LOUISIANA DEPARTMENT OF EDUCATION

Office of Assessments, Accountability, and Analytics

LEAP Assessment Guide for Geometry

Purpose 1
Assessment Design 2
Reporting Categories 7
Test Administration 9
Sample Test Items 15
Resources 23
Appendix A 24
Appendix B 28

Purpose

This document is designed to assist Louisiana educators in understanding the LEAP Geometry assessment.

Introduction

All students in grades 3–8, Algebra I, and Geometry will take the LEAP assessments, which provide

- questions that have been reviewed by Louisiana educators to ensure their alignment to the K-12 Louisiana Student Standards for Mathematics and appropriateness for all Louisiana students;
- measurement of the full range of student performance; and
- information for educators and parents about student readiness in mathematics and whether students are “on track” for college and careers.

Vision for Mathematics Standards and Assessment

Students in Louisiana are ready for college or a career if they are able to meet college and workplace expectations without needing remediation in mathematics skills and concepts. The K-12 Louisiana Student Standards for Mathematics support students to become mathematically proficient by focusing on three components of rigor: conceptual understanding, procedural skill and fluency, and application.

- **Conceptual understanding** refers to understanding mathematical concepts, operations, and relations. It is more than knowing isolated facts and methods. Students should be able to make sense of why a mathematical idea is important and the kinds of contexts in which it is useful. It also allows students to connect prior knowledge to new ideas and concepts.
- **Procedural skill and fluency** is the ability to apply procedures accurately, efficiently, and flexibly. It requires speed and accuracy in calculation while giving students opportunities to practice basic skills. Students' ability to solve more complex application tasks is dependent on procedural skill and fluency.
- **Application** provides a valuable context for learning and the opportunity to solve problems in a relevant and a meaningful way. It is through real-world application that students learn to select an efficient method to find a solution, determine whether the solution(s) makes sense by reasoning, and develop critical thinking skills.

Assessment Design

Supporting Mathematics Instruction

The LEAP mathematics assessments focus on testing the LSSM according to the components of rigor reflected in high-quality mathematics instructional materials that:

- require students to demonstrate understanding of mathematical reasoning in mathematical and applied contexts;
- assess accurate, efficient, and flexible application of procedures and algorithms;
- rely on application of procedural skill and fluency to solve complex problems; and
- require students to demonstrate mathematical reasoning and modeling in real-world contexts.

Assessable Content

Each item on the LEAP mathematics assessments is referred to as a task and is identified by one of three types: Type I, Type II, or Type III. All task types are aligned directly to the K-12 Louisiana Student Standards for Mathematics. Type I tasks are further aligned to LEAP mathematics evidence statements for the Major Content and Additional & Supporting reporting categories and allow for the testing of more than one of the student standards on a single task. Type II and III tasks are further aligned to LEAP mathematics evidence statements for the Expressing Mathematical Reasoning and Modeling & Application reporting categories.

- **Type I tasks** are designed to assess conceptual understanding, fluency, and application, and are aligned to the major, additional, and supporting content for the grade or course.
- **Type II tasks** are designed to assess student reasoning ability of selected content in applied contexts.
- **Type III tasks** are designed to assess student modeling ability of selected content in applied contexts.

LEAP Mathematics Evidence Statements

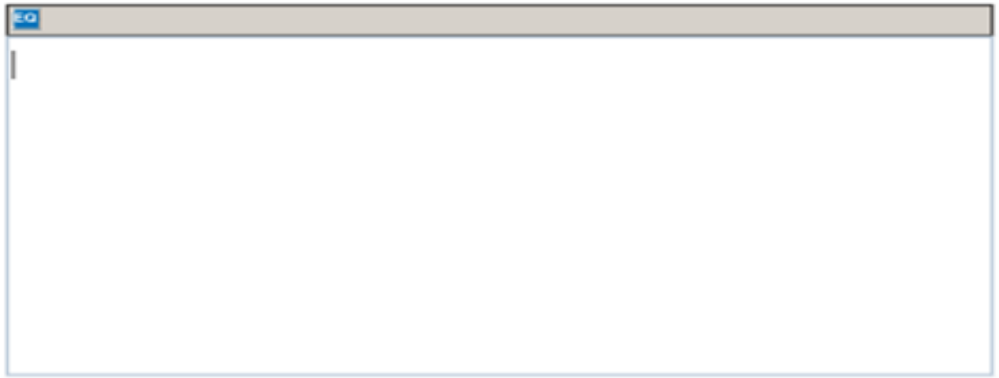
LEAP mathematics evidence statements are labeled to include the task type (I, II, or III) and the grade (3, 4, 5, 6, 7, or 8) or course (A1 or GM). LEAP evidence statements for Geometry are labeled as "LEAP.I.GM.#" for Type I tasks, "LEAP.II.GM.#" for Type II tasks, and "LEAP.III.GM.#" for Type III tasks. See the table in Appendix A for a listing of assessable content of the LSSM and LEAP mathematics evidence statements.

Item Types

All of the item types in the following list will appear on the tests.

- Multiple Choice (MC) – This item type asks students to choose one correct answer from four and may appear as a one-part question, as part of a two-part question, or as a part of a CR item. The MC items are worth one point.
- Multiple Select (MS) – This item type asks students to choose **more than one** correct answer and may appear as a one-part question, as part of a two-part question, or as a part of a CR item. Whenever this item type is used, the question always identifies in boldface print that more than one answer is required. The question **may or may not** specify the exact number of correct answers. The MS items are worth one point. Students must choose **all correct answers and no incorrect** answer can be chosen.
- Short Answer (SA) – This item type asks students to key numeric answers into an entry box using the keyboard and may appear as a one-part question, as part of a two-part question, or as a part of a CR item. The SA items are worth one point. Unless specified in the question, a student will earn credit for an answer that is mathematically equivalent to the correct numerical answer. Answers to SA items can be positive or negative and must be entered in integer or decimal form.
- Keypad Input (KI) – This item type asks students to key numeric or algebraic answers in the form of fractions, mixed numbers, expressions, equations, or inequalities. This item type may appear as a one-part question, as part of a two-part question, or as a part of a constructed-response item. The KI items are worth one point. Unless specified in the question, a student will earn credit for an answer that is equivalent to the correct numeric or algebraic response.
- Technology Enhanced (TE) – This item type uses technology to capture student responses and may appear as a one-part question, as part of a two-part question, or as a part of a CR item. The TE items are worth one point. Students must meet the requirements of the question exactly to receive credit. The Online Tools Training (OTT) allows students to practice answering the different types of TE questions. For a summary of the different styles of technology-enhanced items refer to the LEAP Technology-Enhanced Item Types document.

