LOUISIANA DEPARTMENT OF EDUCATION

Office of Assessments, Accountability, and Analytics

LEAP Assessment Guide for Grade 4 Mathematics

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Purpose

This document is designed to assist Louisiana educators in understanding the LEAP Grade 4 Mathematics 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 Mathematical Reasoning & Modeling reporting category.

- **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 grade 4 are labeled as "LEAP.I.4.#" for Type I tasks, "LEAP.II.4.#" for Type II tasks, and "LEAP.III.4.#" 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 below will appear on the test.

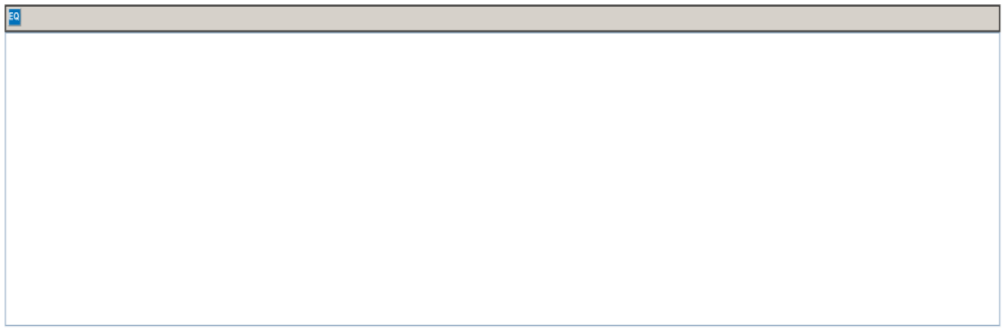
- Multiple-Choice (MC) – This item type asks students to choose one correct answer and may appear as a one-part question, as part of a two-part question, or as a part of a CR item. The MC items are worth one point.

- 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 the number of correct answers required. The MS items are worth one point. Students must choose **all correct answers and no incorrect** answer must be chosen to receive credit.

- 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 equivalent to the correct numerical answer. Answers to SA items must be entered as whole numbers or in decimal form.

- Technology-Enhanced (TE) – This item type appears only on the CBT and uses technology to capture student responses. TE items 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. The Online Tools Training (OTT) allows students to practice answering the TE questions to prepare for the CBT. 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 a single- or multi-part item. 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 and maximum point values will vary by CR task. Maximum values for CR items are 3, 4, or 6 points. When responding to a computer-based CR item, students will type their responses into a response box, like the one shown below.



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 into 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

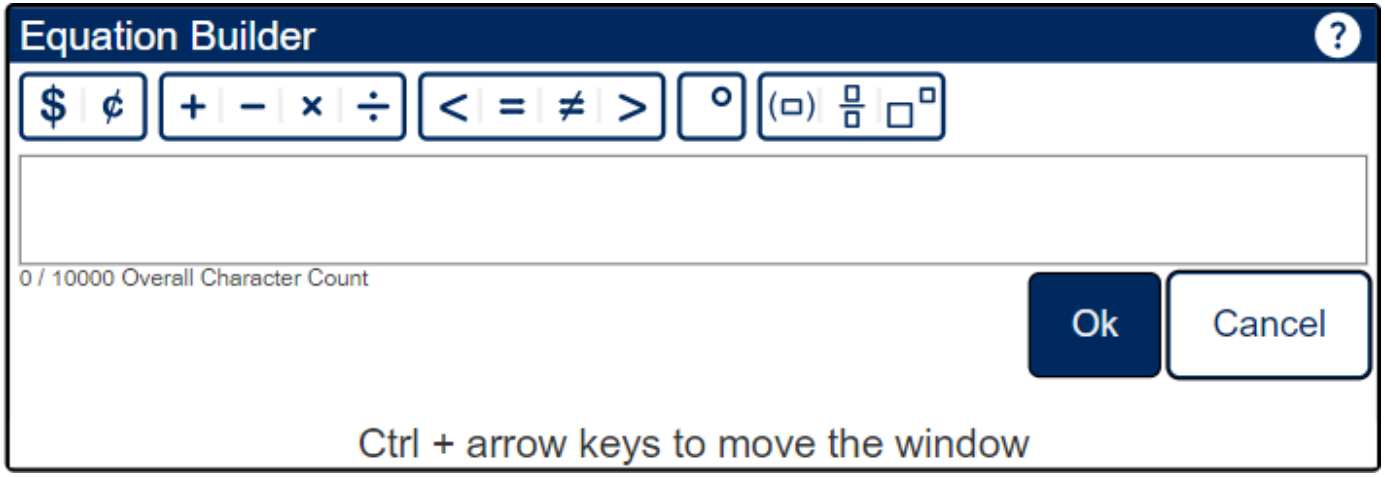
Students are not required to use the equation builder for any symbols that are also available on the keyboard.

