no need to describe the dots or the color of the dots; only the number is given.

d. Example:

Which rule describes the pattern?

A. take away 1

B. take away 2

C. take away 3

D. take away 4

Alt text: Four groups of dots are shown in a pattern: 8, 6, 4, 2.

2. Linear patterns
   a. For long patterns of simple shapes or objects, like fruit, list single shapes without a number and more than one shape in a row with a number. This reduces the cognitive load and helps students focus on the pattern.
   b. Example:

Use the pattern to answer the question.

Which comes next in the pattern?

A.

B.

C.

D.

Asset: Alt text: The pattern shows a line of shapes: 2 triangles, 2 squares, 2 triangles, 2 squares.

Answer options:
A. Alt text: A line of shapes: 3 triangles, 1 square.
B. Alt text: A line of shapes: 4 triangles.
C. Alt text: A line of shapes: 2 triangles, 2 squares.
D. Alt text: A line of shapes: 4 squares.

Money

a. For Canadian money, describe coins as a five-cent coin, ten-cent coin, etc.

b. For U.S. money, describe the coins as a nickel, dime, etc. However, if the illustrative representative of the coins shows a numerical value (e.g., the number *25* is pictured prominently on the quarter), then describe the coins as five-cent coin, 10-cent coin, etc.

c. Example:

> Rachel used these coins to buy a drink.
>
> 5¢ 5¢ 25¢ 25¢ 25¢ 25¢
>
> 1¢ 1¢ 1¢ 10¢ 10¢ 10¢
>
> **How much did Rachel pay for the drink?**
>
> A. $1.03
>
> B. $1.28
>
> C. $1.38
>
> D. $1.43
>
> E. $1.47

Alt text: United States money. 2, five-cent coins. 4, twenty-five-cent coins. 3, one-cent coins. And 3, ten-cent coins.

Number Lines

Box-and-Whisker Plots

a. Consider the stem. This will determine what information you can and must include in the image description.

b. Include the title if there is one.

c. Depending on the stem, describe the box-and-whisker plots by giving the range of the number line, the whiskers, the box, and the median value.

d. Example:

> The box-and-whisker plot shown represents the number of sit-ups the students in Penelope's gym class were able to do.
>
> 0 3 6 9 12 15 18 21 24 27 30 33 36
>
> **What was the median number of sit-ups that a student was able to do?**
>
> A. 9
>
> B. 18
>
> C. 21
>
> D. 27

(This item asks for the median, so we can't state it outright. If we could, we would say ". . . and the box ranges from 9 to 27 sit-ups, with a median of 21 sit-ups.")

Alt text: A box-and-whisker plot. Longdesc: The number line goes from 0 to 36. The whiskers range from 3 to 33 sit-ups, and the box ranges from 9 to 27 sit-ups. A line divides the box at 21 sit-ups.

Fractions
a.   Set up the number line by providing the range of numbers.
b.   If fractions are the skill being tested, describe the number line as being divided into equal parts. For example, "A number line goes from 0 to 2. Marks divide the space between each number into 3 equal parts."
c.   If fractions are not the skill being tested, give the divisions between integers in fractions. For example, "A number line goes from 0 to 2. Marks divide the space between each number into thirds."
d.   When describing points at a positive number, use the smaller positive number as the anchor. For example, say, "The point is at the second mark to the right of 2."
e.   When describing points at a negative number, use the larger negative number as the anchor. For example, say, "The point is at the second mark to the left of negative 1."
f.   Example:

Which point represents the fraction $\frac{3}{4}$?

A.   Alt text: A number line. Longdesc: The number line goes from zero to one. Marks divide the space between each number into four equal parts. A point is on the first mark to the right of zero.
B.   Alt text: A number line. Longdesc: The number line goes from zero to one. Marks divide the space between each number into four equal parts. A point is on the third mark to the right of zero.
C.   Alt text: A number line. Longdesc: The number line goes from zero to one. Marks divide the space between each number into five equal parts. A point is on the first mark to the right of zero.
D.   Alt text: A number line. Longdesc: The number line goes from zero to one. Marks divide the space between each number into five equal parts. A point is on the fourth mark to the right of zero.

Inequalities
a.   Set up the number line by providing the range of numbers.
b.   Use "filled-in" circle and "open" circle to describe points.

   c.   Refer to the ray or line segment using the phrase "the number line is shaded."

   d.   When both negative and positive numbers appear on the number line, specify "negative" and "positive" before each number mentioned.

   e.   Example:

Which graph shows this solution set?

$y < -4$ or $y > 2$

A.   (number line with filled circle at −4, open circle at 2, shaded between)

B.   (number line with open circle at −4, open circle at 2, shaded between)

C.   (number line with filled circle at −4, filled circle at 2, shaded between)

D.   (number line with filled circles at −4 and 2, shaded to the left of −4 and to the right of 2)

E.   (number line with open circles at −4 and −2, shaded to the left of −4 and to the right of −2)

A.   Alt text: A number line. Longdesc: The number line goes from negative 4 to positive 2. At negative 4, there is a filled-in circle. At positive 2, there is an open circle. Between negative 4 and positive 2, the number line is shaded.

B.   Alt text: A number line. Longdesc: The number line goes from negative 4 to positive 2. At negative 4 and positive 2, there are open circles. Between negative 4 and positive 2, the number line is shaded.

C.   Alt text: A number line. Longdesc: The number line goes from negative 4 to positive 2. At negative 4 and positive 2, there are filled-in circles. Between negative 4 and positive 2, the number line is shaded.

D.   Alt text: A number line. Longdesc: The number line goes from negative 4 to positive 2. At negative 4 and positive 2, there are filled-in circles. The number line is shaded to the left of negative 4 and to the right of positive 2.

E.   Alt text: A number line. Longdesc: The number line goes from negative 4 to positive 2. At negative 4 and positive 2, there are open circles. The number line is shaded to the left of negative 4 and to the right of positive 2.

Line Plots

   a.   Set up the number line by providing the title, units, and range of numbers.

   b.   From left to right, list the number of marks at each point, stating number of marks first, and then the number on the number line.

   c.   Use a bulleted list to organize the data.

d.   Example:

> The line plot shows the length of some beads in inches. Melanie is making a bracelet using all the beads.
>
> **Bead Lengths**
>
>
>
> **Inches**
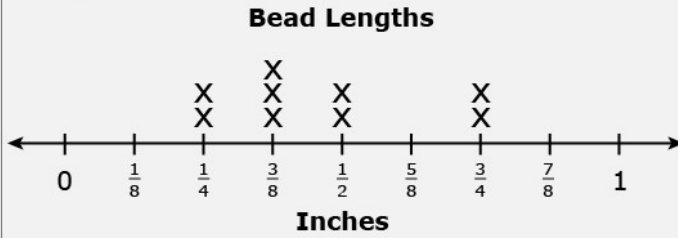
| What is the total length of the beads when lined up end to end? |

A. $3\frac{1}{8}$

B. $3\frac{3}{8}$

C. $3\frac{7}{8}$

D. $4\frac{1}{8}$

E. $4\frac{3}{8}$

Alt text: A line plot. Longdesc: The line plot is entitled Bead Lengths. It goes from 0 to 1 inch.
- 2 marks at one-fourth.
- 3 marks at three-eighths.
- 2 marks at one-half.
- 2 marks at three-fourths.

Skip Counting

a.   Describe the skip-counting pattern by indicating number of skips and intervals.

b.   When both negative and positive numbers appear on the number line, specify "negative" and "positive" before each number.

c.   Example:

| Which number line shows how to find the sum of $-8 + (-2)$? |
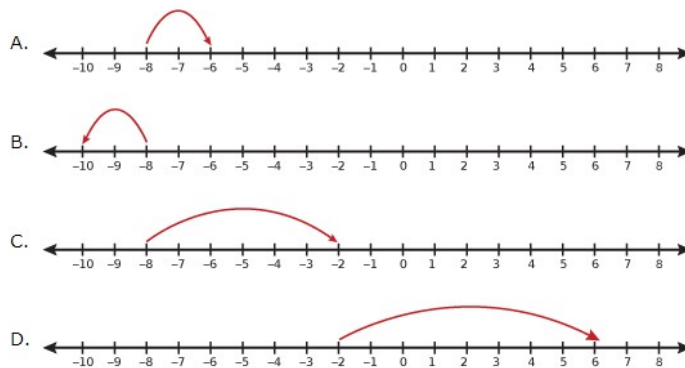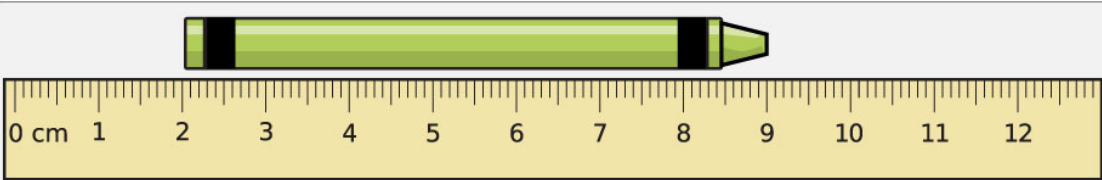
A.   Alt text: An arrow on a number line skips once, going from negative 8 to negative 6.

B. Alt text: An arrow on a number line skips once, going from negative 8 to negative 10.
C. Alt text: An arrow on a number line skips once, going from negative 8 to negative 2.
D. Alt text: An arrow on a number line skips once, going from negative 2 to positive 6.

Rulers

a.   Describe the ruler based on its units.
b.   Indicate the start and endpoint of the object measured.
c.   If the object extends past a whole unit, list the number of marks before or after the closest number.
d.   Ruler items whose objects start at zero and go to a whole number have visual bias.
e.   Example:

> **Use the ruler to answer the question.**
>
> 0 cm 1   2   3   4   5   6   7   8   9   10   11   12
>
> **What is the length of the crayon to the nearest centimeter?**
>
> A.   2 cm
> B.   7 cm
> C.   9 cm
> D.   70 cm
> E.   90 cm

Alt text: A picture. Longdesc: The picture shows a crayon measured with a centimeter ruler with marks showing each tenth of a centimeter. The crayon begins at 2 centimeters and ends at 9 centimeters.

Spinners

a.   Describe how many parts the spinner is divided into and if parts are equal or unequal.
b.   List different parts, if necessary to answering the question. If pieces are unequal, list from largest to smallest.
c.   Remember: You do not need to repeat information given in the setup language of the item. However, sometimes it is helpful to the student to have all of the description of the image together in the alt tag.

d. Example with equal-sized pieces:

The spinner is divided into 5 equal sections. Leah is going to spin the arrow one time.
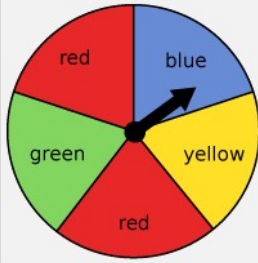
What is the probability that the spinner will land on a <u>green</u> section?

A. 20%

B. 25%

C. 40%

D. 50%

E. 67%

(In this example, the image description repeats some information given in the text outside the image in order to keep the pertinent information for answering the question together.)

<u>Alt text</u>: The spinner is divided into 5 equal sections. 1 section is green.

e. Example with unequal-sized pieces:

Use the spinner to answer the question.
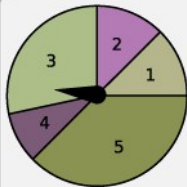
Which number will the spinner stop on <u>least</u> often?

A. 1

B. 2

C. 3

D. 4

E. 5

<u>Alt text</u>: A spinner. <u>Longdesc</u>: A spinner is divided into 5 unequal parts labeled 1 through 5. From largest to smallest:

- 5, which takes up almost half the spinner.
- 3, which is a little more than a quarter of the spinner.
- 1 and 2, which are equal and each take up about one-eighth of the spinner.

- 4, which is a little smaller than 1 and 2.

Thermometers

a.   Set up the thermometer by providing the range of numbers, the units, and the intervals.
b.   Describe the temperature level by saying at which mark the liquid in the thermometer stops.
c.   Example:

Use the thermometer to answer the question.
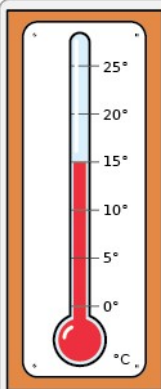
What temperature does the thermometer show?

A. 5 °C   D. 20 °C

B. 10 °C   E. 25 °C

C. 15 °C

Alt text: The thermometer shows temperatures from 0 degrees to 25 degrees Celsius (C). Marks show every 5 degrees. The red liquid stops at 15 degrees.

