This guide includes:

PURPOSE

This document is designed to assist Louisiana educators in understanding the LEAP 2025 Algebra I 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 the 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 Algebra I 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 Algebra I **Additional & Supporting Content:** solve problems involving the additional and supporting content for Algebra I	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

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.

The LEAP 2025 Algebra I test contains a total of 68 points. The table below shows the breakdown of task types and point values. The LEAP 2025 Algebra I test is **timed**. No additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP). The LDOE is currently analyzing timing data, feedback from schools and districts, and field-test information to determine the appropriate session times for the LEAP 2025 Algebra I and Geometry assessments. Information about exact session times will be added to the table Fall 2017.

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

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 Algebra I 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 Algebra I. Some Type I tasks may be further aligned to LEAP 2025 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 item/task. Type II tasks are designed to assess student reasoning ability of selected major content for Algebra I in applied contexts. Type III tasks are designed to assess student modeling ability of selected content for Algebra I 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 Algebra I 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, 2017 – December 13, 2017	January 2018
Spring	April 23, 2018 – May 18, 2018	In window
Summer	June 18, 2018 – June 22, 2018	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 sort shapes into categories by using a drag-and-drop tool, show a fraction or an area by selecting cells in a figure, or create angles by rotating rays.

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
- Reference Sheet
- Equation Builder
- Help tool

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. (The OTT will be updated Fall 2017.)

Sample Test Items

This section includes five 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 taks is located in Appendix B. Look for some of these tasks in the OTT (*updated Fall*).

4-point Type I Task: Fill-in-the-Blank, Multiple-Choice, Technology-Enhanced Coordinate Plane Graphing

Tonya's class planted sunflowers and the students are tracking the growth of their individual plants. The table shows the height of Tonya's plant t days after she planted her sunflower seed.

Time (days)	Height (inches)
10	4
20	8
30	12
40	16

Part A

If the growth of the sunflower continues at the same rate, what is the expected height, in inches, on day 55?

Enter your answer in the box.

[ ] inches

Part B

Based on the data in the table, which function is an appropriate model for the height, $h(t)$, in inches?

(a) $h(t) = 4t$

(b) $h(t) = \frac{1}{4}t$

(c) $h(t) = \frac{5}{2}t$

(d) $h(t) = \frac{2}{5}t$

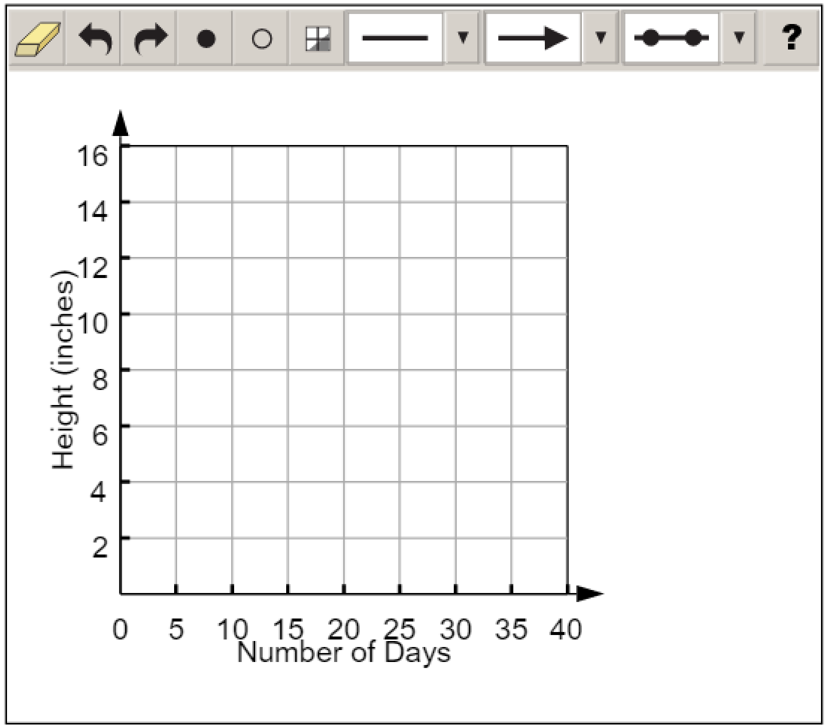
Tonya's class planted sunflowers and the students are tracking the growth of their individual plants. The table shows the height of Tonya's plant *t* days after she planted her sunflower seed.

