Assessment Guide for Geometry

This guide includes:

- Purpose
- Assessment Design
- Assessable Content
- Test Administration Policies
- Resources
- Appendix A: Assessable Content
- Appendix B: Answer Key/Rubrics for Sample Items
- Appendix C: Update Log (describes ongoing updates to guide)

UPDATES INCLUDED 1/22/18

- **Calculator Policy**
- **New Resource Links**

PURPOSE

This document is designed to assist Louisiana educators in understanding the LEAP 2025 Geometry test.

Introduction

In order to create a more cohesive grades three through high school assessment system, the high school assessments are transitioning from four-level to five-level tests. These new tests provide:

- consistency with the approach and design of the LEAP 2025 math assessments at grades 3-8;
- questions that have been reviewed by Louisiana educators to ensure their alignment with Louisiana Student Standards for Mathematics (LSSM) and appropriateness for Louisiana students;
- consistency in graduation requirements; ability to measure the full range of student performance, including the performance of high- and low-performing students;
- information for educators and parents about student readiness in mathematics and whether students are "on track" for college and careers; and
- comparison of Louisiana student performance to that of students in other states.

For additional information about the high school assessment program, see the 2017-2018 High School Assessment Frequently Asked Questions.

ASSESSMENT DESIGN

Each item on the LEAP 2025 Geometry test is referred to as a task and is identified by one of three types: Type I, Type II, or Type III. As shown in the table, 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 (MP)
Type I	conceptual understanding, fluency, and application	**Major Content:** solve problems involving the major content for Geometry **Additional & Supporting Content:** solve problems involving the additional and supporting content for Geometry	can involve any or all practices
Type II	written arguments/justifications, critique of reasoning, or precision in mathematical statements	**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/application in a real-world context or scenario	**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 will be divided, based on Achievement Level Descriptors into the following subcategories.

Subcategory	Associated LSSM and LEAP 2025 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 subcategories, which may help identify when students need additional support or more challenging work; and
- how well schools and districts 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 studies 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 studies 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 studies 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 studies 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 studies 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. In Geometry, the ALDs are written for the four assessment reporting categories. Access the Geometry ALDs in the Assessment library for a breakdown of the knowledge, skills, and practices associated with each achievement level.

The LEAP 2025 Geometry test contains a total of 68 points. Of the 42 points for Type I tasks, 62% are Major Content and 38% are Additional & Supporting Content. The table below shows the breakdown of task types and point values. The LEAP 2025 Geometry test is **timed**. No additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP).

Test Session	Type I (points)	Type II (points)	Type III (points)	Total (points)	Number of Embedded Field-Test Tasks	Session Time (minutes)
Session 1a: No Calculator	9	0	0	9	1	25
Session 1b: Calculator	7	3	3	13	1	55
Session 2: Calculator	13	4	6	23	1	80
Session 3: Calculator	13	4	6	23	3	80
TOTAL	42	11	15	68	6	240

Note: The test will contain additional field-test tasks. The field-test tasks do **not** count towards a student's final score on the test; they provide information that will be used to help develop future test forms.

ASSESSABLE CONTENT

The tasks on the LEAP 2025 Geometry test are aligned directly to the Louisiana Student Standards for Mathematics (LSSM) for all reporting categories. Type I tasks, designed to assess conceptual understanding, fluency, and application, are aligned to the major, additional, and supporting content for Geometry. Some Type I tasks may be further aligned to LEAP 2025 evidence statements for the Major Content and Additional & Supporting Content reporting categories and allow for the testing of more than one of the student standards on a single item/task. Type II tasks are designed to assess student reasoning ability of selected major content for Geometry in applied contexts. Type III tasks are designed to assess student modeling ability of selected content for Geometry in applied contexts. Type II and III tasks are further aligned to LEAP 2025 evidence statements for the Expressing Mathematical Reasoning and Modeling & Application reporting categories. All tasks are reviewed and vetted by teacher committees to verify direct and full alignment to the LSSM. See the table in Appendix A for a listing of assessable content of the LSSM and LEAP 2025 evidence statements.

TEST ADMINISTRATION POLICIES

Administration Information

The LEAP 2025 Geometry test is administered during three testing windows. The school or district test coordinator will communicate the testing schedule. For more information about scheduling and administration policies, refer to the Computer-based Test Guidance document, found in the LDOE Assessment Library. Students taking the Fall 2017 Algebra I and Geometry assessments will receive results in January 2018, while students taking the Spring and Summer 2018 Algebra I and Geometry assessments will receive results during the testing window. The table below shows the testing window and student-level results by administration.