Venn Diagrams

Double

a.   Focus on the data in the Venn diagram, not on the appearance.
b.   List the contents of each circle and then the area of intersection, using narrative description.
c.   For lower grade levels, we may want to describe the diagram as "two overlapping circles."
d.   Provide the data in brief statements.
e.   Illustrations included in the Venn diagram are often decorative and rarely need to be described.

f.   Example:

The diagram shows how many students used crayons, markers, or both to make their artwork.

Crayons   **Markers**

4   18   7

What is the total number of students who used crayons?

A. 4

B. 7

C. 11

D. 18

E. 22

Alt text: The diagram shows 2 overlapping circles labeled Crayons and Markers. Crayons has 4. Markers has 7. The area of overlap has 18.

Triple

a.   Consider the grade level of the item to determine how much interpretation is necessary to include in the description. This specific example is for 6+. However, the descriptions below show two different levels of description.

b.   List most relevant information first to avoid having the student listen to a long list of information before getting to the answers.

c. Example (with most interpretation for lower grades):

Use the Venn diagram to answer the question.

All students taking a performing arts class is the universal set.
   J = students taking Orchestra
   K = students taking Band
   L = students taking Dance

U
J K
   6   8   12
      3
   10   15
0
   5
L

How many students are taking exactly 2 performing arts classes?

A. 23   D. 56

B. 33   E. 59

C. 36

Alt text: A Venn diagram. Longdesc: The Venn diagram shows the intersections of circles J, K, and L. Some students are in all three classes, some are in two classes, and some are in one class.

Three classes.

- 3 students, Orchestra, Band, and Dance.

Two classes.

- 8 students, Orchestra and Band.
- 15 students, Band and Dance.
- 10 students, Dance and Orchestra.

One class.

- 6 students, Orchestra.
- 12 students, Band.
- 5 students, Dance.

The set has zero students who don't take performing arts classes.

d. Example (with less interpretation for higher grade levels):

Alt text: A Venn diagram. Longdesc: The Venn diagram shows the intersection of circles J, K, and L. The set has zero students who don't take performing arts classes. Some students are in all three classes, some are in two classes, and some are in one class.

- Intersection of J, K, and L, 3 students.
- Intersection of J and K, 8 students.
- Intersection of J and L, 10 students.
- Intersection of K and L, 15 students.
- J, 6 students.

- K, 12 students.
- L, 5 students.

Universal Sets and Shading

a. Focus on the data in the Venn diagram, not on the appearance.
b. List contents of each circle, and then the area of intersection.
c. Use narrative description.
d. For lower grade levels, we may want to describe the diagram as "two overlapping circles."
e. Provide the data in brief statements.
f. If the item is comparing different shading of the same data presented in a Venn diagram, it is unnecessary to give all of the data details for each description. Instead focus on the differences between the images (see example).
g. Example:

At a store in Kansas, 280 customers were surveyed to find out which snack they enjoy. One customer is chosen at random.

Let S be the event that the customer enjoys salted peanuts.
Let D be the event that the customer enjoys dry roasted peanuts.

Which Venn diagram is shaded to represent the event $S \cap D$?
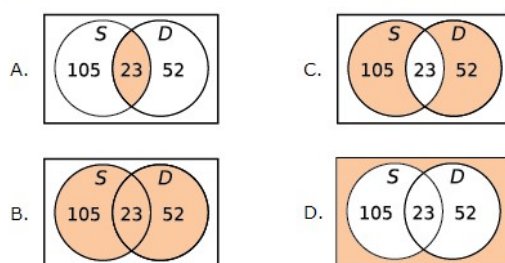
A. Alt text: A Venn diagram. Longdesc: The Venn diagram shows two intersecting circles. Circle S has 105, circle D has 52. The area of intersection has 23. The shaded area is the area of intersection.
B. Alt text: A Venn diagram. Longdesc: The Venn diagram shows two intersecting circles. Circle S has 105, circle D has 52. The area of intersection has 23. The shaded area is both circles and their area of intersection.
C. Alt text: A Venn diagram. Longdesc: The Venn diagram shows two intersecting circles. Circle S has 105, circle D has 52. The area of intersection has 23. The shaded area is both circles where they do not intersect.
D. Alt text: A Venn diagram. Longdesc: The Venn diagram shows two intersecting circles. Circle S has 105, circle D has 52. The area of intersection has 23. The shaded area is the universal set outside the circles.

Visual Bias in Math Item Types

Complexity

1. Geoboards
   a. Since geoboards typically show an irregular shape that would require a long and complex description, they are categorized as having visual bias.

b. Example:
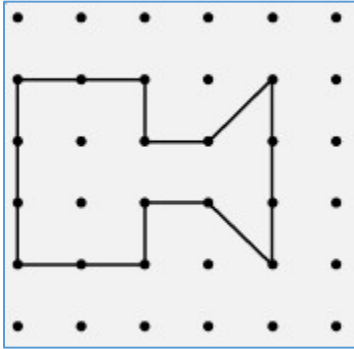
2. Graphs with three or more curves
    a. When there are three curves on one graph, the description becomes too long and complicated, with too many numbers and pieces of information to hold in a student's working memory. These images are categorized as having visual bias.
    b. Example:
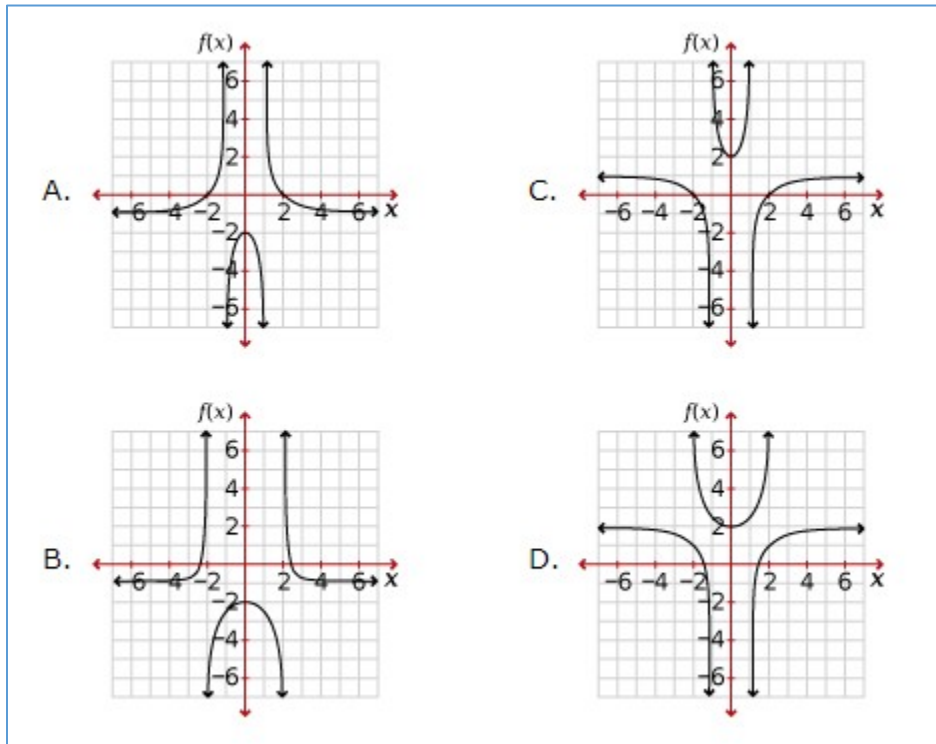
Counting Squares for Perimeter/Area

a. Many irregular shapes have visual bias when students need to find the perimeter or area, especially when the sides are not labeled with lengths. In those cases, students are expected to count and add squares, which is a visual skill. These items are categorized as having visual bias.

b.   Example:

Use the shapes to answer the question.

Which shape has the smallest perimeter?

A.

C.

B.

D.

Number Lines with Equivalent Fractions

a.   With items of this type, sighted students can quickly find the equivalent fractions by seeing which number line points line up. This gives the sighted student a strong advantage over nonsighted students in answering the question, so these items are categorized as having visual bias.

b.   Example:

Choose all the number lines that show equivalent fractions.
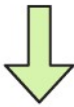
Rotation

a.   Item rotation is a visual skill that is not easily accessible to nonsighted students. These items are categorized as having visual bias.

b.   Example:
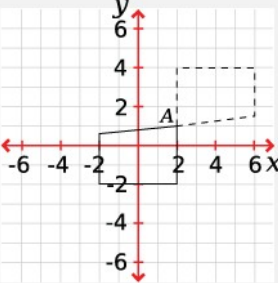
> **Use the picture to answer the question.**
>
>
>
> **Kaleigh rotates the shape 180°.**
>
> **Which picture shows how it looks after she rotates it?**
>
>

c.   Example on a coordinate plane:

> The graph shows a pre-image and an image (dashed lines) after two reflections.
>
>
>
> **Which correctly describes this transformation?**
>
> A.   a reflection over $y = 0$ then over $x = 2$
>
> B.   a reflection over $y = 1$ then over $x = 2$
>
> C.   a reflection over $y = 2$ then over $x = 0$
>
> D.   a reflection over $y = 2$ then over $x = 1$
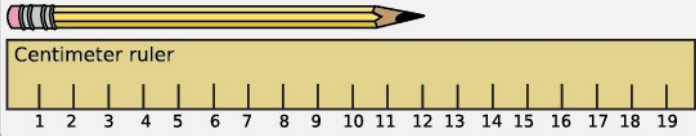
Ruler Items for Which the Item Being Measured Starts at 0 and Ends at a Whole Number

a.   In these items, the image description would immediately cue the answer (the number at which the item ends), and there is no other effective way to describe the image. For images with objects that end between labeled numbers and needs tick marks in their description (or start at a number other than 0), an image description can be written.

b.   Example:

> A ruler is used to measure a pencil.
>
> Centimeter ruler
>
> 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
>
> **Estimate the length of the pencil.**
>
> A. 19 cm
>
> B. 15 cm
>
> C. 10 cm
>
> D. 16 cm
>
> E. 12 cm
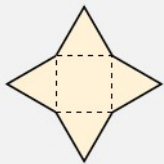
Shapes

1. 3-D figures—Determining a 3-D figure from a net
    a. This item requires an understanding of how a 2-D object transforms into a 3-D object. Since this is a visual exercise, the item has visual bias.
    b. Example:
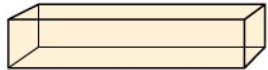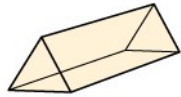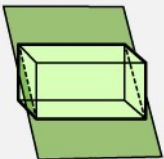
    > The diagram shows the net of a three-dimensional figure.
    >
    > **What figure can be made from the net?**
    >
    > A.
    >
    > B.
    >
    > C.
    >
    > D.

2. 3-D figures—Determining 2-D cross-sections of 3-D figure
    a. This type of item requires a visual understanding of how a 2-D object transforms into a 3-D object. Since this is a visual exercise, the item has visual bias and should not be described.

b. Example:

> The right rectangular prism is sliced by a plane as shown.
>
> **What is the shape of the cross-section?**
>
> A. ▢   D. ▭
>
> B. ◺   E. ▱
>
> C. ⏢

3. Shapes—Combining to make a new shape
    a. This item type assesses a visual skill, so it is categorized as having visual bias.
    b. Example:
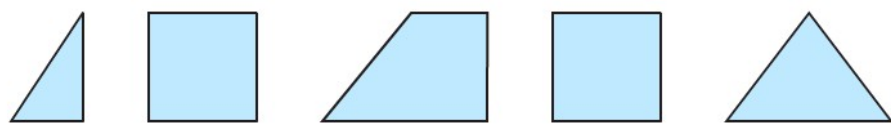
> **Use the shape to answer the question.**
>
> **Select 2 shapes that combine to form the shape shown.**

4. Shapes—Matching
    a. This type of item asks the student to use visual skills to identify the shape. In the following example, describing the asset shape as a "round clock" and naming each of the shapes would test a different skill (knowing that "round" means a "circle"). Therefore, items of this type have visual bias.
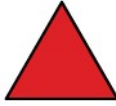
b. Example:

Use the clock to answer the question.

What shape is the clock?

A.

C.

B.

D.

Visual Comparison

a. The visual comparison of the qualities of two objects, such as length, is a sighted skill. Therefore, items of this type are categorized as having visual bias.

b. Example:

Select the pencil that is the shortest.

A.

B.

C.
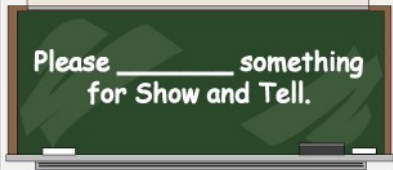
D.

Part 4. Reading and Language Usage

Blanks

a.   When a student needs to fill in information (e.g., the student must choose the answer option that would fit best in the blank), use the term "blank" for the line. You can put commas around the word "blank" to create more of a pause.

b.   Example:

> **Read the sentence.**
>
> Please _____ something for Show and Tell.
>
> **Which word completes the sentence correctly?**
>
> 1. bring
> 2. brings
> 3. brought
> 4. brung

Alt text: The sentence is missing a word. It reads: Please, blank, something for Show and Tell.