Time (days)	Height (inches)
10	4
20	8
30	12
40	16

Part C

On the given *xy*-coordinate plane, graph the function *h*.

To graph a line, click the line button. Then, click a place on the coordinate plane to represent one point on the line and drag the pointer to another point on the line, and a line will appear.



Tonya's class planted sunflowers and the students are tracking the growth of their individual plants. The table shows the height of Tonya's plant *t* days after she planted her sunflower seed.

Time (days)	Height (inches)
10	4
20	8
30	12
40	16

Part D

What is an appropriate domain for the function in context?

(a) integers only

(b) nonnegative integers only

(c) all real numbers

(d) all nonnegative real numbers

2-point Type I Task: Multiple-Select

A parabola with the equation $y = a(x - b)^2 + c$ has a minimum at the point (2, –1) and a y-intercept of 3 when graphed in the xy-coordinate plane.

Part A

What are the values of a, b, and c?

Select the **three** that apply.

(a) $a = -1$

(b) $a = 1$

(c) $a = 2$

(d) $b = -2$

(e) $b = 2$

(f) $c = -1$

(g) $c = 1$

A parabola with the equation $y = a(x - b)^2 + c$ has a minimum at the point (2, –1) and a y-intercept of 3 when graphed in the xy-coordinate plane.

Part B

What are the x-intercepts of the parabola?

Select **all** that apply.

- (a) –3
- (b) –2
- (c) –1
- (d) 0
- (e) 1
- (f) 2
- (g) 3

1-point Type I Task: Technology-Enhanced Drop-Down Menu

Select from the drop-down menus to correctly complete the sentences.

The sum $\frac{1}{3} + \frac{\sqrt{5}}{3}$ is [▾] because the sum [▾] be expressed as a single fraction with a rational numerator and a rational denominator.

- rational
- irrational

- can
- cannot

The quotient $\frac{20}{\sqrt{16}}$ is [▾] because the quotient [▾] .

- rational
- irrational

- has a square root in its denominator
- is equal to an integer

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

The table shows values for a linear function, *f*.

x	***f*(*x*)**
–1	–8
3	–5
7	–2
11	1

What is the equation for the function *f*?

Drag and drop the numbers into the boxes. **Not** all numbers listed will be used.

?

$-\frac{29}{4}$ $\quad -\frac{3}{4}$ $\quad \frac{3}{4}$ $\quad \frac{4}{3}$ $\quad \frac{11}{4}$

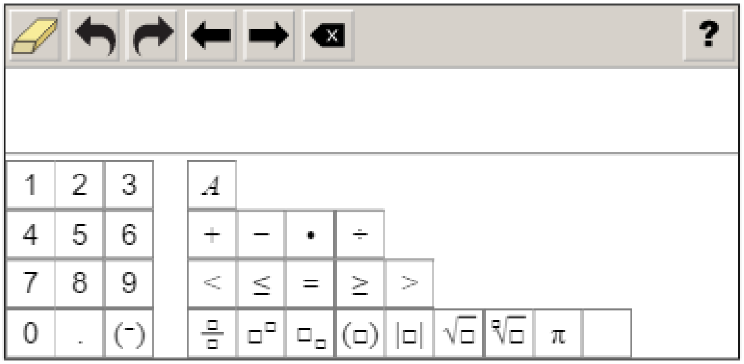
$f(x) = \boxed{}\, x + \boxed{}$

1-point Type I Task: Technology-Enhanced Short Equation Input

The area, A, of a rectangular parking lot is given by the equation $A = 16s^2 + 25$. Jacob knows the area of the parking lot and wants to find s. Solve $A = 16s^2 + 25$ for s.

Enter your answer in the box provided. Enter **only** your answer.