For example, students may use a slash, forward / or back \, to represent a fraction, a carat ^ to represent exponents, or a dash – to represent subtraction. The degree ° and cents ¢ symbols are not available on the keyboard, but students may type the words “degrees” and “cents” as necessary.

The Equation Builder does not include all symbols/characters students might need to type into the open response box. Students should know how to type a question mark ? and a colon : using the keyboard.

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.



Test Design

The LEAP mathematics assessment in grade 4 contains a total of 37 tasks for 52 points. The table below shows the breakdown of the number of tasks and point values by Reporting Category and Session. The LEAP mathematics test is **timed**. No additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP).

Reporting Category	Session 1		Session 2		Session 3		Total	
	Tasks	Points	Tasks	Points	Tasks	Points	Tasks	Points
A - Major Content	8-9	9	7-9	9	9	9	24-27	27
B - Additional & Supporting Content	3-4	4	2-3	3	2	2	7-9	9
C - Mathematical Reasoning & Modeling	1	4	1	6	2	6	4	16
Total Operational	13	17	11	18	13	17	37	52
Total Field-Test	1-2	N/A	1	N/A	1-2	N/A	3-5	N/A
Session Time	65 minutes		65 minutes		65 minutes		195 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	30	30	36	58%	70%
	2-point	3	6		11.5%	
Type II	3-point	1	3	7	6%	13%
	4-point	1	4		7%	
Type III	3-point	1	3	9	6%	17%
	6-point	1	6		11.5%	
Total		37	52		100%	

Reporting Categories

Each of the three task types is aligned to one of three reporting categories: Major Content, Additional & Supporting Content, or Mathematical Reasoning & Modeling. 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 grade 4 **B - Additional & Supporting Content:** solve problems involving the additional and supporting content for grade 4	may align with any or all practices
Type II	written argument/justification, critique of reasoning/precision in mathematical statements	**C - Mathematical Reasoning & Modeling:** express mathematical reasoning by constructing mathematical arguments and critiques; solve real-world problems engaging particularly in the modeling practice	primarily MP.3, MP.4, and MP.6, but may also involve any of the other practices
Type III	modeling or application in a real-world context		

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

Subcategory	LSSM and LEAP Mathematics Evidence Statements	Description
Compare and Solve Problems with Fractions	4.NF.A.1, 4.NF.A.2, 4.NF.B.3, 4.NF.B.4, LEAP.I.4.1, LEAP.I.4.6	Students understand the concept of a fraction, recognize and generate equivalent fractions, and compare fractions. Students understand and solve mathematical and word problems involving addition, subtraction, and multiplication of fractions.
Solve Multi-Step Problems	4.OA.A.3, 4.NBT.B.5, 4.NBT.B.6, LEAP.I.4.2, LEAP.I.4.3, LEAP.I.4.4, LEAP.I.4.5	Students solve multi-step word problems using the four operations with multi-digit whole numbers, including interpreting remainders.
Multiplicative Comparison and Place Value	4.OA.A.1, 4.OA.A.2, 4.NBT.A.1, 4.NBT.A.2, 4.NBT.A.3	Students recognize, interpret, and represent comparisons using multiplications equations and statements of comparison. Students read, write, compare, and round multi-digit whole numbers.

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 testing window opens April 1, 2027, and runs through May 12, 2027 for all computer-based tests. The school or district test coordinator will communicate each school's testing schedule. For updates to the testing schedule, refer to the 2026-2027 Louisiana Assessment Calendar. All LEAP assessments are **timed**. No additional time is permitted, except for students who have a documented extended time accommodation (e.g., an IEP).