- Constructed Response (CR) – This item type can be single- or multi-part. CR items ask students to create a written explanation or justification, model a process, and/or compute an answer to earn a series of points. A student may receive partial or full credit on CR items, but maximum point values will vary by task. Maximum values for CR items are 3, 4, or 6 points. When responding to a CR item, students will type their responses into a response box, like the one shown.



Response Box

The response box allows students to use the keyboard to type in their response or work. There is a limit to the number of characters that can be typed in the response box; however, it is set well beyond what a student might produce based on grade-specific expectations of the item. The toolbar at the top of the response box has the Equation Builder tool that allows the students to create a response with commonly used grade-specific mathematical symbols.

Equation Builder

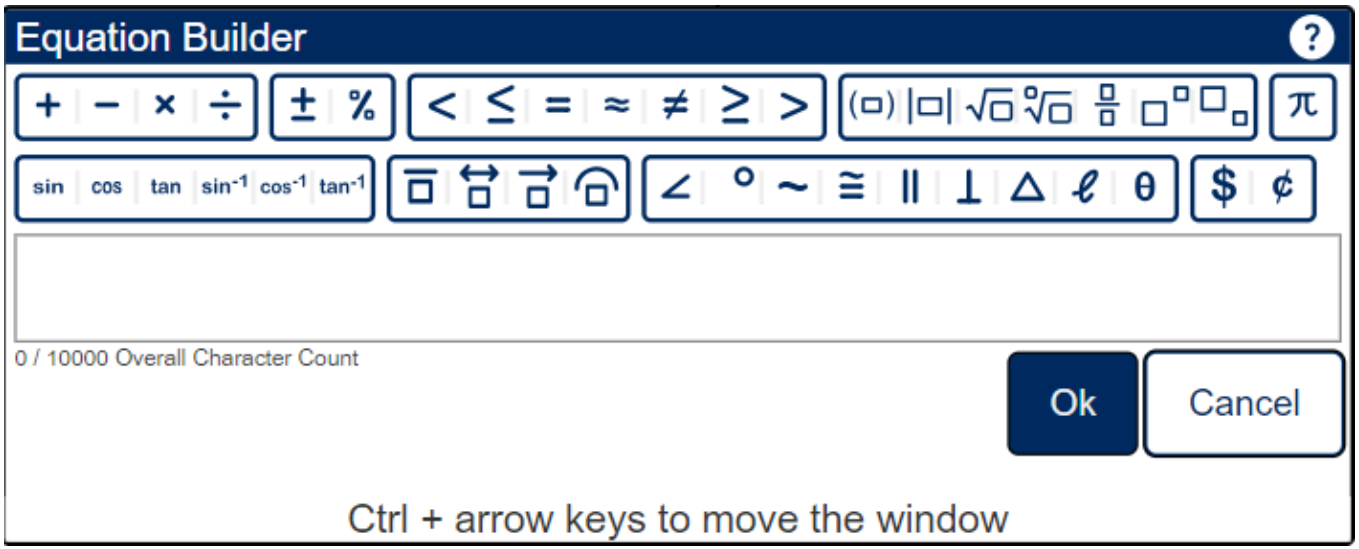
Students are **not** required to use the equation builder for any symbols that are also available on the keyboard. For example, students may use a slash, forward / or back \, to represent a fraction, a carat ^ to represent exponents, or a pair of pipes || to represent absolute value.

Additionally, symbols like degree ° and perpendicular ⊥ are not available on the keyboard, but students may type the words “degrees” and “perpendicular” as necessary. Other symbols, such as square root √ and pi π, are not available on the keyboard, but may be required in symbol form for expressions and equations.

The Equation Builder does not include all symbols/characters students might need to type into the response box. Students should know how to type a negative sign - and a colon : using the keyboard. The × button in the Equation Builder is a multiplication symbol and should not be used as a variable x, but students are not penalized if they do.

Using the Equation Builder

- To enter text, click the pointer in the **Response Box** and type text using the keyboard.
- Click on the **Equation Builder button** to open the tool and enter any mathematical symbols, characters, or format.
- When finished, click on the **OK** button in the lower-right corner of the Equation Builder tool – the equation will be entered into the response box.
- To cancel what you have entered, click on the **Cancel** button in the lower-right corner of the Equation Builder tool and you will be returned to the response box.
- To edit an existing equation, double-click on the equation in the Response Box. This will re-open the Equation Builder.



Beginning in the 2027-2028 school year, a comprehensive exam for Math will replace the Algebra I and Geometry LEAP. Passing the Math comprehensive exam will be required for high school graduation for students entering the high school cohort in 2026-2027 and beyond. This comprehensive exam will be taken during the spring semester of a student's second year of the cohort. The comprehensive Math exam will include items that address the Louisiana Student Standards as developed for Algebra I and Geometry. Question types will be similar to items used on the current Algebra I and Geometry LEAP. For more information on comprehensive exams, please see the Comprehensive Exams FAQ.

Test Design

The LEAP Geometry assessment contains a total of 39 tasks for 68 points. The table below shows the breakdown of the number of tasks and point values by Reporting Category and Session. The LEAP Geometry assessment is **timed**. No additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP).

Reporting Category	Session 1a: No Calculator		Session 1b: Calculator		Session 2: Calculator		Session 3: Calculator		Total	
	Tasks	Points	Tasks	Points	Tasks	Points	Tasks	Points	Tasks	Points
A - Major Content	5	5	2	5	6-7	8	6-7	8	19-21	26
B - Additional & Supporting Content	2	4	2	2	4	5	3-5	5	11-13	16
C – Expressing Mathematical Reasoning	0	0	1	3	1	4	1	4	3	11
D – Modeling & Application	0	0	1	3	1	6	1-2	6	3-4	15
Total Operational	7	9	6	13	13	23	12-13	23	38-39	68
Total Field-Test	1	N/A	1	N/A	1	N/A	3	N/A	6	N/A
Session Time	25 minutes		55 minutes		80 minutes		80 minutes		240 minutes	

Note: The test contains field-test tasks, which **do not** count toward the test score; they provide information that will be used to develop future test forms.

The following table includes information on the total tasks, total points, and percentage of assessment points by task-type point-values.

Task Types	Point Values	Total Tasks	Total Points		Percentage of Points	
Type I	1-point	24	24	42	35%	62%
	2-point	7	14		21%	
	4-point	1	4		6%	
Type II	3-point	1	3	11	4%	16%
	4-point	2	8		12%	
Type III	3-point	1-3	3-9	15	4-13%	22%
	6-point	1-2	6-12		9-18%	
Total		38-39	68		100%	

Reporting Categories

Each of the three task types is aligned to one of four reporting categories: Major Content, Additional & Supporting Content, Expressing Mathematical Reasoning, or Modeling & Application. Each task type is designed to align with at least one of the Louisiana Student Standards for Mathematical Practice (MP), found on pages 6-8 in the K-12 Louisiana Student Standards for Mathematics.

