

Georgia
Milestones
Assessment System



Assessment Guide
Coordinate Algebra



Assessment Guide

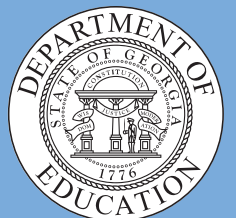


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THE GEORGIA MILESTONES ASSESSMENT SYSTEM

The purpose of the Georgia Student Assessment Program is to measure student achievement of the state-adopted content standards and inform efforts to improve teaching and learning. Results of the assessment program are utilized to identify students failing to achieve mastery of content, to provide educators with feedback about instructional practice, and to assist school districts in identifying strengths and weaknesses in order to establish priorities in planning educational programs.

The State Board of Education is required by Georgia law (O.C.G.A. §20-2-281) to adopt assessments designed to measure student achievement relative to the knowledge and skills set forth in the state-adopted content standards. The Georgia Milestones Assessment System (Georgia Milestones) fulfills this requirement and, as a key component of Georgia's Student Assessment Program, is a comprehensive summative assessment program spanning Grade 3 through high school. Georgia Milestones measures how well students have learned the knowledge and skills outlined in the state-adopted content standards in Language Arts, Mathematics, Science, and Social Studies. Students in grades 3 through 8 take an end-of-grade assessment in English Language Arts and Mathematics; additionally, students in grades 5 and 8 are assessed in Science; and students in grade 8 are assessed in Social Studies. High school students take an end-of-course assessment for each of the five courses designated by the State Board of Education. In accordance with State Board Rule, Georgia Milestones end-of-course measures serve as the final exams for the specified high school courses.

The main purpose of Georgia Milestones is to inform efforts to improve student achievement by assessing student performance on the standards specific to each course or subject/grade tested. Specifically, Georgia Milestones is designed to provide students and their parents with critical information about the students' achievement and, importantly, their preparedness for the next educational level. The assessment system is a critical informant of the state's accountability measure, the College and Career Ready Performance Index (CCRPI), providing an important gauge about the quality of the educational services and opportunities provided throughout the state. The ultimate goal of Georgia's assessment and accountability system is to ensure that all students are provided the opportunity to engage with high-quality content standards, receive high-quality instruction predicated upon those standards, and are positioned to meet high academic expectations.

Features of the Georgia Milestones Assessment System include:

- technology-enhanced items in all grades and courses;
- open-ended (constructed-response) items in English Language Arts (all grades and courses);
- a writing component (in response to passages read by students) at every grade level and course within the Language Arts assessment; and
- online administration as the primary mode of administration.

The mode of administration for the Georgia Milestones program is online. Paper/pencil test materials, such as Braille forms, will be available for the small number of students who cannot interact with the computer due to their disability as documented in an IEP, IAP/504, or EL-TPC Plan.

Georgia Milestones follows guiding principles to help ensure that the assessment system:

- is sufficiently challenging to ensure Georgia students are well positioned to compete with other students across the United States and internationally;
- is intentionally designed across grade levels to send a clear signal of student academic progress and preparedness for the next level, whether it is the next grade level, course, or college or career;
- is accessible to all students, including those with disabilities or limited English proficiency, at all achievement levels;
- supports and informs the state’s educator-effectiveness initiatives, ensuring items and forms are appropriately sensitive to quality instructional practices; and
- includes innovative technology-enhanced items.

GEORGIA MILESTONES END-OF-COURSE (EOC) ASSESSMENTS

As previously mentioned, Georgia law (§20-2-281) mandates that the State Board of Education adopt EOC assessments for core courses to be determined by the Board. An EOC assessment serves as a student’s final exam in the associated course. With educator input and State Board approval, the Georgia Milestones EOC assessments measure student achievement in the following courses: American Literature and Composition, Algebra I, Coordinate Algebra, Biology, and United States History.

Any student enrolled in and/or receiving credit for one of the above-mentioned courses, regardless of grade level, is required to take the Georgia Milestones EOC assessment upon completion of that course. This includes middle school students completing a course associated with a Georgia Milestones EOC assessment, regardless of whether they are receiving high school credit. Students enrolling from non-accredited programs are required to take and pass the Georgia Milestones EOC assessment prior to receiving credit for the course.

A student’s final grade in the course will be calculated using the Georgia Milestones EOC assessment as follows (State Board Rule 160-4-2-.13):

- For students enrolled in Grade 9 for the first time before July 1, 2011, the EOC assessment counts as 15% of the final grade.
- For students enrolled in Grade 9 for the first time on or after July 1, 2011, the EOC assessment counts as 20% of the final grade.

Results of the EOC assessments, according to the legislated and identified purposes, must:

- provide a valid measure of student achievement of the state content standards across the full achievement continuum;
- serve as the final exam for each course, contributing 15% or 20% to the student’s final course grade;
- provide a clear signal of each student’s preparedness for the next course and ultimately post-secondary endeavors (college and career);
- allow for the detection of the academic progress made by each student from one assessed course to the next;
- support and inform educator-effectiveness measures; and
- inform state and federal accountability measures at the school, district, and state levels.

Additional uses of the EOC assessments include: (1) certifying student proficiency prior to the awarding of credit for students enrolling from non-accredited private schools, home study programs, or other non-traditional educational centers and (2) allowing eligible students to demonstrate competency without taking the course and earn course credit (e.g., “test out”). In both cases, students are allotted *one* administration.

ASSESSMENT GUIDE

The Georgia Milestones Coordinate Algebra EOC Assessment Guide is provided to acquaint Georgia educators and other stakeholders with the structure of and content assessed by the test. Importantly, this guide is not intended to inform instructional planning. It is essential to note that there are a small number of content standards that are better suited for classroom or individual assessment than for large-scale summative assessment. While those standards are not included in the tests and therefore are not included in this Assessment Guide, the knowledge, concepts, and skills inherent in those standards are often required for the mastery of the standards that are assessed. Failure to attend to all content standards within a course can limit a student’s opportunity to learn and show what he or she knows and can do on the assessment.

The Georgia Milestones Coordinate Algebra EOC Assessment Guide is in *no way* intended to substitute for the state-mandated content standards; it is provided to help educators better understand the structure and content of the assessment, *but it is not all-encompassing of the knowledge, concepts, and skills covered in the course or assessed on the test*. The state-adopted content standards and associated standards-based instructional resources, such as the Content Frameworks, should be used to plan instruction. This Assessment Guide can serve as a *supplement* to those resources, in addition to any locally developed resources, **but should not be used in isolation**. In principle, the Assessment Guide is intended to be descriptive of the assessment program and should not be considered all-inclusive. The state-adopted content standards are located at www.georgiastandards.org.

TESTING SCHEDULE

The Georgia Milestones Coordinate Algebra EOC assessment is offered during three Main Administrations. Main Administrations are primarily intended to provide an opportunity to assess student achievement at the completion of a course and to serve as the final exam for the associated course as required by State Board Rule. As a result, the EOC assessment should occur as close to the conclusion of the course as possible. Main Administrations can also be utilized to verify credit from a non-accredited school or home schooling. In addition to the Main Administrations, Mid-Month Administrations are provided in order to allow students additional testing opportunities for the various reasons noted below.

Purpose for EOC Assessment	Winter & Spring Main Administrations	Mid-Month Administrations	Summer Main Administration
Completion of Course	Yes	Yes	Yes
Makeup from Previous Administration	Yes	Yes	Yes
Retest	No*	Yes	Yes
Test Out	No	Yes**	Yes
Validation of Credit	Yes	Yes	Yes

*Winter and Spring Main Administrations cannot be used for the purpose of a retest.

**August, September, and March Mid-Month Administrations as well as the Summer Main Administration can be used for the purpose of a test out.

Note: Each district determines a local testing window within the state-designated testing window.

TEST STRUCTURE

DESCRIPTION OF TEST FORMAT AND ORGANIZATION

The Georgia Milestones Coordinate Algebra EOC assessment is primarily a criterion-referenced test designed to provide information about how well a student has mastered the state-adopted content standards within the course. The assessment consists of both operational items and field test items (newly written items that are being tried out and do not contribute to the student's score). Each student will receive one of four Achievement Level designations, depending on how well the student has mastered the content standards. The four Achievement Level designations are Beginning Learner, Developing Learner, Proficient Learner, and Distinguished Learner. In addition to criterion-referenced information, the Georgia Milestones measures will also produce an estimate of how Georgia students are achieving relative to their peers nationally. The norm-referenced information provided is supplementary to the criterion-referenced Achievement Level designation and will not be utilized in any manner other than to serve as a barometer of national comparison. Only the criterion-referenced scores and Achievement Level designations will be utilized in the accountability metrics associated with the assessment program (such as student growth measures, educator-effectiveness measures, or the CCRPI).

The table on the following page outlines the number and types of items included on the Coordinate Algebra EOC assessment.

Coordinate Algebra EOC Assessment Design

Description	Number of Items	Number of Points
1-point Selected-Response and Technology-Enhanced Items ^{1, 2}	42	42
2-point Technology-Enhanced Items ¹	8	16
Field Test Items ³	5	0
Total⁴	55	58

¹ **Technology-Enhanced:** Possible variants of the technology-enhanced item types used for Coordinate Algebra include multiple-part selected-response, multiple-select, drag-and-drop, drop-down, graphing, and keypad-input.

² **1-point Selected-Response and Technology-Enhanced Items:** The ratio of selected-response to technology-enhanced items may vary. The target range of 1-point technology-enhanced items is 0 to 5.

³ **Field Test Items:** Field test items may include 1-point selected-response, 1-point technology-enhanced, and 2-point technology-enhanced items.

⁴ **Total:** Of the total 55 items, 50 contribute to the student's Coordinate Algebra score.

The test will be given in two sections. Section 1 is divided into two parts. Students may have up to 65 minutes per section to complete Sections 1 and 2. The total estimated testing time for the Coordinate Algebra EOC assessment ranges from approximately 60 to 130 minutes. Total testing time describes the amount of time students have to complete the assessment. It does not take into account the time required for the test examiner to complete pre-administration and post-administration activities (such as reading the standardized directions to students). Sections 1 and 2 may be administered on the same day or across two consecutive days based on the district's testing protocols for the EOC measures (in keeping with state guidance).

During the Coordinate Algebra EOC assessment, a formula sheet will be available for students to use. There is an example of the formula sheet in the Additional Sample Items section of this guide. Another feature of the Coordinate Algebra EOC assessment is that students may use a graphing calculator in Part B of Section 1 and in all of Section 2.

CONTENT MEASURED

The Coordinate Algebra EOC assessment will measure the Coordinate Algebra standards that are described at www.georgiastandards.org.

The content of the assessment is organized into three groupings, or domains, of standards for the purposes of providing feedback on student performance. A content domain is a reporting category that *broadly* describes and defines the content of the course, as measured by the EOC assessment. The standards for Coordinate Algebra are grouped into four domains: Algebra (*includes Number and Quantity*), Functions, Algebra Connections to Geometry, and Algebra Connections to Statistics and Probability. Each domain was created by organizing standards that share similar content characteristics. The content standards describe the level of expertise that Coordinate Algebra educators should strive to develop in their students. Educators should refer to the content standards for a full understanding of the knowledge, concepts, and skills subject to be assessed on the EOC assessment.