Administration and Reporting for LEAP 2025 Algebra I and Geometry

Administration	Testing Window	Release of Results
Fall	November 29 – December 15	January 2018
Spring	April 23 – May 18	In window
Summer	June 18 – June 22	In window

Students will enter their answers into the online testing system. The way each answer is entered depends on the task type. For example, for a multiple-choice task, a student will select the circle next to the correct answer. For fill-in-the-blank and constructed-response tasks on online test forms, students will type in the number (integer or decimal) or text in the box using the typing tools provided. Some response boxes limit the length of the response that can be typed and whether numbers and/or text can be typed. Computer-based tests allow for the use of technology enhanced items (TE) that use innovative, engaging ways to assess student understanding of material beyond the limitations of a traditional selected-response task. A TE item may require the student to complete an equation by using a drag-and-drop tool, graph an equation or shape on the coordinate plane, or complete geometric proof using drop-down menu selections.

The computer-based tests include the following online tools, which allow a student to select answer choices, “mark” tasks, eliminate answer options, use a calculator, take notes, enlarge the task, guide the reading of a task line by line, see the reference sheet, 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 tool 
- Highlighter tool 
- Cross-Off tool 
- Calculator 
- Sticky Note tool 
- Magnifying tool 
- Line Guide 
- Graphing tool 
- Equation Builder 
- Help tool 
- Reference Sheet 

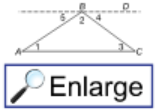
All students should work through the Online Tools Training (available in INSIGHT or here using the Chrome browser) to practice using the online tools so they are well prepared to navigate the online testing system.

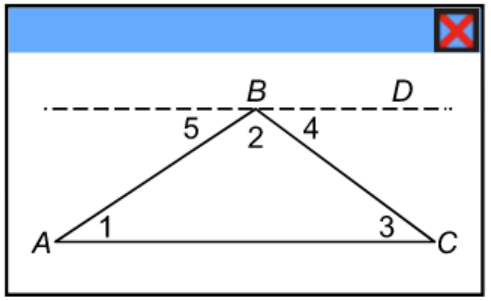
Sample Test Items

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.





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

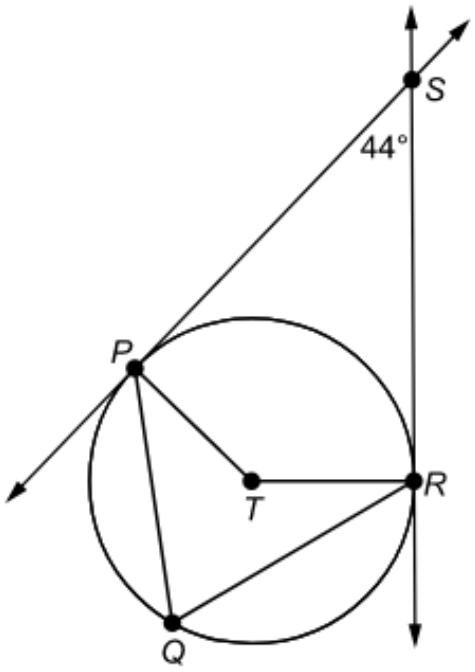
Select from the drop-down menu to correctly complete the sentence.

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: Fill-in-the-Blank

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

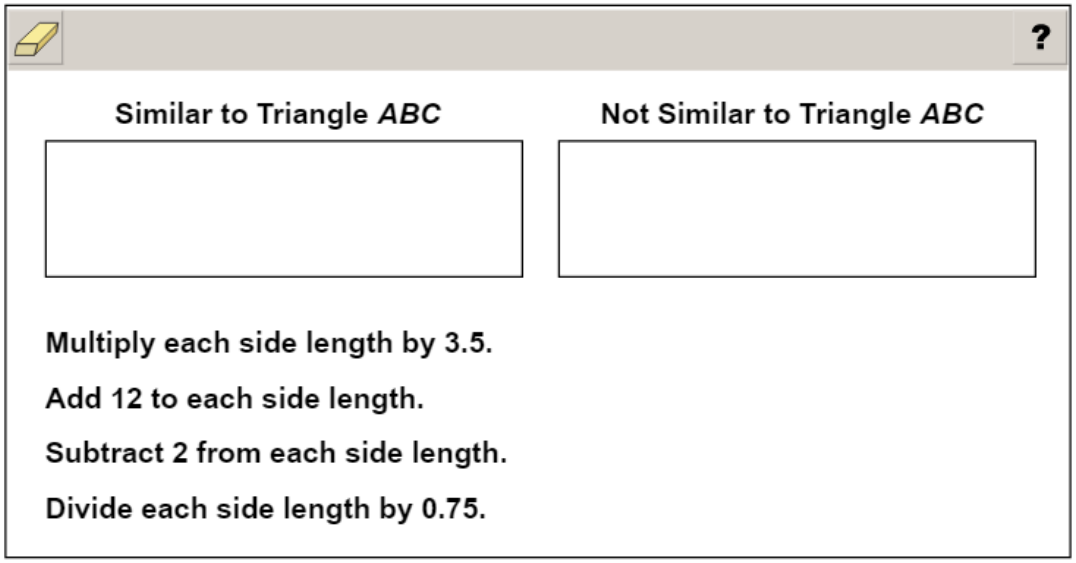
What is the measure, in degrees, of $\angle PQR$?