Task Type	Description	Reporting Category	Mathematical Practice
Type I	conceptual understanding, fluency, application	**A - Major Content:** solve problems involving the major content for Geometry **B - Additional & Supporting Content:** solve problems involving the additional and supporting content for Geometry	may align with any or all practices
Type II	written argument/justification, critique of reasoning/precision in mathematical statements	**C - Expressing Mathematical Reasoning:** express mathematical reasoning by constructing mathematical arguments and critiques	primarily MP.3 and MP.6, but may also involve any of the other practices
Type III	modeling or application in a real-world context	**D - Modeling & Application:** solve real-world problems engaging particularly in the modeling practice	primarily MP.4, but may also involve any of the other practices

The Major Content reporting category is divided, based on Achievement Level Descriptors, into the following subcategories.

Subcategory	LSSM and LEAP Mathematics Evidence Statements	Description
Congruence Transformations/ Similarity	GM: G-CO.B.6, GM: G-SRT.A.1, GM: G-SRT.A.2, GM: G-SRT.B.5, LEAP.I.GM.1	Students apply similarity and congruence criteria to determine similarity or congruence of transformed figures, to prove theorems and geometric relationships, and to solve problems.
Similarity in Trigonometry/Modeling & Applying	GM: G-SRT.C.6, GM: G-SRT.C.7, GM: G-SRT.C.8, GM: G-GPE.B.6, LEAP.I.GM.2	Students understand and apply trigonometric ratios and the Pythagorean Theorem to demonstrate mathematical relationships in right triangles and to solve problems. Students apply geometric concepts in modeling situations, including using coordinates and equations to compute values, prove theorems and criteria, and solve problems.

These reporting categories will provide parents and educators valuable information about

- overall student performance, including readiness to continue further studies in mathematics;
- student performance broken down by mathematics content and practices, which may help identify when students need additional support or more challenging work;
- student performance in Major Content broken down by content subcategories, which may help teachers and schools hone in on specific content for professional development; and
- how well schools and schools systems are helping students achieve higher expectations.

Achievement-Level Definitions

Achievement-level definitions briefly describe the expectations for student performance at each of Louisiana's five achievement levels:

- **Advanced:** Students performing at this level have **exceeded** college and career readiness expectations and are well prepared for the next level of study in this content area.
- **Mastery:** Students performing at this level have **met** college and career readiness expectations and are prepared for the next level of study in this content area.
- **Basic:** Students performing at this level have **nearly met** college and career readiness expectations and may need additional support to be fully prepared for the next level of study in this content area.
- **Approaching Basic:** Students performing at this level have **partially met** college and career readiness expectations and will need much support to be prepared for the next level of study in this content area.
- **Unsatisfactory:** Students performing at this level have **not yet met** the college and career readiness expectations and will need extensive support to be prepared for the next level of study in this content area.

Achievement Level Descriptors

Achievement Level Descriptors (ALDs) indicate what a typical student at each level should be able to demonstrate based on his or her command of grade-level standards. ALDs are written for the four assessment reporting categories. Access the ALDs in the Assessment Resources Webpage for a breakdown of the knowledge, skills, and practices associated with each achievement level.

Test Administration

Administration Information

The LEAP Geometry test is administered during three testing windows. The school or district test coordinator will communicate the testing schedule. The table shows the testing window and student-level results by administration. For updates to the testing schedule, refer to the 2026-2027 Louisiana Assessment Calendar.

Administration	Testing Window	Student-Level Results
Fall	November 30 - December 18, 2026	In window
Spring	April 1 - May 12, 2027	Near the end of the test window
Summer	June 21 - June 25, 2027	In window

Scheduling Requirements for Computer-Based Testing

Computer-based testing allows school systems some flexibility in scheduling. However, to reduce incidences of testing irregularities, school systems **must adhere** to the following scheduling and administration practices:

- Testing students in the same grade level across the school at or very close to the same time
- Completing makeup testing for students immediately upon their return
- Limiting student interaction during breaks between test sessions
- Isolating students who have not completed testing for the day (e.g., students with extended time accommodation)
- Preventing interaction between groups of students taking the same tests at different times within a testing day
- Requiring the completion of a session once it is opened (i.e., limiting the reopening of test sessions)
- Taking the sessions within a content area in the correct order (e.g., Math Session 1 taken before Math Session 2)

The following is also recommended:

- Limiting sessions to no more than three in one day for a student; and
- Administering **no more than one session** that includes an **extended-response task or writing prompt** (e.g., ELA Sessions 1 and 2, English I/II Sessions 1 and 2, and U.S. History Session 2) in a day to an individual student.

For more information about scheduling and administration policies, refer to the Online Assessment Scheduling Guidance, found in the LDOE Assessment Resources Webpage.

Spanish Mathematics Guidelines

Spanish-language versions of the LEAP mathematics assessments are available as an accommodation for Spanish-speaking English learners. The following guidelines should be used when assigning a student to a Spanish-language mathematics assessment. The student should meet at least one of the following criteria:

- student whose primary language is Spanish and who receives instruction in Spanish
- student who is a recently arrived EL and had prior instruction in mathematics in Spanish
- student who is enrolled in a dual-language immersion program that includes mathematics taught in Spanish

Consideration of the following is strongly urged when deciding which version of the mathematics assessment form (i.e., English-language or Spanish-language version) is best for a Spanish-speaking student.

- The language in which a student receives instruction affects their performance.
- A Spanish-speaking student who is not receiving instruction in Spanish may not have knowledge of math-specific terms translated to Spanish.
- A Spanish-speaking student may not have the literacy skills required to read in Spanish (speaking Spanish is not the same as reading Spanish).

If a teacher is unsure whether the Spanish-language version is appropriate for a specific student, it is recommended that the student take one session of the LEAP mathematics practice test in English and one session in Spanish in order to determine the language in which the student is most comfortable.

Testing Materials

The chart that follows summarizes the tools and resources for the Geometry LEAP assessment.

Required Tools	Provided	Session: 1a	Sessions: 1b, 2, & 3	Guidelines
scratch paper (lined, graph, unlined), two pencils	by Test Administrator	YES	YES	• Reference sheets may be printed from the DRC Insight Portal (eDirect) • Tools provided by Test Administrator must not be written on • See Calculator Policy for calculator specifications
calculator	online and/or by Test Administrator	NO	YES	
High School Mathematics Reference Sheet	online and/or by Test Administrator	YES	YES	
Allowable Tools	**Provided**	**Session: 1a**	**Sessions: 1b, 2 & 3**	**Guidelines**
protractor, tracing paper, reflection tools, straight edge, and compass	by Test Administrator	YES	YES	Schools may permit students to bring their own allowable tools; test administrators must ensure tools are appropriate for testing (e.g., tools do not have any writing on them)

Calculator Policy

The LEAP Geometry test allows a graphing calculator (recommended) or scientific calculator during Sessions 1b, 2, and 3. Calculators are **not** allowed during Session 1a of the test. For students with the approved accommodation, a graphing calculator (recommended) or scientific calculator is allowed during all test sessions. Students should use the calculator they have regularly used throughout the school year in their classroom and are most familiar with, provided their regular-use calculator is not outside the boundaries of what is allowed. The following table includes calculator information by session for both general testers and testers with approved accommodations for calculator use.