The approximate proportional number of points associated with each domain is shown in the following table. A range of cognitive levels will be represented on the Coordinate Algebra EOC assessment. Educators should always use the content standards when planning instruction.

Coordinate Algebra: Domain Structures and Content Weights
Reporting Categories and Content Standards

Reporting Category/Domain	Content Standards Assessed	Approximate # of Points	Approximate % of Test
Algebra <i>(includes Number and Quantity)</i>	MGSE9-12.N.Q (1, 2, 3)	17	30%
	MGSE9-12.A.CED (1, 2, 3, 4)		
	MGSE9-12.A.REI (1, 3, 5, 6, 10, 11, 12)		
	MGSE9-12.A.SSE (1, 1a, 1b)		
Functions	MGSE9-12.F.IF (1, 2, 3, 4, 5, 6, 7, 7a, 7e, 9)	17	30%
	MGSE9-12.F.BF (1, 1a, 2, 3)		
	MGSE9-12.F.LE (1, 1a, 1b, 1c, 2, 3, 5)		
Algebra Connections to Geometry	MGSE9-12.G.CO (1, 2, 3, 4, 5)	15	25%
	MGSE9-12.G.GPE (4, 5, 6, 7)		
Algebra Connections to Statistics and Probability	MGSE9-12.S.ID (1, 2, 3, 5, 6, 6a, 6c, 7, 8, 9)	9	15%
Total		58	100%


The Standards for Mathematical Practice (1–8) will be embedded within items aligned to the mathematical content standards.

ITEM TYPES

The Coordinate Algebra EOC assessment consists of selected-response and technology-enhanced items.

A selected-response item, sometimes called a multiple-choice item, is defined as a question, problem, or statement that is followed by several answer choices, sometimes called options or response choices. The incorrect choices, called distractors, usually reflect common errors. The student's task is to choose, from the choices provided, the best answer to the question (the stem). The Coordinate Algebra selected-response items will have four answer choices.

A technology-enhanced item is an innovative way to measure student skills and knowledge by using scaffolding within a multi-step process. Technology-enhanced items are worth one or two points. If the item is worth two points, partial credit is awarded for special combinations of responses that do not include all the correct answers. For Coordinate Algebra, there are a number of specific technology-enhanced item types being used:

- In multi-select items, the student is asked to pick two or three correct responses from five or six answer options.
- In multi-part items, the student responds to a question, statement, or prompt that has two or more parts.
- In drag-and-drop items, the student uses a mouse, touchpad, or touchscreen to move responses to designated areas on the screen.
- In drop-down menu items, the student uses a mouse, touchpad, or touchscreen to open a drop-down menu and select an option from the menu. A drop-down menu item may have multiple drop-down menus.
- In keypad-input items, the student uses the physical keyboard or the pop-up keyboard on a touchscreen to type a number, expression, or equation into an answer box.
- In coordinate-graph items, the student uses a mouse, touchpad, or touchscreen to draw lines and/or plot points on a coordinate grid on the screen.
- In line-plot items, the student uses a mouse, touchpad, or touchscreen to place Xs above a number line to create a line plot.
- In bar-graph items, the student uses a mouse, touchpad, or touchscreen to select the height of each bar to create a bar graph.
- In number-line items, the student uses a mouse, touchpad, or touchscreen to plot a point and/or represent inequalities.
- Since some technology-enhanced items in this guide were designed to be used only in an online, interactive-delivery format, some of the item-level directions will not appear to be applicable when working within the format presented in this document (for example, "Move the clocks into the graph" or "Create a scatter plot").
- This icon  identifies special directions that will help the student answer technology-enhanced items as shown in the format presented within this guide. These directions do not appear in the online version of the test but explain information about how the item works that would be easily identifiable if the student were completing the item in an online environment.

To give students practice using technology-enhanced items in an online environment very similar to how they will appear on the online test, visit “Experience Online Testing Georgia.”

1. Go to the website “Welcome to Experience Online Testing Georgia” (<http://gaexperienceonline.com/>).
2. Select “Test Practice.”
3. Under “End-of-Course (EOC) All Assessments,” select “Online Tools Training.”
4. Select “EOC Test Practice.”
5. Select “Technology Enhanced Items.”
6. You will be taken to a login screen. Use the username and password provided on the screen to log in and practice navigating technology-enhanced items online.

Please note that Google Chrome is the only supported browser for this public version of the online testing environment.

DEPTH OF KNOWLEDGE DESCRIPTORS

Items found on the Georgia Milestones assessments, including the Coordinate Algebra EOC assessment, are developed with a particular emphasis on cognitive complexity, or Depth of Knowledge (DOK). DOK is measured on a scale of 1 to 4 and refers to the level of cognitive demand required to complete a task (or in this case, an assessment item). The higher the level, the *more complex* the item; however, higher levels do not necessarily mean *more difficult* items. For instance, a question can have a low DOK but a medium or even high difficulty level. Conversely, a DOK 4 question may have a low difficulty level but still require a great deal of cognitive thinking (e.g., analyzing and synthesizing information instead of just recalling it). The following descriptions and table show the expectations of the four DOK levels in greater detail.

Level 1 (Recall of Information) generally requires students to identify, list, or define, often asking them to recall who, what, when, and where. Consequently, this level usually asks students to recall facts, terms, concepts, and trends and may ask them to identify specific information contained in documents, excerpts, quotations, maps, charts, tables, graphs, or illustrations. Items that require students to “describe” and/or “explain” could be classified at Level 1 or Level 2, depending on what is to be described and/or explained. A Level 1 “describe” and/or “explain” would require students to recall, recite, or reproduce information.

Level 2 (Basic Reasoning) includes the engagement of some mental processing beyond recalling or reproducing a response. A Level 2 “describe” and/or “explain” would require students to go beyond a description or explanation of recalled information to describe and/or explain a result or “how” or “why.”

Level 3 (Complex Reasoning) requires reasoning, using evidence, and thinking on a higher and more abstract level than Level 1 and Level 2. Students will go beyond explaining or describing “how and why” to justifying the “how and why” through application and evidence. Level 3 questions often involve making connections across time and place to explain a concept or “big idea.”

Level 4 (Extended Reasoning) requires the complex reasoning of Level 3 with the addition of planning, investigating, applying significant conceptual understanding, and/or developing that will most likely require an extended period of time. Students should be required to connect and relate ideas and concepts *within* the content area or *among* content areas in order to be at this highest level. The distinguishing factor for Level 4 would be a show of evidence (through a task, a product, or an extended response) that the cognitive demands have been met.

The following table identifies skills that students will need to demonstrate at each DOK level, along with question cues appropriate for each level.

Level	Skills Demonstrated	Question Cues
<p>Level 1 Recall of Information</p>	<ul style="list-style-type: none"> • Make observations • Recall information • Recognize formulas, properties, patterns, processes • Know vocabulary, definitions • Know basic concepts • Perform one-step processes • Translate from one representation to another • Identify relationships 	<ul style="list-style-type: none"> • Find • List • Define • Identify; label; name • Choose; select • Compute; estimate • Express • Read from data displays • Order
<p>Level 2 Basic Reasoning</p>	<ul style="list-style-type: none"> • Apply learned information to abstract and real-life situations • Use methods, concepts, theories in abstract and real-life situations • Perform multi-step processes • Solve problems using required skills or knowledge (requires more than habitual response) • Make a decision about how to proceed • Identify and organize components of a whole • Extend patterns • Identify/describe cause and effect • Recognize unstated assumptions, make inferences • Interpret facts • Compare or contrast simple concepts/ideas 	<ul style="list-style-type: none"> • Apply • Calculate; solve • Complete • Describe • Explain how; demonstrate • Construct data displays • Construct; draw • Analyze • Extend • Connect • Classify • Arrange • Compare; contrast

Level	Skills Demonstrated	Question Cues
<p>Level 3 Complex Reasoning</p>	<ul style="list-style-type: none"> • Solve an open-ended problem with more than one correct answer • Create a pattern • Relate knowledge from several sources • Draw conclusions • Make predictions • Translate knowledge into new contexts • Assess value of methods, concepts, theories, processes, formulas • Make choices based on a reasoned argument • Verify the value of evidence, information, numbers, data 	<ul style="list-style-type: none"> • Plan; prepare • Predict • Create; design • Generalize • Justify; explain why; support; convince • Assess • Rank; grade • Test; judge • Recommend • Select • Conclude
<p>Level 4 Extended Reasoning</p>	<ul style="list-style-type: none"> • Analyze and synthesize information from multiple sources • Apply mathematical models to illuminate a problem or situation • Design a mathematical model to inform and solve a practical or abstract situation • Combine and synthesize ideas into new concepts 	<ul style="list-style-type: none"> • Design • Connect • Synthesize • Apply concepts • Analyze • Create • Prove

SCORES

Selected-response items and technology-enhanced items are machine scored. However, the Coordinate Algebra EOC assessment consists of selected-response and technology-enhanced items.

Students will receive a scale score and an Achievement Level designation based on total test performance. In addition, students will receive information on how well they performed at the domain level. For more information on scoring, please see the *Georgia Milestones End-of-Course (EOC) Interpretive Guide for Score Reports*.

EXAMPLE ITEMS

Example items, which are representative of the applicable DOK levels across various Coordinate Algebra content domains, are provided.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

Example Item 1

Selected-Response: 1 point

DOK Level: 1

Coordinate Algebra Content Domain: Algebra Connections to Geometry

Standard: MGSE9-12.G.CO.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

Which statement defines a circle?

- A. A circle is the set of all points in a plane that are equidistant from each other.
- B. A circle is the set of all points in a plane that are equidistant from a given point.
- C. A circle is the set of all points in a plane that are equidistant from a given segment.
- D. A circle is the set of all points in a plane that are equidistant from a given arc.

Correct Answer: B

Explanation of Correct Answer: The correct answer is choice (B) A circle is the set of all points in a plane that are equidistant from a given point. This is how a circle is defined. Choices (A), (C), and (D) are incorrect because they define a circle as being a set of points that are equidistant from the wrong point of reference.

Example Item 2**Selected-Response:** 1 point**DOK Level:** 2**Coordinate Algebra Content Domain:** Functions

Standard: MGSE9-12.F.BF.2. Write arithmetic and geometric sequences recursively and explicitly, use them to model situations, and translate between the two forms. Connect arithmetic sequences to linear functions and geometric sequences to exponential functions.

The first term in an arithmetic sequence is 5. The fourth term in the sequence is -4 . The tenth term is -22 .

Which function can be used to find the n th term of the arithmetic sequence?