Circle/Pie Graphs
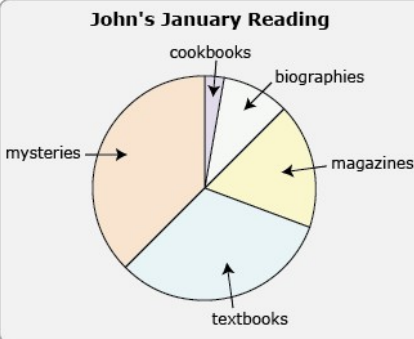
a.   Give the title of the graph and describe how it is divided.

b.   If the graph is divided into unequal parts, describe the parts from largest to smallest using a bullet list.

c.   It is not necessary to describe the colors of the parts unless they are mentioned in other parts of the item.

d.   Example:

> **Read the pie graph.**
>
> **John's January Reading**
>
> cookbooks
>
> biographies
>
> mysteries
>
> magazines
>
> textbooks
>
> **Based on the pie graph, which type of reading did John spend the LEAST time on in January?**
>
> 1. cookbooks
>
> 2. magazines
>
> 3. mysteries
>
> 4. textbooks

Alt text: A pie graph. Longdesc: A pie graph entitled John's January Reading shows five types of reading. In order from greatest amount to smallest amount of time spent reading, the reading types are:
- Mysteries.
- Textbooks.
- Magazines.
- Biographies.
- Cookbooks.

Forms

Simple Forms

a.   Describe the area in general by stating that information needs to be given, or describe the blank as a "blank line."

b. Example:

Alt text: A checklist. Longdesc:

Registration Form for Dog Day Care.

Dog's name, blank line. Owner's name, blank line.

Will the dog sit on command? Yes or No.

Will the dog come when called? Yes or No.

Has the dog had a medical checkup? Yes or No.

Does the dog play well with other dogs? Yes or No.

Complex Forms

a. In instances where the image contains blanks and checkboxes, you may use "provide" when a blank or box needs to be filled out, and "select" when choices have a box next to them to be checked.

b. Use the same letter case as shown in the image to indicate the hierarchy of the information.

c. Use "Start title" and "End title" to ensure student will be able to find the title easily.

d.   Example:

Read this section from an employment application.

Company Employment Application

Daytime Telephone Number   ☐☐☐-☐☐☐-☐☐☐☐   **E-mail Address**

Last Name	First Name	Middle Init.
Street or Mailing Address		Apartment No.
City	State	Zip Code

Have you ever worked for the company before? (If yes, please answer the following questions)	Yes		No	
What was your position?				
What dates did you hold this position?				
Who was your supervisor?				

Which information is required only for applicants who are former employees of the company?

1. telephone number

2. e-mail address

3. mailing address

4. position held

Alt text: An application. Longdesc:

Title. Company Employment Application. End title.

Provide:

- Daytime Telephone Number.
- E-mail Address.
- Last Name, First Name, and Middle Initial.
- Street or Mailing Address and Apartment Number.
- City, State and Zip Code.

Have you ever worked for the company before? Select Yes or No. If yes, please answer the following questions.

1. What was your position?
2. What dates did you hold this position?
3. Who was your supervisor?

Labeled Sentence Parts

Sentence Parts Labeled for Editing Selection

a.   Give students the full sentence without any distractions.

b.   Identify the labels.

c.   Use a list so students can easily navigate from one letter to the next.

d. Example:

> **Read the sentence.**
>
> Mr. patel teaches spanish, music, and art at my brother's high school.
>   A   B   C   D   E   F   G
>
> **Which underlined words should be capitalized?**
>
> 1. A, B
>
> 2. A, C, D
>
> 3. B, C, D, E
>
> 4. E, F, G

Alt Text: A sentence. Longdesc: Mr. patel teaches spanish, music, and art at my brother's high school. There are underlined words labeled A through G.

- A, patel.
- B, spanish.
- C, music.
- D, art.
- E, brother's.
- F, high.
- G, school.

Blank Spaces Labeled

a. Identify the labels first to provide students with context, and then give the sentence.
b. When choosing the names for the lines (lines, blanks, spaces), remain consistent with the language used in the rest of the item. In the example below, "space" is used to be consistent with the language in the answer options.
c. Example:

> **Read the words.**
>
> _____ rolled _____ across the street
>   A   B
>
> _____.
>   C
>
> **How can you make a complete sentence?**
>
> 1. Put the word And in space A.
>
> 2. Put the words The ball in space A.
>
> 3. Put the word clear in space B.
>
> 4. Put the words and down the hill in space C.

Alt text: A sentence with spaces labeled A, B, and C mixed in with the words. The sentence is: Space A rolled Space B across the street Space C.

Passages with Images

A description of a passage image might already be embedded within the passage text. Use your best judgment to avoid repeating information or to determine that the information should be repeated in the image description for fairness (e.g., if the description of the image appears scattered throughout the passage, it might be better to consolidate the information in one place in the image description to give a similar experience as a sighted student would have in seeing the image).

Picture (Photo or Illustration)

a. Give a brief description of the image. The level of detail necessary will depend on the passage and item. An item that directs students toward the image or asks the student to compare information found in the passage and the image will require greater detail in the image description.

b. State the caption if one accompanies the image. It is not necessary to restate the credit for the image.

c. Example:

Read the passage.

Family Pets and Animals

The Lincolns were a family devoted to pets. Lincoln's law partner, William Herndon, noted that if the Lincoln children "wanted a dog--cat...it was all right and well treated--housed--petted--fed--fondled, etc., etc." The boys shared their love of animals with their father.

Lincoln loved his horses, such as "Old Bob," who took him on the long, lonely journeys across the prairie when he was traveling to the circuit courts. ("Old Bob" survived to 1865 and was included in Lincoln's funeral procession in Springfield, Illinois.)

Lincoln also showed affection for dogs and cats. In the 1850s, the Lincolns kept a dog, named Fido, and Mrs. Lincoln once, in a letter to her husband, referred to cats as "your hobby." William Herndon commented on the importance of pets and animals to Lincoln: "If exhausted from severe and long-continued thought, he had to touch the earth again to renew his strength. When this weariness set in he would stop thought, and get down with a little dog or kitten to recover; and when the recovery came he would push it aside to play with its own tail."

Did you know?

Abraham Lincoln and his family owned a pet dog while they lived in Springfield. Fido, a retriever/shepherd mix lived with the Lincolns until they left for Washington D.C. Fido remained in Springfield with family friends. Lincoln Home National Historic Site, Illinois

("Family Pets and Animals" from the National Park Service)

What is the main idea of the passage?

1. The Lincoln family had a pet dog.

2. The Lincoln family loved their pets.

3. The president spent time with animals when he felt tired.

4. The president had a horse who carried him long distances.

Alt text: Photo: A picture of a dog. Caption: Abraham Lincoln and his family owned a pet dog while they lived in Springfield. Fido, a retriever/shepherd mix, lived with the Lincolns until they left for Washington, D.C. Fido remained in Springfield with family friends. Lincoln Home National Historic Site, Illinois.

d.   Example:

Read the passage.

Ice Cream through the Ages

Today's scholars believe that ice cream originated sometime before 200 BCE. Records show that Roman emperors enjoyed a cool treat made from ice sweetened with honey. In China, around 600 CE, the emperors ate a frozen delicacy made from flavored milk. According to legend, Marco Polo brought this recipe back to Italy. At first, only nobles and people who could afford it had the opportunity to eat ice cream. George Washington and Thomas Jefferson had their own recipes. Over time, as technology improved, ice cream became available to everyone.

Make Your Own Pineapple Sorbet!

1 lb frozen pineapple chunks
1 cup water
1 cup coconut milk or cream
Honey to taste

Blend all ingredients and freeze.

Today, ice cream is often served in a cone.

What is most likely the purpose of the photo and caption?

1. to illustrate how today's ice cream is different

2. to show how flavorings for ice cream have changed

3. to develop a connection between ice cream and sorbet

4. to suggest that today's ice cream is superior to ice cream of the past

Alt text: A photo and a caption. Longdesc: The photo shows a scoop of ice cream in an ice cream cone. The caption reads: Today, ice cream is often served in a cone.

Sidebar
a.   Give the title of the sidebar using "Title" and "End title."
b.   Give the full text of the sidebar and describe any images which may appear in it if they are not purely decorative.

c.   Example:

Read the passage.

Today's scholars believe that ice cream originated sometime before 200 BCE. Records show that Roman emperors enjoyed a cool treat made from ice sweetened with honey. In China, around 600 CE, the emperors ate a frozen delicacy made from flavored milk. According to legend, Marco Polo brought this recipe back to Italy. At first, only nobles and people who could afford it had the opportunity to eat ice cream. George Washington and Thomas Jefferson had their own recipes. Over time, as technology improved, ice cream became available to everyone.

Today, ice cream is often served in a cone.

Make Your Own Pineapple Sorbet!

1 lb frozen pineapple chunks
1 cup water
1 cup coconut milk or cream
Honey to taste

Blend all ingredients and freeze.

How does the sidebar help the reader understand the passage?

1. It provides a recipe for one of the earliest forms of ice cream.

2. It reveals why ice cream has remained popular throughout history.

3. It suggests that the making of ice cream is not limited to historical figures.

4. It supports the idea that the ingredients for ice cream are not exactly healthful.

Alt text: A sidebar. Longdesc: Title. Make Your Own Pineapple Sorbet! End title.
- 1 pound frozen pineapple chunks.
- 1 cup water.
- 1 cup coconut milk or cream.
- Honey to taste

Blend all ingredients and freeze.

Sentence Corrections

Edited sentences can be described in a number of ways, depending on what the edits are. Use your best judgment to determine the description that is easiest to understand.

a.   It may make more sense to describe the original sentence, read without the edits, and then read the edited sentence. Example:

Which sentence has been edited to avoid repeated words?

1. The family brought their dogs to ~~to~~ the park.

2. The family brought their ~~four~~ dogs to the park.
   (three)

3. The family brought their dogs to the ^ park.
   (neighborhood)

4. The family ~~brought~~ their dogs to the park.
   (brings)

A. <u>Alt text</u>: Original sentence: The family brought their dogs to to the park. Edited sentence: The family brought their dogs to the park.

B. <u>Alt text</u>: Original sentence: The family brought their four dogs to the park. Edited sentence: The family brought their three dogs to the park.

C. <u>Alt text</u>: Original sentence: The family brought their dogs to the park. Edited sentence: The family brought their dogs to the neighborhood park.

D. <u>Alt text</u>: Original sentence: The family brought their dogs to the park. Edited sentence: The family brings their dogs to the park.

b. When the stem or other part of the item calls out the specific editing that has been performed (in the example below, "the word crossed out" is stated in the stem), describe the editing in addition to the original sentence and the edited sentence. Example:

<u>Alt Text</u>: An edited sentence. Original sentence: Hopefully, I will see ya later. The word ya is crossed out and you is written above it. Edited sentence: Hopefully, I will see you later.

Sequence of Events Charts (Plot Diagrams)

a. Use a numbered list for the separate events.

b. Use language consistent with the stem (in the example item, we use the term "box" because it appears in the item).

c. Example:

> **Read the chart.**
>
> The boxes show the order of some of the events from the story.
>
> > | The three pigs begin building their houses. |
> >
> > ↓
> >
> > | The wolf blows down the straw house. |
> >
> > ↓
> >
> > | The wolf blows down the stick house. |
> >
> > ↓
> >
> > | |
>
> **Which event from the story belongs in the final box?**
>
> 1. The pigs plan to visit each house.
>
> 2. The wolf asks to be allowed inside.
>
> 3. Each pig chooses a different building material.
>
> 4. The wolf learns he cannot blow down a brick house.

(**Note**: This item's passage of "The Three Little Pigs" has been omitted from the screenshot.)

Alt text: 4 boxes. Longdesc:

- Box 1. The three pigs begin building their houses.
- Box 2. The wolf blows down the straw house.
- Box 3. The wolf blows down the stick house.
- Box 4. Empty.