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

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 shown summarizes the tools and resources for the grade 4 mathematics assessment.

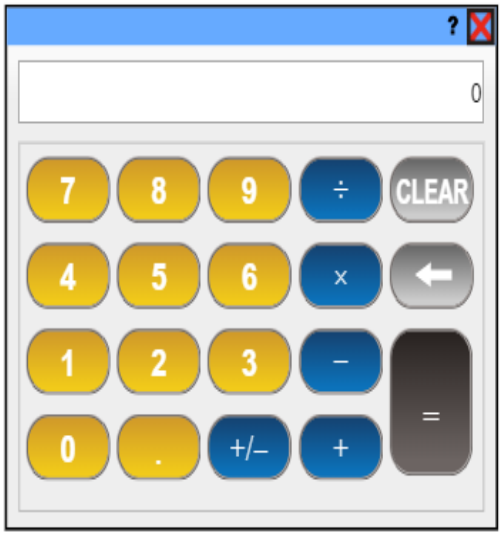
Tools	Provided	Guidelines
scratch paper (lined, graph, unlined), two pencils	by Test Administrator	• All tools available for all sessions • Tools provided by Test Administrator must not be written on
$\frac{1}{8}$—inch ruler, centimeter ruler, and protractor	online	

Calculator Policy

Students are **not** allowed to use calculators during the administration of any mathematics test in grades three through five.

For students with the approved accommodation for calculator use, a four-function calculator must be provided for all sessions.

- Square root, percent, memory, and +/- keys are also allowed, but not required.
- An online calculator (shown) will be available for all sessions, but a hand-held calculator is allowed.
- 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 IAP.
- 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.



- The student should use the calculator they have used regularly 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 detailed above.
- 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.

Reference Sheet

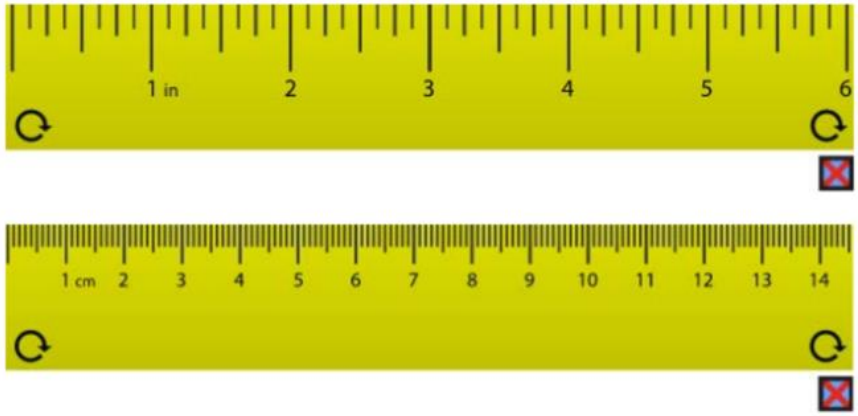
Students in grade 4 will not have a reference sheet because the LSSM for this grade does not require one.

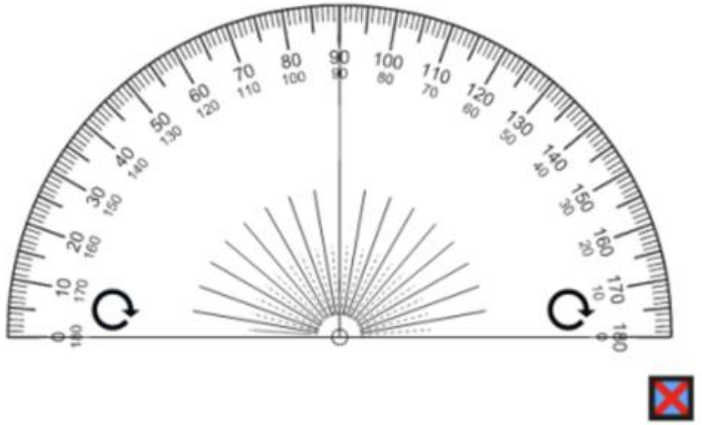
Requisite Knowledge

Students in grade 4 will be required to know relative sizes of measurement units within one system of units. Therefore, the requisite knowledge listed is necessary in grade 4 and will **not** be provided in a reference sheet.