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*.

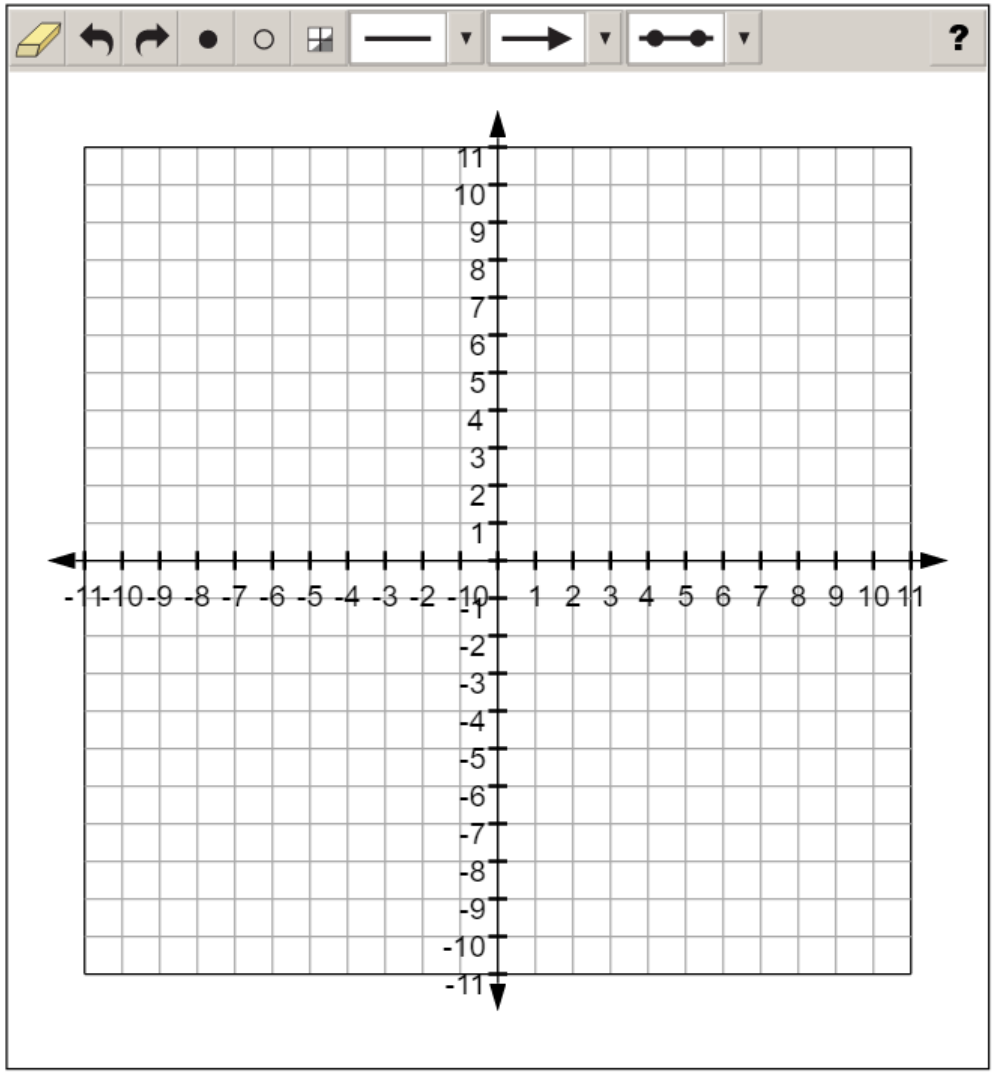
Drag and drop each transformation into the appropriate box.