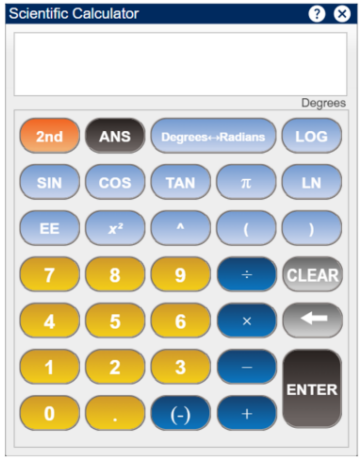
Calculator Policy	Session 1a	Sessions 1b, 2, & 3
General Testers	Not allowed	Graphing calculator and scientific calculator available online, may also have a handheld graphing calculator (recommended) or scientific calculator
Testers with approved accommodation for calculator use	Graphing calculator and scientific calculator provided online, may also have handheld	
Additional information for testers with approved accommodations for calculator use: • If a student needs an adaptive calculator (e.g., large key, talking), the student may bring his or her own or the school may provide one, as long as it is specified in his or her approved IEP or 504 Plan.		

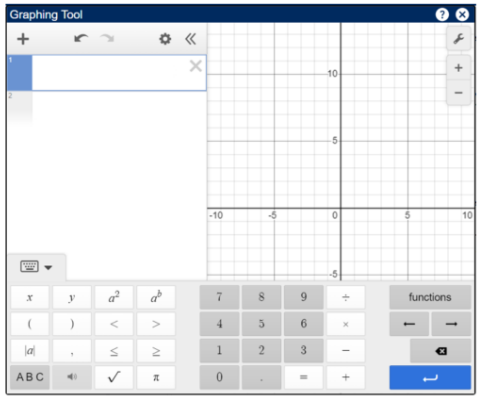
NOTE: Please refer to Louisiana Desmos for more information about the online graphing calculator used on LEAP Geometry assessment. To become familiar with the testing version of the online graphing calculator, teachers and students can visit Desmos for more practice.

Schools must adhere to the following guidance regarding calculators.

- Calculators with the following features are **not** permitted:
  - Computer Algebra System (CAS) features,
  - "QWERTY" keyboards,
  - paper tape
  - talk or make noise, unless specified in IEP/IAP
  - tablet, laptop (or PDA), phone-based, or wristwatch
- Students are **not** allowed to share calculators within a testing session.
- Test administrators must confirm that memory on all calculators has been cleared before and after the testing sessions.
- If schools or school systems permit students to bring their own hand-held calculators, test administrators must confirm that the calculators meet all the requirements as defined above.

Online Scientific Calculator and Graphing Calculator





Reference Sheet

Students in Geometry will be provided a reference sheet online with the information shown. The High School Reference sheet may be printed from the DRC Insight Portal (*e*Direct) or found in the Assessment Guidance library on page 5 of LEAP Grades 5-HS Mathematics Reference Sheets.

- 1 inch = 2.54 cm
- 1 m = 39.37 inches
- 1 mile = 5280 feet
- 1 mile = 1760 yards
- 1 mile = 1.609 km
- 1 km = 0.62 mile
- 1 pound = 16 ounces
- 1 pound = 0.454 kg
- 1 kg = 2.2 pounds
- 1 ton = 2000 pounds
- 1 cup = 8 fluid ounces
- 1 pint = 2 cups
- 1 quart = 2 pints
- 1 gallon = 4 quarts
- 1 gallon = 3.785 L
- 1 L = 0.264 gallon
- 1 L = 1000 cubic cm

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Radians	1 radian = $\frac{180}{\pi}$ degrees
Degrees	1 degree = $\frac{\pi}{180}$ radians
Arithmetic Sequence	$a_n = a_1 + (n-1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1-r}$ where $r \neq 1$

Testing Platform

Students taking the computer-based tests will enter their answers into the online testing system. The way each answer is entered depends on the task type. The computer-based tests include the following online tools, which allow a student to select answer choices, “mark” tasks, eliminate answer options, highlight specific information, take notes, enlarge the task, guide the reading of a task line by line, apply a mask to cover a part of their screen, see the mathematics reference sheet, use a calculator, use the graphing tool, and use an equation builder for entering special characters. A help tool is also featured to assist students as they use the online system.

- Pointer

- Cross-off

- Highlighter

- Sticky note

- Magnifier

- Line guide

- Masking

- Reference Sheet

- Calculator

- Graphing Tool

- Help

- Equation Builder

Note: The images to the left represent both ways students will see the online tools. All tools, except the equation builder, will have a white background. When a student hovers the curser over the icon, it will change the background to blue as shown.

All students taking the computer-based test should work through the Online Tools Training, using the online tools so students are well prepared to navigate the online testing system.

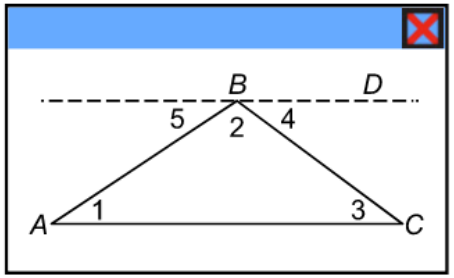
Sample Test Items

This section includes four Type I tasks, one Type II task, and one Type III task as they would appear on a CBT form. The answer key for each Type I task and scoring rubrics for each constructed-response task is located in Appendix B. Look for some of these tasks in the OTT.

4-point Type I Task: Multiple-Choice, Multiple-Select, Technology-Enhanced Drop-Down Menu

An incomplete proof of the theorem that the sum of the interior angles of a triangle is 180 is shown.

Enlarge



Given: $\triangle ABC$

Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$

Statement	Reason
1) Draw line BD parallel to line AC	1)
2)	2)
3) $m\angle 2 + m\angle 4 = m\angle ABD$; $m\angle 5 + m\angle ABD = 180°$	3) Angle addition postulate
4) $m\angle 5 + m\angle 2 + m\angle 4 = 180°$	4) Substitution property of equality
5) $m\angle 1 + m\angle 2 + m\angle 3 = 180°$	5)

Part A

What is the appropriate reason for the statement in step 1?