- 1 meter = 100 centimeters
- 1 kilometer = 1000 meters
- 1 kilogram = 1000 grams
- 1 liter = 1000 milliliters
- 1 foot = 12 inches
- 1 pound = 16 ounces
- 1 minute = 60 seconds
- 1 hour = 60 minutes
- Area and Perimeter formula for rectangles

Measurement Tools





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, use a ruler and protractor, apply a mask to cover a part of their screen, 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

- Measurement Tools

- Masking

- 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 and one Type III task as they would appear on a CBT form. The answer keys for each Type I task and scoring rubric for the Type III task are located in Appendix B. Look for some of these tasks in the OTT.

Multiple-Choice/Multiple-Select Type I Task

Part A

A plant grew $\frac{3}{10}$ meter in April and $\frac{27}{100}$ meter in May.

Which expression can be used to find the total amount the plant grew during the two months?

(a) $\frac{3}{10} + \frac{27}{10}$

(b) $\frac{30}{10} + \frac{27}{10}$

(c) $\frac{3}{100} + \frac{27}{100}$

(d) $\frac{30}{100} + \frac{27}{100}$

Part B

A plant grew $\frac{3}{10}$ meter in April and $\frac{27}{100}$ meter in May.

In June, the plant grew another $\frac{13}{100}$ meter.

What is the total fraction of a meter the plant grew during the three months?

Select the **two** correct answers.

(a) $\frac{7}{10}$

(b) $\frac{40}{10}$

(c) $\frac{70}{10}$

(d) $\frac{4}{100}$

(e) $\frac{40}{100}$

(f) $\frac{70}{100}$

Short Answer Task

An airplane flew 1,155 miles on its first trip and 1,695 miles on its second trip.

What is the total number of miles the airplane flew on these two trips?

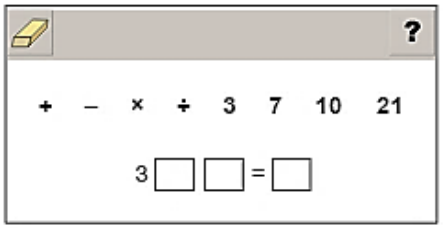
Enter your answer in the box.

TEI: Drag-and-Drop Task

Mike is 3 years old. His Uncle Joe is 7 times as old as Mike.

Use the numbers and symbols to find Uncle Joe's age.

Drag and drop the numbers and symbols into each correct box.



TEI: Match Interaction / Dropdown Menu Type I Task

Part A

The table shows the lengths of five different animals in a zoo.
For each animal, select a place in the table to show whether it is less than or greater than $\frac{5}{10}$ meter in length.

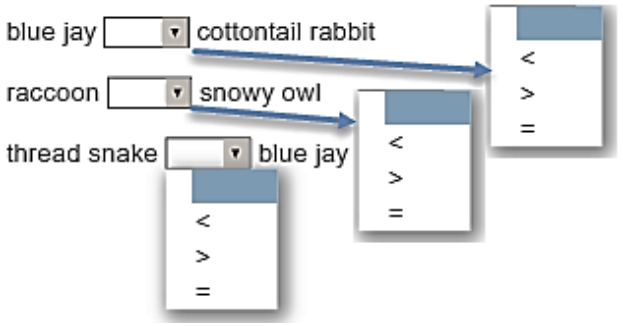
Select one cell per row.

	Less than $\frac{5}{10}$ meter	Greater than $\frac{5}{10}$ meter
Blue jay length (in meters) $\frac{25}{100}$	☐	☐
Cottontail rabbit length (in meters) $\frac{4}{10}$	☐	☐
Raccoon length (in meters) $\frac{8}{10}$	☐	☐
Snowy owl length (in meters) $\frac{67}{100}$	☐	☐
Thread snake length (in meters) $\frac{11}{100}$	☐	☐

Part B

Use the lengths in the table to compare the lengths of the animals.