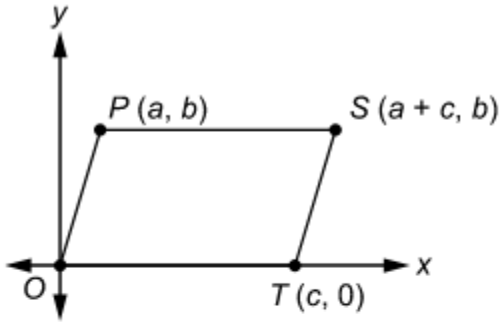
1-point Type I Task: Technology-Enhanced Coordinate Grid

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.

EQ

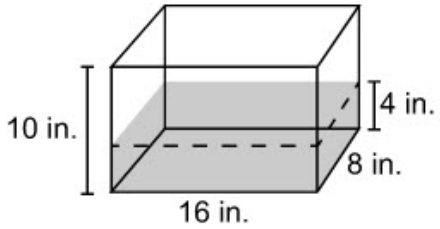
6-point Type III Task: Constructed-Response

Part A

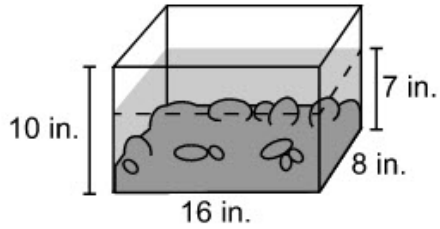
Moira collected some stones at the beach. Now she wants to make a clear plastic container to display the stones. To plan the container, Moira decides that she must first find the volume of the stones.

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.



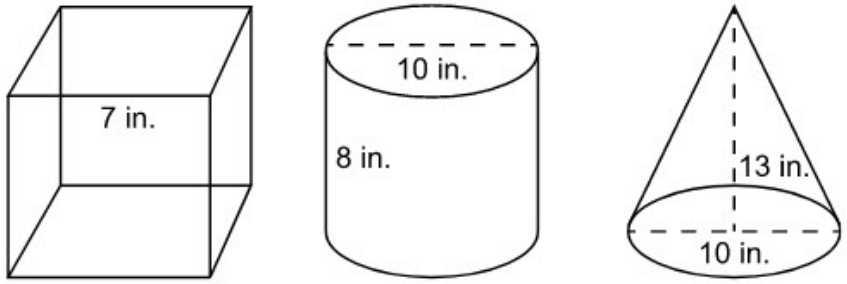
Using this information, find the volume of the stones. Show your work.

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

EQ

Part B

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



cube cylinder cone

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

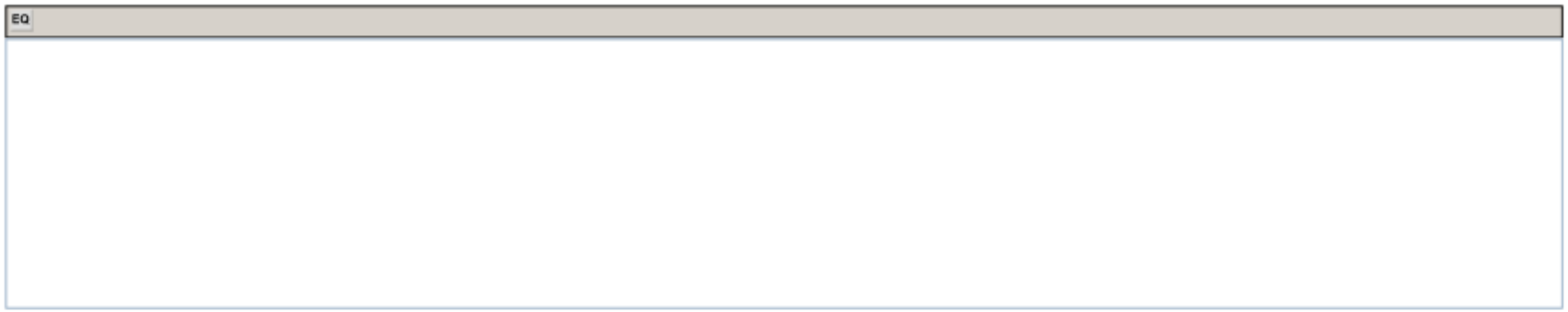
Enter your answer and show your work in the box provided.