Timelines
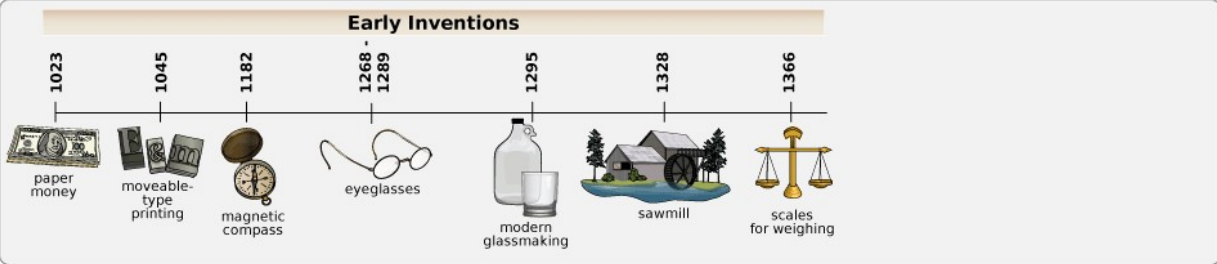
a. Give title if one appears.

b. Use a bullet list to show events on the timeline.

c. Ignore illustrations unless they provide additional necessary information or are mentioned in other parts of the item.

d.   Example:

Alt text: A timeline. Longdesc: Early Inventions.

- 1023, paper money.
- 1045, moveable-type printing.
- 1182, magnetic compass.
- 1268 to 1289, eyeglasses.
- 1295, modern glassmaking.
- 1328, sawmill.
- 1366, scales for weighing.

Venn Diagrams

a.   Focus on the data in the Venn diagram, not on its appearance.

b.   List the contents of each circle and then the area of intersection using a narrative description.

c.   For lower grade levels, we may want to describe the diagram as "two overlapping circles."

d.   Provide the data in brief statements.

e.   Avoid describing purely decorative images.

f.   Example:

> **Use the diagram to answer the question.**
>
> **Great Horned Owls   Robins**
>
> eat mice and rats
> hooked beak
> use other birds' nests
>
> lay eggs
> care for young
>
> eat seeds and insects
> build nests
>
> **How are great horned owls and robins different?**
>
> 1. Robins lay eggs.
> 2. Robins build nests.
> 3. Great horned owls eat insects.
> 4. Great horned owls care for their young.

Alt text: A Venn diagram. Longdesc: The Venn diagram has two intersecting circles. One circle is labeled Great Horned Owls. The other circle is labeled Robins.
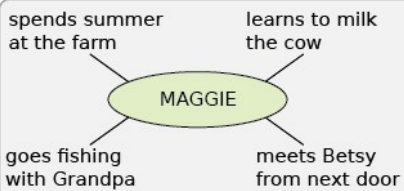
- Circle 1, Great Horned Owls: eat mice and rats, hooked beak, use other birds' nests.
- Circle 2, Robins: eat seeds and insects, build nests.
- Area of Intersection: lay eggs, care for young.

Webs (Word/Association)

a.   Describe the center circle and give the number of connections.
b.   Describe the surrounding circles. If there are many connected circles, it may be best to use a bullet list to describe them.

c.   Example:

> **Read the chart about the book <u>Maggie's Summer</u> by Fiona Nickleby.**
>
> spends summer   learns to milk
> at the farm   the cow
>
> MAGGIE
>
> goes fishing   meets Betsy
> with Grandpa   from next door
>
> **What is the chart organizing?**
>
> 1. author
>
> 2. events
>
> 3. setting
>
> 4. vocabulary

<u>Alt text</u>: A chart. <u>Longdesc</u>: The chart shows a web with center circle, Maggie, connected to four labels: spends summer at the farm, learns to milk the cow, meets Betsy from next door, goes fishing with Grandpa.

Visual Bias in Reading and Language Usage Item Types

<u>Using a Picture to Choose the Correct Preposition</u>

These items often have visual bias because the language needed to describe the image usually contains the preposition being tested, cuing the key.

Example:

> **Use the picture to answer the question.**
>
>
>
> **Where is the cat?**
>
> 1. by the bed
>
> 2. on the bed
>
> 3. over the bed
>
> 4. under the bed

<u>Identifying Uppercase or Lowercase Letters</u>
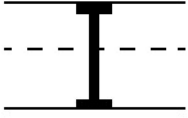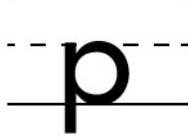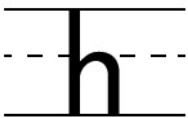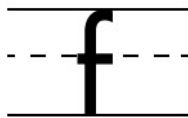
Screen readers don't usually describe the case of the letters being read, so a student relying on a screen reader would be unable to answer a question of this type when the letters are plain text. If

the letters are images, any effective description would contain the words "uppercase" or "lowercase," cuing the key. Therefore, these items are categorized as having visual bias.

Example:

Which letter is uppercase?
1. I	3. p
2. h	4. f

Part 5. Science

Where element symbols, equations, scientific labels, etc. appear in the example item text, a tool was used to ensure that these would be read as optimally as possible. For example, we used a tool to ensure that the element symbol "Au" in the text of an answer option would be read by screen readers as "Upper A u." While the text may appear different, the language in the image descriptions given here is consistent with how screen readers will read the text in other parts of each item.

Chemical Elements

When to Use the Element Symbol

a. When an item uses the element symbol in other parts of the item, then the image description should also use the element symbol.

b. When writing the element symbol, you may choose to use a space between the letters of the symbol to allow for better screen reader behavior. In addition, you may choose to highlight the upper and/or lowercase letters of the symbol. Keep consistency in mind when making this choice to ensure that what a student hears in the image description matches what he or she will hear when the rest of the item is read.

c. Example:

(**Note:** In the example below, not all of the elements in the periodic table are described. For more information about describing periodic tables, please see the **Periodic Tables** section.)

Alt text: A periodic table. Longdesc: The first four rows of the periodic table are shown. The following elements are included.

Element Symbols	Period	Group	Atomic Number	Electronegativity
Upper H	1	1	1	2.1
Upper B	2	13	5	2.0

Element Symbols	Period	Group	Atomic Number	Electronegativity
Upper C	2	14	6	2.5
Upper O	2	16	8	3.5
Upper F	2	17	9	4.0
Upper N a	3	1	11	0.9
Upper M g	3	2	12	1.2
Upper C l	3	17	17	3.0
Upper K	4	1	19	0.8
Upper C a	4	2	20	1.0
Upper Z n	4	12	30	1.6

When to Use the Element Name

a.   When the element name appears in other parts of the item, or when the symbol appears only in the image, use the element name. You may also decide to include the symbol after the name.

b.   Example:

(**Note:** In the example below, not all of the elements in the periodic table are described. For more information about describing periodic tables, please see the **Periodic Tables** section.)

Use the first four rows of the periodic table to answer the question.

Which common Earth element is **most** likely to be found in a new star?

A. beryllium (Be)

B. hydrogen (H)

C. iron (Fe)

D. lithium (Li)

Alt text: The periodic table. Longdesc: The first four rows of the periodic table are shown. The following elements are included.

Element (Symbol)	Period	Group	Atomic Number	Atomic Weight
Beryllium (Upper B e)	2	2	4	9.01

Element (Symbol)	Period	Group	Atomic Number	Atomic Weight
Hydrogen (Upper H)	1	1	1	1.008
Iron (Upper F e)	4	8	26	55.8
Lithium (Upper L i)	2	1	3	6.94

Chemical Models

Atomic Model

a. Provide a general description to introduce the number of models and their labels.
b. Describe the energy levels, working from the outside toward the interior.
c. Describe the contents of the center.
d. Use the term *energy level* (not *shell*) to refer to the outer rings, and use the term *center* (not *nucleus*) to refer to the interior, except when *shell* or *nucleus* is used elsewhere in the item.
e. Use the terms *negative sign*, *positive sign,* and *empty circle* when there is no key identifying what these symbols mean. If the model uses letters (E, P, N) use these letters in the image description unless the full words (proton, electron, neutron) are used elsewhere in the item (at which point you may choose to use the full word in the image description as well).
f. Example:

Use the diagrams to answer the question.

A   B   C   D   E
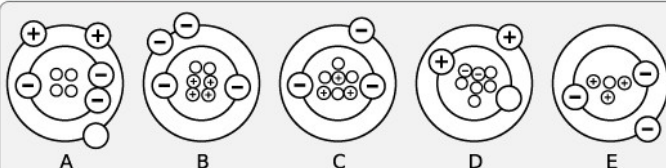
An isotope of beryllium has an atomic number of 4 and an atomic mass of 6.

Which model represents an isotope of beryllium?

A. Model A

B. Model B

C. Model C

D. Model D

E. Model E

Alt text: A group of models. Longdesc: There are five models labeled A through E.

- Model A has 2 energy levels. The outer energy level has 2 positive signs and 1 empty circle. The inner energy level has 3 negative signs. The center contains 4 empty circles.
- Model B has 2 energy levels. The outer energy level has 2 negative signs. The inner energy level has 2 negative signs. The center contains 4 positive signs and 2 empty circles.

- Model C has 2 energy levels. The outer energy level has 1 negative sign. The inner energy level has 2 negative signs. The center contains 3 positive signs and 4 empty circles.
- Model D has 2 energy levels. The outer energy level has 1 positive sign. The inner energy level has 1 positive sign and 1 empty circle. The center contains 2 negative signs and 5 empty circles.
- Model E has 2 energy levels. The outer energy level has 1 negative sign. The inner energy level has 2 negative signs. The center contains 3 positive signs and 1 empty circle.

Lewis Dot Structure / Electron Dot Structure

a. Refer to the dot structure as a cluster or a chain depending on its formation.
b. State what each cluster contains, starting with the middle atom and moving around the cluster in a clockwise direction. For a chain, move from left to right.
c. Depending on how the elements are referenced in other parts of the item, use the element symbol or the full name.
d. Describe the valence electrons as "electrons."
e. Describe the dots as shared pairs or lone pairs to distinguish whether they are shared with another element.
f. Example:

The table shows the number of valence electrons for some elements.

Element	Number of Valence Electrons
H	1
C	4
Cl	7

What is the Lewis structure for chloroform ($CHCl_3$)?

A. :Cl:H:Cl:C:Cl:

B. (Lewis structure)

C. (Lewis structure)

D. :C̈:H:C̈l:C̈l:C̈l:

A. Alt text: A Lewis structure. Longdesc: The Lewis structure shows a chain of atoms: Upper C l, Upper H, Upper C l, Upper C, Upper C l. There is a pair of shared electrons between each atom. The first Upper C l and the last Upper C l each have one lone pair of electrons.

B. Alt text: A Lewis structure. Longdesc: The Lewis structure shows a cluster of atoms: Upper H is surrounded by Upper C l top, Upper C l to the right, Upper C bottom, Upper C l to the left. There is a pair of shared electrons between each atom. The four outer atoms each have three lone pairs of electrons.

C. Alt text: A Lewis structure. Longdesc: The Lewis structure shows a cluster of atoms: Upper C is surrounded by Upper C l top, Upper C l to the right, Upper C l bottom, Upper H to the

left. There is a pair of shared electrons between each atom. The three Upper C l atoms each have three lone pairs of electrons.

D. <u>Alt text</u>: A Lewis structure. <u>Longdesc</u>: The Lewis structure shows a chain of atoms: Upper C, Upper H, Upper C l, Upper C l, Upper C l. There is a pair of shared electrons between each atom. Upper C has three additional lone pairs of electrons. The middle two Upper C l atoms each have two lone pairs of electrons. The last Upper C l has three lone pairs of electrons.
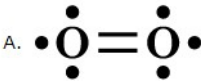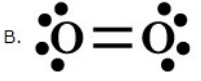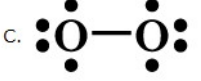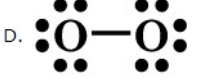
Orbital Notation / Electron Configuration

a. Provide an overview to let students know there are boxes and arrows, and to point out how many boxes each S and P will always have.
b. Describe what each box contains, using a bulleted list. To be more succinct, use the terms *up* and *down* (instead of "arrow pointing up/down").
c. If multiple boxes are associated with a letter, preface each box contents with a box number (e.g., Box 1, Box 2, etc.).
d. Example:

Use the electron configuration of oxygen in the ground state to answer the question.

↑↓	↑↓	↑↓ ↑ ↑
1s	2s	2p

Which diagram shows the Lewis structure for oxygen?

A. •Ö=Ö•

B. :Ö=Ö:

C. :Ö—Ö:

D. :Ö—Ö:

Asset: <u>Alt text</u>: An electron configuration. <u>Longdesc</u>: The electron configuration is an orbital diagram with boxes and arrows. Each S has one box, and each P has three boxes.

- 1 S. 1 up, 1 down.
- 2 S. 1 up, 1 down.
- 2 P. Box 1, 1 up, 1 down. Box 2, 1 up. Box 3, 1 up.

(See **Lewis dot structure** section for more information on how to describe the answer options for this item.)