Select from the drop-down menus to correctly complete each comparison.



Type III Constructed-Response Task

The table shows the number of yards Ed ran in each of the first three football games of the season.

Ed's Running Yards

Game	Yards
1	157
2	309
3	172

After the first three games of the season, Rico had exactly 3 times the total number of running yards that Ed had.

How many **more** total running yards did Rico have than Ed after the first three games of the season? Show your work using equations.

Enter your answer and your work or explanation in the box provided.

EQ

Resources

Assessment Guidance Webpage

- LEAP Equation Builder for Grades 3-5: provides teachers with information on using the equation builder; Spanish
- LEAP Grades 5-HS Mathematics Reference Sheets: includes all the mathematics references sheets provided for LEAP testing
- Assessment Development Educator Review Committees: describes the item development process and associated committees, includes information on applying for participation

Practice Test Webpage

- LEAP Grade 4 Mathematics CBT Practice Test and Answer Key: includes answer keys, scoring rubrics, and alignment information; Spanish
- 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

DRC INSIGHT Portal (eDIRECT):

- Includes access to tutorials, manuals, and user guides

INSIGHT ^{TM}

- 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 Grade 4 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
- Grade 4 Mathematics - 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
- Grade 4 Learning Acceleration Guidance: identifies remedial standards, 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 Newsletters

Appendix A

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

LSSM Content Standards	
4.OA.A	Use the four operations with whole numbers to solve problems.
4.OA.A.1	Interpret a multiplication equation as a comparison and represent verbal statements of multiplicative comparisons as multiplication equations, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7, and 7 times as many as 5.
4.OA.A.2	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and/or equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison (Example: 6 times as many vs. 6 more than)[1]
4.OA.A.3	Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *Example: Twenty-five people are going to the movies. Four people fit in each car. How many cars are needed to get all 25 people to the theater at the same time?*
4.NBT.A	Generalize place value understanding for multi-digit whole numbers.
4.NBT.A.1	Recognize that in a multi-digit whole number less than or equal to 1,000,000, a digit in one place represents ten times what it represents in the place to its right. *For example, (1) recognize that 700 ÷ 70 = 10; (2) in the number 7,246, the 2 represents 200, but in the number 7,426 the 2 represents 20, recognizing that 200 is ten times as large as 20, by applying concepts of place value and division*.
4.NBT.A.2	Read and write multi-digit whole numbers less than or equal to 1,000,000 using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
4.NBT.A.3	Use place value understanding to round multi-digit whole numbers, less than or equal to 1,000,000, to any place.
4.NBT.B	Use place value understanding and properties of operations to perform multi-digit arithmetic.
4.NBT.B.4	Fluently add and subtract multi-digit whole numbers with sums less than or equal to 1,000,000, using the standard algorithm.
4.NBT.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

[1] See LSSM Table 2, p. 61.

4.NBT.B.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NF.A	Extend understanding of fraction equivalence and ordering.
4.NF.A.1	Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.A.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)
4.NF.B	Build fractions from unit fractions.
4.NF.B.3	Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. *Example: 3/4 = 1/4 + 1/4 + 1/4.* b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
4.NF.B.4	Multiply a fraction by a whole number. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.) a. Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

4.NF.C	Understand decimal notation for fractions, and compare decimal fractions.
4.NF.C.5	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
4.NF.C.6	Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram; represent 62/100 of a dollar as $0.62.*
4.NF.C.7	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