EQ

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.



Testing Materials

All students should receive scratch paper (lined, graph, and/or unlined) and two pencils from their test administrator.

Required Tools	Provided	Session 1a	Sessions 1b, 2, & 3	Guidelines
scratch paper (lined, graph, un-lined), two pencils	by Test Administrator	YES	YES	• Reference sheets may be printed from *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 2025 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. **As of January 22, 2018, the online graphing application previously provided by DRC has been permanently replaced with a fully functional graphing calculator provided by Desmos.** 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	**Must be provided handheld** graphing calculator (recommended) or scientific calculator	
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 approves IEP or 504 Plan.		

NOTE: To become familiar with the online graphing calculator, teachers and students can visit Desmos for practice at https://www.desmos.com/calculator.

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 districts 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 below. The High School Mathematics Reference Sheet may be printed from *e*Direct or found in the Assessment Library on page 5 of LEAP 2025 Grades 5-HS Mathematics Reference Sheets.

High School Mathematics Reference Sheet

1 inch = 2.54 centimeters	1 pound = 16 ounces	1 quart = 2 pints
1 meter = 39.37 inches	1 pound = 0.454 kilogram	1 gallon = 4 quarts
1 mile = 5280 feet	1 kilogram = 2.2 pounds	1 gallon = 3.785 liters
1 mile = 1760 yards	1 ton = 2000 pounds	1 liter = 0.264 gallon
1 mile = 1.609 kilometers	1 cup = 8 fluid ounces	1 liter = 1000 cubic centimeters
1 kilometer = 0.62 mile	1 pint = 2 cups	

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 $r \neq 1$

RESOURCES

Assessment Guidance Library

- LEAP 2025 Equation Builder Guide for High School: provides teachers with information on using the equation builder within the open-response boxes; Spanish version available
- LEAP 2025 Grades 5-HS Mathematics Reference Sheets: includes all the mathematics references sheets provided for LEAP 2025 testing for grades five through eight and high school; the high school reference sheet is used for both Algebra I and Geometry
- Desmos: link to Desmos free online graphing calculator and resources for its use (https://www.desmos.com/calculator)

Practice Test Library

- LEAP 2025 Geometry Practice Test Answer Key: includes answer keys, scoring rubrics, and alignment information for each task on the practice test
- LEAP 2025 Mathematics Practice Test Guidance: provides guidance on how teachers might better use the practice tests to support their instructional goals
- Practice Test Quick Start Guide: provides information regarding the administration and scoring process needed for the online practice tests

Assessment Library

- LEAP Accessibility and Accommodations Manual: provides information about Louisiana's accessibility features and accommodations for testing
- LEAP 2025 Technology Enhanced Item Types: provides a summary of technology enhanced items students may encounter in any of the computer-based tests across courses and grade-levels
- LEAP 360: an optional, free high-quality non-summative assessment system that provides educators with a complete picture of student learning at the beginning, middle, and end of the school year; includes diagnostic and interim assessments
- EAGLE Sample Test Items: a part of the LEAP 360 system, which allows teachers to integrate high-quality questions into day-to-day classroom experiences and curricula through teacher-created tests, premade assessments, and individual items for small group instruction

INSIGHT™

- LEAP 2025 Geometry Practice Test: offers an online practice test to help prepare students for the test
- Online Tools Training: provides teachers and students the opportunity to become familiar with the online testing platform and its available tools; available here using the Chrome browser

K-12 Math Planning Resources Library

- K-12 Louisiana Student Standards for Math: explains the development of and lists the math content standards that Louisiana students need to master
- Geometry - Teachers Companion Document PDF or word doc: contains descriptions of each standard to answer questions about the standard's meaning and how it applies to student knowledge and performance
- Geometry Remediation Guide: reference guide for teachers to help them more quickly identify the specific remedial standards necessary for every standard, includes information on content emphasis
- Geometry Crosswalk: shows specifically how the math standards have changed from 2015-2016 to 2016-2017
- K-12 LSSM Alignment to Rigor: provides explanations and a standards-based alignment to assist teachers in providing the first of those: a rigorous education

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 2025 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 2025 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 2025 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
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

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

LEAP 2025 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 the Major Content Assessable Content table.
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 the Major Content Assessable Content table.