(a) Through any two points, there is exactly one line.

(b) Through a point not on a line, there is exactly one line parallel to the given line.

(c) If two lines cut by a transversal form congruent corresponding angles, then the lines are parallel.

(d) If two lines cut by a transversal form congruent alternate interior angles, then the lines are parallel.

Part B

Which pairs of angle congruences or equalities should be used for the statement in step 2?

Indicate **all** such pairs.

(a) $\angle 1 \cong \angle 2$ or $m\angle 1 = m\angle 2$

(b) $\angle 1 \cong \angle 3$ or $m\angle 1 = m\angle 3$

(c) $\angle 1 \cong \angle 4$ or $m\angle 1 = m\angle 4$

(d) $\angle 1 \cong \angle 5$ or $m\angle 1 = m\angle 5$

(e) $\angle 2 \cong \angle 3$ or $m\angle 2 = m\angle 3$

(f) $\angle 2 \cong \angle 4$ or $m\angle 2 = m\angle 4$

(g) $\angle 2 \cong \angle 5$ or $m\angle 2 = m\angle 5$

(h) $\angle 3 \cong \angle 4$ or $m\angle 3 = m\angle 4$

Part C

Select from the drop-down menu to correctly complete the sentence.

The reason for the statement in step 2 is that

[ ] .

- if two parallel lines are cut by a transversal, then alternate interior angles are congruent
- if two parallel lines are cut by a transversal, then corresponding angles are congruent
- if two lines cut by a transversal form congruent corresponding angles, then the lines are parallel
- if two lines cut by a transversal form congruent alternate interior angles, then the lines are parallel

Part D

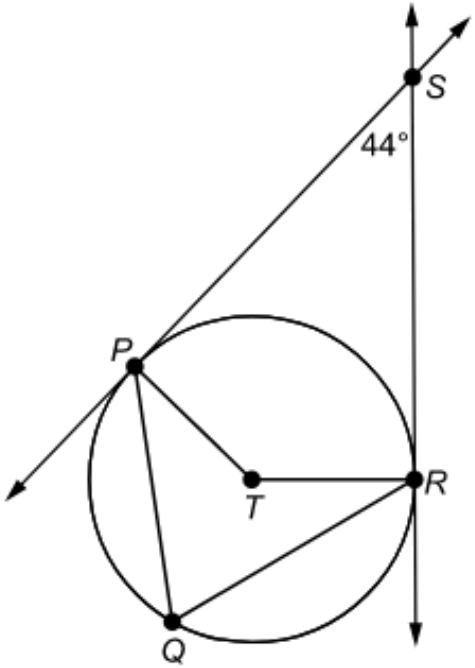
Select from the drop-down menu to correctly complete the sentence.

The appropriate reason for the statement in step 5 is the [ ].

- reflexive property of equality
- symmetric property of equality
- transitive property of equality
- substitution property of equality

2-point Type I Task: Short Answer

Circle T is shown. Line PS and line RS are tangent to circle T.



Part A

What is the measure, in degrees, of $\angle PTR$?

Enter your answer in the box.

Part B

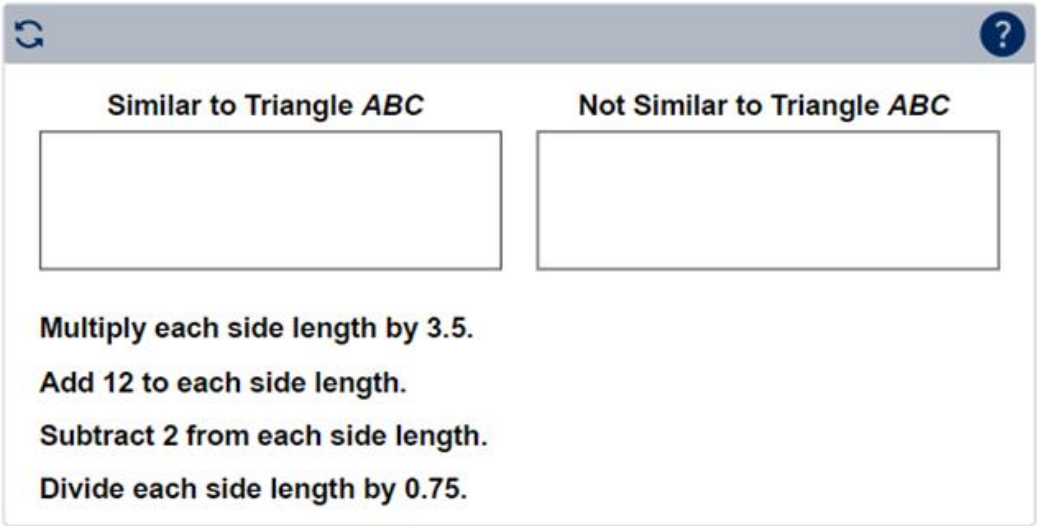
What is the measure, in degrees, of $\angle PQR$?

Enter your answer in the box.

1-point Type I Task: Technology-Enhanced Drag-and-Drop

Triangle *ABC* has sides with lengths of 3, 6, and 8. Classify each of the transformations described as producing a triangle **similar** to triangle *ABC* or a triangle **not similar** to triangle *ABC*.