LEAP Evidence Statements	
LEAP.I.4.1	Apply conceptual understanding of fraction equivalence and ordering to solve simple word problems requiring fraction comparison. Content Scope: Knowledge and skills articulated in ● 4.NF.A – Tasks have "thin context." Tasks do not require adding, subtracting, multiplying, or dividing fractions. Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy. Fractions equal to whole numbers are limited to 0 – 5.
LEAP.I.4.2	Solve one-step word problems involving multiplying two two-digit numbers. Content Scope: Knowledge and skills articulated in ● 4.NBT.B.5, 4.OA.A – The given numbers are such as to require a general strategy based on place value and the properties of operations (e.g., 63 × 44). Word problems shall include a variety of grade-level appropriate applications and contexts.
LEAP.I.4.3	Solve one-step word problems involving multiplying a four-digit number by a one-digit number. Content Scope: Knowledge and skills articulated in ● 4.NBT.B.5, 4.OA.A – The given numbers are such as to require a general strategy based on place value and the properties of operations (e.g., 2392 × 8). Word problems shall include a variety of grade-level appropriate applications and contexts.
LEAP.I.4.4	Solve one-step word problems involving dividing a four-digit number by a one-digit number. Content Scope: Knowledge and skills articulated in ● 4.NBT.B.6, 4.OA.A – The given numbers are such as to require a general strategy based on place value and the properties of operations (e.g., 2328 ÷ 8). Quotients are whole numbers. Word problems shall include a variety of grade-level appropriate applications and contexts.

[2] Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.

LEAP.I.4.5	Solve multi-step[3] word problems posed with whole numbers and involving computations best performed by applying conceptual understanding of place value, perhaps involving rounding. Content Scope: Knowledge and skills articulated in • 4.OA.A.3, 4.NBT – Tasks must be aligned to 4.OA.A.3 and 1 or more of the subsequent standards listed in the content scope.
LEAP.I.4.6	Solve real-world and mathematical problems about perimeter involving grade-level addition and subtraction of fractions, such as finding an unknown side of a rectangle. Content Scope: Knowledge and skills articulated in • 4.NF.B.3, 4.MD.A.3 – Tasks must be aligned to both standards listed in the content scope.
LEAP.I.4.7	Solve one-step word problems involving adding or subtracting two four-digit numbers. Content Scope: Knowledge and skills articulated in • 4.NBT.B.4, 4.OA.A – The given numbers are such as to require an efficient/standard algorithm (e.g., 7263 + 4875, 7263 – 4875, 7406 – 4637) and do not suggest any obvious ad hoc or mental strategy (e.g., 6,999 + 3,501 or 7300 – 6301). Word problems shall include a variety of grade-level appropriate applications and contexts.
LEAP.I.4.8	Solve addition and subtraction word problems involving three four-digit addends, or two four-digit addends and a four-digit subtrahend. Content Scope: Knowledge and skills articulated in • 4.NBT.B.4, 4.OA.A – The given numbers are such as to require an efficient/standard algorithm (e.g., 7263 + 4875 + 6901) and do not suggest any obvious ad hoc or mental strategy (e.g., 6,999 + 3,501 - 5,000).

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

LSSM Content Standards	
☐ 4.OA.B	☐ Gain familiarity with factors and multiples.
4.OA.B.4	Using whole numbers in the range 1–100, a. Find all factor pairs for a whole number in the range 1-100. b. Recognize that a whole number is a multiple of each of its factors. c. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. d. Determine whether a given whole number in the range 1-100 is prime or composite.

[3] Multi-step must have at least 3 steps.

4.OA.C	Generate and analyze patterns.
4.OA.C.5	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*
4.MD.A	Solve problems involving measurement and conversion of measurements.
4.MD.A.1	Know relative sizes of measurement units within one system of units including ft, in; km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (Conversions are limited to one-step conversions.) *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*
4.MD.A.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving whole numbers and/or simple fractions (addition and subtraction of fractions with like denominators and multiplying a fraction times a fraction[4] or a whole number), and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*
4.MD.B	Represent and interpret data.
4.MD.B.4	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*
4.MD.C	Geometric measurement: understand concepts of angle and measure angles.
4.MD.C.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where two rays intersect the circle. b. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. c. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
4.MD.C.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

[4] Students in Grade 4 will be assessed on multiplying a fraction and a whole number as indicated in the NF domain. Some students may be able to multiply a fraction by a fraction as a result of generating equivalent fractions; however, mastery of multiplying two fractions occurs in Grade 5.