- A. $f(n) = -n$
- B. $f(n) = n + 4$
- C. $f(n) = -3n + 8$
- D. $f(n) = \frac{1}{2}(n + 5) + 2$

Correct Answer: C

Explanation of Correct Answer: The correct answer is choice (C) $f(n) = -3n + 8$. Since the sequence is changing at a constant rate and it is given that $f(1) = 5$ and $f(4) = -4$, it can be determined that in 3 terms, the value changes by -9 or that each single term changes by -3 . The function will be in the form $f(x) = -3n + b$. Substituting $f(1)$ can determine that $5 = -3(1) + b$ to reveal that $b = 8$. Choice (A) is incorrect because it is true for $f(4)$ but not $f(1)$. Choice (B) is incorrect because it is true for $f(1)$ but not $f(4)$. Choice (D) is incorrect because it is true for $f(1)$ but not $f(4)$.

Example Item 3**Selected-Response:** 1 point**DOK Level:** 3**Coordinate Algebra Content Domain:** Algebra

Standard: MGSE9-12.A.CED.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret data points as possible (i.e. a solution) or not possible (i.e. a non-solution) under the established constraints.

Jose wants to spend no more than \$30 on apples and grapes for the month. Apples cost \$1.50 per pound, and grapes cost \$2 per pound. Jose also wants his monthly caloric intake from apples and grapes to be greater than 2000 calories. He determines that 1 pound of apples has 200 calories and 1 pound of grapes has 300 calories.

Let a represent the number of pounds of apples, and g represent the number of pounds of grapes. Which system of inequalities can be used to determine the number of pounds of apples and the number of pounds of grapes that Jose can buy for a month?

A.
$$\begin{cases} 1.5a + 2g \geq 30 \\ 200a + 300g > 2000 \end{cases}$$

B.
$$\begin{cases} 1.5a + 2g \leq 30 \\ 200a + 300g > 2000 \end{cases}$$

C.
$$\begin{cases} 2a + 1.5g \leq 30 \\ 300a + 200g > 2000 \end{cases}$$

D.
$$\begin{cases} 2a + 1.5g \geq 30 \\ 200a + 300g < 2000 \end{cases}$$

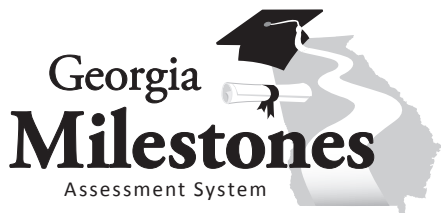
Correct Answer: B

Explanation of Correct Answer: The correct answer is choice (B) $1.5a + 2g \leq 30$ and $200a + 300g > 2000$. This response correctly assigns the costs of the fruit and recognizes that the sum must be less than or equal to \$30. It also correctly assigns the calories of the fruit and recognizes that this total should be greater than 2,000 calories. Errors made while solving this item represent misunderstandings of how to represent the context in linear inequalities. Choice (A) represents a case where Jose is spending \$30 or more on the fruit. Choice (C) represents confusion over how to assign costs and calories to the proper types of fruit. Choice (D) represents confusion over how to assign the costs to the proper types of fruit, as well as misunderstandings of how to represent the context in linear inequalities.

ADDITIONAL SAMPLE ITEMS

This section has two parts. The first part is a set of 24 sample items for Coordinate Algebra. The second part contains a table that shows for each item the standard assessed, the DOK level, the correct answer (key), and a rationale/explanation about the key and distractors. The sample items can be utilized as a mini test to familiarize students with the item formats found on the assessment.

All example and sample items contained in this guide are the property of the Georgia Department of Education.



Coordinate Algebra Formula Sheet

Below are the formulas you may find useful as you take the test. However, you may find that you do not need to use all of the formulas. You may refer to this formula sheet as often as needed.

<p style="text-align: center;"><u>Linear Formulas</u></p> <p>Slope Formula</p> $m = \frac{y_2 - y_1}{x_2 - x_1}$ <p>Linear Equations</p> <p>Slope-intercept Form: $y = mx + b$</p> <p>Point-slope Form: $y - y_1 = m(x - x_1)$</p> <p>Standard Form: $Ax + By = C$</p> <p>Arithmetic Sequence Formulas</p> <p>Recursive: $a_n = a_{n-1} + d$</p> <p>Explicit: $a_n = a_1 + d(n - 1)$</p> <p style="text-align: center;"><u>Geometry Formulas</u></p> <p>Perimeter</p> <p>The perimeter of a polygon is equal to the sum of the lengths of its sides.</p> <p>Area</p> <p>Triangle $A = \frac{1}{2}bh$</p> <p>Rectangle $A = bh$</p> <p>Distance Formula</p> $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ <p>Coordinates of point which partitions a directed line segment AB at the ratio of $a:b$ from $A(x_1, y_1)$ to $B(x_2, y_2)$</p> $(x, y) = \left(\frac{bx_1 + ax_2}{b + a}, \frac{by_1 + ay_2}{b + a} \right)$ <p>OR</p> $(x, y) = \left(x_1 + \frac{a}{a + b}(x_2 - x_1), y_1 + \frac{a}{a + b}(y_2 - y_1) \right)$	<p>Average Rate of Change</p> <p>The change in the y-value divided by the change in the x-value for two distinct points on a graph.</p> <p style="text-align: center;"><u>Exponential Formulas</u></p> <p>Exponential Equation</p> $y = ab^x$ <p>Geometric Sequence Formulas</p> <p>Recursive: $a_n = r(a_{n-1})$</p> <p>Explicit: $a_n = a_1 \cdot r^{n-1}$</p> <p>Compound Interest Formula</p> $A = P\left(1 + \frac{r}{n}\right)^{nt}$ <p style="text-align: center;"><u>Statistics Formulas</u></p> <p>Mean</p> $\bar{x} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$ <p>Interquartile Range</p> $IQR = Q_3 - Q_1$ <p>The difference between the first quartile and third quartile of a set of data.</p> <p>Mean Absolute Deviation</p> $\frac{\sum_{i=1}^n x_i - \bar{x} }{n}$ <p>The sum of the distances between each data value and the mean, divided by the number of data values.</p>
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You can find mathematics formula sheets on the Georgia Milestones webpage at <http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Pages/Georgia-Milestones-EOC-Resources.aspx>.

Item 1

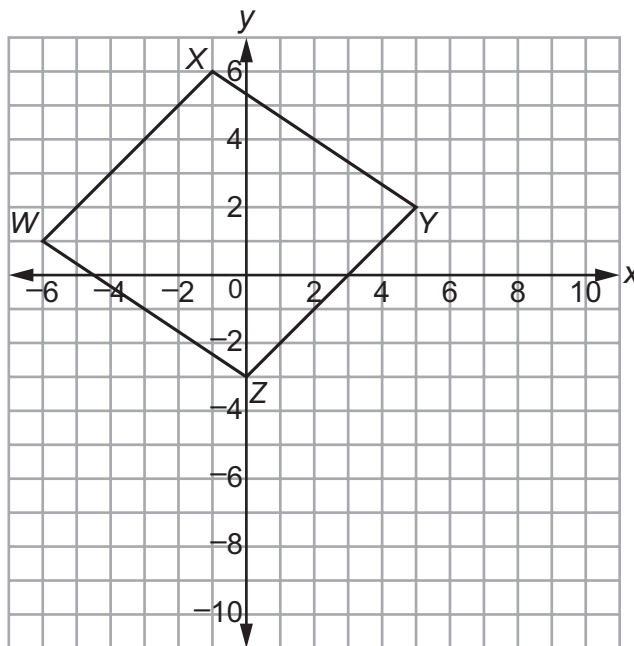
Selected-Response: 1 point

Which set of data points could be modeled by a line of best fit that is a decreasing linear function?

- A. $\{(0, 0), (1, 8), (2, 15), (3, 22), (4, 30)\}$
 B. $\{(0, 5), (1, 6), (2, 10), (3, 16), (4, 28)\}$
 C. $\{(0, 50), (1, 42), (2, 33), (3, 25), (4, 16)\}$
 D. $\{(0, 64), (1, 60), (2, 52), (3, 39), (4, 22)\}$

Item 2

Selected-Response: 1 point

Look at quadrilateral $WXYZ$ on the coordinate grid.What are the coordinates of a point on the directed line segment XY that partitions the segment into a ratio of 1:1?

- A. $(\frac{1}{2}, 5)$
 B. $(2, 4)$
 C. $(3, 3\frac{1}{3})$
 D. $(5, 2)$

Item 3**Selected-Response:** 1 point

The total daily expenses to operate Sheila's pie bakery are the cost of salaries and ingredients. Sheila has four employees, and she pays each employee a daily rate. On average, it costs the same amount of money to make each pie. This expression shows the total daily expenses for Sheila's bakery to make x pies.

$$4(75) + \$0.50x$$

What does the term $4(75)$ represent?

- A. the amount of money Sheila must pay her employees per day
- B. the number of pies Sheila must sell per day
- C. the total cost of expenses per pie
- D. the amount of money customers pay per pie

Item 4**Selected-Response:** 1 point**Which function represents the data in the table?**

x	3	6	10	15
y	2.5	4	6	8.5

- A. $f(x) = 2x + 1$
- B. $f(x) = \frac{x}{2} - 1$
- C. $f(x) = 2x - 1$
- D. $f(x) = \frac{x}{2} + 1$

Item 5

Selected-Response: 1 point

What is the solution to this system of equations?

$$x - 3y = 1$$

$$x - 2y = 6$$

- A. $(-4, -5)$
- B. $(-2, -1)$
- C. $(4, 1)$
- D. $(16, 5)$

Item 6

Selected-Response: 1 point

Information about the costs of three catering companies is shown in this table.

Catering Company Costs

Acme Catering Company	Best Foods Company	Creative Catering Company
\$6 per person plus a flat \$100 time and equipment charge	\$8 per person plus a flat \$40 time and equipment charge	\$10 per person charge with no other fees

Gavin can spend no more than \$300 on the catering for an event. What is the greatest number of people that Gavin can have at his event without spending more than \$300 on catering?

- A. 30
- B. 32
- C. 33
- D. 37

Item 7

Selected-Response: 1 point

Parallelogram $ABCD$ has four congruent sides but no right angles. The diagonals of $ABCD$ intersect at point P . A single transformation maps parallelogram $ABCD$ onto itself.

Which phrase could NOT describe this transformation?

- A. a rotation 90° clockwise about point P
- B. a rotation 180° about point P
- C. a reflection across the line that passes through points A and C
- D. a reflection across the line that passes through points B and D

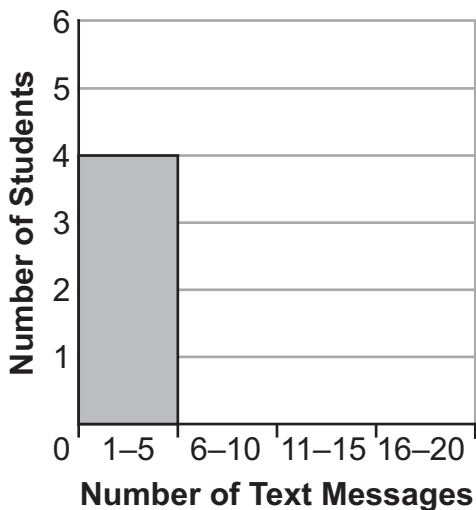
Item 8

Selected-Response: 1 point

This list shows the number of text messages each student in a group sent in one day.