$s =$



4-point Type II Task: Constructed-Response

Part A

List the steps to solve the equation $x^2 + 12x - 28 = 0$ by completing the square, and give the solution or solutions.

Enter your work and your answers in the box provided.

EQ

Part B

Explain what value or values of c make the equation $x^2 + 12x + c = 0$ have one and only one solution. Justify your answer.

Enter your answer and your justification in the box provided.

EQ

3-point Type III Task: Constructed-Response

A quality-control technician at a candle factory tested eight 16-ounce candles, each 3 inches in diameter. These candles came from the same production run. The table shows the decrease in weight of each candle after burning for 3 hours. Candle makers believe that the rate at which the candles burn is constant.

Candle	1	2	3	4	5	6	7	8
Weight Loss (ounces)	0.5	0.6	0.5	0.7	0.7	0.5	0.5	0.6

Write an equation that can be used to model the weight, *w* of such a candle as a function of *h*, the number of hours burning. Then, explain how the equation can be used to predict the weight of a candle that has burned for 5 hours.

Enter your equation and your explanation in the box provided.

EQ

Testing Materials

As in previous years, students should receive scratch paper (lined, graph, and/or unlined) and two pencils from their test administrator. New to this year, Algebra I testers will be able to access a reference sheet.

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	

Calculator Policy

The Algebra I test allows a graphing 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 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.

<table>
<tr><th>Calculator Policy</th><th>Session 1a</th><th>Sessions 1b, 2, & 3</th></tr>
<tr><td>General Testers</td><td>Not allowed</td><td rowspan="2">Calculator and graphing capabilities[1] available online, may also have a hand-held graphing calculator (recommended)</td></tr>
<tr><td>Testers with approved accommodation for calculator use</td><td>Must be provided hand-held graphing calculator</td></tr>
<tr><td colspan="3">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.</td></tr>
</table>

Additionally, 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.

[1] More specific information about the available online calculator and graphing capabilities will be included Fall 2017.

Reference Sheet

Students in Algebra I will be provided a reference sheet online with the information below. The High School 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	$S_n = \frac{a_1 - a_1 r^{n-1}}{1 - r}$ where $r \neq 1$

RESOURCES

- 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 Algebra I Practice Test and Answer Key: (*Available Fall*) offers an online practice test to help prepare students for the test; accessed through INSIGHT
- LEAP 2025 Practice Test Guidance: (*Updated Fall*) provides guidance on how teachers might better use the practice tests to support their instructional goals
- 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
- LEAP Accessibility and Accommodations Manual: (*Updated Fall*) provides information about Louisiana's accessibility features and accommodations for testing
- Practice Test Quick Start Guide: provides information regarding the administration and scoring process needed for the online practice tests
- Technology Enhanced Item Types Available in INSIGHT: (*Updated Fall*) provides a one-page summary chart of technology enhanced items students may encounter in any of the computer-based tests across courses and grade-levels
- EAGLE: provides teachers a bank of questions that can be used for instructional and assessment purposes
- Online Tools Training: (*Updated Fall*) provides teachers and students the opportunity to become familiar with the online testing platform and its available tools; available in INSIGHT or here using the Chrome browser
- K-12 Louisiana Student Standards for Math: explains the development of and lists the math content standards that Louisiana students need to master
- Algebra I - 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
- Algebra I 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
- Algebra I Crosswalk: shows specifically how the math standards 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
- 9-12 Grade Math Teachers Toolbox: provides links to resources, such as the standards, shared teacher resources, remediation guides, and instructional plans

APPENDIX A

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

LSSM Content Standards	
A1: A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.*
A1: A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, or see $2x^2 + 8x$ as $(2x)(x) + 2x(4)$, thus recognizing it as a polynomial whose terms are products of monomials and the polynomial can be factored as $2x(x+4)$.*
A1: A-APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
A1: A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
A1: A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R.*
A1: A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A1: A-REI.B.4	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as “no real solution.”
A1: A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
A1: A-REI.D.11	Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, piecewise linear (to include absolute value), and exponential functions.
A1: A-REI.D.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