Structural Formula

a. When a structural formula is linear,
    i. Refer to the elements from left to right.
    ii. Use the symbol instead of the full name of the element.
b. When a structural formula is clustered,

      i.   Reference the element in the middle first, and then move from left to right to describe the elements around it OR move in a clockwise direction to describe the elements around it. Choose the pattern that presents the information as clearly and concisely as possible.

      ii.   Use the symbol instead of the full name of the element.

  c.   When a structural formula is a ring,

      i.   Describe the overall shape of the structure.

      ii.   Describe the details of the structure, starting with the ring and then moving left to right or clockwise, depending on what is clearest within the item.

      iii. When referencing the elements of the ring, use the element name and the element symbol for clarity.

  d.   Describe the bonds as "shares a single/double/triple bond with."

  e.   Keep in mind that you may not need to describe every detail of the structure. This depends on the skill being assessed in the item. Be as concise as possible within the context of the item.

  f.   Example with clustered and linear elements:

These compounds are examples of alcohols.

$$CH_3-CH-OH \qquad CH_3-CH_2-OH \qquad \overset{\displaystyle OH \quad OH}{\underset{\displaystyle}{CH_2-CH_2}}$$
$$\underset{\displaystyle CH_3}{|}$$
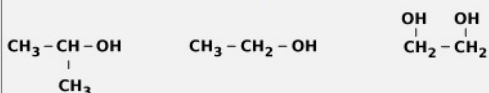
Which is the basic unit common to alcohols?

A. $-OH$

B. $-CH_2$

C. $-CH_3$

D. $-CH-CH_3$

E. $-CH_2-CH_2$

Alt text: A diagram. Longdesc: The diagram shows 3 compounds:

- Upper C Upper H shares single bonds with Upper C Upper H 3, Upper C Upper H 3, and Upper O Upper H.
- Upper C Upper H 3 shares a single bond with Upper C Upper H2, which shares a single bond with Upper O Upper H.
- Upper C Upper H 2 shares a single bond with Upper C Upper H 2. Each Upper C Upper H 2 shares a single bond with a different Upper O Upper H.

g. Example with ring structure:

The diagram shows a molecule of aspirin.

Aspirin
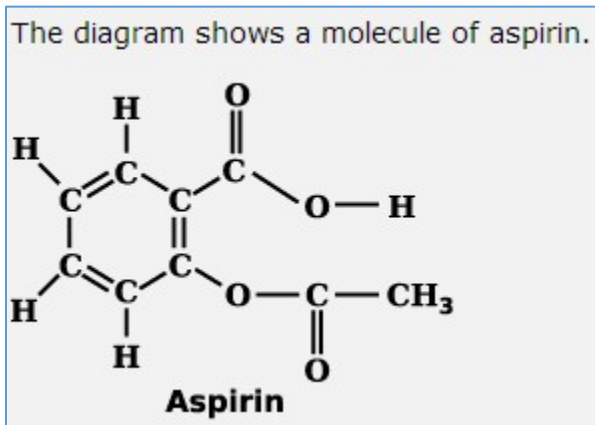
Alt text: A diagram of a molecule. Longdesc: The molecule has a main ring with two long chains. The ring has six carbon (Upper C) whose bonds alternate between single bonds and double bonds. 4 of the carbons share a single bond with an Upper H, for a total of 4 Upper H coming off the ring. Two chains attach to the ring at the 2 remaining Upper C, who share a double bond. Those chains are:

- Ring's Upper C shares a single bond with Upper C, which shares a double bond with Upper O and a single bond with a second Upper O. The second Upper O shares a single bond with Upper H.
- Ring's second Upper C shares a single bond with Upper O, which shares a single bond with an Upper C. This Upper C shares a double bond with an Upper O and a single bond with Upper C Upper H 3.

Structural Formula of Macromolecules

a. Focus on the atoms, chains, and number of each atom to help students differentiate one macromolecule from another.

b. Describe the links and units instead of leading students with a term like *fatty acids.*

c. Write out the element name.

d. Example:
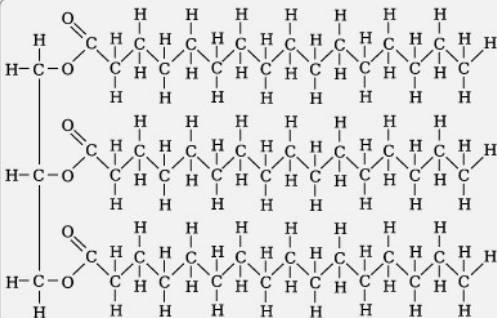
> **Use the diagram to answer the question.**
>
>
>
> **Which type of macromolecule does the diagram represent?**
>
> A. a lipid
>
> B. a protein
>
> C. a nucleic acid
>
> D. a carbohydrate

Alt text: A diagram. Longdesc: The diagram is a macromolecule with carbon, hydrogen, and oxygen. These atoms are shown as three linked chains connected to a backbone at each first oxygen. The chains contain 17 carbon and 2 oxygen. Two of the chains contain 33 hydrogen; the other chain contains 32 hydrogen. Each second oxygen shares a double bond with a carbon.

Containers

Beakers and Flasks

a. Set up the description with the number of containers.
b. Describe the shape of the containers. Make sure you use grade-appropriate language.
c. Focus on the most important qualities to the knowledge or skill being assessed (in the following example, it is the size of the opening).
d. If measurement of the liquid is shown, state the measurement if it will not cue the answer.

e.   Example:

A student pours one pint of water into each container and leaves the containers uncovered in a warm room.
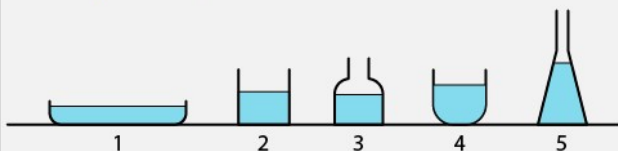
When the student returns at the same time the next day, which container will have the **most** water remaining?

A. 1

B. 2

C. 3

D. 4

E. 5

Alt text: A diagram. Longdesc: The diagram shows five containers.
- Container 1 is a shallow pan with a very wide opening.
- Container 2 is a square beaker with a medium opening.
- Container 3 is a flask with a round top and narrow opening.
- Container 4 is a beaker with a round bottom and medium opening.
- Container 5 is a triangular flask with a very narrow opening.
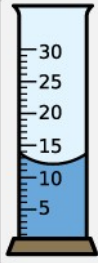
Graduated Cylinders

a.   Describe the graduated cylinder, including the range of measurement and the interval of the marks.

b.   When the skill being assessed is reading the graduated cylinder, describe the curve of the liquid in the graduated cylinder, beginning with the sides and then giving the low point of the curve. If the item is assessing a different skill, you may give the exact measurement instead (bottom of the meniscus).

c. Example:

> **Use the graduated cylinder to answer the question.**
>
>
>
> **What is the volume of the liquid in the graduated cylinder?**
>
> A. 10 mL
>
> B. 11 mL
>
> C. 12 mL
>
> D. 13 mL
>
> E. 14 mL

Alt text: A graduated cylinder. Longdesc: The graduated cylinder shows volume from 0 to 30. Marks show every 5 mL. The surface of the liquid in the cylinder curves down. At both sides of the cylinder, the liquid is at 14 mL. The low point of the liquid is at 12 mL.

Cycles

Life Cycle

a. Provide a setup of the image if the text surrounding the image does not already do so.
b. Describe a lettered cycle in alphabetical order.
c. List the stages in the cycle starting from the beginning and moving clockwise.
d. Typically, describe the cocoon stage as "pupa," but be consistent with the term used in other parts of the item. Describe the caterpillar stage as "larva," but also include the word "caterpillar" to be comprehensive.

e.   Example:
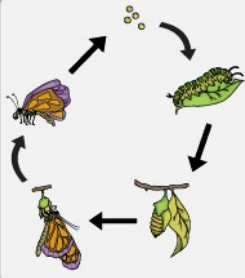
> **Use the diagram to answer the question.**
>
>
>
> **What is happening at the arrow between the adult stage and egg stage?**
>
> A. The eggs transform into a butterfly.
>
> B. The eggs are laid by an adult butterfly.
>
> C. The eggs result from the butterfly transforming again.
>
> D. The eggs are a byproduct of adult emerging from the chrysalis.

Alt text: A diagram. Longdesc: The diagram shows a butterfly development cycle. Arrows point from one stage to the next. The cycle shows these stages: eggs, a caterpillar or larva, a chrysalis, a butterfly emerging from a chrysalis, and a butterfly. An arrow points from the butterfly back to the eggs.

(**Note:** Usually, it is not necessary to refer back to the first stage of the cycle at the end of the description; however, in this item, the stem calls out the arrow between two specific stages, so it is helpful to refer to that arrow at the end of the longdesc.)

Water Cycle

a.   Provide a setup of the image if the text surrounding the image does not already do so.

b.   Describe a lettered cycle in alphabetical order.

c.   If an item is not assessing a student's knowledge of the names of each stage in the cycle, include the stage names in the description along with a description of what is physically happening.

d.   Example:

> **Use the diagram to answer the question.**
>
>
>
> **Which set represents the path of a water molecule from the ocean through the water cycle?**
>
> A. A, B, E, D, C, A
>
> B. A, C, E, B, D, A
>
> C. A, D, B, E, C, A
>
> D. A, B, D, E, C, A
>
> E. A, E, B, C, D, A

Alt text: A diagram. Longdesc: A diagram shows parts of the water cycle labeled A through E.

- A: Water in the ocean.
- B: Water falling from the clouds as rain.
- C: Water moving up from the ocean into a cloud.
- D: Water running down a mountainside into the ocean.
- E: Water condensing inside a cloud.

Diagrams

When describing diagrams, it is important to consider the skill being assessed and the language used in other parts of the item to determine what information needs to be in the image description. Often, you don't need to describe every detail of the diagram. By focusing on the similarities and differences, or the change between parts of the diagram, you can communicate the information necessary to make the item accessible.

Astronomy
1. Moon phases
    a. Start with the side of the moon that has the majority, whether that is shaded or sunlit, and then describe the remainder.
    b. Use the terms *right* and *left* to distinguish the sides.
    c. For higher grades, use the terms *illuminated* and *shadowed*. For lower grades, use the terms *sunlit* and *shaded*.

d. Example:

These are the phases of the Moon.

Asset: Alt tag: A cycle. Longdesc: The cycle is presented like a circle. From the top and moving clockwise, the phases are:

- Last Quarter: Half of the moon is sunlit on the left. The right half is shaded.
- Waning Gibbous: Most of the moon is sunlit on the left. Less than half of the right side is shaded.
- Full Moon: The moon is fully sunlit.
- Waxing Gibbous: Most of the moon is sunlit on the right. Less than half of the left side is shaded.
- First Quarter: Blank.
- Waxing Crescent: Most of the moon is shaded on the left. A sliver on the right side is sunlit.
- New Moon: The moon is fully shaded.
- Waning Crescent: Most of the moon is shaded on the right. A sliver on the left side is sunlit.
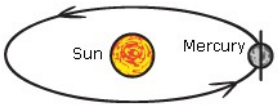
Answer options:
A. Alt text: Half of the moon is shaded on the left. The right half is sunlit.
B. Alt text: Half of the moon is sunlit on the left. The right half is shaded.
C. Alt text: Most of the moon is sunlit on the left. Less than half of the right side is shaded.
D. Alt text: Most of the moon is sunlit on the right. Less than half of the left side is shaded.
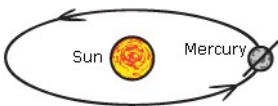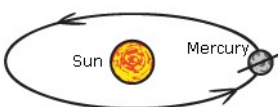
2. Orbits
   a. We provide a setup for each description (a general description of the entire diagram).
   b. If comparing images (in a diagram flow or between answer options), highlight what is different and what is similar.
   c. Describe the details of each image in the same order.
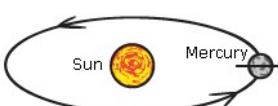
d. Example:

> Which diagram **best** shows the tilt of Mercury's axis compared to its orbit around the Sun?
>
> A. Sun — Mercury
> B. Sun — Mercury
> C. Sun — Mercury
> D. Sun — Mercury

    A. <u>Alt text</u>: The diagram shows Mercury orbiting the Sun. Mercury is to the right of the Sun. The tilt of Mercury's axis is vertical.

    B. <u>Alt text</u>: The diagram shows Mercury orbiting the Sun. Mercury is to the right of the Sun. The tilt of Mercury's axis is diagonal, close to a vertical line.

    C. <u>Alt text</u>: The diagram shows Mercury orbiting the Sun. Mercury is to the right of the Sun. The tilt of Mercury's axis is diagonal, close to a horizontal line.

    D. <u>Alt text</u>: The diagram shows Mercury orbiting the Sun. Mercury is to the right of the Sun. The tilt of Mercury's axis is horizontal.