16, 2, 8, 5, 3, 20,
15, 4, 9, 16, 19, 17

The students are creating this histogram to show their data.



What should be the height of the bar for 6–10 text messages?

- A. 1
- B. 2
- C. 4
- D. 5

Item 9**Multi-Select Technology-Enhanced:** 2 points

The formula shown represents final velocity, v , in terms of initial velocity, v_0 , acceleration, a , and time, t .

$$v = v_0 + at$$

Select **THREE** equations that are equivalent to the final velocity formula.

A. $v_0 = v + at$

B. $v_0 = v - at$

C. $a = \frac{v - v_0}{t}$

D. $a = \frac{v_0 - v}{t}$

E. $t = a(v_0 + v)$

F. $t = \frac{v - v_0}{a}$

Item 10

Multi-Part Technology-Enhanced: 2 points

Tamina drives to a friend's house at an average rate of 45 miles per hour. She wants to determine that rate in feet per minute.

Part A

Which ratio is needed to convert 45 miles per hour into feet per minute?

- A. $\frac{1 \text{ mi}}{5,280 \text{ ft}}$
- B. $\frac{5,280 \text{ ft}}{1 \text{ mi}}$
- C. $\frac{60 \text{ sec}}{1 \text{ min}}$
- D. $\frac{60 \text{ min}}{1 \text{ hr}}$

Part B

What is 45 miles per hour in feet per minute?

- A. 2,640
- B. 2,700
- C. 3,960
- D. 5,280

Item 11

Multi-Part Technology-Enhanced: 2 points

On Tuesday, Kylie picked raspberries at a farm. The equation shown represents the number of buckets of raspberries she had picked, y , for x hours after 1 p.m.

$$y = \frac{8}{3}x + 7$$

Part A

What does the number $\frac{8}{3}$ represent in the equation?

- A. Kylie can pick 8 buckets of raspberries every 3 hours.
- B. Kylie can pick 3 buckets of raspberries every 8 hours.
- C. At 3 p.m. Kylie had picked a total of 8 buckets of raspberries.
- D. At 8 p.m. Kylie had picked a total of 3 buckets of raspberries.

Part B

What does the number 7 represent in the equation?

- A. Kylie had already picked raspberries for 7 hours.
- B. Kylie had 7 more hours for picking raspberries.
- C. Kylie can pick 7 buckets of raspberries every hour.
- D. Kylie had already picked 7 buckets of raspberries.

Item 12

Drag-and-Drop Technology-Enhanced: 2 points

Candice has a savings account. The total amount of money, in dollars, that is in the account at any time, in years, can be described by the equation $A = 3,000(1 + 0.04)^t$.

Based on this equation, move the term that BEST represents each part of the equation into the correct row in the table.

?	
initial deposit	
growth factor	
time	
interest rate	

t
 A
 0.04
 $3,000$
 $(1 + 0.04)$

- ➡ Use a mouse, touchpad, or touchscreen to move a term into each row. Each term may be used once. Not all terms will be used.

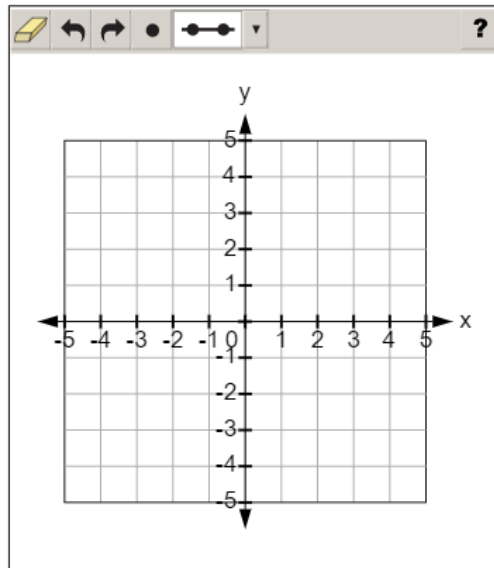
Item 13**Coordinate-Graph Technology-Enhanced: 2 points**

A system of equations is shown.

$$y = 3x - 5$$

$$y = -x + 3$$

Graph the system of equations to show its solution.



- ➔ Use a mouse, touchpad, or touchscreen to graph lines on the coordinate grid. At most 2 lines and 5 points can be graphed.

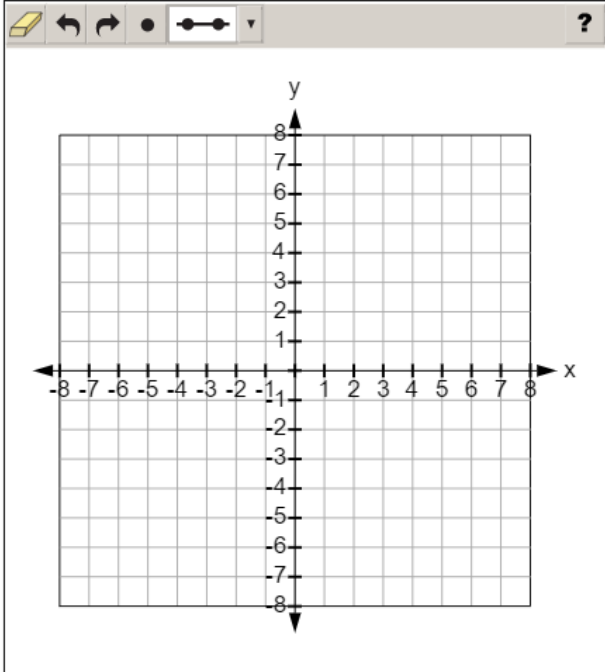
Item 14

Coordinate-Graph Multi-Part Technology-Enhanced: 2 points

Part A

Part A
An equation is shown.
$$y = 2x - 2$$

Graph the solution to the equation.



- Use a mouse, touchpad, or touchscreen to graph a line on the coordinate grid. At most 1 line and 2 points can be graphed.

Go on to the next page to finish item 14.

Item 14. *Continued.*

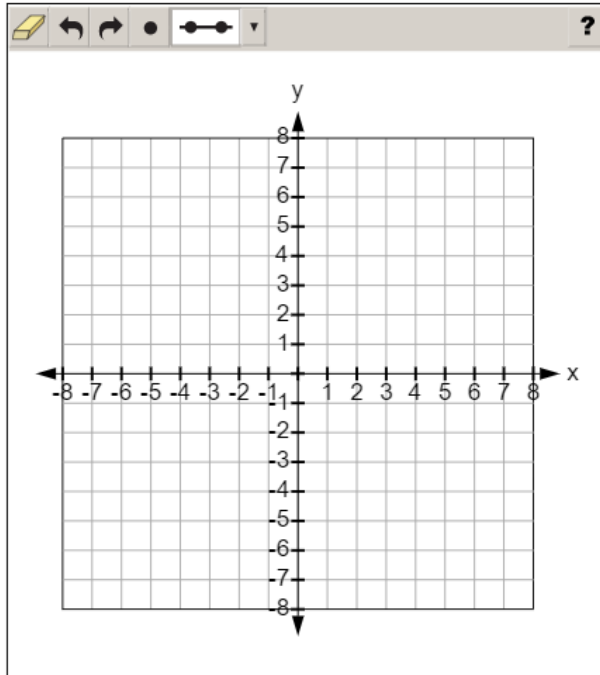
Part B

Part B

An equation is shown.

$$4y + x = 20$$

Graph the solution to the equation.



- ➡ Use a mouse, touchpad, or touchscreen to graph a line on the coordinate grid. At most 1 line and 2 points can be graphed.

Item 15

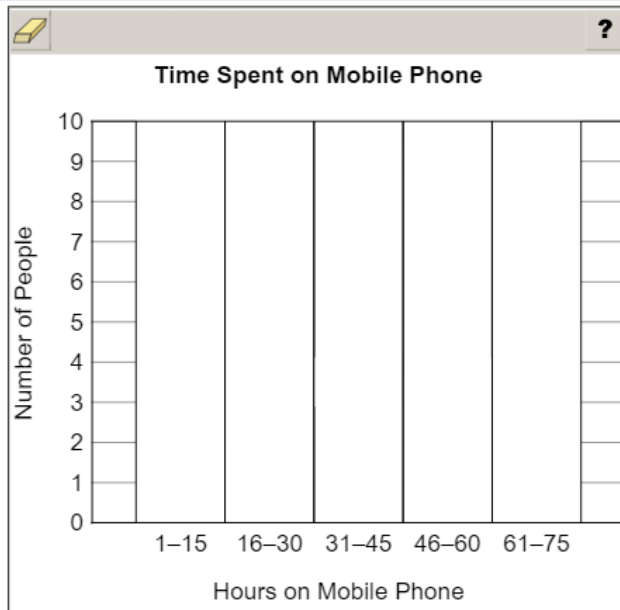
Bar-Graph Technology-Enhanced: 2 points

Christie surveys 15 students in her math class to find the numbers of hours they spent on their mobile phones last week. Her data are shown.

38, 30, 17, 24, 66, 37, 31, 67,

15, 37, 18, 48, 15, 27, 30

Create a histogram to represent Christie's data.

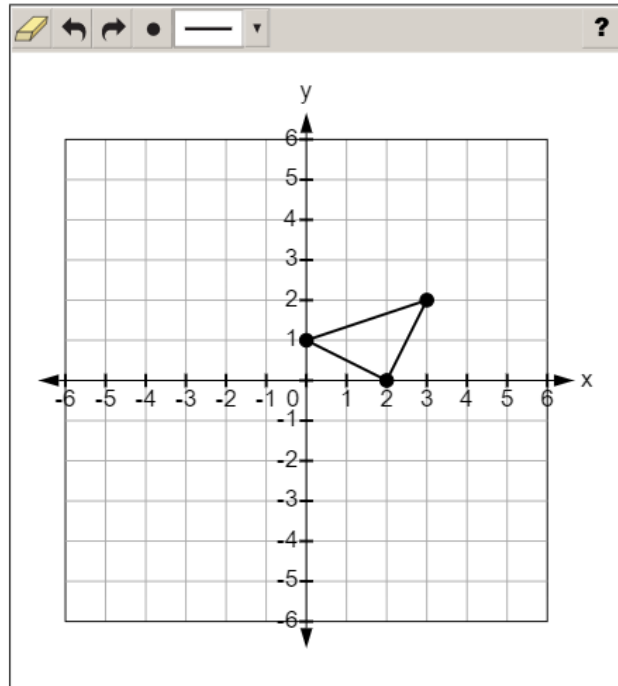


➡ Use a mouse, touchpad, or touchscreen to create each bar in the histogram.

Item 16**Coordinate-Graph Technology-Enhanced:** 2 points

The triangle shown is reflected across the x -axis and then rotated 90° clockwise around the origin.

Graph the image of the triangle after the transformations.



- ➡ Use a mouse, touchpad, or touchscreen to graph the image of the triangle on the coordinate grid. At most 3 points and 3 line segments can be graphed.

Item 17


Drop-Down Technology-Enhanced: 1 point

Two functions are described below.

- The graph of linear function $f(x)$ has an x -intercept of $(-2, 0)$ and a y -intercept of $(0, 3)$.
- The graph of linear function $g(x)$ is defined by the equation $y = \frac{4}{5}x - 2$.