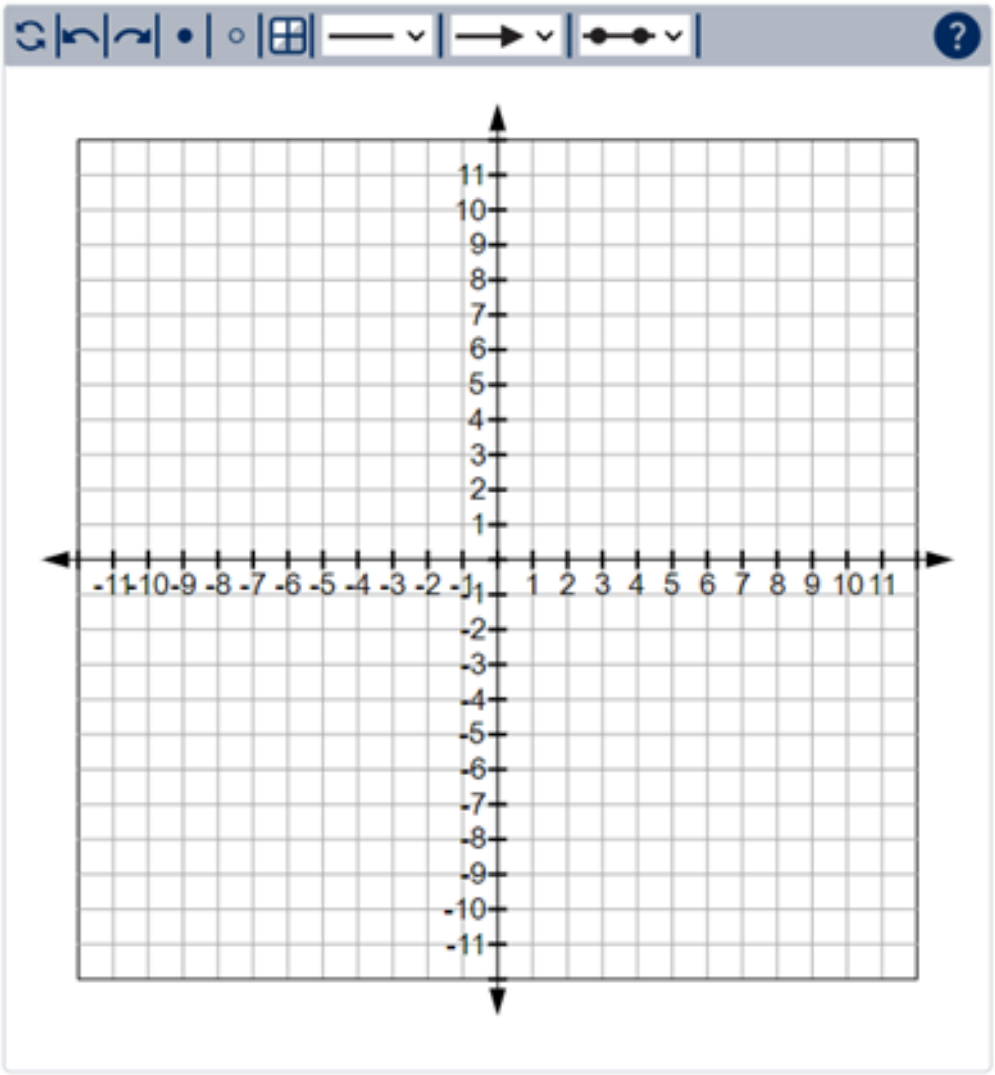
Drag and drop each transformation into the appropriate box.



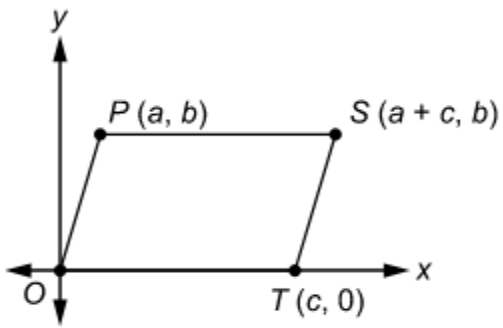
1-point Type I Task: Technology-Enhanced Coordinate Grid

Line segment JK in the coordinate plane has endpoints with coordinates (–4, 11) and (8, –1) . Graph $\overline{JK}$ and find two possible locations for point M so that M divides $\overline{JK}$ into two parts with lengths in a ratio of 1:3.

To graph a line segment, click the line segment button. Then, click on one of the endpoints of the line segment and drag the pointer to the other endpoint. To plot points, click the point button. Then click on the location of the points on the coordinate plane.



3-point Type II Task: Constructed-Response



Is the figure shown in the *xy*-coordinate plane a parallelogram? Why or why not? Use the given coordinates to justify your answer.

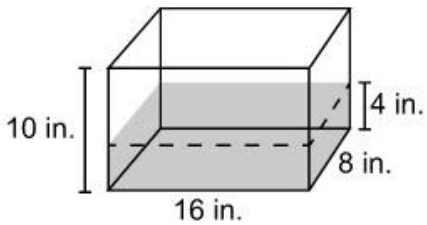
6-point Type III Task: Constructed-Response

Part A

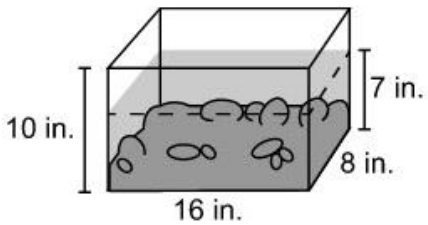
Moira collected some stones at the beach. Now she wants to make a clear plastic container to display the stones. To plan the container, Moira decides that she must first find the volume of the stones.

Moira has an aquarium that is shaped like a rectangular prism. It is 8 inches wide, 16 inches long, and 10 inches high. She plans to use the aquarium to find the volume of the stones.

First, Moira pours some water into the aquarium. She measures and finds that the water reaches to a height of 4 inches.



Then Moira puts the stones in the aquarium. She measures and finds that the water reaches to a new height of 7 inches.

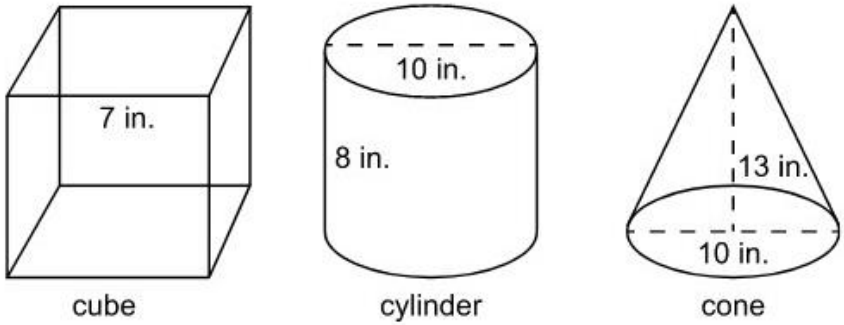


Using this information, find the volume of the stones. Show your work.

Enter your answer and show your work in the box provided.

Part B

Moira is considering three possible shapes for the container that will hold the stones. The shapes are shown.



Find the volume of **each** shape. Show your work.

Enter your answer and show your work in the box provided.

Part C

Based on Parts A and B, which of the three shapes would be Moira's **best** choice for a container for the stones? Explain your answer.

Enter your answer and your explanation in the space provided.