Biology—Cell Structure

a. Cell images may have visual bias. It depends on the context of the question. Each cell diagram should be considered individually. Images that require a student to identify cell parts often have visual bias because the amount of detail needed to describe the different parts leads to cognitive overload.

b. When a cell structure item does not have visual bias, describe the labeled parts of the image. It is usually not necessary to describe the diagram in detail.

c.   Example:

> This is a simplified diagram of a cell in a multicellular organism.
>
> Cell wall
> Chloroplast
> Nucleus
> Vacuole
>
> **What is NOT a characteristic of this cell?**
>
> A. It has cell-to-cell communication with adjacent cells.
>
> B. It can release oxygen as a product of its life processes.
>
> C. It has specialized structures to change its length and apply force.
>
> D. It has the same number of chromosomes as other cells in the organism.
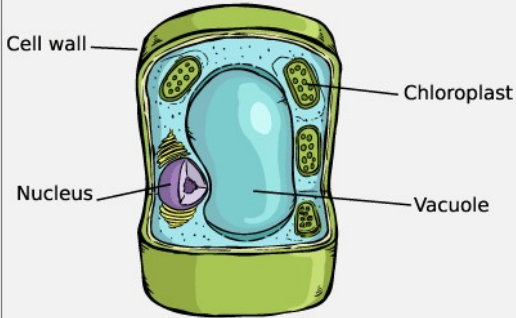
Alt text: Four parts of the cell are labeled: cell wall, chloroplast, vacuole, and nucleus.

Physics

1. Circuits using illustration
    a.   Give an overview of the components of the circuit.
    b.   Describe whether the circuit is complete or open.
    c.   Describe the elements of the circuit in order, using the vocabulary shown in the rest of the item (if applicable).
    d.   Example:

> The diagram shows a complete circuit.
>
> Battery in holder
> Wire   Wire
> Nail
> Paper clips
>
> **Which energy transformation is taking place in this circuit?**
>
> A. Electrical energy is transformed into light energy.
>
> B. Electrical energy is transformed into sound energy.
>
> C. Electrical energy is transformed into chemical energy.
>
> D. Electrical energy is transformed into electromagnetic energy.
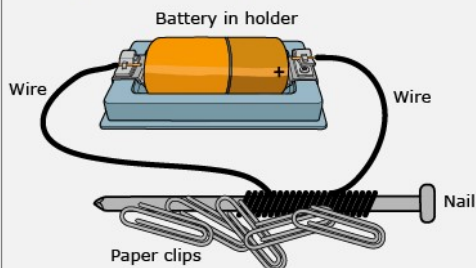
Alt text: A diagram. Longdesc: The diagram shows a nail connected to a 1-cell battery by a wire. The wire runs from the positive end of the battery, wraps around the nail, and ends at the negative end of the battery. Paper clips are sticking to the nail.

2. Circuits using symbols
   a. Use circuit vocabulary: *series*, *parallel*, *bulbs*, and *battery cells*.
   b. Specify if the circuit is a series circuit, a parallel circuit, or both.
   c. When describing battery cells, specify the number of batteries shown.
   d. Example:

Assume that all bulbs shown in the circuits are identical.

In which circuit will the bulbs be the brightest?
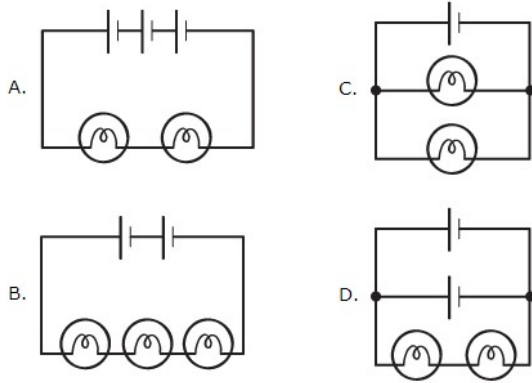
   A. Alt text: The series circuit with 2 bulbs connected to a battery with 3 cells.
   B. Alt text: The series circuit with 3 bulbs connected to a battery with 2 cells.
   C. Alt text: The parallel circuit with 2 bulbs connected to a battery with 1 cell.
   D. Alt text: The circuit shows 2 bulbs in series connected to 2 battery cells in parallel.

3. Force on an object
   a. Provide a setup for the image (general description) if one is not already provided in the asset.
   b. Give the name of the force (if shown), the direction of the force, and the amount of force (if shown).
   c. If more than one force is acting upon an object, start at the top and describe them in clockwise order.
   d. If amount of force is shown by the length of the arrow, describe this by saying which force is greater.

e. Example:

Students are investigating the effect of multiple forces acting on an object. They measure and diagram the forces acting on a 0.6 kg wooden block as shown in the diagram.

normal force = 5.9 N

frictional force = 2.5 N ← 0.6 kg → forward force = 3.8 N

force of gravity = 5.9 N

What is the net force on the wooden block?

- A. 1.3 N backward
- B. 1.3 N forward
- C. 6.3 N backward
- D. 6.3 N forward

Alt text: A diagram. Longdesc: The diagram shows a 0.6-kilogram wooden block with 4 forces acting on it.
- Normal force, up, 5.9 N.
- Forward force, right, 3.8 N.
- Force of gravity, down, 5.9 N.
- Frictional force, left, 2.5 N.

4. Free body diagram
   a. Provide a setup for the image (general description) if one is not already provided in the asset.
   b. Describe the direction of the arrows representing force on the ball for each answer choice.
   c. Describe which force is greater.
   d. Use a consistent order of details for each description to highlight the difference between them.

e. Example:

A ball is thrown upward with a force of F_{throw}. Assuming no air resistance, the ball will follow the parabolic path shown. Point P is the position of the ball slightly after it reaches maximum height.
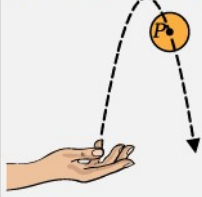
Which free-body diagram represents the force(s) on the ball at point P, where F_g is the force of gravity?

A. F_{throw} / F_g

B. F_{throw} / F_g

C. F_g

D. F_{throw} / F_g
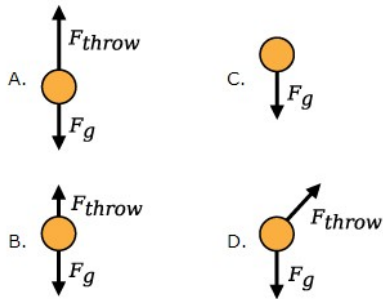
Asset: <u>Alt text</u>: The parabolic path moves up and slightly right of the point of throw.
Answer options:
A. <u>Alt text</u>: Force of throw is up. Force of gravity is down. Force of throw is greater than force of gravity.
B. <u>Alt text</u>: Force of throw is up. Force of gravity is down. Force of throw is less than force of gravity.
C. <u>Alt text</u>: No force of throw. Force of gravity is down.
D. <u>Alt text</u>: Force of throw is up and slightly right. Force of gravity is down. Force of throw and force of gravity are equal.

5. Kinetic energy
   a. Set up the image by naming the points.
   b. Describe where the points are on the curved path.
   c. Use language from the asset to describe the line shown in the image.

d. Example:

> A boy throws a rock while standing on a cliff. The path of the rock is shown in the picture.
>
>
>
> **Where is the potential energy of the rock greatest?**
>
> A. position P
>
> B. position Q
>
> C. position R
>
> D. position S
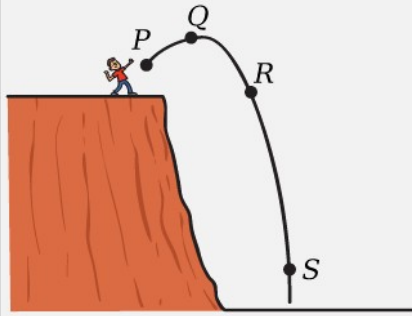
Alt text: A picture. Longdesc: The path curves away from the boy, up and to the right, and then down and to the right, landing on the ground below the cliff. The path has four labeled points: P, Q, R, and S.

- Point P is at the beginning of the curved path, closest to the boy.
- Point Q is just before the top of the curved path.
- Point R is on the falling part of the curved path.
- Point S is near the bottom of the curved path, just above the ground.

6. Light, sound, and water—Rays or waves hitting an object
    a. Provide a setup of the image if one is not already given through other text in the item, including the description of the ray or wave and the object it meets.
    b. Describe the path and angle of the light ray or sound wave and the angle before and after hitting another object.
    c. If the item is about sound waves, also describe the shape of the wave.

d. Example:

Which diagram shows how a mirror changes the path of a ray of light?

A.

Mirror

C.

Mirror

B.

Mirror

D.

Mirror

A. <u>Alt text</u>: A diagram. <u>Longdesc</u>: The path of the incoming light ray hits the mirror at a downward right diagonal. The path of the reflected ray returns at the same angle, downward and to the left.

B. <u>Alt text</u>: A diagram. <u>Longdesc</u>: The path of the incoming light ray hits the mirror at a downward right diagonal. The path of the reflected ray goes straight down within the mirror.

C. <u>Alt text</u>: A diagram. <u>Longdesc</u>: The path of the incoming light ray hits the mirror at a downward right diagonal. The path of the reflected ray continues through the mirror at a downward right diagonal.

D. <u>Alt text</u>: A diagram. <u>Longdesc</u>: The path of the incoming light ray hits the mirror straight on going right. The path of the reflected ray continues through the mirror at an upward right diagonal.

7. Light, sound, and water—Waves on a graph
   a. Describe the axes of the graphs with labels (if given).
   b. Describe wavelength and period if the skill of reading the graph is not being tested.

c.   Example:

> These plots represent two different water waves.
>
>
>
> **How does Wave 1 compare to Wave 2?**
>
> A. Wave 1 has lower energy and an equal wavelength to Wave 2.
>
> B. Wave 1 has higher energy and an equal wavelength to Wave 2.
>
> C. Wave 1 has a shorter wavelength and lower energy than Wave 2.
>
> D. Wave 1 has a shorter wavelength and higher energy than Wave 2.

Alt text: Two plots. Longdesc: The plots show Wave 1 and Wave 2. Both waves show the x-axis is labeled Time in seconds, and the y-axis is labeled Amplitude in centimeters.
   - Wave 1 has a wavelength from positive 5 to negative 5. The period is 5.
   - Wave 2 has a wavelength from positive 10 to negative 10. The period is 5.
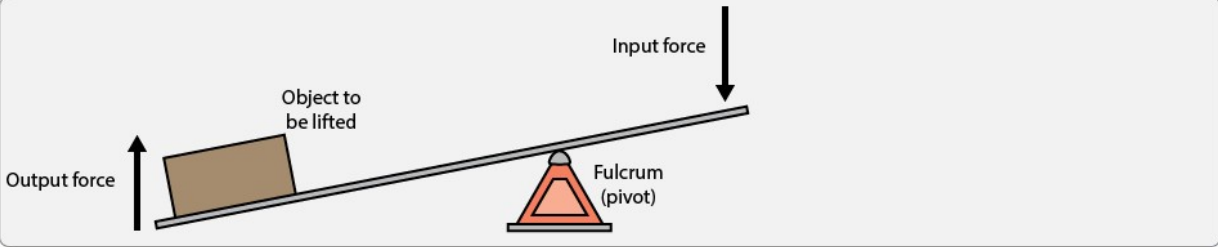
8. Systems—Levers
   a. Use the labels provided in the asset for consistency.
   b. Include the arrows in the description.
   c. Depending on the language in the item and the grade level, you may decide to use the term *pivot* instead of *fulcrum*.

d. Example:

> **The diagram shows a lever system.**
>
> Input force
>
> Object to
> be lifted
>
> Output force
>
> Fulcrum
> (pivot)
>
> **How does this lever system function?**
>
> A. The lever system increases the mass of the object to be lifted.
>
> B. The lever system increases the amount of work required to lift an object.
>
> C. The lever system divides the input force to produce a smaller output force.
>
> D. The lever system uses the weight of the object due to gravity to lift the object.

Alt text: A diagram. Longdesc: The lever system is a beam balancing on a fulcrum (pivot), with an object to be lifted weighing down one end of the beam. The fulcrum is closer to the end of the beam without the object. An arrow next to the object points up, indicating output force. The shorter end of the beam is raised in the air. An arrow points down, indicating input force.

9. Systems—Pulleys
   a. Describe the number of pulleys and the way the rope connects the pulleys.
   b. It may not be necessary to describe the size of the pulleys or the number of sections of rope.
   c. Of comparing pulley systems, identify the differences between the pulley systems rather than describing each system in detail.

d.   Example:

Use the diagrams to answer the question.

If you needed to lift a 300-kilogram object using a mass of only 50 kilograms, which pulley system could be used to lift the mass?