4.MD.C.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a letter for the unknown angle measure.
4.MD.D	Relate area to operations of multiplication and addition.
4.MD.D.8	Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems.
4.G.A	Draw and identify lines and angles, and classify shapes by properties of their lines and angles.
4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Assessable Content for Mathematical Reasoning & Modeling Reporting Category (Type II, Type III)

LEAP Evidence Statements – Type II	
LEAP.II.4.1	Base explanations/reasoning on the properties of operations. Content Scope: Knowledge and skills articulated in ● 4.NBT.B.5 - Students need not use formal property names. Tasks do not have a context. Unneeded parentheses should not be used.[5] ● 4.NBT.B.6 - Students need not use formal property names. Tasks do not have a context. Unneeded parentheses should not be used.[5]
LEAP.II.4.2	Base explanations/reasoning on the relationship between multiplication and division. Content Scope: Knowledge and skills articulated in ● 4.NBT.B.6 – Tasks do not have a context.
LEAP.II.4.3	Reason about the place value system itself. Content Scope: Knowledge and skills articulated in ● 4.NBT.A – Tasks have "thin context"[6] or no context.

[5] For example, use 4 + 3 × 2 rather than 4 + (3 × 2).

[6] "Thin context" is a sentence or phrase that establishes a concrete referent for the quantity/quantities in the problem, in such a way as to provide meaningful avenues for mathematical intuition to operate, yet without requiring any sort of further analysis of the context. For example, a task could provide a reason for being given a set of fractional measurements such as, "The fractions represent lengths of ribbon."

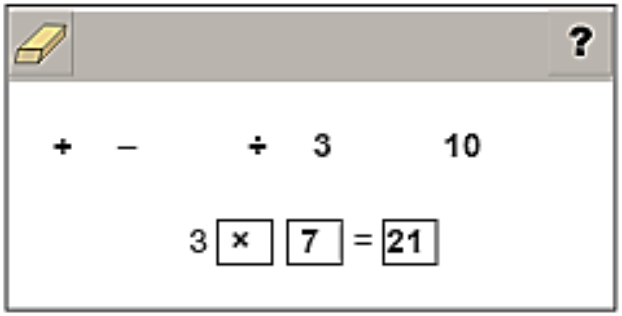
LEAP.II.4.4	Base arithmetic explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in ● 4.NF.A - Tasks have "thin context"[7] or no context. ● 4.NF.B.3a, 4.NF.B.3b - Tasks have "thin context" [6] or no context. Fractions equal to whole numbers are limited to 0 – 5. ● 4.NF.B.4a - Tasks have "thin context"[7] or no context. Fractions equal to whole numbers are limited to 0 – 5. ● 4.NF.B.4b - Tasks have "thin context"[7] or no context. ● 4.NF.C - Tasks have "thin context"[6] or no context.
LEAP.II.4.5	Distinguish correct explanation/reasoning from that which is flawed, and – if there is a flaw in the argument – present corrected reasoning. (For example, some flawed 'student' reasoning is presented and the task is to correct and improve it.) Content Scope: Knowledge and skills articulated in ● 4.OA.A.3 – Reasoning in these tasks centers on interpretation of remainders. ● 4.NF.A.1 - Tasks have "thin context"[6] or no context. Fractions equal to whole numbers are limited to 0 – 5. ● 4.NF.A.2 - Tasks have "thin context"[6] or no context. Fractions equal to whole numbers are limited to 0 – 5. ● 4.NF.B - Results may equal fractions greater than 1 (including fractions equal to whole numbers limited to 0 – 5). ● 4.NF.C - Tasks have "thin context"[6] or no context. ● 3.OA.B, 3.NF, 3.MD.C – Tasks may have scaffolding.[7]
LEAP.II.4.6	Present solutions to multi-step[3] 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 two-step problems and present corrected solutions. Content Scope: Knowledge and skills articulated in ● 4.OA.A.3 - Tasks may involve interpreting remainders. ● 4.NF.B.3c - Tasks have "thin context"[6] or no context. Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) so as to keep computational difficulty lower. ● 4.NF.B.3d, 4.NF.B.4c - Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) so as to keep computational difficulty lower.
LEAP.II.4.7	Base explanations/reasoning on a number line diagram (whether provided in the prompt or constructed by the student in her response). Content Scope: Knowledge and skills articulated in ● 4.NF.A.1 - Fractions equal to whole numbers are limited to 0 – 5. ● 4.NF.A.2 - Fractions equal to whole numbers are limited to 0 – 5. ● 4.NF.B.3a ● 4.NF.B.4a, 4.NF.B.4b

[7] Scaffolding in a task provides the student with an entry point into a pathway for solving a problem. In unscaffolded tasks, the student determines his/her own pathway and process.