A1: F-IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
A1: F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
A1: F-IF.B.4	For linear, piecewise linear (to include absolute value), quadratic, and exponential functions that model a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.*
A1: F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*
A1: F-IF.B.6	Calculate and interpret the average rate of change of a linear, quadratic, piecewise linear (to include absolute value), and exponential function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
LEAP 2025 Evidence Statements	
LEAP.I.A1.1	Understand the concept of a function and use function notation. Content Scope: Knowledge and skills articulated in • A1: F-IF.A – Tasks require students to use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a real-world context.
LEAP.I.A1.2	Given a verbal description of a linear or quadratic functional dependence, write an expression for the function and demonstrate various knowledge and skills articulated in the Functions category in relation to this function. Content Scope: Knowledge and skills articulated in • A1: F-IF, A1: F-BF, A1: F-LE – Given a verbal description of a functional dependence, the student would be required to write an expression for the function; identify a natural domain for the function given the situation; use a graphing tool to graph several input-output pairs; select applicable features of the function, such as linear, increasing, decreasing, quadratic, nonlinear; and find an input value leading to a given output value.[2]

[2] Some examples: (1) A functional dependence might be described as follows: "The area of a square is a function of the length of its diagonal." The student would be asked to create an expression such as $f(x) = \frac{1}{2}x^2$ for this function. The natural domain for the function would be the positive real numbers. The function is increasing and nonlinear. (2) A functional dependence might be described as follows: "The slope of the line passing through the points $(1, 3)$ and $(7, y)$ is a function of y." The student would be asked to create an expression such as $s(y) = \frac{(3-y)}{(1-7)}$ or this function. The natural domain for this function would be the real numbers. The function is increasing and linear.

LEAP.I.A1.3	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in • A1: S-ID, excluding normal distributions and limiting function fitting to linear functions and quadratic functions o Tasks should go beyond 6.SP.4. o For tasks that use bivariate data, limit the use of time series. Instead use data that may have variation in the *y*-values for given *x*-values, such as pre and post test scores, height and weight, etc. o Predictions should not extrapolate far beyond the set of data provided. o Line of best fit is always based on the equation of the least squares regression line either provided or calculated through the use of technology. o To investigate associations, students may be asked to evaluate scatter plots that may be provided or created using technology. Evaluation includes shape, direction, strength, presence of outliers, and gaps. o Analysis of residuals may include the identification of a pattern in a residual plot as an indication of a poor fit. o Quadratic models may assess minimums/maximums, intercepts, etc.
LEAP.I.A1.4	Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing quadratic function models and/or writing and solving quadratic equations. Content Scope: Knowledge and skills articulated in • A1: A-SSE.B.3, A1: A-APR.B.3, A1: A-CED.A.1, A1: A-REI.B.4, A1: F-IF.B.4, A1: F-IF.B.6, A1: F-IF.C.7a, A1: F-IF.C.8, A1: F-IF.C.9, A1: F-BF.A.1a, A1: F-BF.B.3, A1: F-LE.B.5 – A scenario might be described and illustrated with graphics (or even with animations in some cases). Solutions may be given in the form of decimal approximations. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required.[3]

[3] Some examples: (1) A company sells steel rods that are painted gold. The steel rods are cylindrical in shape and 6 cm long. Gold paint costs $0.15 per square inch. Find the maximum diameter of a steel rod if the cost of painting a single steel rod must be $0.20 or less. You may answer in units of centimeters or inches. Give an answer accurate to the nearest hundredth of a unit. (2) As an employee at the Gizmo Company, you must decide how much to charge for a gizmo. Assume that if the price of a single gizmo is set at *P* dollars, then the company will sell $1000 - 0.2P$ gizmos per year. Write an expression for the amount of money the company will take in each year if the price of a single gizmo is set at *P* dollars. What price should the company set in order to take in as much money as possible each year? How much money will the company make per year in this case? How many gizmos will the company sell per year? (Students might use graphical and/or algebraic methods to solve the problem.) (3) At $t = 0$, a car driving on a straight road at a constant speed passes a telephone pole. From then on, the car's distance from the telephone pole is given by $C(t) = 30t$, where *t* is in seconds and *C* is in meters. Also at $t = 0$, a motorcycle pulls out onto the road, driving in the same direction, initially 90 m ahead of the car. From then on, the motorcycle's distance from the telephone pole is given by $M(t) = 90 + 2.5t^2$, where *t* is in seconds and *M* is in meters. At what time t does the car catch up to the motorcycle? Find the answer by setting *C* and *M* equal. How far are the car and the motorcycle from the telephone pole when this happens? (Students might use graphical and/or algebraic methods to solve the problem.)