A. system A   D. system D

B. system B   E. system E

C. system C

Alt text: A set of diagrams. Longdesc: Five diagrams of pulley systems are shown: A, B, C, D, and E.

- System A has 2 pulleys and a rope that loops around them.
- System B has 4 pulleys and a rope that loops around them.
- System C has 2 pulleys and a rope that is threaded through the pulleys in an S shape.
- System D has 5 pulleys and a rope that is threaded through 2 pulleys in an S shape and then loops around the other pulleys.
- System E has 6 pulleys and a rope that loops around them.

Diagrams That Convey Change

a.   Provide a setup for the images or diagrams
b.   Explain the differences between the images or diagrams, describing the elements of the images in the same order.
c.   Spell out abbreviations if they do not appear as abbreviations in other parts of the item.
d.   Use the language from the item in the image description.

e.   Example:

> **In the experiment shown, a cylinder is filled with air, and an airtight piston is pulled up out of the cylinder. The resulting pressure is measured on the attached gauge.**
>
>
>
> 2 cm — A   6 cm — B   18 cm — C
>
> **According to the data, when the volume of a cylinder is tripled, what happens to the pressure?**
>
> A. Pressure increases.
>
> B. Pressure is one-third.
>
> C. Pressure is unchanged.
>
> D. Pressure decreases slightly.
>
> E. Pressure decreases nine times.
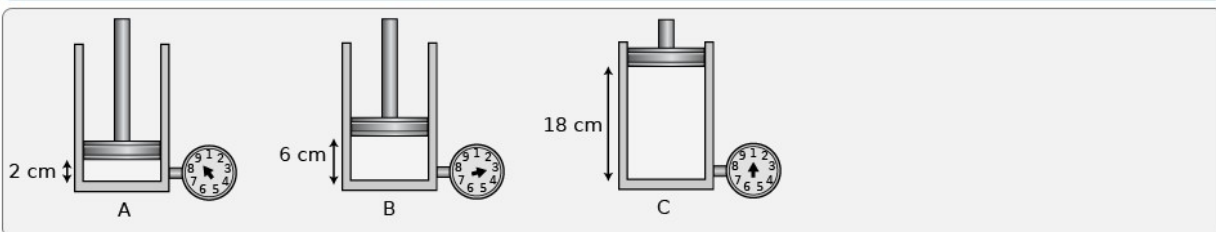
Alt text: An experiment. Longdesc: The experiment shows a cylinder with a piston in three different positions, labeled A, B, and C. The cylinder is about 20 centimeters high.
- Position A: volume, 2 centimeters. Pressure, 9.
- Position B: volume, 6 centimeters. Pressure, 3.
- Position C: volume, 18 centimeters. Pressure, 1.

Flowcharts and Process Diagrams

a.   Introduce the graphic.
b.   Use a list to organize a step-by-step process.
c.   For flowcharts that seem to combine more than one cycle, you can break the diagram into cycles to make the description easier to understand.

d. Example:

> The diagram represents how glucose is regulated in the human body. The graph represents the blood glucose level of an individual over a 6-hour period.
>
> | Body works to maintain blood glucose level of 90 mg glucose/100mL of blood |
> | Eating causes blood glucose level to increase |
> | Pancreas releases insulin |
> | Glucose enters body cells, and insulin triggers the liver to convert glucose to glucagon |
> | Blood glucose level drops below 90 mg glucose/100mL blood |
> | Pancreas releases glucagon |
> | Glucagon signals liver to convert glycogen to glucose |
>
> **Which action explains the blood glucose pattern represented in the graph?**
>
> A. The liver stored too much glycogen.
>
> B. The pancreas did not release enough insulin.
>
> C. The pancreas did not release enough glucagon.
>
> D. The liver did not break down enough glycogen.

Alt text: A diagram. Longdesc: The diagram shows two possible cycles of glucose entering the bloodstream after eating a meal.

Cycle 1:
1. Body works to maintain blood glucose level of 90 milligrams glucose per 100 milliliters of blood.
2. Eating causes blood glucose level to increase.
3. Pancreas releases insulin.
4. Glucose enters body cells, and insulin triggers the liver to convert glucose to glucagon.

Cycle 2:
1. Body works to maintain blood glucose level of 90 milligrams glucose per 100 milliliters of blood.
2. Blood glucose level drops below 90 milligrams glucose per 100 milliliters blood.
3. Pancreas releases glucagon.
4. Glucagon signals liver to convert glycogen to glucose.

(**Note:** A description of the graph is not shown here, as it is a separate image and would require a separate description. Go to the Science section for **Graphs** for more information.)

Geology

Faults

a. Set up the description by giving a general overview of the picture if an overview hasn't already been given by preceding text.

b. Describe the fault planes as *inclined* or *vertical*.

c. If arrows are shown in the diagram to indicate the movement of the plates, use the terms *up* and *down* to describe them.

d.   Example:
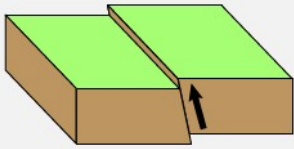
Use the diagrams to answer the question.

Three Basic Fault Types
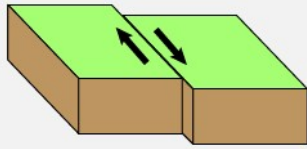
A   B   C

Which type of fault is shown in Diagram C?

A. normal fault

B. reverse fault

C. strike-slip fault

D. convergent fault

Alt text: Three diagrams. Longdesc: The diagrams show three basic fault types.

- Diagram A: Two plates shift past each other along an inclined fault plane. One side of the fault plane moves down.
- Diagram B: Two plates shift past each other along an inclined fault plane. One side of the fault plane moves up.
- Diagram C: Two plates shift past each other horizontally along a vertical fault plane.

Graphic Plates

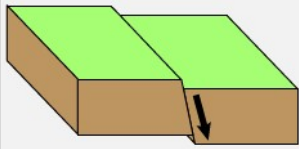a.   Set up the description by giving a general overview of the picture if an overview hasn't already been given by preceding text.

b.   Use terminology that appears in other parts of the item. Pay particular attention to language in answer options so no answer option is immediately recognizable as a distractor just because the image description did not include terminology from that answer option.

c.   Example:

The diagram shows the movement of two tectonic plates.

Oceanic crust →   ← Continental crust
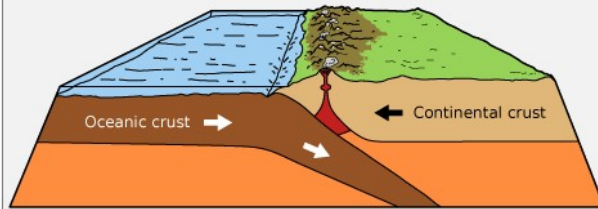
Which statement <u>best</u> identifies the diagram?

A. This is a divergent plate boundary because oceanic crust is formed at the trench.

B. This is a transform plate boundary because a coastal mountain range is formed.

C. This is a geological hot spot because volcanoes are formed by rising magma.

D. This is a convergent plate boundary because the plates are moving toward each other.

<u>Alt text</u>: A diagram. <u>Longdesc</u>: The diagram shows the Oceanic crust and the Continental crust meeting at a coast. The Oceanic crust extends beneath the Continental crust. Arrows indicate that the Oceanic crust and the Continental crust are moving toward each other. A trench is shown in the water above where the two crusts meet. On land, a coastal mountain range is located in the Continental crust. A volcano is pictured in the coastal range, with magma extending down from the tip of its cone, through the Continental crust, to the Oceanic crust beneath.

Fossils

a.   Begin with "The fossil shows . . ." if the word fossil is mentioned in the item.

b.   Describe the shape or the distinguishing parts of the skeleton that are pictured in the fossil. The level of detail necessary for the description will vary based on the context of the item.

c.   If the item asks a student to match an image to an imprint (the images in the answer options are identical to the imprint of the fossil), the item may have visual bias. Also, if the image cannot be described in such a way as to eliminate all but one answer option, then the item should be categorized as having visual bias.

d.   Example:

> Kiko was in the science room at school where this fossil was displayed.
>
>
>
> **Which plant or animal is <u>most</u> like this fossil?**
>
> A. tree leaf
>
> B. fish
>
> C. rat
>
> D. snail
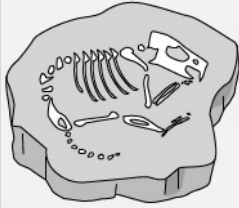
<u>Alt text</u>: The fossil shows a small skeleton with a head, a thin body, legs, and a tail.

Layers

a.   Provide a setup for the layers. If available, use the information in the stem to set up the image.

b.   List the layers shown in the picture or diagram, starting at the surface and moving down.

c.   Describe only the aspects of the diagram that are needed to understand and answer the item using the skills being assessed by the item. If the physical features of each layer are not needed for the skill being assessed, you may not want to describe them to avoid cognitive overload.

d.   If reading the key is not the skill being assessed by the item, you may want to interpret the key/image for the student to reduce the cognitive load.

e.   Example:

> **Use the diagram to answer the question.**
>
>
>
> **Which layer was formed before the granite?**
>
> A. 1   C. 9
>
> B. 2   D. 10

Alt text: A diagram. Longdesc: The diagram shows a cross section view of rock layers beneath Earth's surface. The layers are split by a vertical fault, labeled 7, and the layers on either side of the fault line do not align. The two sides are labeled Side A and Side B.

Starting from the surface, going down into the earth on Side A:

- 1, soil.
- 2, sandstone.
- 3, shale.
- 4, limestone.
- 5, conglomerate.
- 6, shale.
- Bottom undefined layer.

Starting from the surface, going down into the earth on Side B:

- 1, soil.
- 9, shale.
- 10, limestone.
- 11, conglomerate.
- 12, shale.
- 8, granite, is a mound-like clump that intrudes the bottom undefined layer and then layers 12, 11, and 10.

Graphs (Line)

Science graphs may be treated differently from math graphs since the items often assess an understanding of a conceptual trend rather than how to read data on a graph.

a.   Provide a setup for the graph, giving the labels for the x- and y-axes if shown.

b.   Describe the overall shape of the line by using general terms such as *increases, decreases, curves,* and *starts to level off*.

c.   If data points are shown, describe the data. Use a range if the data is not precise.

d.   Example without data points:

Asset: <u>Alt text</u>: A diagram. <u>Longdesc</u>: The diagram shows how long ago rock layers were formed and fossil types found in the rock layers:

- 50 million years ago. Plants on land.
- 100 million years ago. Plants in shallow sea.
- 150 million years ago. Plants in deep sea.
- 200 million years ago. Plants in shallow sea.
- 250 million years ago. Plants in deep sea.

Answer options:

A.   <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Sea Level in meters and millions of years ago. As millions of years ago increases, sea level rises from nearly zero, falls a little, and then rises again.

B.   <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Sea Level in meters and millions of years ago. As millions of years ago increases, sea level rises from nearly zero, reaches a peak, and then falls to nearly zero again.

C.   <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Sea Level in meters and millions of years ago. As millions of years ago increases, sea level rises from nearly zero, falls a little, rises again, and then falls to nearly zero again.

D.   <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Sea Level in meters and millions of years ago. As millions of years ago increases, sea level begins high, falls dramatically, and then rises again.

E.   <u>Alt text</u>: A graph. <u>Longdesc</u>: The graph shows Sea Level in meters and millions of years ago. As millions of years ago increases, sea level begins low and rises steadily.

e. Example with data points:

The diagram represents how glucose is regulated in the human body. The graph represents the blood glucose level of an individual over a 6-hour period.

Body works to mantain blood glucose level of 90 mg glucose/100mL of blood

Eating causes blood glucose level to increase

Blood glucose level drops below 90 mg glucose/100mL blood

Pancreas releases insulin

Pancreas releases glucagon

Glucose enters body cells, and insulin triggers the liver to convert glucose to glucagon

Glucagon signals liver to convert glycogen to glucose

Which action explains the blood glucose pattern represented in the graph?

A. The liver stored too much glycogen.

B. The pancreas did not release enough insulin.

C. The pancreas did not release enough glucagon.

D. The liver did not break down enough glycogen.

Alt text: A graph. Longdesc: The line graph shows the x-axis is labeled Time in hours. The y-axis is labeled Blood Glucose Level in milligrams glucose per 100 milliliters blood. The line starts at zero hours at 100 blood glucose level, decreases slowly, and then begins to level off.

- 0 hours, 100 blood glucose level.
- 1 hour, about 95 blood glucose level.
- 2 hours, about 90 blood glucose level.
- 3 hours, 80 blood glucose level.
- 4 hours, about 70 blood glucose level.
- 5 hours, about 65 blood glucose level.
- 6 hours, 60 blood glucose level.

(**Note:** A description of the flowchart is not shown here, as it is a separate image and would require a separate description. Go to the section for **Flowcharts** for more information.)