Use the drop-down menus to complete the statements about the functions.

The y -intercept of the graph of $f(x)$ is the y -intercept of the graph of $g(x)$. The slope of the graph of $f(x)$ is the slope of the graph of $g(x)$.

 Use a mouse, touchpad, or touchscreen to click the arrow beside each of the two blank boxes. When you click the arrow, a drop-down menu will appear, showing you all the possible options for that blank box. Each drop-down menu with its options is shown below.

The y -intercept of the graph of $f(x)$ is the y -intercept of the graph of $g(x)$. The slope of the graph of $f(x)$ is the slope of the gra

greater than
less than
the same as

greater than
less than
the same as

Item 18

Keypad-Input Technology-Enhanced: 1 point

A table of values is shown.

x	y
0	3
3	5
6	7
9	9

Create a linear equation that represents the values shown in the table.

The keypad interface consists of a top toolbar with icons for undo, redo, left arrow, right arrow, and delete (X), followed by a question mark icon. Below the toolbar is a grid of input fields. The first row contains numbers 1, 2, 3, followed by variables x and y , and mathematical operators $+$, $-$, \cdot , and \div . The second row contains numbers 4, 5, 6, and operators $<$, $\%$, $=$, $>$, and $\sqrt{\quad}$. The third row contains numbers 7, 8, 9, and operators $\frac{\square}{\square}$, \square^{\square} , and (\square) . The fourth row contains numbers 0, a decimal point $.$, and a negative sign $(-)$.

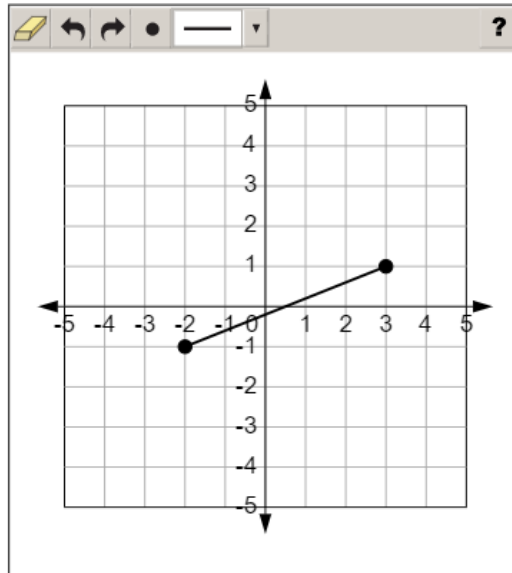
Use a mouse, touchpad, or touchscreen to enter a response.

Item 19

Coordinate-Graph Technology-Enhanced: 1 point

A line segment is shown on a coordinate plane.

Draw the image of the line segment after a 90° rotation counterclockwise about the point $(-2, -1)$.



- ➡ Use a mouse, touchpad, or touchscreen to graph a line on the coordinate grid. At most 1 line segment and 2 points can be graphed.

Item 20

Drop-Down Multi-Part Technology-Enhanced: 2 points

Part A

A company sells fruit in cylindrical cans. The cans all have the same height, but there are several different sizes of circular bases. The table shows some information about the different sizes of the cans.

Radius (centimeters)	Area of Base (square centimeters)	Surface Area (square centimeters)	Volume (cubic centimeters)
3	28.26	244.92	282.6
4	50.24	351.68	502.4
5	78.50	471.00	785.0
6	113.04	602.88	1,130.4

Part A The dimensions in the table that have a constant rate relationship are and .



Use a mouse, touchpad, or touchscreen to click the arrow beside each of the two blank boxes. When you click the arrow, a drop-down menu will appear, showing you all the possible options for that blank box. Each drop-down menu with its options is shown below.

The dimensions in the table that have a constant rate relationship are and .

radius area of base surface area volume	radius area of base surface area volume
--	--

Go on to the next page to finish item 20.

Item 20. Continued.**Part B**

A company sells fruit in cylindrical cans. The cans all have the same height, but there are several different sizes of circular bases. The table shows some information about the different sizes of the cans.

Radius (centimeters)	Area of Base (square centimeters)	Surface Area (square centimeters)	Volume (cubic centimeters)
3	28.26	244.92	282.6
4	50.24	351.68	502.4
5	78.50	471.00	785.0
6	113.04	602.88	1,130.4

Part B Which statement explains why these dimensions have a constant rate relationship?

- (a) Each entry for both dimensions has a factor of 3.14.
- (b) The second dimension increases by the same percentage over each interval.
- (c) Dividing the second dimension by the first dimension has the same result for each row.
- (d) The second dimension can be found by substituting the first dimension into an equation.



Use a mouse, touchpad, or touchscreen to select a response.

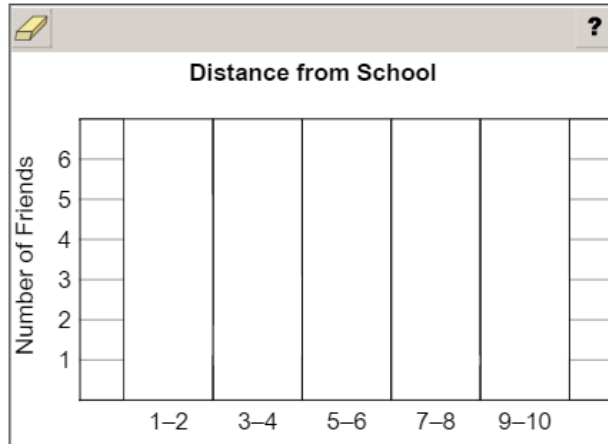
Item 21**Bar-Graph Technology-Enhanced:** 1 point

Greta collected data on the distance, in miles, that each of her friends lived from their school. The results are shown, but two of the values are missing.

5, 8, 1, 1, 3, 3, ?, ?

When the two missing values are included, the median of the data set will be 3 and the mean of the data set will be 4.

Complete the histogram to represent the data set after determining the two missing values.



→ Use a mouse, touchpad, or touchscreen to create each bar in the histogram.

Item 22

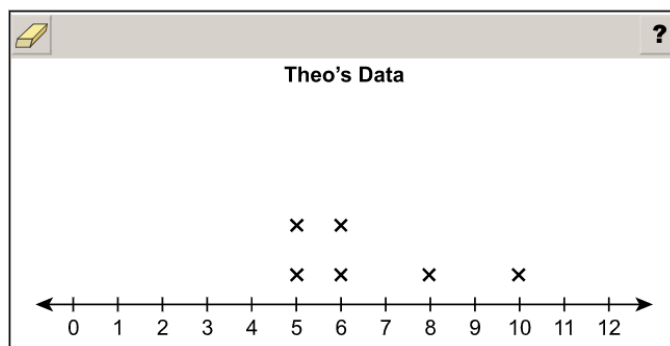
Line-Plot Technology-Enhanced: 1 point

Kendra and Theo each collected data on the number of birds they observed at a bird feeder each hour for eight hours. The data Kendra collected is summarized as shown.

- The range of Kendra's data is 6.
- The median of Kendra's data is 7.
- The mean of Kendra's data is 7.

The data Theo collected has the same range and the same median as the data Kendra collected, but the mean of Theo's data is 7.5. The line plot correctly shows six of the eight data points for Theo's data set.

Plot the remaining two data points on the line plot.



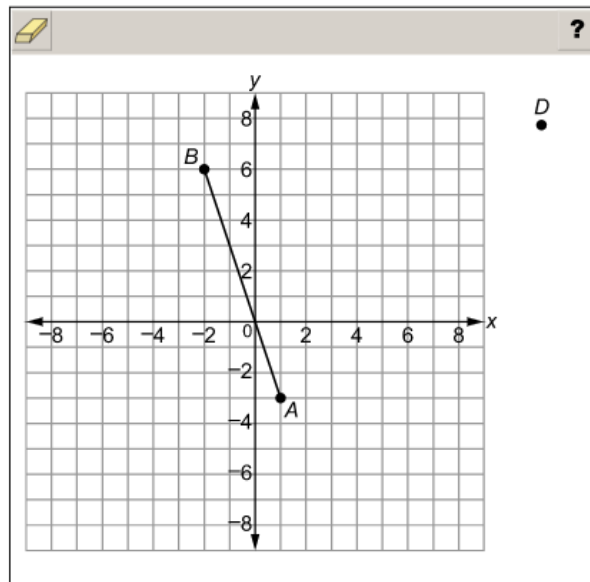
- ➡ Use a mouse, touchpad, or touchscreen to add Xs to the line plot. At most 2 Xs can be plotted for each number.

Item 23**Drag-and-Drop Technology-Enhanced:** 1 point

Point A is located at $(1, -3)$. Point B is located at $(-2, 6)$. Line segment AB is shown on the coordinate grid.

Point D partitions line segment AB such that the ratio $AD:DB$ is $7:2$.

Move point D to plot it on the coordinate grid.



- ➡ Use a mouse, touchpad, or touchscreen to move the labeled point onto the grid. The labeled point may be used once.

Item 24


Keypad-Input Multi-Part Technology-Enhanced: 2 points

Part A

Michelle will sell her homemade necklaces for \$8 each at a craft fair. It costs her \$150 for the booth rental at the craft fair. She made 200 necklaces to sell.

Part A What is the maximum amount, in dollars, of profit Michelle can earn from the sale of her necklaces?

      			
1	2	3	
4	5	6	
7	8	9	
0	.	(-)	

 Use a mouse, touchpad, or touchscreen to enter a response.

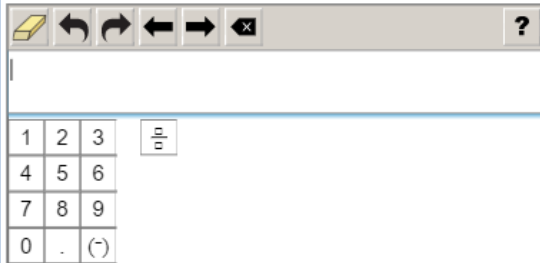
Go on to the next page to finish item 24.

Item 24. Continued.**Part B**


Michelle will sell her homemade necklaces for \$8 each at a craft fair. It costs her \$150 for the booth rental at the craft fair. She made 200 necklaces to sell.

Part B Michelle wants to graph the equation for her profit from selling her necklaces. The y -intercept of this graph will be her profit from selling none of her necklaces.

What is the y -intercept of the graph of the equation that represents Michelle's profit from selling her necklaces?



1	2	3	$\frac{\square}{\square}$
4	5	6	
7	8	9	
0	.	(-)	

 Use a mouse, touchpad, or touchscreen to enter a response.