LEAP.I.A1.5	Solve multi-step mathematical problems with degree of difficulty appropriate to the course that requires analyzing quadratic functions and/or writing and solving quadratic equations. Content Scope: Knowledge and skills articulated in • A1: A-SSE.B.3, A1: A-APR.B.3, A1: A-CED.A.1, A1: A-REI.B.4, A1: F-IF.B.4, A1: F-IF.B.6, A1: F-IF.C.7a, A1: F-IF.C.8, A1: F-IF.C.9, A1: F-BF.A.1a, A1: F-BF.B.3, A1: F-LE.B.5 – Tasks do not have a real-world context. Exact answers may be required or decimal approximations may be given. Students might choose to take advantage of the graphing utility to find approximate answers or clarify the situation at hand. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required.[4]
LEAP.I.A1.6	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in • A1: F-LE, A1: A-CED.A.1, A1: A-SSE.B.3, A1: F-IF.B, A1: F-IF.C.7, limited to linear functions, quadratic functions, and exponential functions. A1: F-LE.A is the primary content and at least one of the other listed content elements will be involved in tasks as well. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required.

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

LSSM Content Standards	
A1: A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions emphasizing integer exponents. *For example, the growth of bacteria can be modeled by either* $f(t) = 3^{(t+2)}$ *or* $g(t) = 9(3^t)$ *because the expression* $3^{(t+2)}$ *can be rewritten as* $(3^t)(3^2) = 9(3^t)$.
A1: A-APR.B.3	Identify zeros of quadratic functions, and use the zeros to sketch a graph of the function defined by the polynomial.
A1: A-REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
A1: F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph piecewise linear (to include absolute value) and exponential functions.

[4] Some examples: (1) Given the function $f(x) = x^2 + x$, find all values of *k* such that $f(3-k) = f(3)$. (Exact answers are required.) (2) Find a value of *c* so that the equation $2x^2 - cx + 1 = 0$ has a double root. Give an answer accurate to the tenths place.

A1: F-IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
A1: F-IF.C.9	Compare properties of two functions (linear, quadratic, piecewise linear [to include absolute value] or exponential) each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, determine which has the larger maximum.*
A1: F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative). Without technology, find the value of k given the graphs of linear and quadratic functions. With technology, experiment with cases and illustrate an explanation of the effects on the graph that include cases where $f(x)$ is a linear, quadratic, piecewise linear (to include absolute value) or exponential function.
A1: F-LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
A1: S-ID.B.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
LEAP 2025 Evidence Statements	
LEAP.I.A1.7	Apply properties of rational and irrational numbers to identify rational and irrational numbers. Content Scope: Knowledge and skills articulated in • A1: N-RN.B – Tasks should go beyond asking students to only identify rational and irrational numbers. This evidence statement is aligned to the cluster heading. This allows other cases besides the three cases listed in N-RN.3 to be assessed.