Resources

Assessment Guidance Webpage

- LEAP Equation Builder Guide for High School: provides information on using the equation builder; Spanish
- LEAP Grades 5-HS Mathematics Reference Sheets: includes all the mathematics references sheets provided for LEAP testing; used for both Algebra I and Geometry
- Desmos: link to Desmos free online graphing calculator and resources for its use
- Assessment Development Educator Review Committees: describes the item development process and associated committees, includes information on applying for participation

Practice Test Webpage

- LEAP Geometry Practice Test and Answer Key: includes answer keys, scoring rubrics, and alignment information for each task
- LEAP Mathematics Practice Test Guidance: provides guidance on using the mathematics practice tests to support instructional goals
- Practice Test Quick Start Guide: provides information regarding administration and scoring of the online practice tests

Assessment Resources Webpage

- LEAP Accessibility and Accommodations Manual: provides information about accessibility features and accommodations
- LEAP Technology Enhanced Item Types: provides a summary of technology enhanced items
- Achievement Level Descriptors: descriptions of the knowledge, skills, and cognitive processes that students should demonstrate with relative consistency and accuracy at each level of achievement
- LEAP 360: non-summative assessment system; includes diagnostic and interim assessments

DRC INSIGHT Portal (eDIRECT):

- Includes access to tutorials, manuals, and user guides

INSIGHT ™

- Online Tools Training: allows students to become familiar with the tools available in the online testing platform; also available through this link using the Chrome browser
- LEAP Geometry Practice Test: helps prepare students for the tests

K-12 Louisiana Math Webpage

- K-12 Louisiana Student Standards for Mathematics: explains the development of and lists the math content standards for Louisiana students
- Geometry - Teachers Companion Document 2.0: contains descriptions of each standard to answer questions about the standard's meaning and how it applies to student knowledge and performance
- Geometry Learning Acceleration Guidance: reference guide for teachers to help them more quickly identify the specific remedial standards necessary for every standard, includes information on content emphasis
- K-12 LSSM Alignment to Rigor: provides explanations and a standards-based alignment to assist teachers in providing a rigorous education
- Math Formative Assessment Items: instructional resources in grade-level documents that teachers can download and incorporate into their daily instruction. (Password to access the document is Educate2020)

Contact the LDOE

- assessment@la.gov for assessment questions
- classroomsupporttoolbox@la.gov for curriculum and instruction questions
- AskLDOE for general questions
- ldoecommunications@la.gov to subscribe to newsletters; include the newsletter(s) you want to subscribe to in your email

Newsroom: archived copies of newsletters including LDOE Weekly School System Newsletters and Teacher Leader Newsletter

Appendix A

Assessable Content for the Major Content Reporting Category (Type I)

LSSM Content Standards	
GM: G-CO.B.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
GM: G-SRT.A.1	Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
GM: G-SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
GM: G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
GM: G-SRT.C.6	Understand that by similarity, side ratios in right triangles, including special right triangles (30-60-90 and 45-45-90), are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
GM: G-SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
GM: G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
GM: G-GPE.B.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
LEAP Evidence Statement	
LEAP.I.GM.1	Prove geometric theorems as detailed in GM: G-CO.C. • GM: G-CO.C –Theorems include but are not limited to the examples listed in standards GM: G-CO.C.9, 10, and 11. Multiple types of proofs are allowed (e.g., two-column proof, indirect proof, paragraph proof, and flow diagrams).
LEAP.I.GM.2	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in • GM: G-MG and GM: G-GPE.B.7 – GM: G-MG is the primary content.[1]

[1] See examples at https://www.illustrativemathematics.org/ for GM: G-MG.

Assessable Content for the Additional & Supporting Content Reporting Category (Type I)

LSSM Content Standards	
GM: G-CO.A.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.
GM: G-CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
GM: G-CO.A.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
GM: G-C.A.2	Identify and describe relationships among inscribed angles, radii, and chords, including the following: the relationship that exists between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; and a radius of a circle is perpendicular to the tangent where the radius intersects the circle.
GM: G-GPE.A.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
GM: G-GMD.A.1	Give an informal argument, e.g., dissection arguments, Cavalieri's principle, and informal limit arguments, for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
GM: G-GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
GM: G-GMD.B.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
LEAP Evidence Statements	
LEAP.I.GM.3	Make and understand geometric constructions as detailed in GM: G-CO.D. • Tasks may include requiring students to justify steps and results of a given construction.
LEAP.I.GM.4	Find arc lengths and areas of sectors of circles. • GM: G-C.B – Tasks involve computing arc lengths or areas of sectors given the radius and the angle subtended; or vice versa.
LEAP.I.GM.5	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in GM: S-CP. • GM: S-CP

Assessable Content for the Expressing Mathematical Reasoning Reporting Category (Type II)

LEAP Evidence Statements	
LEAP.II.GM.1	Apply geometric reasoning in a coordinate setting, and/or use coordinates to draw geometric conclusions. Content scope: Knowledge and skills in • GM: G-GPE.B.4 • GM: G-GPE.B.5 • GM: G-GPE.B.6, GM: G-GPE.B.7
LEAP.II.GM.2	Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. Content scope: Knowledge and skills in • GM: G-CO.A, GM: G-CO.B • GM: G-CO.C.9, GM: G-CO.C.10 – Theorems include, but are not limited to, the examples listed in standards. • GM: G-CO.D • GM: G-SRT.A • GM: G-SRT.B
LEAP.II.GM.3	Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as 1 + 4 = 5 + 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. Content scope: Knowledge and skills in • GM.G-SRT.C.8, GM: G-GMD.A.3
LEAP.II.GM.4	Use a combination of algebraic and geometric reasoning to construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about geometric figures. Content scope: Knowledge and skills in • Algebra content from Algebra I course and Geometry content from the Geometry course – Tasks involve proving or disproving geometric principles through algebraic applications. • Algebra content can include modeling with equations (linear and/or quadratic) and inequalities, solving equations (linear and/or quadratic) and inequalities, and properties of linear relationships. • G-GPE.B.6, GM: G-GMD.A.3

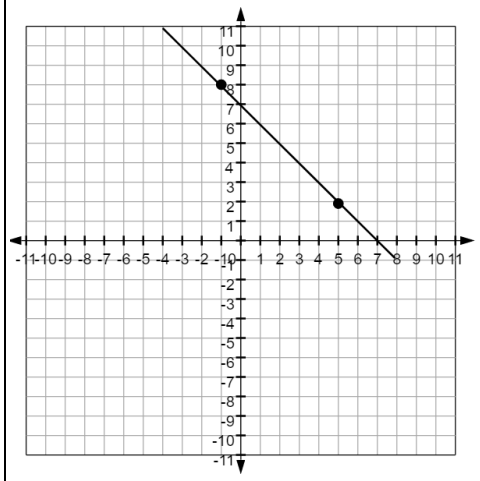
Assessable Content for the Modeling & Applications Reporting Category (Type III)

LEAP Evidence Statements	
LEAP.III.GM.1	Solve multi-step contextual problems with degree of difficulty appropriate to the course. Content scope: Knowledge and skills in • 6.G, 7.G, and/or 8.G
LEAP.III.GM.2	Solve multi-step contextual problems with degree of difficulty appropriate to the course involving perimeter, area, or volume that require solving a quadratic equation. • Tasks do not cue students to the type of equation or specific solution method involved in the task.[2]
LEAP.III.GM.3	Solve multi-step contextual word problems with degree of difficulty appropriate to the course. Content scope: Knowledge and skills in • GM: G-SRT.C.8, involving right triangles in an applied setting. Tasks may, or may not, require the student to autonomously make an assumption or simplification in order to apply techniques of right triangles. [3]
LEAP.III.GM.4	Micro-models: Autonomously apply a technique from pure mathematics to a real-world situation in which the technique yields valuable results even though it is obviously not applicable in a strict mathematical sense (e.g., profitably applying proportional relationships to a phenomenon that is obviously nonlinear or statistical in nature). Content Scope: Knowledge and skills articulated in GM.G-SRT.C.8, GM: G-GMD.A.3.
LEAP.III.GM.5	Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity. Content Scope: Knowledge and skills articulated in G-GPE.B.6, GM: G-GMD.A.3.