ADDITIONAL SAMPLE ITEM KEYS

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
1	MGSE9-12.S.ID.6a	1	C	The correct answer is choice (C) $\{(0, 50), (1, 42), (2, 33), (3, 25), (4, 16)\}$. This set of data points is the only one from the list that could be modeled by a decreasing linear function, which has a negative value for a in the linear function formula: $f(x) = ax + b$. Choice (A) is incorrect because the data points correspond to an increasing linear function. Choice (B) is incorrect because the data points correspond to an increasing nonlinear function. Choice (D) is incorrect because the data points correspond to a nonlinear function.
2	MGSE9-12.G.GPE.6	1	B	The correct answer is choice (B) (2, 4). Choices (A), (C), and (D) are incorrect because they do not divide directed line segment XY into two equal parts.
3	MGSE9-12.A.SSE.1a	2	A	The correct answer is choice (A) The amount of money Sheila must pay her employees per day. The 4 represents the number of employees and the 75 represents the daily rate she pays each employee. Choice (B) is incorrect because the number of pies Sheila must sell per day is represented by x . Choice (C) is incorrect because the total cost of expenses per pie is represented by the value of the entire expression. Choice (D) is incorrect because the amount of money customers pay per pie is not represented in the expression.
4	MGSE9-12.F.BF.1	2	D	The correct answer is choice (D) $f(x) = \frac{x}{2} + 1$. When the x -values in the table are substituted for x in this function, the results are equal to the corresponding y -values. Choice (A) is incorrect because it indicates multiplication of 2 and x instead of division of x by 2. Choice (B) is incorrect because it indicates subtraction of 1 instead of addition of 1. Choice (C) is incorrect because it indicates multiplication of 2 and x instead of division of x by 2 and indicates subtraction of 1 instead of addition of 1.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
5	MGSE9-12.A.REI.6	2	D	The correct answer is choice (D) (16, 5). When the values of the coordinate pair are substituted into the system of equations, both sides are equal for both equations. As such, the coordinate pair represents a solution to the system of equations. Choice (A) is incorrect because the values of the coordinate pair, when substituted into the system of equations, result in an incorrect solution for the first equation. Choices (B) and (C) are incorrect because the values of the coordinate pairs, when substituted into the system of equations, result in incorrect solutions for the second equation.
6	MGSE9-12.A.CED.1	3	C	The correct answer is choice (C) 33. At \$6 per person, and with a \$100 flat service charge added, Acme Catering Company can provide services for 33 people at a cost of \$298. Choice (A) is incorrect because it is the number from the Creative Catering Company, but not the largest number possible. Choice (B) is incorrect because it is the number from the Best Foods Company, but not the largest number possible. Choice (D) is incorrect because the student selects the highest number without basing the response on the context provided.
7	MGSE9-12.G.CO.3	3	A	The correct answer is choice (A) a rotation 90° clockwise about point P . A rotation of only 90° would not result in a transformation that maps parallelogram $ABCD$ onto itself. Choices (B), (C), and (D) are incorrect because they would, in fact, result in a transformation that maps parallelogram $ABCD$ onto itself. As such, there is more than one way to achieve this, and a clockwise rotation of 90° is not one of them.
8	MGSE9-12.S.ID.1	2	B	The correct answer is choice (B) 2. Only 2 students sent 6–10 text messages. Choices (A), (C), and (D) are incorrect because the student either made a counting mistake or looked at the numbers for 11–15 or 16–20 text messages instead of those for 6–10.
9	MGSE9-12.A.CED.4	2	B/C/F	The correct answers are choices (B), (C), and (F). Choices (A), (D), and (E) are incorrect because they solve for the terms incorrectly.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
10	MGSE9-12.N.Q.1	2	Part A: B Part B: C	Part A: The correct answer is choice (B) $\frac{5,280 \text{ ft}}{1 \text{ mi}}$. This ratio converts miles to feet. Choice (A) is incorrect because it is the reciprocal of the needed conversion. Choice (C) is incorrect because it is the wrong conversion. Choice (D) is incorrect because it is the reciprocal of the other needed conversion. Part B: The correct answer is choice (C) 3,960. The rate of 45 miles per hour is multiplied by 5,280 feet per mile and multiplied by 1 hour per 60 minutes, which is 3,960 feet per minute. Choice (A) is incorrect because it is the result of dividing 5,280 by 2. Choice (B) is incorrect because it is the result of multiplying 60 by 45. Choice (D) is incorrect because it is just the amount of feet per mile.
11	MGSE9-12.S.ID.7	2	Part A: A Part B: D	Part A: The correct answer is choice (A) Kylie can pick 8 buckets of raspberries every 3 hours. The slope represents how much the y changes per change in x-value, or how many buckets of raspberries are picked per a number of hours. Choice (B) is incorrect because it flips the values of x and y. Choice (C) is incorrect because it mistakes what the y-values represent. Choice (D) is incorrect because it mistakes what the y-values represent and flips the values for x and y. Part B: The correct answer is choice (D) Kylie had already picked 7 buckets of raspberries. The 7 represents the y-intercept, which is the value of the function when x is zero, or at 1 p.m. Choices (A), (B), and (C) are incorrect because they misrepresent what the y-intercept means.
12	MGSE9-12.A.SSE.1b	2	N/A	See scoring rubric and exemplar response on page 48.
13	MGSE9-12.A.REI.6	2	N/A	See scoring rubric and exemplar response on page 49.
14	MGSE9-12.A.REI.10	2	N/A	See scoring rubric and exemplar response beginning on page 50.
15	MGSE9-12.S.ID.1	1	N/A	See scoring rubric and exemplar response on page 52.
16	MGSE9-12.G.CO.5	2	N/A	See scoring rubric and exemplar response on page 53.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
17	MGSE9-12.F.IF.9	2	N/A	See scoring rubric and exemplar response on page 54.
18	MGSE9-12.A.CED.2	1	N/A	See scoring rubric and exemplar response on page 55.
19	MGSE9-12.G.CO.5	2	N/A	See scoring rubric and exemplar response on page 56.
20	MGSE9-12.F.LE.1b	2	N/A	See scoring rubric and exemplar response on page 57.
21	MGSE9-12.S.ID.1	2	N/A	See scoring rubric and exemplar response on page 58.
22	MGSE9-12.S.ID.2	3	N/A	See scoring rubric and exemplar response on page 59.
23	MGSE9-12.G.GPE.6	1	N/A	See scoring rubric and exemplar response on page 60.
24	MGSE9-12.F.IF.7a	3	N/A	See scoring rubric and exemplar response on page 61.

EXAMPLE SCORING RUBRICS AND EXEMPLAR RESPONSES

Item 12

Scoring Rubric

Points	Description
2	The student correctly places terms in all four rows.
1	The student correctly places terms in three of the four rows.
0	The student does not correctly place terms in at least three rows.

Exemplar Response

The correct response is shown below.

?	
initial deposit	3,000
growth factor	(1 + 0.04)
time	t
interest rate	0.04
A	

The formula for compound interest calculations is $A = P(1 + r)^t$, where A is the final amount of money, P is the principal or initial deposit, r is the interest rate as a decimal number, and t is the time. In the equation given, “3,000” is substituted in for P the initial deposit, and “0.04” is substituted in for r , the interest rate. The growth factor is $(1 + 0.04)$ since, at the end of one time period, the account would have 100% of the initial savings plus an additional 4% in interest added to the account.

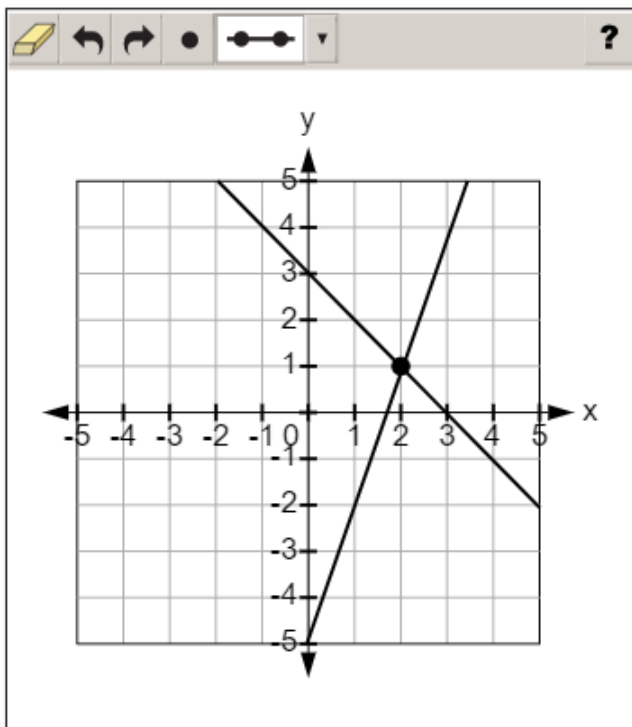
Item 13

Scoring Rubric

Points	Description
2	The student correctly graphs both lines.
1	The student correctly graphs one line.
0	The student does not correctly graph either line.

Exemplar Response

The correct response is shown below.



The graph of $y = 3x - 5$ has a y -intercept of -5 and a slope of 3 , so the graph will pass through the points $(0, -5)$ and $(1, -2)$. The graph of $y = -x + 3$ has a y -intercept of 3 and a slope of -1 , so the graph will pass through the points $(0, 3)$ and $(1, 2)$. The solution to the system of equations is the point where the lines intersect, which is located at the point $(2, 1)$.

Item 14

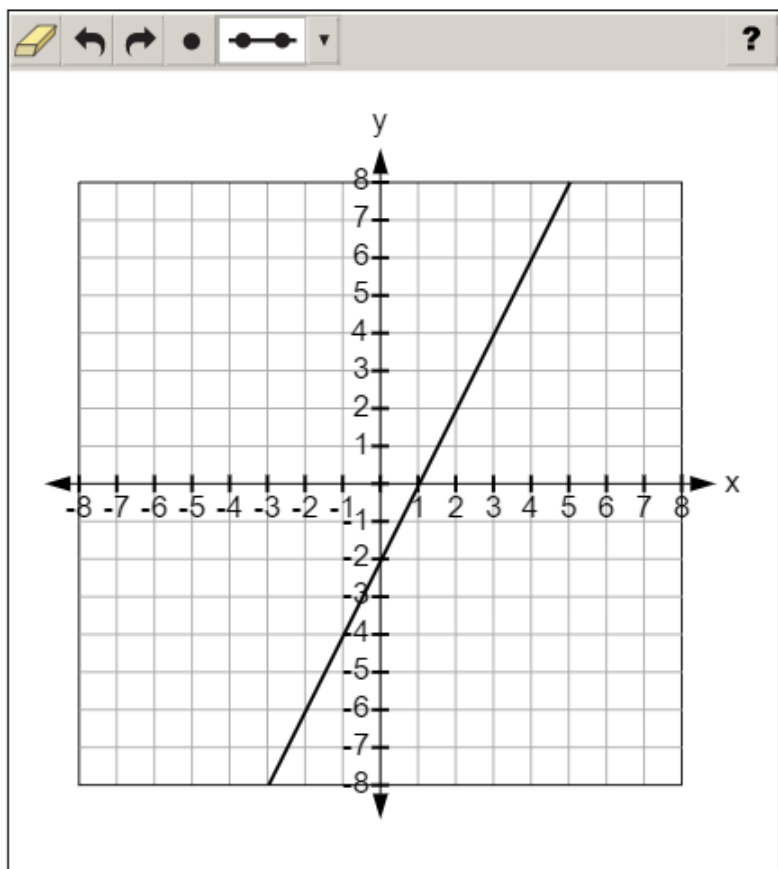
Scoring Rubric

Points	Description
2	The student correctly answers both Part A and Part B.
1	The student correctly answers either Part A OR Part B.
0	The student does not correctly answer either part.