Maps

a. Provide a general description of the map.
b. Describe the key, if one is present.
c. Drill down into the details of the image, using subject-specific vocabulary (e.g., latitude, longitude). You may want to focus on the idea being conveyed with the image (in the following example, current and wind direction) instead of giving all of the details of the map's appearance.
d. When a compass is pictured on the map, you may use these directions to help specify details on the map.
e. Keep language consistent with language in other parts of the item.

f.   Example when reading the key is <u>not</u> the skill being assessed:

Students read that winds from the ocean bring moist air, while winds from the continent bring dry air. A teacher tells them that ocean currents coming from polar regions bring cool water, while ocean currents from equatorial regions bring warm water. The class observes a map showing the direction of prevailing winds and major ocean currents around the continent of South America.
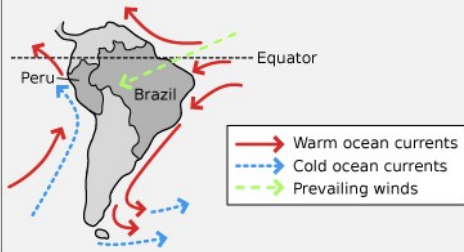
What is <u>most</u> likely the climate on the coastlines of Brazil and Peru?

A. The Brazilian coast is dry and cool; the Peruvian coast is wet and warm.

B. The Brazilian coast is dry and warm; the Peruvian coast is wet and cool.

C. The Brazilian coast is wet and cool; the Peruvian coast is dry and warm.

D. The Brazilian coast is wet and warm; the Peruvian coast is dry and cool.

(**Note:** In this case, the information conveyed by the map can be summarized instead of focusing on the colors from the key (making the connection for the student).)
<u>Alt text</u>: A map. <u>Longdesc</u>: In South America, Peru is on the west coast and Brazil is on the east coast. Below the equator on the Brazilian coast, warm ocean currents flow south, and prevailing winds blow from east to west in Brazil. Below the equator on the Peruvian coast, warm and cold ocean currents flow north.

g.   Example when reading the key is the skill being assessed:

Use the map of Florida to answer the question.

Sea level has changed throughout geological history. Many scientists predict that global climate change will result in a change in current sea level.

Which region of Florida is <u>LEAST</u> likely to experience widespread impact from a rise in sea level?

A. northern Florida   C. eastern Florida

B. southern Florida   D. western Florida

(**Note:** Since reading and understanding the key is the skill being assessed, describe the colors on the map instead of giving the data conveyed by the colors in the key (allowing the student to make the connection).)

<u>Alt text</u>: A map. <u>Longdesc</u>: The map is entitled Land Elevations in Florida. It shows a key of land elevations by color. Red is below 1.5 meters, blue is 1.5 to 3.5 meters, yellow is above 3.5 meters.

- Northern Florida is mostly yellow.
- Southern Florida is mostly red with some blue around the red.
- Eastern Florida is mostly yellow with some of the coastline dotted in blue and red.
- Western Florida is mostly yellow with most of the coast lined in blue.

Periodic Tables

a.   Provide a brief introduction that tells students the whole table is shown, but describe in detail <u>only the elements that are highlighted or given</u> in the answer choices, stem, or asset.

  i.   Use a table for easy navigation when describing three or more elements.

  ii.   Write the description as a narrative if only one or two elements from the periodic table are described.

  iii.   When describing a single element in a square (not in a full periodic table), list the numbers and identify what the numbers represent. A table format (instead of a list) is easier to navigate.

b.   When referring to the elements, use the full name or the symbol, maintaining consistency with the rest of the item (do not use the full name of the element if only the symbol is used in the rest of the item). Use *Element Symbol* for a table header when using only the symbol. Use *Element (Symbol)* for the header when using the element name. For more information about when to use the symbol and when to use the full name of chemical elements, please see the **Chemical Elements** section.

c.   Identify what the numbers are in the periodic table if doing so will not affect the construct being assessed. When in doubt, consult a content specialist.

d.   When describing elements, use the order in which they appear in the answer options.

  i.   If an element is highlighted in the periodic table, begin with that element description and then move on to the order in which they appear in the answer options.

  ii.   If elements appear in multiple answer options (in various combinations), use the period order number.

  iii.   If elements are <u>not</u> in the answer options, use the period number order.

e.   Example:

> **Use the periodic table to answer the question.**
>
>
>
> **Which bond has the LEAST covalent character?**
>
> A. Al-S
>
> B. Cd-S
>
> C. Sr-S
>
> D. Se-S

Alt text: The periodic table. Longdesc: The full periodic table of the elements is shown. The following elements are included.

Element Symbol	Period	Group	Atomic number	Electronegativity
Upper S	3	16	16	2.5
Upper A l	3	13	13	1.5
Upper C d	5	12	48	1.7
Upper S r	5	2	38	1.0
Upper S e	4	16	34	2.4

Punnett Squares

When the Punnett Square Is Blank

a.   Describe the squares as having "empty boxes."

b.   Describe the left side and top of each square.

c.   Use "uppercase" and "lowercase" to help define the letters.

d.   Example:

> The Punnett squares (A, B, C, D) represent genetic crosses between four pairs of pea plants.
>
> A. [Punnett square: T, t across top; T, t down left side]
>
> C. [Punnett square: T, t across top; t, t down left side]
>
> B. [Punnett square: T, T across top; t, t down left side]
>
> D. [Punnett square: T, T across top; T, t down left side]
>
> T = tall
> t = short
>
> **Which cross is most likely to produce 50% short pea plants?**
>
> A. A   C. C
>
> B. B   D. D

Alt text: Four Punnett squares. Longdesc: Each Punnett square shows a square with 4 empty boxes. A key shows uppercase T represents tall and lowercase t represents short.

- Punnett Square A: Uppercase T and lowercase t on the left side of the square. Uppercase T and lowercase t on the top of the square.
- Punnett Square B: Lowercase t and lowercase t on the left side of the square. Uppercase T and uppercase T on the top of the square.
- Punnett Square C: Lowercase t and lowercase t on the left side of the square. Uppercase T and lowercase t on the top of the square.
- Punnett Square D: Uppercase T and lowercase t on the left side of the square. Uppercase T and uppercase T on the top of the square.

When the Punnett Square Is Mostly Full
a.   Describe the left side and top of the square, depending what is shown.
b.   Describe what is in each box, using "uppercase" and "lowercase" to help define the letters.
c.   You may also choose to create the Punnett square in the longdesc using a table.

d. Example:

> The genotype of one parent is missing from this Punnett square:
>
> | T | TT | Tt |
> |---|----|----|
> | T | TT | Tt |
>
> **Which term describes the genotype of the missing parent?**
>
> A. dominant
>
> B. heterozygous
>
> C. homozygous
>
> D. recessive

Alt text: A Punnett square. Longdesc: A square with four boxes. Uppercase T and uppercase T are on the left side of the square. In the square:

- Uppercase T and uppercase T in the first box on the top.
- Uppercase T and lowercase t in the second box on the top.
- Uppercase T and uppercase T in the first box on the bottom.
- Uppercase T and lowercase t in the second box on the bottom.

Or (with table)

Alt text: A Punnett square. Longdesc: A square with four boxes. Uppercase T and uppercase T are on the left side of the square.

uppercase T and uppercase T	uppercase T and lowercase t
uppercase T and uppercase T	uppercase T and lowercase t

Pyramids and Webs

Pyramid
a. Provide a general description of the pyramid, giving title and number of levels.
b. Use a bullet list, describe the details of the levels, starting from the bottom and moving up.
c. The level of detail in the description of the pyramid levels depends on the context of the item. Describe only what is necessary to the item.

d.   Example:

This ecological pyramid represents the relative amount of available energy at each trophic level in a marine ecosystem.

Marine Ecosystem Energy Pyramid

Level 4 ———————— 1 unit

Level 3 ———————— 10 units

Level 2 ———————— 100 units

Level 1 ———————— 1000 units

| **How does the law of conservation of energy apply to this ecosystem?** |

A. The energy from Level 4 will eventually be passed back to the organisms in Level 1.

B. There is a greater amount of energy available to the organisms in Level 4 than in Level 1.

C. Some energy from each level is released as heat, but the total amount of energy remains the same.

D. Producers in the lower level obtain energy from the Sun, and other organisms obtain energy by eating producers.

Alt text: An ecological pyramid. Longdesc: The pyramid is titled Marine Ecosystem Energy Pyramid, and it shows four levels. From the base to the peak, the levels are:

- Level 1, 1000 units.
- Level 2, 100 units.
- Level 3, 10 units.
- Level 4, 1 unit.

(**Note:** This item assesses understanding of the law of conservation of energy, so it is important to describe the amount of energy, but it is unnecessary to describe the images/organisms in each level.)

Webs and Chains
a.   Focus on the relationship between the organisms instead of the diagram's structure.
b.   Use a list to organize the information and approach the food web from the top (the organism not consumed by others).
c.   Alternatively, for food chains (organisms in a row, separated by arrows), use language like "from" and "to." For example, "The arrows point from the grasses, to the marmot, and from the marmot to the grizzly bear."
d.   Additional description may be needed to help visually impaired students understand above-grade or specialized terms—knowledge that sighted students might access by seeing the image. This additional information is acceptable as long as knowledge of those terms is not the construct being assessed.

e.   Example:

The food web shows the feeding relationships of some of the organisms in the Florida Everglades ecosystem.

Great blue heron
Alligator
Mosquito
Carp
Mud turtle
Butterfly orchid
Bladderwort

If humans hunt most of the great blue heron in this ecosystem, which event will <u>most</u> likely happen to the other species in the food web?

A. Mud turtles will decrease in number, because they will lose habitat.

B. Mosquitoes will decrease in number, due to an increase in predation.

C. Carp and alligators will decrease in number, due to a decrease in food.

D. Bladderworts and orchids will decrease in number, because of more competition.

<u>Alt text</u>: A food web. <u>Longdesc</u>:
- Alligator consumes Great blue heron (bird), Carp (fish), and Mud turtle.
- Great blue heron consumes Carp.
- Carp consumes Mosquito and Bladderwort (plant).
- Mud turtle consumes Bladderwort.
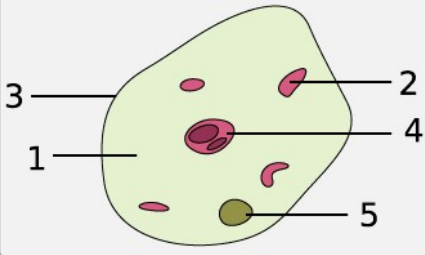- Mosquito consumes Butterfly orchid (plant).

(**Note:** Additional description was given to some of the organisms (identifying a heron as a bird, carp as a fish, and bladderwort and butterfly orchid as plants). Without such verbal identification, visually impaired students may not know what these species are, and visually aided students would have an unfair advantage.)

Visual Bias in Science Item Types

Many of the Science items with visual bias that you will encounter will be due to complexity. If the image needs so much description that a student would be unable to keep track of the information presented in the description, or if the description requires language too complex for the level being assessed, the image has visual bias.

Example:

> This drawing is of an animal cell.
>
>
>
> **Which can be identified in this diagram as the nucleus?**
>
> A. 1
>
> B. 2
>
> C. 3
>
> D. 4
>
> E. 5

This image is deceptively simple in design. Describing the labeled parts' appearance in enough detail to allow a student to differentiate between parts would lead to a cognitive overload and possibly incorporate vocabulary above grade level. In addition, describing the labeled parts by name would cue the answer. Therefore, this image would be classified as having visual bias.

Part 6. Resources

NWEA Contact Information

For questions or concerns about content or technical issues with this document, please contact AccessFeedback@nwea.org.

Additional Resources

The National Center of Accessible Media (NCAM) at WGBH

http://ncam.wgbh.org

    i.   Describing STEM images: http://ncamftp.wgbh.org/ncam-old-site/experience_learn/educational_media/stemdx/guidelines.html

    ii.   Describing Images for Enhanced Assessments https://www.wgbh.org/foundation/ncam/guidelines/describing-images-for-enhanced-assessments

    iii.   Image Description Training Webinar http://diagramcenter.org/diagramwebinars.html#a11yimages

MathSpeak

http://www.gh-mathspeak.com/examples/grammar-rules/

National Center on Accessible Instructional Materials

http://aem.cast.org/

PBS LearningMedia™ (rich-media content library for K-16)

www.teachersdomain.org/

American Printing House Tactile Graphic Image Library

http://www.aph.org/tgil/

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Trusted by educators to assess more than nine million students around the world each year, NWEA is recognized for offering a world-class assessment—the most stable assessment scale in K–12 education. NWEA partners to help all kids learn, supporting educators with assessment solutions that accurately measure student growth and guide them to individualized learning options.