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

LEAP 2025 Evidence Statements	
LEAP.II.A1.1	Base explanations/reasoning on the properties of rational and irrational numbers. Content scope: Knowledge and skills articulated in • A1: N-RN.B.3 – For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required.
LEAP.II.A1.2	Given an equation or system of equations, reason about the number or nature of the solutions. Content scope: Knowledge and skills articulated in • A1: A-REI.B.4a, A1: A-REI.B.4b, limited to real solutions only. • A1: A-REI.D.11, limited to equations of the form $f(x) = g(x)$ where f and g are linear or quadratic.
LEAP.II.A1.3	Given a system of equations, reason about the number or nature of the solutions. Content scope: Knowledge and skills articulated in • A1: A-REI.C.5

LEAP.II.A1.4	Base explanations/reasoning on the principle that the graph of an equation and inequalities in two variables is the set of all its solutions plotted in the coordinate plane. Content scope: Knowledge and skills articulated in • A1: A-REI.D, excluding exponential functions.
LEAP.II.A1.5	Construct, autonomously, chains of reasoning that will justify or refute algebraic propositions or conjectures. Content scope: Knowledge and skills articulated in • A1: A-APR.A.1
LEAP.II.A1.6	Express reasoning about transformations of functions. Content scope: Knowledge and skills articulated in • A1: F-BF.B.3, limited to linear and quadratic functions. Tasks will not involve ideas of even or odd functions.
LEAP.II.A1.7	Express reasoning about linear and exponential growth. Content scope: Knowledge and skills articulated in • A1: F-LE.A.1a
LEAP.II.A1.8	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about functions. Content scope: Knowledge and skills articulated in • A1: F-IF.C.8a – Tasks involve using algebra to prove properties of given functions.[5] Scaffolding is provided to ensure tasks have appropriate level of difficulty.[6] Tasks may have a mathematical or real-world context.
LEAP.II.A1.9	Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any). Content scope: Knowledge and skills articulated in • A1: A-REI.A.1, A1: A-REI.B.4a, A1: A-REI.B.4b, limited to quadratic equations and real solutions.
LEAP.II.A1.10	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about linear equations in one or two variables. Content scope: Knowledge and skills articulated in • 8.EE.B – Revisiting content initially introduced in grade 8, from a more mature reasoning perspective

[5] Some examples: (1) Prove algebraically that the function $h(t) = t(t - 1)$ has minimum value 14. (2) Prove algebraically that the graph of $g(x) = x^2 - x + 14$ is symmetric about the line $x = 12$. (3) Prove that $x^2 + 1$ is never less than $-2x$.

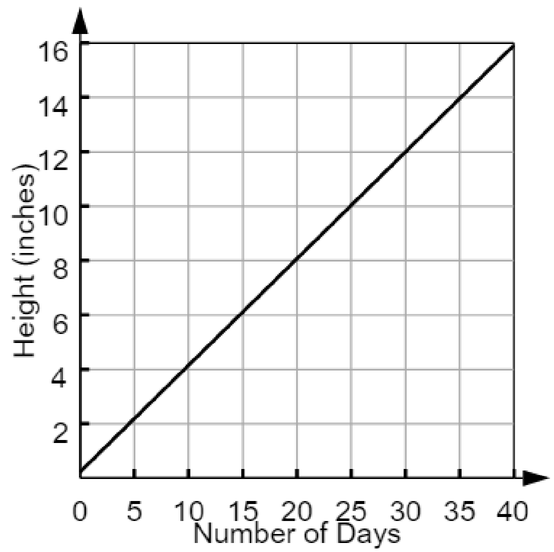
[6] Example: (1) The prompt could show the graphs of $x^2 + 1$ and $-2x$ on the same set of axes, and say, "From the graph, it looks as if $x^2 + 1$ is never less than $-2x$. In this task, you will use algebra to prove it." And so on, perhaps with additional hints or scaffolding.

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

LEAP 2025 Evidence Statements	
LEAP.III.A1.1	Solve multi-step contextual problems with degree of difficulty appropriate to the course. Content scope: Knowledge and skills articulated in • 7.RP.A, 7.NS.A.3, 7.EE, and/or 8.EE
LEAP.III.A1.2	Solve multi-step contextual word problems with degree of difficulty appropriate to the course. Content scope: Knowledge and skills articulated in • A1: A-CED, A1: N-Q, A1: A-SSE.B.3, A1: A-REI.C.6, A1: A-REI.D.11, A1: A-REI.D.12, limited to linear equations and exponential equations with integer exponents. A1: A-CED is the primary content; other listed content elements may be involved in tasks as well. • A1: F-BF.A.1a, A1: F-BF.B.3, A1: A-CED.A.1, A1: A-SSE.B.3, A1: F-IF.B, A1: F-IF.C.7, limited to linear functions and quadratic functions. A1: F-BF.A.1a is the primary content; other listed content elements may be involved in tasks as well.
LEAP.III.A1.3	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.A1.4	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.