Exemplar Response

Part A

The correct response is shown below.



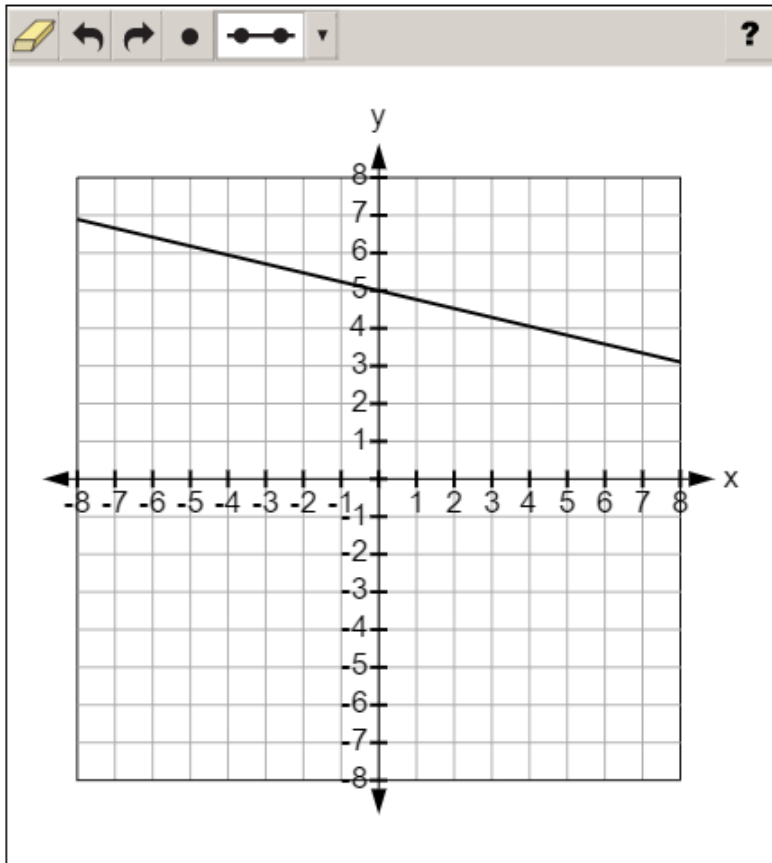
The equation $y = 2x - 2$ is a linear equation that has a y-intercept of -2 and a slope of 2 . The line passes through the points $(0, -2)$ and $(1, 0)$.

Go on to the next page to finish item 14.

Item 14

Part B

The correct response is shown below.



The equation $4y + x = 20$ is a linear equation that in slope-intercept form is written as $y = -\frac{1}{4}x + 5$. The graph of the line has a y -intercept of 5 and a slope of $-\frac{1}{4}$. The line passes through the points $(0, 5)$ and $(4, 4)$.

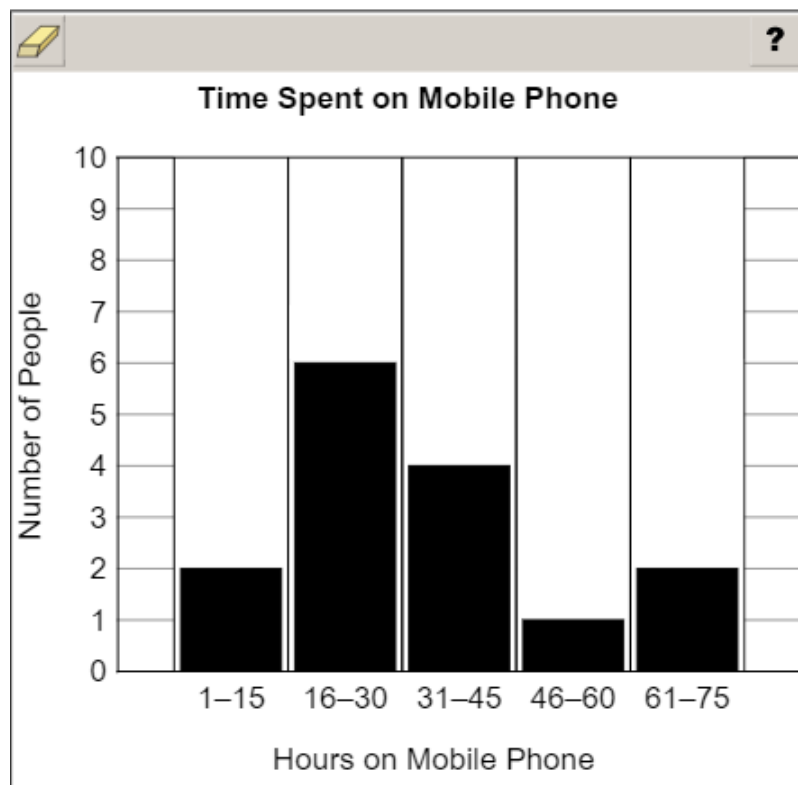
Item 15

Scoring Rubric

Points	Description
2	The student correctly creates all five bars of the histogram.
1	The student correctly creates three or four of the bars of the histogram.
0	The student does not correctly create at least three bars of the histogram.

Exemplar Response

The correct response is shown below.



A histogram represents the frequencies of items that fall within given ranges. There are 2 items in the 1–15 range, 6 items in the 16–30 range, 4 items in the 31–45 range, 1 item in the 46–60 range, and 2 items in the 61–75 range.

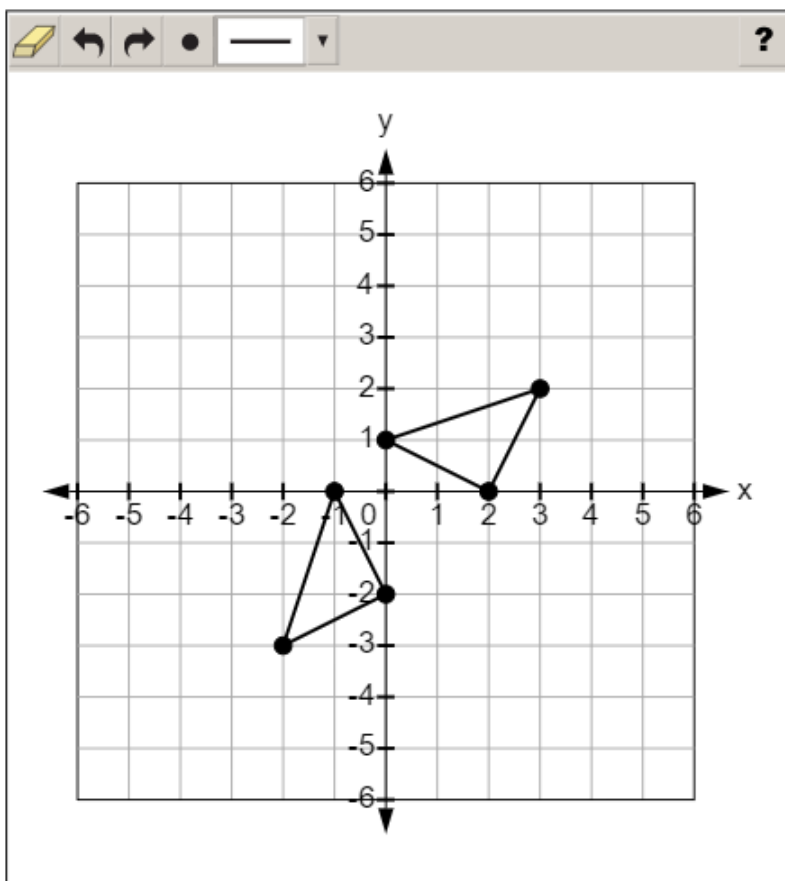
Item 16

Scoring Rubric

Points	Description
2	The student correctly graphs all three vertices and sides of the image of the triangle.
1	The student correctly graphs one or two vertices of the image of the triangle.
0	The student does not correctly graph at least one vertex of the image of the triangle.

Exemplar Response

The correct response is shown below.



Reflecting a point across the x -axis causes the x -coordinate to remain the same and the y -coordinate to become its opposite, as shown by the rule $(x, y) \rightarrow (x, -y)$. Rotating a point 90° clockwise reverses the position of the x - and y -coordinates and makes the new y -coordinate its opposite, as shown by the rule $(x, y) \rightarrow (y, -x)$. Combining these two transformations yields the rule $(x, y) \rightarrow (-y, -x)$. Applying the combined rule to the original points $(0, 1)$, $(3, 2)$, and $(2, 0)$ yields the final points $(-1, 0)$, $(-2, -3)$, and $(0, -2)$.

Item 17**Scoring Rubric**

Points	Description
1	The student correctly selects both drop-down menu options.
0	The student does not correctly select both drop-down menu options.

Exemplar Response

The correct response is shown below.

The y -intercept of the graph of $f(x)$ is the y -intercept of the graph of $g(x)$. The slope of the graph of $f(x)$ is the slope of the graph of $g(x)$.

“Greater than” is the correct response for the first drop-down menu because the y -intercept of $f(x)$ is 3 and the y -intercept of $g(x)$ is -2 . “Greater than” is the correct response for the second drop-down menu because the slope of $f(x)$ is 1.5 and the slope of $g(x)$ is 0.8.

Item 18

Scoring Rubric

Points	Description
1	The student correctly answers the question.
0	The student does not correctly answer the question.

Exemplar Response

The correct response is shown below.

The screenshot shows a digital math input interface. At the top, there is a toolbar with icons for erasing, undo, redo, left arrow, right arrow, and a close button (X). Below the toolbar, the equation $y = \frac{2}{3}x + 3$ is displayed. Below the equation is a keypad with the following elements:

1	2	3	x	y	+	-	•	÷	
4	5	6			<	≤	=	≥	>
7	8	9			$\frac{\square}{\square}$	\square^\square	(\square)		
0	.	(-)							

This is the correct response because the y -values increase by 2 units for every 3 units the x -values increase by, and y is 3 when x is 0. Any equation that is equivalent to the exemplar response will be given credit.