[2] For example: An artist wants to build a right-triangular frame in which one of the legs exceeds the other in length by 1 unit, and in which the hypotenuse exceeds the longer leg in length by 1 unit. Use algebra to show that there is one and only one such right triangle, and determine its side lengths.
[3] For example, a configuration of three buildings might form a triangle that is nearly, but not quite, a right triangle; then, a good approximate result can be obtained if the student autonomously approximates the triangle as a right triangle.

Appendix B

Answer Key/Rubrics for Sample Items

Item Type	Key	Alignment
4-point Type I Task: Multiple-Choice, Multiple-Select, Technology-Enhanced Drop-Down Menu	Part A: B Part B: D, H Part C: The reason for the statement in step 2 is that [if two parallel lines are cut by a transversal, then alternate interior angles are congruent]. Part D: The appropriate reason for the statement in step 5 is the [substitution property of equality].	LEAP.I.GM.1
1-point Type I Task: Short Answer	Part A: 136 Part B: 68	GM: G-C.A.2
1-point Type I Task: Technology-Enhanced Drag-and-Drop	**Similar to Triangle *ABC*** **Multiply each side length by 3.5.** **Divide each side length by 0.75.** **Not Similar to Triangle *ABC*** **Add 12 to each side length.** **Subtract 2 from each side length.**	GM: G-SRT.A.2
1-point Type I Task: Technology-Enhanced Coordinate Grid		GM: G-GPE.B.6

Item Type	Key	Alignment
3-point Type II Task: Constructed-Response	see rubric	LEAP.II.GM.1
6-point Type III Task: Constructed-Response	see rubric	LEAP.III.GM.1

Type II Constructed-Response Rubric

Score	Description
3	Reasoning component: 2 points • Determination that the figure is a parallelogram • Valid explanation of equal lengths for pairs of opposite sides or valid explanation of parallel sides Computation component: Correct computation of slopes or lengths Sample Student Response: A four-sided figure with opposite sides parallel meets the conditions for a parallelogram. The side $\underline{OT}$ lies on the x-axis, which is horizontal. Therefore, its slope is 0. Side $\underline{PS}$ also lies on a horizontal line because each endpoint has the same y-coordinate. Therefore, it also has slope 0. Because the two sides have the same slope, they must be parallel. The side $\underline{OP}$ lies on a line with slope $\frac{b-0}{a-0} = \frac{b}{a}$ Side $\underline{TS}$ lies on a line with slope $\frac{b-0}{a+c-c} = \frac{b}{a}$ Because both sides have the same slope, they are parallel. Therefore, the figure is a parallelogram. OR: A four-sided figure with opposite sides the same length meets the conditions for a parallelogram. The endpoints of side $\underline{OT}$ have the same y-coordinate, so its length is the difference of the x-coordinates, $c - 0 = c$. The endpoints of side $\underline{PS}$ have the same y-coordinate, so its length is the difference of the x-coordinates, $+c - a = c$. Therefore, opposite sides have the same length. The length of side $\underline{OP}$ is $\sqrt{(a-0)^2 + (b-0)^2} = \sqrt{a^2 + b^2}$, found by using the distance formula. (Note: student could use a right triangle argument). The length of side $\underline{TS}$ is $\sqrt{(a+c-c)^2 + (b-0)^2} = \sqrt{a^2 + b^2}$. Opposite sides have the same length therefore; the figure is a parallelogram.
2	Student response includes 2 of the 3 elements.
1	Student response includes 1 of the 3 elements.
0	Student response is incorrect or irrelevant.

Type III Constructed-Response Rubric

PART A	
Score	**Description**
2	Computation component: Correct volume of 384 cubic inches for the stones Modeling component: Correct work to support answer Sample Student Response: Because they are contained within the aquarium, the water and the combination of water and stones each have the shape of a rectangular prism. The formula for the volume V of a rectangular prism is V = lwh, where l is the length of the prism, w is the width, and h is the height. Volume (stones) = Volume (stones + water) – Volume (water) Volume (stones + water) = 16 in. × 8 in. × 7 in. = 896 in^3 and Volume (water) = 16 in. × 8 in. × 4 in. = 512 in^3 Volume (stones) = 896 in^3 – 512 in^3 = 384 in^3 So the volume of the stones is 384 cubic inches.
1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.

PART B	
Score	**Description**
3	Computation component: 2 points • Correct volume of the cube 343 cubic inches, the cylinder 200π ≈ 628 cubic inches, and the cone $\frac{325\pi}{3}$ ≈ 340 cubic inches Modeling component: Correct work to support each volume calculation Sample Student Response: Volume for the cube: Use the formula for the volume, V, of a cube, $V = s^3$. $V = 7^3 = 343$ cubic inches Volume of the cylinder: Use the area formula for a circle to find the area, B, of the base, $B = \pi r^2$. $B = \pi(5)^2 = 25\pi$ square inches Use the formula for the volume, V, of a cylinder, $V = Bh$. $V = (25\pi)(8) = 200\pi \approx 628$ cubic inches Volume of the cone: Use the area formula for a circle to find the area, B, of the base, $B = \pi r^2$. $B = \pi(5)^2 = 25\pi$ square inches Use the formula for the volume, V, of a cone, $V = \frac{Bh}{3}$. $V = \frac{(25\pi)(13)}{3} = \frac{325\pi}{3} \approx 340$ cubic inches
2	Student response includes 3 of the 4 elements.
1	Student response includes 1-2 of the 4 elements.
0	Student response is incorrect or irrelevant.

PART C	
Score	**Description**
1	Modeling component: Choice of the cylinder and a logical explanation for the choice. Sample Student Response: The stones have irregular shapes, so there will be some empty space between them when they are placed in the container. This means that the volume of the container must be a bit greater than 384 cubic inches. The volumes of the cube and the cone are less than the volume of the stones, so the stones will not fit inside either of these shapes. The volume of the cylinder is more than $1\frac{1}{2}$ times the volume of the stones $(384 \times 1\frac{1}{2} = 576$ and$628 > 576)$. The stones will fit inside the cylinder.
0	Student response is incorrect or irrelevant.