APPENDIX B

Answer Key/Rubrics for Sample Items

Item Type	Key	Alignment
4-point Type I Task: Fill-in-the-Blank, Multiple-Choice, Technology-Enhanced Coordinate Plane Graphing	Part A: 22 Part B: D Part C:  Part D: D	LEAP.I.A1.6
2-point Type I Task: Multiple-Select	Part A: B, E, F Part B: E, G	A1: F-IF.B.4
1-point Type I Task: Technology-Enhanced Drop-Down Menu	irrational because the sum cannot be expressed as a single fraction or. s rational because the quotient is equal to an integer	LEAP.I.A1.7

Item Type	Key	Alignment
1-point Type I Task: Technology-Enhanced Drag-and-Drop	$f(x) = \boxed{\frac{3}{4}}\,x + \boxed{-\frac{29}{4}}$	A1: F-LE.A.2
1-point Type I Task: Technology-Enhanced Short Equation Input	$\sqrt{\frac{A-25}{16}}$	A1: A-CED.A.4
4-point Type II Task: Constructed-Response	Part A: see rubric Part B: see rubric	LEAP.II.A1.9
3-point Type III Task: Constructed-Response	see rubric	LEAP.III.A1.3

Type II Constructed-Response Rubric

PART A	
Score	**Description**

2	Student Response includes the following 2 elements.
	• **Reasoning component =** 1 point
	  o Algebraic or written explanation for solving the equation
	• **Computation component =** 1 point
	  o Solution of $x = 2$ or -14
	
	Sample Student Response:
	$x^2 + 12x - 28 = 0$
	$x^2 + 12x = 28$
	$x^2 + 12x + 36 = 28 + 36$
	$(x + 6)^2 = 64$
	$x + 6 = \pm 8$
	$x = 8 - 6 = 2$ or $x = -8 - 6 = -14$

1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.
PART B	
Score	**Description**

2	Student response includes the following 2 elements.
	• **Reasoning component =** 1 point
	  o Valid explanation
	• **Computation component =** 1 point
	  o Solution of $c = 36$
	
	Sample Student Response:
	
	There would be only one solution if the factors of the polynomial are the same. If the factors are the same, then the identity $(x + a)^2 = x^2 + 2ax + a^2$ can be used. The middle term is 12, co c would have to be the square of half of that number. Therefore $c = 36$.

1	Student response includes 1 of the 2 elements.
0	Student response is incorrect or irrelevant.

Type III Constructed-Response Rubric

Score	Description

3	Student Response includes the following 3 elements.
	• **Modeling component =** 2 points
	  o Correct equation, $w \approx 16 - 0.19h$
	  o Accurate use of notation and vocabulary to support correct calculations and mathematical reasoning, identifying variables as needed
	• **Computation component =** 1 point
	  o Correct application of the model to make an accurate prediction
	
	Sample Student Response:
	
	If the burn rate is believed to be constant, determine the average burn rate for the eight candles as the ratio of weight loss per hour.
	
	ounces lost over three hours $\frac{0.5+0.6+0.5+0.7+0.7+0.5+0.5+0.6}{8} \approx 0.575$
	
	ounces lost per hour on average $\frac{0.575}{3} \approx 0.19$
	
	For 0 hours, the weight of each candle is 16 ounces. Therefore, $w \approx 16 - 0.19h$.
	This model can be used to predict the weight of the candle when *h*, the number of hours of burning, is 5.
	$w \approx 16 - 0.19(5)$
	$w \approx 16 - 0.95$
	$w \approx 15.05$
	
	According to the model, the weight of the candle after 5 hours of burning would be about 15.05 ounces.

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.