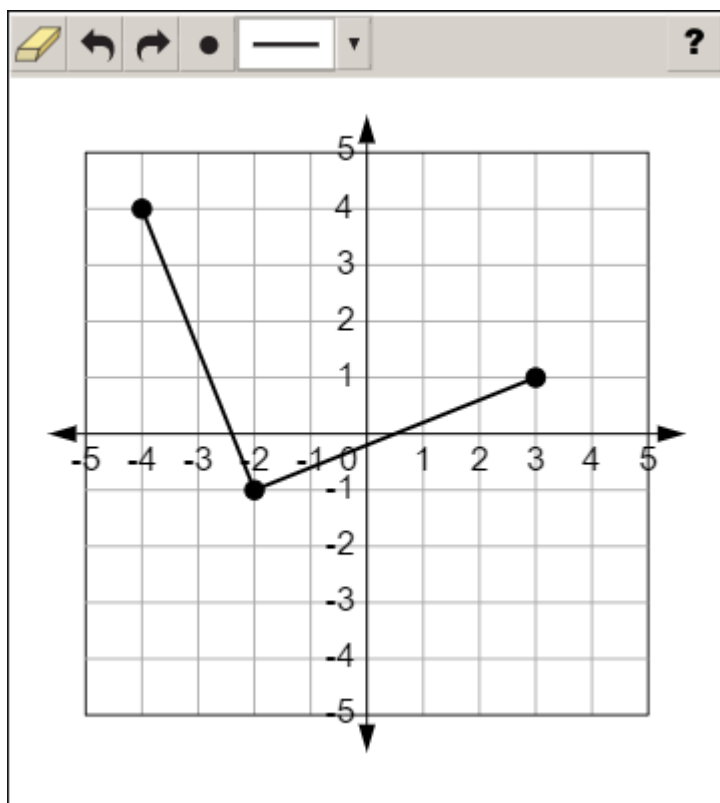
Item 19

Scoring Rubric

Points	Description
1	The student correctly graphs the line segment.
0	The student does not correctly graph the line segment.

Exemplar Response

The correct response is shown below.



This is the correct response because rotating a line segment 90 degrees about one of its endpoints results in a right angle. Therefore, the slopes of the line segments must be opposite reciprocals. The slope of the original line segment is $\frac{2}{5}$, and the slope of the rotated line segment is $-\frac{5}{2}$. The line segments are also congruent because rotations preserve length.

Item 20

Scoring Rubric

Points	Description
2	The student correctly answers both Part A and Part B.
1	The student correctly answers either Part A OR Part B.
0	The student does not correctly answer either part.

Exemplar Response

Part A

The two correct responses are shown below.

The dimensions in the table that have a constant rate relationship are and .

The dimensions in the table that have a constant rate relationship are and .

This is correct because the volume in each row is 10 times the area of the base in that row. These dimensions are the only ones that exhibit a linear relationship.

Part B

The correct answer is choice (C) Dividing the second dimension by the first dimension has the same result for each row. This shows that the volume increases by the same amount over equal intervals of the area of the base, which is necessary for a linear relationship. Choice (A) is incorrect because factors of the dimensions are not related to their linear relationship; other dimensions also have a factor of 3.14. Choice (B) is incorrect because constant rate relationships increase by the same amount over equal intervals rather than the same percentage. Choice (D) is incorrect because substitution can be used in relationships that are not linear.

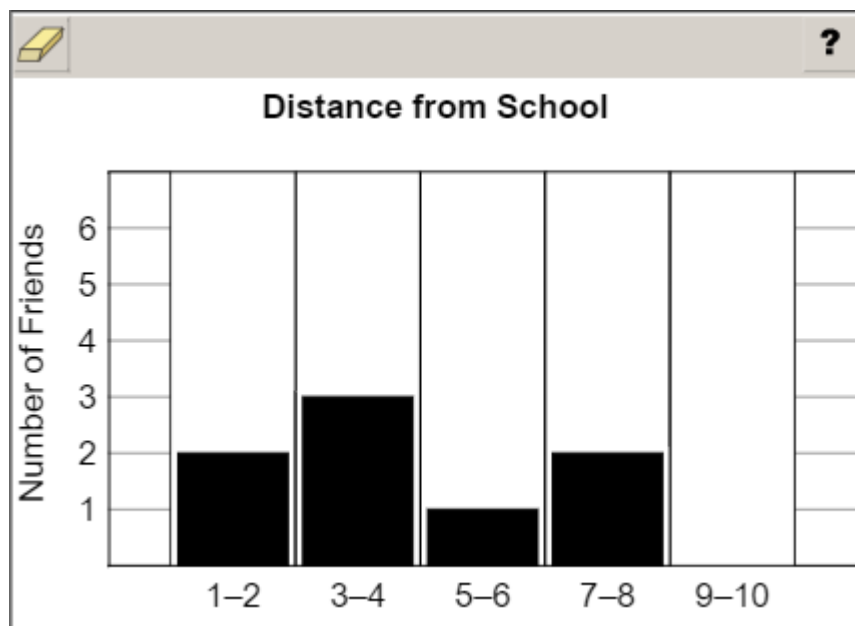
Item 21

Scoring Rubric

Points	Description
1	The student correctly completes the histogram.
0	The student does not correctly complete the histogram.

Exemplar Response

The correct response is shown below.



This is the correct response because the two missing numbers are 3 and 8. Adding those two values to the data set will result in the median being 3 and the mean being 4.

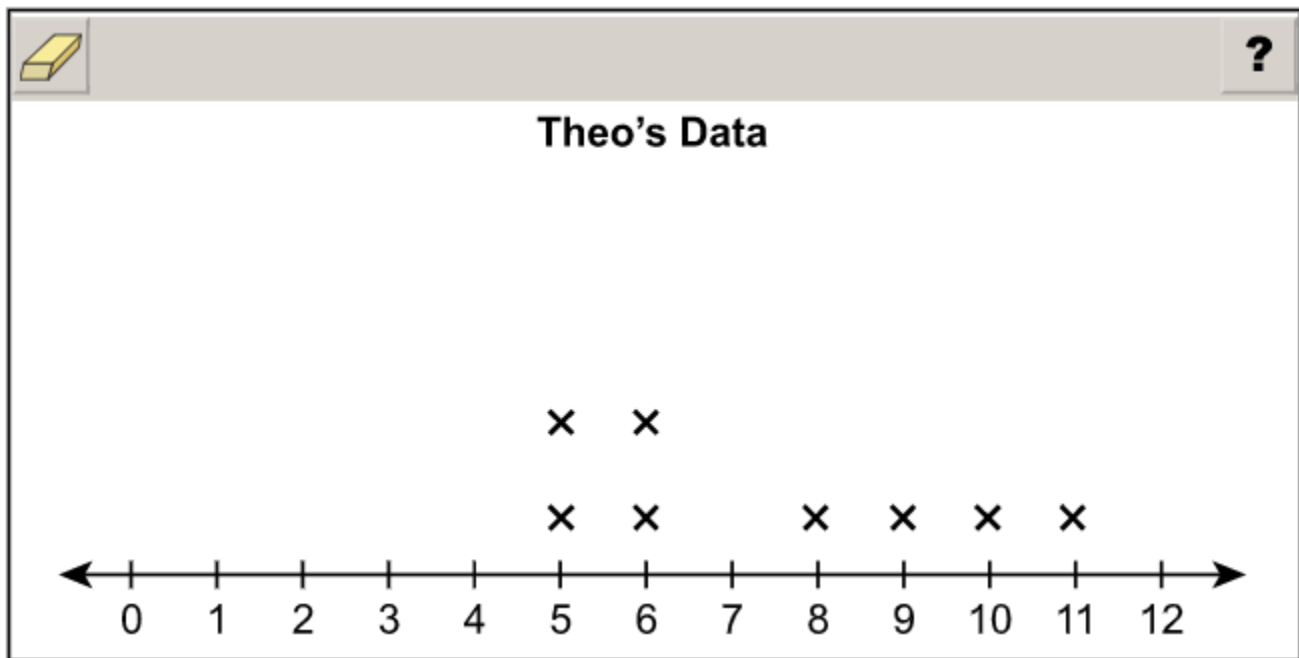
Item 22

Scoring Rubric

Points	Description
1	The student correctly plots the two Xs.
0	The student does not correctly plot the two Xs.

Exemplar Response

The correct response is shown below.



This is the correct response because in order for Theo's data set to have a range of 6, a median of 7, and a mean of 7.5, the two data points must be plotted at 9 and 11.

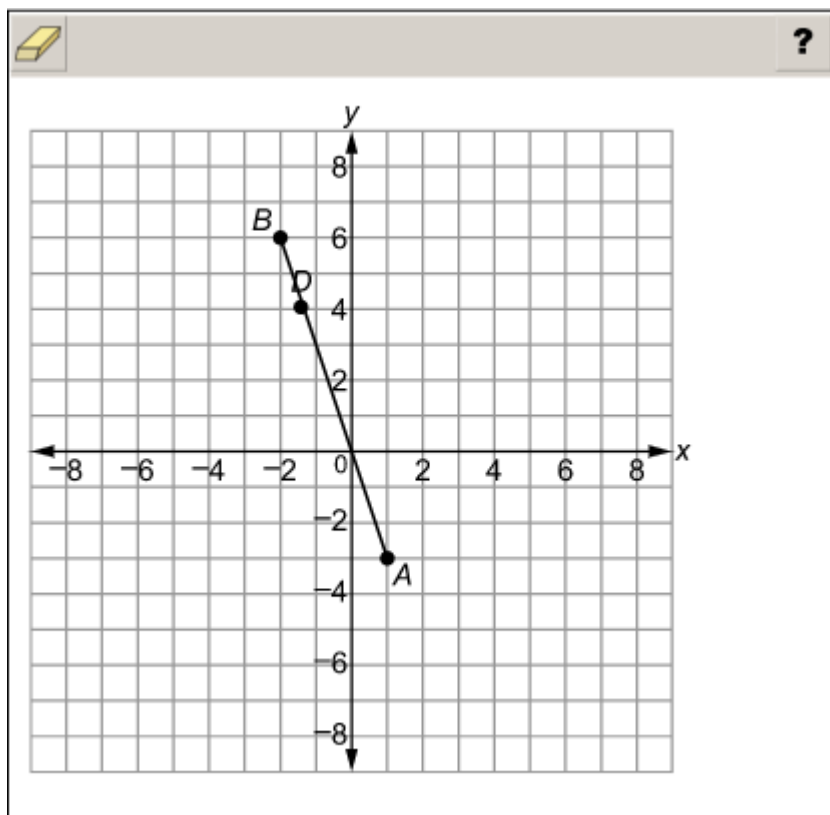
Item 23

Scoring Rubric

Points	Description
1	The student correctly places the point.
0	The student does not correctly place the point.

Exemplar Response

The correct response is shown below.



In the formula for partitioning a line segment substitute the following values, $a = 7$, $b = 2$, $x_1 = 1$, $y_1 = -3$, $x_2 = -2$, and $y_2 = 6$, to determine the location of point D . Solving the formula gives the location $(-\frac{2}{3}, 4)$ for point D .

Item 24

Scoring Rubric

Points	Description
2	The student correctly answers both Part A and Part B.
1	The student correctly answers either Part A OR Part B.
0	The student does not correctly answer either part.

Exemplar Response

Part A

The correct response is shown below.

									
1450									
1	2	3							
4	5	6							
7	8	9							
0	.	(⁻)							

This is the correct response because $8 \times 200 = \$1,600$, which is the maximum she can earn from selling the necklaces. Then, \$150, the cost for renting the booth, is subtracted from \$1,600 to find the profit.

Part B

The correct response is shown below.

									
-150									
1	2	3							
4	5	6							
7	8	9							
0	.	(⁻)							

This is the correct response because the y -intercept represents the sale of 0 bracelets, which results in \$0 from sales, but she still has to pay \$150 for the booth.

Assessment Guide
Coordinate Algebra
End-of-Course