LEAP Evidence Statements – Type III	
LEAP.III.4.1	Solve multi-step[3] contextual word problems with degree of difficulty appropriate to Grade 4, requiring application of knowledge and skills articulated by the LSSM section of the Major Content Assessable Content table. Tasks may have scaffolding.[7]
LEAP.III.4.2	Solve multi-step[3] contextual problems with degree of difficulty appropriate to Grade 4, requiring application of knowledge and skills articulated in 3.OA.A, 3.OA.D.8, 3.NBT, and/or 3.MD. Tasks may have scaffolding.[7] Tasks do not require a student to write a single equation with a letter standing for the unknown quantity in a two-step problem, and then solve that equation. Tasks may require students to write an equation as part of their work to find a solution, but students are not required to use a letter for the unknown. Addition, subtraction, multiplication and division situations in these problems may involve any of the basic situation types with unknowns in various positions (see LSSM, Table 1, Common Addition and Subtraction Situations, p.60; LSSM, Table 2, Common Multiplication and Division Situations, p. 61; and K–5 Progression on Counting and Cardinality and Operations and Algebraic Thinking).

Appendix B

Answer Key/Rubrics for Sample Items

PBT/CBT	Item Type	Key	Alignment
PBT/CBT	Multiple-Choice/Multiple-Select Type I	Part A: D Part B: A, F	4.NF.C.5
PBT/CBT	Short Answer	2850	LEAP.I.4.7
PBT	Type II Constructed-Response	See Rubric	LEAP.II.4.5
CBT	TEI: Drag-and-Drop		4.OA.A.1
CBT	TEI: Match Interaction / Dropdown Menu Type I	Part A:	LEAP.I.4.1

PBT/CBT	Item Type	Key	Alignment
		 Part B: blue jay < cottontail rabbit raccoon > snowy owl thread snake < blue jay	
CBT	Type III Constructed-Response	See Rubric	LEAP.III.4.1

Type II Constructed-Response Rubric

PART A	
Score	**Description**
1	Reasoning component: The student explains the error made. Sample Student Response: Jian rounded the quotient up, but that won't work because the remainder of 3 means there are only 3 ounces of honey left, and that isn't enough to fill the last jar. Note: A variety of explanations are possible, as long as the explanation shows a clear understanding of the error made.
0	Student response is incorrect or irrelevant.
PART B	
Score	**Description**
2	Computation component: 551 (6-ounce) jars and $4,408 Reasoning component: The student explains the steps needed to solve the problem, including correctly interpreting the remainder. Sample Student Response: Divide 3,311 by 6 and get a quotient of 551, with a remainder of 5. This means they could completely fill 551 jars, but the leftover honey wouldn't be enough to fill another jar. I multiplied 551 × $8 and got $4,408.
1	Student response includes 1 of the 2 elements. If a computation mistake is made, credit cannot be given for the computation component, but points can be given for valid reasoning.
0	Student response is incorrect or irrelevant

Type III Constructed-Response Rubric

Score	Description
3	Computation component: Rico had 1276 more yards than Ed after the first three games. Modeling components: Student shows work or explains how to determine the number of yards that Ed had and Rico had after the 3 games and how many more yards Rico had than Ed. Sample Student Response: I found that Ed had 638 yards by adding 157 + 308 + 172. Rico had 3 times the number of yards as Ed, so 638 × 3 = 1914. To find how many more yards Rico had than Ed, I subtracted 638 from 1914 and got 1276. Note: A variety of explanations are valid as long as the student uses a mathematically correct approach to solving the problem.
2	Student response includes 2 of the 3 elements. If a computation mistake is made, credit cannot be given for the computation component, but points can be given for modeling.
1	Student response includes 1 of the 3 elements.
0	Student response is incorrect or irrelevant