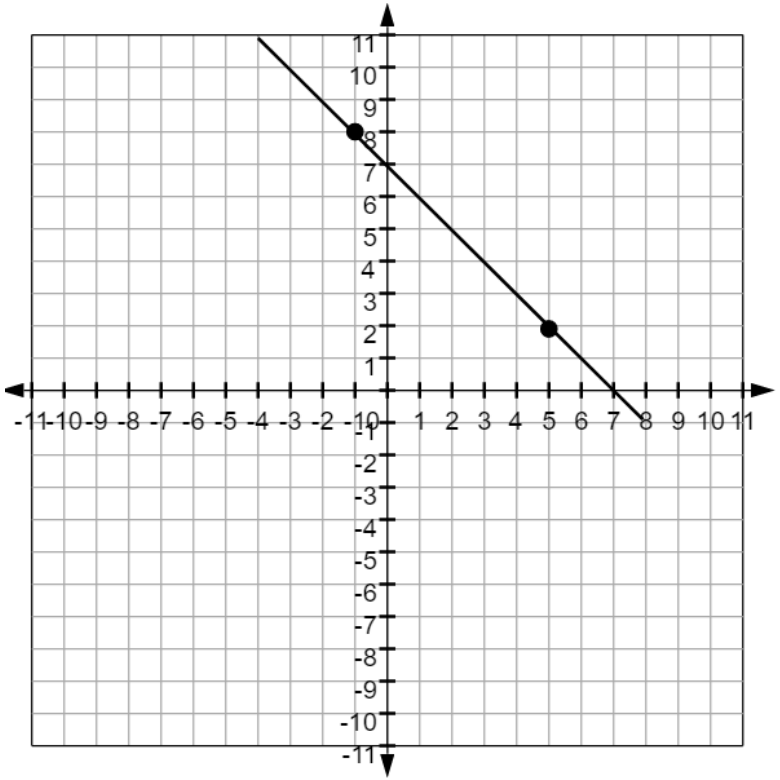
[2] For example: An artist wants to build a right-triangular frame in which one of the legs exceeds the other in length by 1 unit, and in which the hypotenuse exceeds the longer leg in length by 1 unit. Use algebra to show that there is one and only one such right triangle, and determine its side lengths.

[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: Fill-in-the-Blank	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

Item Type	Key	Alignment
1-point Type I Task: Technology-Enhanced Coordinate Grid		GM: G-GPE.B.6
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	Student Response includes the following 3 elements. • **Reasoning component =** 2 points o Determination that the figure is a parallelogram o Valid explanation of equal lengths for pairs of opposite sides or valid explanation of parallel sides • **Computation component =** 1 point o 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 $\overline{OT}$ lies on the *x*-axis, which is horizontal. Therefore, its slope is 0. Side $\overline{PS}$ 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 $\overline{OP}$ lies on a line with slope $\frac{b-0}{a-0} = \frac{b}{a}$ Side $\overline{TS}$ 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 $\overline{OT}$ have the same *y*-coordinate, so its length is the difference of the *x*-coordinates, $c - 0 = c$. The endpoints of side $\overline{PS}$ 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 $\overline{OP}$ 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 $\overline{TS}$ 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	Student Response includes the following 2 elements. • **Computation component =** 1 point o Correct volume of 384 cubic inches for the stones • **Modeling component =** 1 point o 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 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	Student response includes the following 4 elements. • **Computation component =** 2 points o Correct volume of the cube 343 cubic inches, the cylinder 200π ≈ 628 cubic inches, and the cone $\frac{325\pi}{3} \approx 340$ cubic inches • **Modeling component =** 1 point o 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	Student response includes the following element. • **Modeling component =** 1 point o 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.

APPENDIX C

Update Log		
Date	**Page**	**Summary of Changes**
8/22/17	1	Added Appendix C to list of internal links Added box outlining primary changes and internal links
	3	Added information of ratio of Major Content points to Additional & Supporting points Column added to right of table to include session times
	4	Correction to Fall window close date
	12	Correction to typo – “measure” to “measures”
	13	Correction to typos – solid figures mislabeled in original posting
	17	Updated links Added resources
11/15/17	2	Added information about Major Content Reporting Subcategories
	3	Added information about Achievement Level Descriptors and provided link
	15	Updated the Calculator Policy to be more specific for Fall 2017 testing – will be updated again in January 2018 for Spring 2018 testing
	17	Updated Resources section with new/corrected links
1/22/18	15	Updated the Calculator Policy with information about the new Desmos online graphing calculator now available in the online testing platform
	17	Updated Resources section with new links to Desmos